

# DELIVERABLE

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## D8.2 Design – First Report

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## EXECUTIVE SUMMARY

This deliverable is considered to be the report on the activities related to the preparation and procedure of the design phase #1. This first phase of the suppliers' work started with the design, the definition, and the specification of the functional and the technical part of their preparatory work according to the call for tender, the submissions (description of work) of the six winning supplier teams and consortia, and the following negotiation phase between the PREFORMA consortium and each supplier. The document will thus include a description and the basic statements related to all phases of WP5 (Design phase 1) including references and methodologies for:

- Short summary of the negotiation phase procedure.
- Suppliers' functional and technical specification work.
- Basic statements of the end of phase one report.
- PREFORMA first lessons learned from the design phase.
- Procedure of the evaluation of the suppliers' documentation.
- Preparation of the decision making process and underlying procedures.
- Decisions made by PREFORMA consortium.

The previous task 8.1 laid the foundation for evaluation strategy for comparing the results of the suppliers, at the end of the design phase. The evaluation framework has been defined in D8.1, based on contributions of the technical partners as well as of the memory institutions. The strategy negotiated and established in T8.1, and consequently described in D8.1 was used as an input for evaluating the suppliers' results at the end of the Design phase 1 to select the (number of) suppliers who will continue the execution of the tender.

This document is thus intended to include all useful information for the internal and external work process as well as to give an idea on how PCP does work and how the evaluation in PREFORMA will be performed.

After a brief introduction to the general approach and methodology (Chapter 1), the first part (Chapters 2, 3) summarises the outcomes of the evaluation of the 16 proposals received last year (2014) and of the negotiation process, until the formal decision to award a contract to the 6 suppliers who worked in the design phase.

The second part (Chapter 4, 5) builds on the results of the work with the suppliers as well as the work of the suppliers themselves. It is based on the submitted results of the six supplier consortia, and indicates the results that they have achieved.

The third part (Chapters 6, 7) addresses the way (methods, measures, principles) the PREFORMA consortium members and the external reviewers did the formal review, the evaluation, and the preparatory work for decision making on the specification work with a particular focus on the evaluation final stage resulting in decisions on which suppliers to invite for the bid to eventually participate in the prototype phase.

The last part (Chapters 8, 9) is dedicated to the preparation and the decision on which of the suppliers to invite for submitting the bid for the prototype phase.



# **1 GENERAL APPROACH AND METHODOLOGY**

The document describes general norms and methodologies for the evaluation and review process of the design phase 1 lasting from M11 (November 2014) to M14 (February 2015). The task T81 and its results, laid down in D8.1, provided the task 8.2 and thus also this document D8.2 with methods, methodologies, and procedure suggestions for the evaluation of the work performed by the six suppliers. The following sections 1.1 and 1.2 are to be seen as informal citations from D8.1 in order to provide the readers of D8.2 with the basis for understanding the chosen procedures, the underlying processes, the applied forms, the templates used to ask the suppliers for presenting their results, and the set of evaluation strategies as well as the decision making process at the end of design phase 1.

## **1.1 D8.1 OVERALL EVALUATION PROCEDURE SUMMARY**

The aim of document D8.1 has been to develop a painstaking method to evaluate and compare different suppliers. In particular, the developed method shall be effectively employed in the evaluation and comparison of PREFORMA suppliers. The proposed competitive evaluation strategy will be used for the assessment of the suppliers at the end of the design phase 1 in order to choose those who will continue with the prototyping and testing phases.

The proposed method is a general evaluation framework, which is applied to the evaluation and comparison of suppliers as a relevant use case. This means that the proposed method can be successfully employed in other projects, in addition to the PREFORMA project. PREFORMA will provide a report explaining the respective lessons learned.

Evaluating and comparing suppliers requires the PREFORMA members as well as the external reviewers to identify two distinct processes: evaluation process: during this process each supplier is individually examined and it is scored according to its characteristics. The evaluation process is formalized through the evaluation matrix, as described in D8.1 section 2.1.

The outcome of the evaluation process is the supplier score that is a number representing the scoring achieved by the supplier; comparison process: once the suppliers have been scored, they are compared with each other on the basis of their supplier's score. The comparison process is formalized through the comparison matrix, as described in D8.1 section 2.2. The outcome of the comparison process is a ranking of the suppliers, based on their scorings.

## **1.2 EVALUATION PROCESS**

The evaluation process described in D8.1 aims to grasp and model the principal aspects of the complex reality of interest. The following is the item sub-score grading system, which ranges from 1 to 5 meaning 1 – Bad and 5 – Excellent. Note that these values are consistent, for example, with the evaluation scale defined in Recommendation P.800 by Telecommunication Standardization Sector of ITU (ITU-T). The motivation of this choice is to render the evaluation matrix as close as possible to international standardized evaluation methods, since the evaluation matrix should provide unbiased results taking into consideration different suppliers.



As explained in the previous paragraphs, designing the evaluation matrix involves the steps (1) defining reviewer types, (2) defining categories, their respective weights and the weights of reviewer types within each category, and (3) defining items and their respective weights.

Three reviewer types will be considered which correspond to the three main stakeholders involved in the PREFORMA project. They are (1) the technical experts who analyze the proposed solution by evaluating the solution from the technical point-of-view, (2) the domain experts who analyze the proposed solution by verifying the solution regarding whether it fits the requirement of the domain where it shall / will be used, and (3) the external experts who finally analyze the proposed solution, external to the members of the PREFORMA consortium, to compensate for any possible biases in the respective domain.

In particular, each supplier solution will be reviewed by reviewers for each reviewer type. From the technical viewpoint, it will be two reviewers for each proposal. From the domain view, three reviewers are assigned to each proposal, and there will be one external reviewer for each proposal. In total this means that each proposal will have six review matrix results at the end of the review period so that a comprehensive and legally valid / approved analysis and decision making process can be guaranteed.

## **1.3 DESIGN PHASE 1 FORMAL PROCEDURES**

In order to prepare both the selected suppliers and the PREFORMA consortium members (technical partners and memory institutions), various measures have been installed (1) to get all relevant information forwarded to the suppliers and the consortium members alike, (2) to organize virtual meetings between the consortium and the suppliers, (3) to organize the review process according to the delivery dates and the required documentation, and (4) provide the suppliers a basis for presenting their results to the consortium.

In the following, short description will be provided on the procedures for the four aspects along with a few results achieved.

### **1.3.1 Information Procedures**

For keeping the consortium updated, a mailing list has been implemented right at the beginning of the PREFORMA project. This mailing list allowed all partners to send all relevant information to all partners at the same time. As PREFORMA figured out that this was a well-acknowledged way of spreading information, the project management implemented a mailing for all suppliers at once and a mailing list for all evaluators. Via these measures, the PREFORMA management has been able to distribute all necessary information timely and without preferring one or the other supplier. The PREFORMA management decided to provide relevant information / answers on suppliers' questions not only to the supplier who asked a particular question but to provide all suppliers and all PREFORMA consortium members with the answers.

### **1.3.2 Virtual Meetings**

As several of the suppliers had various questions especially in the beginning of the design phase 1, the PREFORMA consortium decided to install the procedure of a virtual meeting with



all suppliers and all PREFORMA consortium members invited to actively participate. The meetings (two per month) started in early November, immediately after the virtual kick-off meeting for the design phase 1, and ended right before the suppliers workshop in early March. All suppliers were encouraged to raise questions before the meeting so that the consortium members were able to prepare for a comprehensive answer. The procedure of establishing such virtual meetings allows the consortium, in addition, to answer all incoming questions to all suppliers so that none of them had an advantage in receiving information perhaps earlier than the others. The suppliers mainly used the virtual meetings to get in touch with the memory institutions being consortium members. Questions had relations to, e.g., training and test data, open source licenses, submission deadlines, and the opportunity to re-submit the functional specification at a later stage in conjunction with the technical specification. The minutes provided allowed those partners and suppliers who did not participate with a comprehensive overview of the discussion, and more importantly on the decisions taken.

### **1.3.3 Intermediate Review Process**

The PREFORMA consortium at a very early stage decided to ask the suppliers for a preliminary functional specification document by the end of M12 (December). The appointed evaluators and reviewers have thus been able to review the draft versions at a very early stage, and could provide first information on how to improve the functional specification, and what to additionally incorporate into the following technical specification. The reviewers did not want to significantly influence the work process of the suppliers so they only informed about obvious gaps and misunderstandings.

### **1.3.4 Suppliers' Workshop**

At the end of the design phase 1, all suppliers have been invited to get to Brussels for a workshop to present the results of their work. The March 6<sup>th</sup> event allowed all suppliers to prepare for a presentation and in best case also a demonstration of the results of the work achieved so far on the functional and technical specification. Only the submission of the end-of-phase-1 administrative report was due after the date of the workshop. The suppliers used the opportunity of the meeting with the PREFORMA consortium to appear with two to six representatives showing the competence and the ability to fulfill the requirements of the PREFORMA memory institutions and the technical members / partners alike.

The workshop was organized in a way that both in the morning and in the afternoon, one supplier for text, image, and AV were invited to present. Each supplier had 15 minutes to prepare for the presentation, and 40 minutes for the presentation as such. Another 20 minutes were allocated to a Q&A session with the first ten minutes for questions raised after each presentation (risk analysis, provision of training, test, and demonstration data). The remaining ten minutes of the suppliers' Q&A session were left open to the PREFORMA consortium members for addressing particular questions to the presenting supplier. So finally the structure of the workshop looked as follows:

0915 - 0930 Preparation of Presentation and Presenters (15)

0930 - 1010 Presentation Consortium #1 on PDF/A (40)



1010 - 1030 Q&A to Consortium #1 PDF/A (20)  
1030 - 1045 Change of Presentation and Presenters (15)  
1045 - 1125 Presentation Consortium #1 on TIFF (40)  
1125 - 1145 Q&A to Consortium #1 TIFF (20)  
1145 - 1200 Change of Presentation and Presenters (15)  
1200 - 1240 Presentation Consortium #1 on AV (40)  
1240 - 1300 Q&A to Consortium #1 AV (20)  
1300 - 1345 Lunch Break for PREFORMA Consortium (45)  
1330 - 1345 Change of Presentation and Presenters (15)  
1345 - 1425 Presentation Consortium #2 on PDF/A (40)  
1425 - 1445 Q&A to Consortium #2 PDF/A (20)  
1445 - 1500 Change of Presentation and Presenters (15)  
1500 - 1540 Presentation Consortium #2 on TIFF (40)  
1540 - 1600 Q&A to Consortium #2 TIFF (20)  
1600 - 1615 Change of Presentation and Presenters (15)  
1615 - 1655 Presentation Consortium #2 on AV (40)  
1655 - 1715 Q&A to Consortium #2 AV (20)  
1730 - 1800 PREFORMA Suppliers' Workshop Summary Meeting (30)

From a procedural viewpoint this meant that the two text (PDF/A) suppliers did not see each other because one opened up the presentations whereas the second one opened up the afternoon session. Same went for image and AV. The PREFORMA consortium by that way made sure that the two competing suppliers had no chance for getting informed about the respective other presentation.

### **1.3.5 Summary**

It turned out to be a positive decision to have the kick-off meeting bringing all six suppliers together independent of the media file type. The consortium and the suppliers got in touch with each other, and the process of keeping each other informed started right after the design phase 1 virtual kick-off. In the beginning, the suppliers aimed at raising their questions to only one of the PREFORMA members, and that did lead to information loss for the others. So the information list by means of a mailing list was established and successfully be implemented allowing suppliers and consortium members to be kept up-to-date. In order not to respond to the same questions several times, the set up the virtual meetings was chosen as a forum for questions from all, answers to all, and information to all. The exchange of information between the suppliers and the consortium members, regardless whether technical partners or memory institutions, allowed not only to provide the suppliers with latest information but allowed the project consortium to think about, and in certain cases also revise decisions.



## 2 ADDENDUM TO THE 2014 EVALUATION

The call for tender and the challenge brief did see in total 16 submissions for the three media file types. The PREFORMA consortium members had to come to a conclusion on which are the six suppliers to invite for the design phase 1. When kicking off the evaluation procedure, it was not at all clear whether or not among the first six suppliers PREFORMA would see two per media file type. The evaluation was done independent of the media file type.

### 2.1 EVALUATION PROCEDURE

The procedure to evaluate the 16 bids consisted of four different phases:

- **Phase 1. Individual evaluations.** Three independent experts evaluated separately each bid and provided an individual evaluation report. All Individual reports sent in by the reviewers can still be found in the PREFORMA repository, accessible from the reserved area of the PREFORMA website.
- **Phase 2. Consolidated reports.** A rapporteur has been nominated for each of the 16 proposal and to seek consensus among the three experts and to provide one single consolidated report for each proposal. The final version of the consolidated reports can be found in the PREFORMA repository, accessible from the reserved area of the PREFORMA website.
- **Phase 3. Requests for clarification.** A number of simple questions have been sent to the suppliers to clarify missing or unclear information deriving from the analysis of the proposals and from the outcome of the Consolidated Reports. Furthermore a clarification about the request to use the CC-BY v4 license for all the content and digital asset developed during the project have been sent to the suppliers to clarify an inconsistency which was found in the Tender documents. Further, an additional review of some IPR requirements was performed by the University of Skövde (in particular focusing on: Open source licensing; Use of open file formats (according to EIFv1); and Implementation of open file formats. All the requests for clarifications and the additional checks made by Skövde can be found in the PREFORMA repository, accessible from the reserved area of the PREFORMA website.
- **Phase 4. Hearings.** The 10 proposals which passed all the thresholds that were set in the Invitation to Tender – according to the scoring of the Consolidated Reports – have been invited for a hearing to provide additional information for omissions in the tender or in response of further questions from the evaluators. All the 10 hearing reports can be found in the PREFORMA repository, accessible from the reserved area of the PREFORMA website.

After the four phases described above have been completed, the PREFORMA Evaluation Committee met together at the **Consensus Meeting**, which was held on September 24<sup>th</sup> from 10:00 to 12:00 am in the PREFORMA Adobe Connect virtual room. The following two sections shortly report what has been agreed during this meeting, i.e. the final ranking of the proposals and the decisions taken.



## 2.2 FINAL RANKING

Here below is the final ranking agreed among all the members of the Evaluation Committee, after all the consolidated reports have been completed and additional information (i.e. answers to several of the clarifying questions sent so far and reports of the hearings) have been received. The table below shows the order of the ranking but not the respective scores. Those can be found in the internal section of the PREFORMA website and in Annex 3 (confidential).

Ranking	Bid	Media type(s)	Final score
1	<b>Vera consortium</b>	TEXT	
2	<b>Preservica</b>	TEXT; (AV)	
3	<b>EasyInnova - image</b>	IMAGE	
4	<b>MediaArea</b>	AV; TEXT	
5	<b>LIBIS - Aware</b>	IMAGE	
6	<b>UCL - IntoPix</b>	AV	
7	DIZI - IO	TEXT; IMAGE	
8	Monguz	TEXT; IMAGE; AV	
9	ArkivIT consortium	TEXT; IMAGE; AV	
10	Engineering	TEXT	

According to the budget available for the design phase 1, PREFORMA decided to proceed with the first six supplier teams.

## 2.3 DECISIONS

On the basis of the ranking presented in section 2.2, the following decisions have been taken by the PREFORMA Evaluation Committee.

1. The following bids have been invited for negotiations:

- Vera Consortium
- Preservica
- Easy Innova Image
- LIBIS – Aware



- MediaArea
- UCL - IntoPix

2. The bids that reached the thresholds but who are not invited now to negotiate could be invited at a later stage in case a negotiation does not arrive to contract, or a supplier does not deliver what it is expected, following the ranking described in section 2.2.



### **3 SUMMARY OF THE NEGOTIATION PHASE RESULTS**

The negotiation phase followed immediately the submission and evaluation process of the suppliers who provided a bid for the design phase 1. Several of the successfully bidding suppliers left a few questions open (e.g. requested budget appeared to be too high, clarification about the open source licenses adopted by PREFORMA, too many file / media types were addressed in one single bid, the suppliers failed to have a clear focus on one single media type, and they often focused on aspects / media types / file types that were not asked in the call for tender).

#### **3.1 NEGOTIATION PROCEDURE**

The final objective of the negotiation phase in general was signing the PREFORMA framework contract, which all suppliers had already at their disposal as part of the tender documents. The contract needed be signed between the respective supplier, the Contractor, and Riksarkivet (RA), the Contracting Authority, on behalf of the entire PREFORMA Consortium. The PREFORMA framework contract commits the contractor to managing and completing the PREFORMA project in accordance with the specification in the Invitation to Tender, the Challenge Brief, and the suppliers' proposal and to the allocation of sufficient resources to the PREFORMA Project to enable each supplier to comply with this obligation.

For achieving and assuring this, the WP2 leader established a bilateral negotiation process between the consortium and the promising suppliers, and undertook the attempt to sort out all aspects that remained unclear for a precise and consistent decision making process. The aim of the PCP PREFORMA project had clearly been communicated throughout the first nine months of the project. WP2 thus addressed this aim once again and prior to the start of the work of the suppliers (from November 1, 2014).

#### **3.2 FIRST RESULTS AFTER NEGOTIATION**

PREFORMA finished the negotiation meetings and the following phase of tuning and tailoring the bids according to the negotiation process with regard to all six suppliers that were considered to enter the design phase 1. The descriptions of work show the results after the negotiation process, and laid the foundation for starting the work on the functional and the technical specification of the requested software components.

A formal and virtual kick-off meeting performed on November 4, 2014, helped clarifying a few remaining questions, and both the PREFORMA consortium members and the teams of suppliers had the opportunity to raise aspects prior to the start. All participants agreed to follow the proposed procedures, to attend the bi-weekly virtual meetings, to provide questions prior to these meetings, to follow the deadlines of M12 (December 2014) and M14 (February 2015), and to prepare for the March 2015 suppliers' workshop to be held in Brussels.



## **4 FUNCTIONAL AND TECHNICAL SPECIFICATION WORK**

The first result of the work of the six suppliers' teams was due at the end of M12 (December 2014). They suppliers were asked to submit a document focusing on the functional specification of the planned and proposed work according to the challenge brief, the call for tender, and especially their own description of work, after the negotiation phase. In the following, PREFORMA will shortly describe the objectives of the functional specification, and summarizes in short the preliminary results achieved by the suppliers.

### **4.1 FUNCTIONAL SPECIFICATION**

The document containing functional specification elements was intended to describe the user requirements and functional specifications of the application to be developed in the PREFORMA related project. The specifications differ according to the media file type, and are to be derived from the analysis of the memory institution's needs, the analysis of current conformance software, the feedback from specialists in text, image preservation, or AV, as well as the OAIS model requirements and the PREFORMA specifications.

To describe the procedures involved, the use cases are widely used for arguing toward the functions and the functional specification per media file type. It is the intention to define application specifications that describe all possible requirements in the project. For each memory institution it can then be determined if they will benefit from implementing all the features or just a subset relevant to them. The same principle will clearly apply in order to explain how the conformance checker can be integrated inside, e.g., the OAIS model. In addition of use cases, all functionalities for each component in conformance checker are to individually be explained.

The operational requirements are also to be taken into account to ensure the application later on fulfills all the functionalities with regard to security, privacy, reliability, recoverability, and performance. The main purpose of the functional specification documentation is thus to identify requirements and specifications as well as operational functionalities. The document lays the foundation for the technical specification that is due two months later.

#### **4.1.1 PREFORMA Consortium**

After reviewing the functional specifications (draft version, end of M12), the PREFORMA consortium members came to some conclusions regarding the degree of meeting the project requirements. In general, the six suppliers seemed to be on the right track with regard to the requirements the PREFORMA memory institutions has reported as basic needs for making use of the suppliers' achievements.

Due to the fact that for some of the suppliers a stronger link between the functional and the technical specification appeared to be seen, the PREFORMA consortium gave permission to all six suppliers for sending an update of the functional specification in addition to the final technical specification. All suppliers followed this recommendation and coherently provided both specifications as one single framework.



#### 4.1.2 veraPDF

Being invited to submit the functional specification document for the text medial file type, the veraPDF team provided their draft functional specification on time.

The PREFORMA challenge brief describes a functional architecture for a conformance checker. The veraPDF consortium responded to the architecture requirement by describing the functional attributes of their own conformance checker for PDF/A validation. In addition to developing software, the veraPDF consortium has undertaken other activities supporting the terms of the tender, specifically:

- The development of an open licensed corpus of test files that instantiates a reference interpretation of the PDF/A standards (see the PDF/A Test Corpus Report for an analysis of the coverage of existing corpora against the standard specifications);
- Consultations of industry and standards organizations for guidance and clarification in interpreting the relevant standards documents, and
- The establishment and fostering of an open source project and community of users and developers who will be the custodians of the software once the funded period is completed

None of these activities were within the scope of the functional specification document, though they are referred to where relevant.

A part of the document defined the terminology, referring to the PREFORMA documentation and describing the relevant, domain-specific language of PDF technology. Another part described the context in which the PDF/A standards exist, including associated standards and existing community best practice documents, and defines the precise scope of PDF/A validation, including limitations. Yet another part focused on the description of the functional components of the conformance checker (implementation checker, policy checker, reporter, metadata fixer, and PREFORMA shell) including use cases, a detailed functional overview of the processes to be designed and developed, and the technologies under consideration (these are described in full in the Technical Specification). Moreover, a detailed functional requirements and examples were provided using the command line interface. The relationship between the different user interfaces was described in more detail. Last but not least, the veraPDF consortium described the plugin architecture for integrating third-party components to extend the core functionality of the conformance checker. For example, additional validation tools for embedded content such as images, fonts, or color profiles. The functional specification ended with a summary of the technical aspects of the design.

#### 4.1.3 Preservica

Being invited to submit the functional specification document for the text medial file type, the Preservica team provided their draft functional specification on time.

To meet the PREFORMA challenge brief, Preservica will design and develop an open-source digital preservation Validation Framework with a set of integrated validation tools available for use. The framework will create a mechanism for combining format validation, conformance to organization format policy, metadata correction and reporting into a single coherent solution. This solution will be able to be used stand-alone, e.g. via a command line shell interface or embedded into a digital repository solution (e.g. as part of ingest or preservation planning activities



in an OAIS-compatible workflow) through either a programmatic API or web services. At a high-level the requirements of the conformance checker will be to:

- Verify whether a file has been produced according to the specifications of a standard file format, and hence,
- Verify whether a file matches the acceptance criteria for long-term preservation by the memory institution, report in a human- and machine- readable format, which properties deviate from the standard specification and acceptance criteria, and
- Perform automated fixes for simple deviations in the metadata of the preservation file.

The PREFORMA challenge brief sets out a number of use cases in which the Validation Framework must operate. These use cases are described in the following sub-sections. They show the common interactions with the preservation Validation Framework and describe how such a Validation Framework may be used in production environments. The use cases describe how conformance and format policy checking are used by different stakeholders and at different points in the lifecycle of born-digital and digitized material. The functional requirements set out in this document have been developed with the aim of meeting these uses cases.

#### **4.1.4 EASY Innova**

Being invited to submit the functional specification document for the still image medial file type, the Easy Innova team provided their draft functional specification on time.

The functional requirements and specifications document describes the user requirements and functional specifications of the DPF Manager framework and the related application in the PREFORMA project. The specifications are derived from the analysis of the memory institution's needs, the analysis of current file validation software, the feedback from specialists in image preservation, the OAIS model requirements, and the PREFORMA specifications.

To describe the procedures involved, the use cases are used. It is the intention here to define functional specifications that describe all possible requirements in the project. For each memory institution it can then be determined if they will benefit from implementing all the features or just a subset relevant to them. The same principle will clearly apply in order to explain how the DPF Manager can be integrated inside the OAIS model. In addition of use cases, all functionalities for each component in the conformance checker are individually explained.

The operational requirements are also taken into account to ensure the application fulfils all the functionalities with a relation to aspects like security, privacy, safety, integrity, authenticity, reliability, recoverability, and performance. The main purpose of the functional specification documentation is to identify requirements and specifications as well as operational functionalities. The document will provide the specifications for the technical specifications that is due two months later, by the end of M14.

#### **4.1.5 LIBIS**

Being invited to submit the functional specification document for the still image medial file type, the LIBIS team provided their draft functional specification on time.



The functional specification bases on the description of work the LIBIS team provided during the call for tender phase. The cornerstone of the work appeared to be the conformance checker. The LIBIS/Aware conformance checker checks the implementation of TIFF/EP and TIFF/IT files according to the specification ISO 12234-2 (TIFF/EP) and ISO 12639 (TIFF/IT). The conformance checker also has a policy checker, a metadata fixer, and a reporting module. The policy checker will do extra checks based on the preservation policy of an organization. For example, the TIFF standard lets you included different color profiles, but the policy of an institution could be to only allow for example the ECI color profiles, because this is a standard color profile.

The metadata fixer will allow a user to correct some mistakes in the embedded metadata. The reporter module generates reports about the Implementation checker and policy checker. The LIBIS/Aware conformance checker will implement all the functionality as specified in the PREFORMA requirements, but we will add functionality to it as well. For the conformance checker we will define a preservation-safe TIFF/A4. This is a subset of the TIFF standard with extra specification of elements that are not clear in the TIFF standard and elements that will hinder preservation are removed. The intention is to discuss this with ISO to update the TIFF standard during the next phases.

Also the policy checker will be extended. With the LIBIS tool, the user can create a full preservation policy according to the SCAPE Preservation policy Framework. To help the user specify a preservation policy LIBIS will also import the SCAPE preservation policies.

An extra module LIBIS will add is the test framework. This will be used to test the conformance checker during development, but it can be for example used by developers to test if their TIFF files validate against Ground truth files. These Ground truth files describe the TIFF files as they should be according to the standard or TIFF/A, a developer can evaluate the difference in conformance between the files in the Ground truth and the same files with new software or new version of existing software.

#### **4.1.6 UCL**

Being invited to submit the functional specification document for the AV medial file type, the UCL team provided their draft functional specification on time.

The functional specification document appeared to be the first documentation of results achieved by the UCL team. This first PREFORMA interim report is a compilation of documents currently elaborated to design our OpenMediaCheck open-source software, based on the PREFORMA documents and our partners' inputs so far. As discussed with the PREFORMA Consortium, this document is a living document, as it will evolve and be refined based on subsequent inputs we will gather during the project.

A key feature that UCL did mention right from the beginning is foreseen to drive the whole design process: modularity. OpenMediaCheck is designed as an extensible set of autonomous archive processing units that can easily be connected together to build complex archive workflows. This approach enables:

- To re-use existing processing units in different workflows (for instance, JPEG 2000 conformance checker will surely be useful in still image or PDF/A-2 conformance checking workflows).



- To extend the software uses beyond conformance checking by developing new processing units.

This modularity is fundamental to comply with the project requirement to build an open-source community and to propose business models around the open-source project to ensure its long-term maintenance. The methodology UCL did use to develop OpenMediaCheck was based on KAOS, a goal-oriented software requirements capturing approach in requirements engineering, and on agile methods. There are several steps that comply with the PREFORMA project subdivision in the three phases: design, prototyping, and testing. However, it should be noted that each of these steps is iterative and includes successive refinements of the previous steps.

#### **4.1.7 MediaArea**

Being invited to submit the functional specification document for the AV medial file type, the MediaArea team provided their draft functional specification on time.

As preservation workflows have incorporated digital technology, significant amounts of careful research have gone into the selection of file format recommendations, lists of codec specifications, and development of best practices; however, despite the existence of such recommendations, there remains a lack of assessment tools to verify and validate the implementation of such recommendations. A few validation tools (such as MKValidator) are produced alongside the development of their associated standards; however, most file format specifications are not officially tied to any validation tool and are documented through human-readable narrative without equivalent computer-actionable code. Where a metadata standard may be described in both a data dictionary and a computer-usable XML Schema, file formats standards often lack a computer-usable verification method. The PREFORMA project recognizes this discrepancy and the resulting long-term impacts on archival communities and seeks to fill in the gaps necessary to provide memory institutions with levels of control to verify, validate, assess and repair digital collections.

MediaArea's approach to this challenge centers on Free Software, modular design, and interoperability and will rely strongly on MedialInfo (an open source MediaArea product) to meet this challenge. MedialInfo is often advised as the first tool to use when a media file is not playable, allowing the user to identify characteristics that would help find an appropriate playback or transcoding tools. MedialInfo's open licensing and agility in technical metadata reporting have encouraged its integration into several archival repository systems and OAIS workflows to assist archival with technical control of collections.

MediaArea sees community involvement as a key factor of evaluating the success of the project. To encourage this, MediaArea will during the prototype phase perform the development work for command line utilities, graphical user interfaces, and documentation in publicly accessible repositories at [github.com](https://github.com). The MediaArea team will set up an online set of project resources such as public access to a corpus of test media, an IRC channel, and a responsive public issue tracker.

## **4.2 TECHNICAL SPECIFICATION**

The document containing the technical specification of the suppliers' work according to their own description of work describes the technical decisions and final architecture of the applica-



tion in order to fulfil the requirements and features described in the respective functional specifications documents submitted two months earlier. It provides an overview and a detailed explanation of the proposed architecture, the necessary data flows, the chosen data structures, and the selected / prepared external interfaces (APIs and Graphical User Interface).

#### **4.2.1 PREFORMA Consortium**

After reviewing the technical specifications (final version, end of M14), the PREFORMA consortium members came to some conclusions regarding the degree of meeting the project requirements. The consortium took into account that the suppliers were allowed to update the functional specification in line with the technical specification, and in line with the latest developments in the domain of digital preservation including the three selected media file formats.

#### **4.2.2 veraPDF**

Being invited to submit the technical specification document for the text medial file type, the veraPDF team provided their draft functional specification on time.

The technical specification provided contained a section describing the architecture and design of the veraPDF conformance checker. The architecture and design have been developed with three guiding principles in mind, simplicity, modularity, reliability, and use of open standards.

The design has been kept as simple as possible. In general, measures of software reliability and maintainability decrease as a system's complexity increases. It's easier to specify the behavior of small single-responsibility classes unambiguously, making them straightforward to implement. This also facilitates the development of unit tests, which benefit from clear specifications. Small, reliable classes provide the building blocks for complex behaviors and systems.

The design makes every effort to separate concerns so that modules perform logically discrete, well defined functions. Modules are designed to be independent and, where appropriate, interchangeable providing opportunities for reuse instead of repetition.

The architecture presented separates the conformance checker into three top-level modules which are then divided into packages and finally interface/class definitions. There are simple, clearly stated dependencies at each level of the design.

The Conformance Checker is intended for use by stakeholders with an interest in PDF reliability: memory institutions looking to safeguard the long term accessibility of digital material and PDF vendors looking to provide robust PDF editing software. The veraPDF team aimed to provide these organizations with components that can be trusted to perform reliably in the long term. These aspirations are at odds with complex software that tries to provide diverse functionality. Instead they've chosen to design simple, modular components that have deliberately limited functionality and need know as little about their external environment as possible. This aspires to the highest principles of software design best practice, valuing predictability and reliability over complexity.

The veraPDF conformance checker design is eventually divided into three top level modules, as described below:

- veraPDF library: Java library that provides definitive implementation checking (PDF/A validation and PDF features reporting) and metadata fixing for PDF documents. The



veraPDF library is designed for easy, adaptable access to PDF/A validation, for use by developers and memory institutions with a deep interest in PDF;

- veraPDF framework: Java library providing a definition and reference implementation of the conformance checker API, and a light framework to support developers implementing a conformance checker;
- veraPDF conformance checker: veraPDF implementation of a conformance checker combining functionality of the veraPDF library with implementation of the veraPDF framework.

### 4.2.3 Preservica

Being invited to submit the technical specification document for the text medial file type, the Preservica team provided their draft functional specification on time.

The Digital Preservation Validation Framework proposed by the Preservica team is an extensible and modular system for validating, conformance checking and metadata repair. It is expected to form the central characterization component of any OAIS system and to allow content producers, archivists and repository managers to have confidence that the objects they are managing can be read and made accessible in the future.

It is designed to benefit from both the existing domain knowledge within the PREFORMA project, the specialist format validator developers and the general open source community by making use of the existing tools as simply as possible. In the future it will be readily extended as new tools become available; the use of linked data will support a flexible and schema-less information model with future potential for seamless interoperability with 3rd party systems.

The production of the Digital Preservation Validation Framework will greatly benefit the aims and objectives of the PREFORMA project and wider digital preservation community as follows:

- By using a small fraction of the overall budget it will reduce the development costs of each format validator as they share tools, terminology and deployment approaches
- Ensure a consistent deployment of each format validator such that they can be used in production preservation systems
- Ensure the future-proofing and longevity of such tools as they are easier to support and more widely used
- Encourage the addition of tools outside and after the project by becoming an easy to support and widely adopted standard.
- Sustained investment by Preservica as we are committed to include and support the open-source code developed as part of the PREFORMA project to our existing product range and to make any future improvements and fixes available to the community.

These benefits will greatly increase the chances of success and the ability of the PREFORMA group to fulfil the brief agreed with the EC. The key characteristics of the Framework are:

- Wrapper for individual validation tools to be combined into a cohesive suite;
- Simple and intuitive API for adding new functionality;



- Ability to state which tools validate which formats and the metadata that is produced when the run;
- Ability to define rules that use the metadata to assert conformance or not;
- Access to the framework via command line, application program interface, web services interface and a graphical use interface;
- Ability to operate stand-alone or incorporated into a OAIS compatible Digital Preservation system;
- Can be distributed as a standard alone executable incorporating all included data and tools;
- Made available to the public as an open-source software project with documentation and test data.

The Preservica team believes strongly that this Digital Preservation Validation Framework will bring the whole project together and having a strong active commercial partner participating in this project will be a benefit to the overall outcome of this project.

#### **4.2.4 EASY Innova**

Being invited to submit the technical specification document for the still image medial file type, the Easy Innova team provided their draft functional specification on time.

The DPF Manager, proposed by Easy Innova for the image media file type, is foreseen to be an application and a framework designed to allow end users and developers to gain full control over the technical properties and structure of digital content data objects intended for long term preservation. In considering the suitability of particular data object for the purposes of preserving digital information as an authentic resource for future generations, relies on the use of a stable, open and well documented file format as well as some data object properties acceptance criteria. The main objective is to give memory institutions full control of the process of the conformity checks of files. This is a four-step process:

- Identification: the process of determining the file format of a Data Object based on the file extension and the file signature.
- Validation: the process of determining the conformance to a specific normative. These normative can be defined by some standardization organization or specific acceptance criteria based on a locally-defined policy rules.
- Modification: the process of modifying the Data Object, preserving the Information Representation, in order to make it more suitable for long term preservation.
- Reporting: the process of collecting and submitting the data object structure and metadata as well as validation result with the modification information.

The DPF Manager provides the tools to process a large number of files from different sources completely automatically. The internal architecture is flexible enough to be suitable for multiple scenarios. The DPF manager architecture was not only designed to fulfil the functional and operational requirements, it was also designed to make it really easy to extend and integrate into other systems, to establish a sustainable developer community around the framework.



#### 4.2.5 LIBIS

Being invited to submit the technical specification document for the still image medial file type, the LIBIS team provided their draft functional specification on time.

The solution consists of a “core” that comprises all business logic required for executing the core tasks of the solution, a storage subsystem, a format service plug-in subsystem, a command-line module and a REST-API + browser-based GUI combination. The core uses the storage subsystem through an API that abstracts the implementation details away from the application. Format specific logic is implemented in external modules (plug-ins) and that implement actions abstracted in an API.

The core modules functionality can be addressed directly by a module that implements the command line version of the solution or it can be accessed through a HTTP REST API made available by a web server. A graphical version of the solution is implemented as a web application that can be accessed locally or over the network. Three configurations are possible:

1. Command-line: the core is accompanied with the command-line module and local implementations of the data storage
2. Local GUI: the core and local implementations of the data storage combined with a light-weight HTTP server makes up the configuration. A compatible browser is required to access the GUI.
3. Web server application: the core, an application server and multi-user database based storage implementations are combined to form a robust multi-user web application that can be accessed by a compatible browser over the network.

Each module in the Core implements a well-defined set of functionality and may or may not use the storage API and/or Format Plug-in API. Modules may be divided into sub-modules to further isolate functional units. Some modules may rely on other modules (e.g. to check authorization). Each (sub-) module is implemented by a single class. Such class methods may return instances of other classes (e.g. an instance of the User class when retrieving user information). Such objects live as long as the application holds a reference to it. If the object requires persistent state, the object will take care of saving and retrieving the state with the help of the storage API. A new instance of the class will represent the last saved state of the object.

#### 4.2.6 UCL

Being invited to submit the technical specification document for the AV medial file type, the UCL team provided their draft functional specification on time.

In accordance with the PREFORMA challenge Brief and the UCL tender proposal, the software is made of two principal components: the shell and the conformance checker.

The shell is the most innovative part of the solution proposed by UCL. The principles that drove their design are based on the nature of the project call, implying several suppliers to work on different components able to be executed into the same shell. This motivated UCL in mainly designing an architecture allowing several suppliers to work on the same project while minimizing dependencies with other developers output. Moreover, while the UCL team will obviously develop some critical processing units themselves (e.g. the conformance checker), the developers' team observed that a lot of high-quality open-source tools are available but are often not easily



connected together. Therefore, the UCL shell is a framework to easily build complex workflows based on autonomous media processing units.

Based on this assumption and decision, the UCL team thinks this approach is a good way to grow an open-source community around the project and leverage the contributions most efficiently. Indeed, given the simplicity of UCL's component interface syntax, a third-party developer will be able to add an external piece of software to their component registry in no time and use it in more complex workflows.

Practically, the shell has been designed as a light and portable web service based on NodeJS. This choice makes UCL's solution intrinsically cross-platform, accessible through various User Interfaces (i.e. command-line interface, Desktop GUI or web-based UI), and seamlessly able to be integrated into third-party systems. Moreover, the modularity of this component-based approach enables:

- Re-usability, i.e. the ability to re-use existing processing units in different workflows. For instance, UCL's proposed JPEG 2000 conformance checker might be required in still image or PDF/A-2 conformance checking workflows.
- Extensibility, i.e. the ability to extend the software uses beyond conformance checking by developing new processing units.

This shell architecture thus allows UCL to design a conformance checker as a workflow connecting several autonomous media processing components. This enables seamless reconfiguration of the conformance checker (even by non-developers) to improve the set of functionalities or replace one component with another more efficient one. Each functional component required by PREFORMA corresponds to one of the autonomous workflow's components: implementation checker, policy checker, metadata fixer, and reporter. Conformance checkers others than the one developed in the context of the OpenMediaCheck will easily be integrated in UCL's technical specification of the shell simply as new components.

#### **4.2.7 MediaArea**

Being invited to submit the technical specification document for the AV medial file type, the MediaArea team provided their draft functional specification on time.

As typical preservation workflows have incorporated digital technology, significant amounts of careful research have gone into the selection of file format recommendations, lists of codec specifications, and development of best practices; however, despite the existence of such recommendations, there remains a lack of assessment tools to verify and validate the implementation of such recommendations. A few validation tools (such as MKValidator) are produced alongside the development of their associated standards; however, most file format specifications are not officially tied to any validation tool and are documented through a human-readable narrative without equivalent computer-actionable code. Where a metadata standard may be described in both a data dictionary and a computer-usable XML Schema, file formats standards often lack a computer-usable verification method. The PREFORMA project recognizes this discrepancy and the resulting long-term impacts on archival communities and seeks to fill in the gaps necessary to provide memory institutions with levels of control to verify, validate, assess and repair digital collections.



MediaArea's approach to this challenge centers on FOSS (Free and Open Source Software), modular design, and interoperability and will rely strongly on MediaInfo (an available open source MediaArea product) to meet this challenge. MediaInfo is often advised as the first tool to use when a media file is not playable, allowing the user to identify characteristics that would help find an appropriate playback or transcoding tools.

MediaInfo's open licensing and agility in technical metadata reporting have encouraged its integration into several archival repository systems and Open Archival Information System (OAIS)-complaint workflows to assist archival institutions with technical control of collections. The team of MediaArea sees community involvement as a key factor of evaluating the success of the project. To encourage this, MediaArea will perform during the prototype phase the development work for command line utilities, graphical user interfaces, and documentation in publicly accessible repositories at [github.com](https://github.com).

MediaArea will also set up an online set of project resources such as public access to a corpus of test media, an IRC channel, and a responsive public issue tracker. In order to foster and demonstrate a focus on interoperability throughout the project, MediaArea will work with Artefactual in order to facilitate integration of resulting project components into ArchiveMatica, a digital repository focused on OAIS. This collaboration will bring the availability of additional OAIS and digital preservation expertise to the project and provide an additional means for the project deliverables to be made available to users.

## 4.3 SUMMARY

As it can easily be seen from the citation of specification results above, both the functional specification documents as well as the technical specification report along with an allowed update of the functions specified did differ in style, size, detailedness, and other parameters. Even if all six suppliers formally fulfilled the requirements of submitting the respective reports on time, the reviewers and the evaluation committee members had a very difficult task to compare the reports, the proposed specifications, their compliance with the suppliers' own description of work, and the compliance with the PREFORMA challenge brief and the call for tender. The next sections will add information the PREFORMA consortium members derived from the end of phase 1 administrative report.



## 5 END OF PHASE 1 REPORT

In addition to the functional specification and the technical specification documents provide by the six suppliers, a third document had to be incorporated into the review process. The so-called end of phase 1 report was foreseen as not only addressing the way the suppliers did make use of the budget. Another important contribution to the review provided by the end of phase 1 report was considered to be the way the suppliers aimed at dealing with the open source licenses. In general, the report had to be seen as complementing the statements in the two specification documents and aiming at how to proceed in terms of a road map of the suppliers toward the prototype phase to follow.

The purpose of the end of phase report was thus to ensure that contractors have performed the procured R&D services as specified in the framework agreement. The description of work undertaken during the design phase1 should include what work was completed and why this was important. The suppliers had to complete the template form as fully as possible. The report must be submitted within 14 days of the completion/ termination of the phase. Suppliers were advised that satisfactory completion of the end of phase 1 report formed a part of the contract.

### 5.1 STRUCTURE OF END OF PHASE 1 REPORT

The aim of the administrative and partly also technical report to be provided at the end of the design phase 1 is to review the results of the six suppliers. In particular, the report contains the following questions to be answered by all suppliers in a way that questions that were purposely left open in functional and technical specification documents should find answers in the end of phase 1 report. Both the functional and the technical specification in their respective revised version were added to the end of phase 1 report as attachments making sure to have all relevant documents for evaluation as one single document with various references from the main part to the annexes and vice versa.

With regard to some of the aforementioned non-technical aspects, the template of the end of phase 1 report contained the following questions with the respective explanation what the PREFORMA consortium did want to see in terms of answers.

#### 1. Provision of the administrative Details

*Please provide us with all necessary administrative details that PREFORMA needs in order to proceed with the procedures.*

#### 2. At the outset of this piece of work, what were your aims and objectives?

*Please provide a concise overview of the supplier's project objectives and of what was expected during the first design phase as agreed in the PREFORMA Tender Form and in the Negotiation Protocol with the supplier.*

#### 3. Please provide a summary off the outputs of this piece of work and relate these to the original objectives. How do the outputs address the challenge of this PCP?



*Please provide the PREFORMA consortium with a concise overview of the progress of the work expected to be done in the first design phase, relating it to the original objectives and to the requirements defined in the PREFORMA Challenge Brief.*

**4. Describe any changes to the original plan in the tender. What was the reason for these changes? Please include any circumstances that aided or impeded the progress of the project and the actions taken to overcome them**

*If applicable, explain the reasons for deviations or clarifications from what was agreed in the Tender Form and in the supplier's Negotiation Protocol, or for failing to have achieved critical objectives and the impact on the supplier's project. If applicable, propose corrective actions that will, in case the supplier is invited to the prototype phase, take place either in the prototype phase as such, or in the re-design phase, if applicable.*

**5. Please provide a short factual summary of the most significant outcomes of your work**

*Please provide the PREFORMA consortium with a concise overview of the main results achieved so far. Please refer to the functional and technical specification without repeating too much here.*

**6. Describe the innovative aspects of the work, including any new findings or techniques**

*Please provide the PREFORMA consortium with a description of the innovative approach that you decided to choose with regard to new technologies, new findings, new strategies, new elements of your road map, and new risks that may have appeared.*

**7. Describe where the R&D and other operational activities have been performed**

*Please provide the PREFORMA consortium with a description of the major R&D work steps and results as well as with all other operational activities performed in the context of the work so far.*

**8. Please provide complete and clear information about the allocation of monies paid by the Authority with consideration to the R&D service contract minimum requirement (that more than 50% of the contract value is attributable directly and exclusively to legitimate R&D services)**

*Please provide the PREFORMA consortium with a statement of the allocation of the budgets used for performing the work. That contains expenditures according to the description of work and the related bid but also derivation including the reasons that led to these derivations.*

**9. Describe any potential long-term collaborations/ partnerships entered into. Please list the organisation/s and the role they played in the project**

*Please provide the PREFORMA consortium with a report on any strategic partnership you went into because of the work you performed. That may include standards developing organizations, user groups, stakeholder groups, or other liaisons you decided to go for in order to improve the quality of your work.*

**10. Please describe how your organisation has gained from this project. What new business opportunities have been created? Do you expect your organisation to grow as a result of this project?**

*In this sub-section, the PREFORMA consortium asks the supplier to provide an overview on how the supplier consortium did benefit from performing the work on behalf of the PREFORMA project. The PCP basis of the PREFORMA project should lead to new business opportunities*



*among the supplier teams, and should allow an increase of market opportunities during and after the end of the project.*

**11. Describe the potential for exploiting the work. Please identify any new intellectual property which has been filed or for which filing is anticipated**

*In this sub-section, the supplier is expected to describe possible business models, business plans, and business cases based on use cases or scenarios relevant for planning ahead. The business plan should not only cover the PREFORMA phases to come but may also give an indication on how exploitation could look like after the end of the PREFORMA project.*

**12. Describe the suitability of the project results for (a) developing a prototype, and (b) development of test series – in order to facilitate assessments of progress into next phase**

*In this sub-section, the supplier is expected to shortly introduce the thought and plans of the supplier consortium on how to proceed with the development work in the next phase. That may include ideas and plans, e.g., for the meta data to address in the prototyping phase, the common platform to demonstrate interoperability between the modules developed inside and outside the PREFORMA project, and other aspects the supplier considers relevant for the prototyping phase.*

**13. Open Source approach**

*In this sub-section, the supplier are asked to describe how they will address the relevant open source topics, the open source licensing, the way to address the open source communities, and the ideas in this respect for the project phases to come.*

**14. Standardisation efforts**

*In this sub-section, the supplier shall, if applicable, describe how the supplier's project aims at contributing to the exploitation of existing standards relevant to the project aims and goals, or how the supplier consortium has thought about contributing to emerging standards. Maybe the supplier can describe how the consortium is going to address future changes on the existing standards taking into account that the near future will bring new archival standards.*

**15. Provision of data**

*In this sub-section, the PREFORMA consortium asks the supplier to provide an overview on how the supplier consortium will work out the different sets of data needed to develop the respective module. This mainly considers the training data to be used internally but also the test data used by the PREFORMA consortium to test the modules and achievements of each of the suppliers working on the same file type. Eventually, demonstration data is needed to allow companies and organizations outside the PREFORMA consortium to spend their effort on developing their own modules but compare them with the PREFORMA modules by means of using the same correct and corrupt demonstration data sets.*

**16. Please insert additional information that may be pertinent. This may be in the form of text, pictures, diagrams, data, graphs that support the work**

*Please provide the PREFORMA consortium with any information that may add to the information provided in the functional and technical specification documentation.*

**17. Describe what ethical aspects you have identified and how this may (have) influence(d) your solution**



*Please provide the PREFORMA consortium with information on each kind of ethically relevant aspects that you came across during the preparation and the work carried out.*

## **5.2 SUPPLIERS' END OF PHASE 1 REPORT**

The following paragraphs aim at introducing the expectations of the PREFORMA consortium as well as the responses of the six suppliers, mainly to the aims and objectives questions. All other answers and comments can be found in the six end-of-phase-1 reports that the suppliers provided the PREFORMA consortium members with, and all did so on time.

### **5.2.1 PREFORMA Consortium**

The PREFORMA consortium agreed to ask the questions listed in the previous section in order to get more information, for a better comparability, for a better evaluation of the description of work done by the suppliers. Due to the fact that the consortium decided to ask for three different media file types, the solutions need to be assessable in a way that a decision can be made on whether to – as planned in the beginning of the project – invite one supplier per media file type for entering the prototype phase, or whether there is a real chance or even a need for inviting more than one supplier team for continuing. As long as the evaluation has not been completed, the option is there to have in minimum three supplier team proceeding but also four or five or even all six. There is still the option to ask supplier teams to merge their efforts. A decision will be made also including the new bids. This decision shall be made mid of April, and will be described in section 8 of this document D8.2

### **5.2.2 veraPDF**

Being invited to submit the end of phase 1 report due mid of March 2015, the veraPDF team provided their documentation on time.

In this report, the PREFORMA consortium mainly focuses on the aims and objectives that needed to be described as a response to the second question. The limit was one page with a given font. The detailedness of the suppliers in answering to the question was different but in general the reviewers did get a comprehensive overview on what the suppliers considered to be the aim and objective of their work.

As far as veraPDF was concerned, the supplier team provided the following information with regard to the procedures and steps of their work. In detail they will produce (adopted and adapted from their description):

- *The functional and technical specifications for a definitive PDF/A Validator (including an analysis of development options based on the specified licencing model);*
- *The plan for engaging communities and on how to communicate with them;*
- *The test cases derived from PDF/A specifications;*
- *An analysis of existing test corpora, and*
- *The demonstrator based on PDFBox.*



### 5.2.3 Preservica

Being invited to submit the end of phase 1 report due mid of March 2015, the Preservica team provided their documentation on time.

In this report, the PREFORMA consortium mainly focuses on the aims and objectives that needed to be described as a response to the second question. The limit was one page with a given font. The detailedness of the suppliers in answering to the question was different but in general the reviewers did get a comprehensive overview on what the suppliers considered to be the aim and objective of their work.

As far as Preservica was concerned, the supplier team provided the following information with regard to the procedures and steps of their work. In detail they will do the following work (adopted and adapted from their description):

*During the first design phase, Preservica was expected to design a Digital Preservation Validation Framework and provide a set of documented requirements of the system to act as both a clear definition for the rest of the project (to ensure that all parties are clear of the specification) and as a basis for planning testing. This would include a number of use cases leveraging our experience of practical end-to-end automated digital preservation workflows.*

*The plan was to design a framework capable of dealing with batches of files of heterogeneous formats (since this is what occurs in real life). This design would be based off existing code in our system which would be extended and made into a stand-alone open-source product.*

*Hence, in the design phase Preservica was planning to:*

- *Design the Digital Preservation Validation Framework by:*
  - *Identifying the existing code that should be reused*
  - *Designing how this can be wrapped into an open-source stand-alone piece of software with both a simple user interface and a clearly defined callable interface*
  - *Designing the API to use to call subsidiary components: namely an implementation checker, a policy checker, a metadata fixer and the reporter framework*
  - *Design the Registry needed to allow decisions to be recorded about which tool (e.g., validator) to use for which format.*
- *Design the implementation checker framework. This would also detail how to validate one format (we suggested the various varieties of PDF/A) and whether this can be done by reusing existing code from one (or more) compatible open-source tools*
- *Design the policy checker. We anticipated using the Schematron language to record the policy but would need to design the framework for checking how files are compliant (or not) with this policy.*
- *Design the reporter framework. We expected this to follow a similar design pattern to Preservica's existing reporting framework.*
- *Design the metadata fixer framework.*



### 5.2.4 EASY Innova

Being invited to submit the end of phase 1 report due mid of March 2015, the EASY Innova team provided their documentation on time.

In this report, the PREFORMA consortium mainly focuses on the aims and objectives that needed to be described as a response to the second question. The limit was one page with a given font. The detailedness of the suppliers in answering to the question was different but in general the reviewers did get a comprehensive overview on what the suppliers considered to be the aim and objective of their work.

As far as EASY Innova was concerned, the supplier team provided the following information with regard to the procedures and steps of their work. In detail they will do the following work (adopted and adapted from their description):

*At the outset of this piece of work the EASY Innova objective was to create a tool, DPF Manager, which would be specially designed to address present and future challenges in the digital preservation and standards compliance areas. The objective was for it to be an open platform with a high modularity that would allow memory institutions and developers to easily add, modify and adapt specialized modules in order to personalize the analysis of still-image files to their processes.*

*EASY Innova wanted to develop a full conformance checker to validate TIFF files against TIFF/EP (ISO 12234-2:2001) and TIFF/IT (ISO 12639:2004) specifications.*

*The supplier team also wanted to define a subset of variants of the TIFF 6.0 suitable for long-term archival purposes, since although TIFF is an appropriate, open and well documented standard for archival, this does not guarantee long life preservation.*

*EASY Innova wanted it to have the following features to guarantee the suitability of DPF Manager to address future challenges:*

- *Modularity: the whole platform will be designed to be highly modular. Specific modules with specific tasks will be created, which is a really important feature that allows memory institutions to highly personalize the platform.*
- *Integration capabilities: thanks to its modularity and the Low-Level API, it will be really easy to integrate other open source projects or proprietary software to offer new formats validation or new functionalities.*
- *Easy to install: no expert knowledge will be needed to install the DPF Manager.*
- *Easy to develop with: our experience in open platforms and open source projects ensure that with simple technical documentation and/or short trainings, developers will be totally capable to develop over the platform.*
- *New formats: whenever new formats appear in the future (e.g. TIFF 7.0), creating a new conformance checker for this format will be very easy. Developers will just need to create a new module that programmatically inherits from the current TIFF 6.0 module and implement the new specific validations.*
- *Scalability: the platform will be designed having always in mind system performance on high workload conditions.*



- *Personalization of automatic tasks: the platform will offer memory institutions the capability to schedule certain tasks like periodical batch analysis of files obsolescence with personalized parameters in order to facilitate archivists and content curators work.*

*The EASY Innova supplier team wanted to create a community around the project that would be continuously creating new modules to validate new formats, to add new functionalities and to guarantee the sustainability of the platform for a long time.*

*They also wanted to create a sustainable business around the DPF Manager, so we created an early version of a business model and business plan based on offering the following services on top of the free open source DPF Manager: cloud/SaaS platform, on-premise installations, 3rd party marketplace, consultancy services and training courses.*

### 5.2.5 LIBIS

Being invited to submit the end of phase 1 report due mid of March 2015, the LIBIS team provided their documentation on time.

In this report, the PREFORMA consortium mainly focuses on the aims and objectives that needed to be described as a response to the second question. The limit was one page with a given font. The detailedness of the suppliers in answering to the question was different but in general the reviewers did get a comprehensive overview on what the suppliers considered to be the aim and objective of their work.

As far as LIBIS was concerned, the supplier team provided the following information with regard to the procedures and steps of their work. In detail they will do the following work (adopted and adapted from their description):

*The main objective of phase 1 was to create functional analysis and a technical design based on the requirements in the challenge brief and tender specification.*

*Another important objective was to research topics needed to build the LIBIS/Aware conformance checker. The most important topic was identifying and solving issues in the TIFF standard. The focus was on issues regarding unclear parts in the standard, confusing parts for developers of decoders and issues regarding preservation and data transmission. For every identified problem test files were created, this will allow easier discussion with ISO and will help developers to better understand the problem and test their solution with these files. The outcome of this research is the preservation-safe TIFF specification and is available in the TIFF/A specification document. The test files are available on our GitHub page.*

*The preservation-safe TIFF specification is a subset of TIFF without the licensing issues and unclear parts of the TIFF standard. This extra step of creating a preservation-safe and license-safe TIFF was necessary because if you create a valid TIFF it is still possible that these files still contain preservation and licensing issues. LIBIS was then consulting TIFF experts to evaluate the preservation-safe TIFF specification. In phase 2 the specification will be tested with real life TIFF files as much as possible. The Test Framework LIBIS will develop in phase 2 will be important for this. The supplier will be able to iteratively test our solution to see if in every development progress is made and no new problems occur.*

*The second important research topic was preservation policies and the relation with the policy checker requirements. This topic was investigated to create a solution to allow memory institution to create a preservation policy according to the SCAPE Preservation Policy Framework and*



*identify appropriate machine readable policies to check. To help memory institutions with creating a preservation policy the SCAPE preservation policies will be imported. The outcome of this research is available in the functional analysis document.*

*The research on patents regarding TIFF resulted in a list of patents that were investigated to see if our conformance checker didn't violate any known patents. During the definition of a preservation-safe TIFF, the LIBIS supplier team also excluded parts of the standard that have licensing issues in the TIFF standard. This makes the preservation-safe TIFF at the end also license-safe.*

*A last important research topic was research on building a test framework. For this topic LIBIS researched Ground truth creation and use. They didn't find examples in the field of file format.*

*There were some ad hoc solutions to test specific cases, but LIBIS wanted to create a general solution that can be used during phase 2 and by other developers. This research is included in the functional analysis.*

## **5.2.6 UCL**

Being invited to submit the end of phase 1 report due mid of March 2015, the UCL team provided their documentation on time.

In this report, the PREFORMA consortium mainly focuses on the aims and objectives that needed to be described as a response to the second question. The limit was one page with a given font. The detailedness of the suppliers in answering to the question was different but in general the reviewers did get a comprehensive overview on what the suppliers considered to be the aim and objective of their work.

As far as UCL was concerned, the supplier team provided the following information with regard to the procedures and steps of their work. In detail they will do the following work (adopted and adapted from their description):

*The UCL PREFORMA proposal, named OpenMediaCheck, aims at providing memory institutions free open-source tools to assess the conformity of their archives in the long term. It has the following technical objectives:*

- Develop a user-friendly, cross-platform shell application dedicated to media files processing, offering modularity, extensibility and re-usability of independent processing units. Redeveloped from scratch but based on expertise gained from the openinterface open-source project and on the Skemmi subcontractor know-how in software engineering, the OpenMediaCheck shell will allow to easily building complex workflows for media files. Such architecture is perfectly suited to both integrate tools from other suppliers and be integrated in legacy systems or other suppliers' shell.*
- Develop a conformance checker for audio-visual MKV files wrapping lossless JPEG 2000 frames and LPCM audio samples. Using the software shell described above, the conformance checker will be provided as independent tools to be connected together for each of the three standards selected. The most complex part, namely the JPEG 2000 conformance checking, will benefit from the UCL and intoPIX (2nd subcontractor of our proposal) expertise in JPEG 2000. Four functional components will be provided for each standard: implementation checker, policy checker, reporter, metadata fixer. Beside*



*open-source software development objectives, following non-technical goals were identified, to make the project sustainable in the long term:*

- *Grow an open-source community around the project. This objective will benefit from UCL expertise in open-source project management, acquired in particular with OpenJPEG, the open-source JPEG 2000 reference software maintained at UCL.*
- *Set up and develop business opportunities around the open-source project. Identified opportunities are support for maintenance and installation, on-demand development of new components, proprietary components sales.*
- *Develop connections with standardization bodies so as to keep PREFORMA tools in sync with standards, and propose amendments based on PREFORMA experience.*

*UCL and intoPIX existing connection with JPEG Committee will help a lot here. Based on these overall project objectives, the specific goals of the Design Phase were:*

- *Provide a functional specification of the software, describing its intended behavior, use cases, and application scenarios.*
- *Provide a technical specification of the software, describing the different components and how they are connected to each other.*
- *Provide an overview of all patent claims that relate to JPEG 2000 Part-1 (ISO/IEC 15444-1:2004) so as to let the PREFORMA Consortium evaluate the appropriateness of JPEG 2000 as a long-term preservation format.*

### **5.2.7 MediaArea**

Being invited to submit the end of phase 1 report due mid of March 2015, the MediaArea team provided their documentation on time.

In this report, the PREFORMA consortium mainly focuses on the aims and objectives that needed to be described as a response to the second question. The limit was one page with a given font. The detailedness of the suppliers in answering to the question was different but in general the reviewers did get a comprehensive overview on what the suppliers considered to be the aim and objective of their work.

As far as UCL was concerned, the supplier team provided the following information with regard to the procedures and steps of their work. In detail they will do the following work (adopted and adapted from their description):

*MediaArea has evolved to specialize in developing technology for archival applications with a focus on media identification, data analysis, and audiovisual conformance. The PREFORMA Challenge Brief struck directly at our professional concerns and interests with its focus on technologically empowering memory institutions to assess, manage, and control relevant file formats. Our area of focus of Matroska and FFV1 compliments the team's advocacy for and support of these formats within audiovisual archival workflows.*

*Within the first phase of PREFORMA project we had several specific aims and objectives:*

- *Identify and involve partners, collaborators and stakeholders within the development of our design work for later PREFORMA phases*
- *Evaluate and assess the status of Matroska, FFV1, and LPCM within archival contexts*



- *Gather feedback of our research and development from diverse communities, including repository system architects, memory institutions, codec developers, and integrators and vendors that support archival work*
- *Design a plan for facilitating the standardization of FFV1 and Matroska within the project*
- *Foster a more immersive relationship between memory institutions and open source technology development*
- *Identify more effective means to utilize the digital preservation features of the specifications of FFV1 and Matroska*
- *Develop an open technical plan that is modular, collaborative, and encouraging of participation*
- *Anticipate and prepare for key areas for collaboration amongst PREFORMA suppliers*

### 5.3 SUMMARY

The PREFORMA consortium members learned from the suppliers' way of raising questions and issues, of responding to the PREFORMA consortium questions, and of addressing topics raised in the end of phase 1 report structure. It was an ongoing bilateral communication between the project consortium and the suppliers. The memory institutions were frequently asked about the suppliers' ideas, and the consortium members of PREFORMA always aimed at making procedural aspects in communication and information exchange as smooth as possible trying to avoid too much bureaucracy in the context of functional and technical specifications.

A few examples will be listed in this document later on in order to explain how the suppliers and their work did influence the work of the PREFORMA consortium as such. But the next section will aim at shortly summarizing the mid of 2014 tender evaluation process in order to explain in a better way how PREFORMA came to the decision which of the 16 suppliers to invite for the design phase 1.

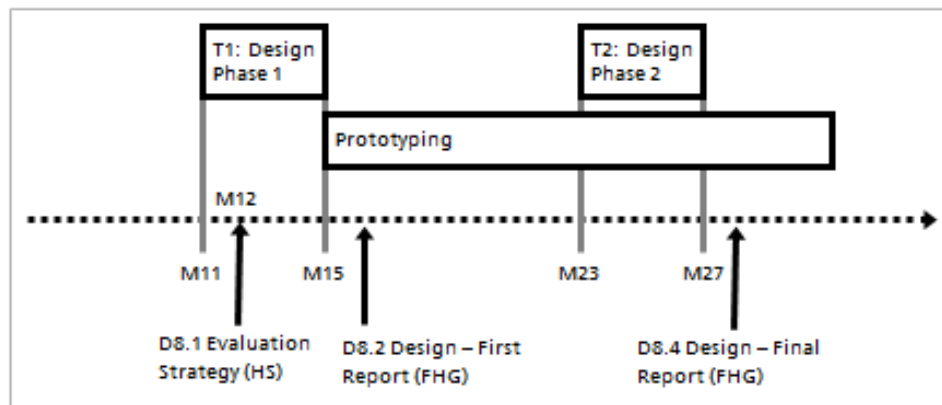


## 6 FIRST LESSONS LEARNED FROM THE DESIGN PHASE

As one of the PCP projects currently running on EU level, the PREFORMA consortium needed to plan, prepare, and undergo the entire call for tender procedure. This meant learning a lot from the preparation of the process and from all the procedures related to the aspect of inviting suppliers to submit their description of work as part of their bid, from negotiating the bids along the line of the PREFORMA requirements, from guiding the suppliers along this line, and from evaluating the submitted specifications and administrative documents in order to be able to go for a fair decision making process.

The first lessons learned – of course there will be much more lessons that PREFORMA will learn from the prototype phase as well as the testing phase later on – contain the time from the end of the negotiation phase until the end of the decision making process for the supplier teams invited for entering the prototype phase. These lessons will shortly be summarized below. Of course there are much more lessons that the PREFORMA consortium did learn along the design phase 1 progress but they more or less address aspects beyond the evaluation and decision making process so they shall be reflected in a different place.

The design phase procedures in general were organized as shown in the figure below. The phase 1 ended with the submission of the suppliers' reports (end of phase 1 report, functional specification, and technical specification) followed by the review and evaluation process. The results, as it can be seen, are to be described, analyzed, and summarized in the present report D8.2 Design – First Report.



Before analyzing the lessons learned in particular, let's provide two generic lessons learned already in the beginning. First of all, PREFORMA did find an appropriate and well-acknowledged way to intensively communicate with the suppliers. Of course, things can and will work even better during the prototype phase to start after the award decisions but both the suppliers and the PREFORMA consortium had to learn how to communicate with each other always taking the limited time and financial resources into account.

Secondly, it turned out to be a very good and wise decision to invite the suppliers for the workshop to Brussels. The aim of the workshop was giving the suppliers a podium for not only sending their respective documents but also to illustrate the findings and definitions, to present



themselves (each of the six) as a consortium rather than independent suppliers just forming a team, and to get in touch with them especially for the memory institutions that may have (had) several questions in terms of the implementation of the proposed modules and components.

A few more details about the different technical means and the lessons that PREFORMA learned from having implemented these communication schemes do follow below.

## **6.1 VIRTUAL MEETINGS**

PREFORMA decided to give all suppliers at the same time the chance to raise questions, to come up with suggestions, and to discuss – even with the other supplier teams – about interoperability, about a common platform called shell, and about strategies to make sure that the proposed modules and components were able to communicate with each other after the design phase 1. It has been announced to all suppliers that specifications, achievements, results, and any other documentation will be made publicly available after the award decision was taken. So establishing an appropriate information chain procedure was one of the first steps PREFORMA undertook, and it turned out to be necessary to have established a set of a very efficient ways of communication.

The 4<sup>th</sup> of November virtual kick-off meeting formed the starting point for the efficient communication between the PREFORMA consortium partners on the one hand, and the six supplier teams on the other. PREFORMA established a procedure of a bi-weekly virtual meeting schedule that allowed all involved parties to get each other better known and understood, and to allow memory institutions to directly contact suppliers working on the media file format of their particular interest. As this means did perfectly work even if not all PREFORMA partners were able to always attend the virtual meetings, PREFORMA has made a decision to establish a monthly virtual meeting with the three remaining suppliers from the beginning of the prototyping phase. PREFORMA expects, based on the design phase 1 lessons learned, to even make these meeting more effective by addressing particular questions raised by the supplier teams in the forehand. This has been offered to the suppliers even in the series of meeting during the design phase 1 virtual meetings but PREFORMA expects the suppliers to even make more use of this means when starting the prototyping phase.

In order to support the information exchange prior to the virtual meetings but also for submitting the meeting minutes, PREFORMA established a new mailing list for supplier communication. It turned out to be a good decision because any communication from a particular PREFORMA consortium member to the particular supplier could easily be followed and archived by all consortium members and all suppliers. In order words, the mailing list in conjunction with the virtual meetings served for keeping the consortium and the suppliers update in terms of the information flows and the collaboration opportunities.

## **6.2 FUNCTIONAL AND TECHNICAL SPECIFICATIONS**

The submission of the draft functional specification was due in December 2014. This turned out to be a wise decision made by the PREFORMA consortium because of the ability to establish a so-called intermediate review process from early January 2015. The PREFORMA consortium members were thus able to send to the suppliers even at this early stage of the specification work a draft functional specification feedback. This feedback did help all suppliers to enhance



and improve the functional specification along with the development of the related technical specification in early spring 2015.

One of the most important lessons learned from having introduced this early stage intermediate review process was that the PREFORMA consortium could (try to) find out and verify whether or not the suppliers had understood the messages. The consortium did clarify potential incongruities between the tender and the Invitation to Tender/Challenge Brief, and agreed on how these issues must be addressed in first Design Phase. What PREFORMA found from the draft functional specification was answers on the questions whether or not the supplier has fully **understood** the issues, whether or not the supplier committed to **research** the issues, and whether or not the supplier eventually committed to **resolve** the issues. All these activities needed to be performed in line with the Invitation to Tender/Challenge Brief to the Contractor.

As a key result of the specification phase, the six open source projects that were invited to enter into the design phase, had finally submitted both a functional and a technical specification that were in line with (a) the PREFORMA requirements, the (b) negotiation protocols with each of the suppliers, and with (c) the descriptions of work of each single supplier team. In particular, what the suppliers offered to develop were the following solutions:

1. veraPDF: THE PDF/A CONFORMANCE CHECKER ACCEPTED INDUSTRY-WIDE *by Open Preservation Foundation, PDF Association, Digital Preservation Coalition, Dual Lab, KEEP SOLUTIONS*
2. DIGITAL PRESERVATION VALIDATION FRAMEWORK *by Preservica*
3. DPF MANAGER: DIGITAL PRESERVATION FORMATS MANAGER *by Easy Innova*
4. LIBIS/AWARE CONFORMANCE CHECKER FOR TIFF *by Libis Library It Services of KU Leuven, AWARE Systems*
5. PREFORMA MEDIACONCH *by MediaArea.net*
6. OPEN MEDIA CHECK *by Université Catholique de Louvain, IntoPIX, Skemmi*

All the results (functional specification, technical specification) have been received on time which was also a nice lesson learned by the PREFORMA consortium, as this is not the case in every single R&D project throughout the world.

The functional specification, as expected by the PREFORMA consortium, appropriately described the functions of the conformance checker and of the other modules that the suppliers offered to develop. The respective specification document, due in M12 (December 2014) turned out to be a combined effort in describing functions and technology, as the functions to implement do influence the overall architecture of the entire system. It on the other hand heavily influences the interoperability framework (work place, shell) to later on bring modules on top. What was interesting to see and to realize – the challenge brief asked the suppliers for developing modules that allow the memory institutions for full getting and gaining control of media files. The functional specifications of the suppliers rather showed the tendency to focus a bit too much on the shell and thus on the integration of the various modules. So an important lesson that PREFORMA learned from reading and evaluating the functional specification: much more focus needs to be put on the needs and requirements of the memory institutions during the course of the prototype phase 1.

The technical specification documentation was due in M14 meaning at the end of February 2015. The technical definitions were directly derived from functions defined and described in the



functional specification document, as requested by PREFORMA. The technical specification contained the description of the architecture for the conformance checker and for the other modules the suppliers proposed / offered to develop. The focus was put on re-usable software components, questions of appropriate licensing, and especially the underlying IPR model. The document aimed at following the pre-defined overall architecture (that the necessary functions required) from technology view, and it did address the aspects of the interoperability framework developed to bring the modules on top. Also here, PREFORMA learned a lot from the technical specification document but from the communication with the suppliers, too. The challenge brief and the related documents issued by PREFORMA explicitly required a policy on re-use of licenses (GPL3+ / MPL2+) whereas after a discussion with the suppliers and an internal PREFORMA decision process, the suppliers were allowed to use license “compatible” software. PREFORMA therefore defined and provided a closed list on what compatible software means as there is a clear definition in the open source community.

Eventually, both the final version of the functional specification as well as its technical counterpart became attachments to the end of phase 1 report that was due mid of March 2015. PREFORMA learned that such a comprehensive documents allows for an easier evaluation because of the fact that functional and technical specifications provided information on a detailed level whereas the end of phase 1 report addressed same or similar aspects more from an administrative viewpoint.

## 6.3 SUPPLIERS WORKSHOP

In addition to what has been described in the previous section about the Brussels suppliers’ workshop and its planning and preparation, all suppliers adequately prepared for the workshop, and showed up being represented by two speakers and up to six speakers. The PREFORMA technical partners used the opportunity to ask questions for the sake of clarification of technically relevant details whereas the memory institution took the opportunity to raise questions about policies, standards, licenses, interoperability, legacy systems, data sets, and more.

One of the most important lessons that PREFORMA learned from running the workshop turned out to be the opportunity for a direct interaction with the suppliers. As PREFORMA has three memory institutions per media file type (ideally), there was the chance to interact with the suppliers in a way that neither a virtual meeting nor the evaluation of written documents could provide. As the suppliers had about 40 minutes for their respective presentations, 20 minutes were left for general and particular questions. For privacy reasons, the individual questions and their respective answers will not be listed here. But as far as the general questions are concerned that were raised to each of the six suppliers, the addressed aspects of risk analysis as well as the provision of data sets for the prototype phase as well as for the testing phase later on.

The first question addressed risks and contingency planning. The suppliers provided a risk analysis as part of their tender. Now that they had completed the design phase, it was important to get to know whether they encounter potential new risks and weaknesses for their respective open source project that they may have identified during the design phase. And it was important, too, to learn whether or not these new risks and weaknesses could affect the plan of the supplier for the upcoming prototyping phase.

The second question addressed the aspect of the availability of data set for the various purposes ranging from training data for their own modules to test data allowing PREFORMA to test the



modules according to the requirements. Eventually, the project needs demonstration data foreseen to be provided to the open source community for developing their own modules, and for testing them according to the PREFORMA set of requirements. In the prototyping phase, the memory institutions being partner in PREFORMA will provide the suppliers with both training and test files. The suppliers were asked to explain their own plans for creating their own training and test files during the prototyping phase. Both training data and test data need to allow the evaluators not only to verify the appropriate functionality of each module but to also find out whether or not the modules (especially the conformance checker) can identify corrupt file format and corrupt content (wrong data but also malware elements).

The success of the suppliers workshop led to the PREFORMA decision to organize a similar workshop at the end of the re-design phase in M26 (formally end of February 2016), and to combine this workshop with the conference and a project internal meeting.

## 6.4 END OF PHASE 1 REPORTS

The end of phase 1 report aimed at bringing forward various administrative details like structure of the work, relation between effort and budget, policies, IPR, and more. PREFORMA used this report for other purposes, too. The evaluators checked the compliance of the functional and technical specification findings with the negotiation phase results in terms of their compliance. The administrative information were complemented by questions regarding the suppliers' future strategies, the road map for the work to come, the questions of future licensing models, and aspects of the training, test, and demonstration data set provision. Moreover, the suppliers were asked to provide information on the intended innovation and the respective R&D highlights, the long-term collaboration and exploitation potential, and the standardization and open source approach details the suppliers had in mind to go for.

The updated structure of the end of phase 1 report allowed the PREFORMA consortium partners to much better understand the aims and goals of the suppliers as it would have been only based on the specification documents. The additional information provided played an important role in the final phase of the evaluation, and also in the decision making process for selecting the most appropriate supplier per media file type for being invited for the prototype phase 1.

## 6.5 SUMMARY

Summarizing what has been found out during the design phase 1 procedures, at least five lessons learned could be identified. They will for sure be complemented by a series of other lessons learned that are of a more generic character, and will be presented and explained on a different occasion.

1. The definition of applicable evaluation criteria was found out to be a very critical part of the project because the evaluation process requires that – eventually – these criteria generate quantitative scores to be used to ranking.
2. The entire set of documents provided by the six suppliers has adequately been focused on the call for tender and the challenge brief topics so that it was comparably easy to evaluate the documents according to the quantitative evaluation criteria defined.



3. The assessment of additional qualitative criteria like, e.g., the “elegance” of the architectural approach could only be appropriately reflected for the evaluation scheme and the decision making process in an appropriate combination of quantitative and qualitative evaluation criteria.
4. The PREFORMA consortium will, with the beginning of the prototype phase 1, put very much effort and attention to the fact that all three selected supplier must focus their development processes on innovative R&D work.
5. All these preliminary lessons learned, and certainly several more, will seriously be incorporated into the planning and preparation of the re-design phase to start in November 2015 (M23 – M26).



## 7 DETAILED PROCEDURE OF THE EVALUATION

The PREFORMA consortium members as well as several of the invited external experts could appropriately base the preparation of the entire evaluation process on their experience made, among others, during the review of the suppliers' bids back in Fall 2014. Various elements and related performed steps of the February / March 2015 review process and the respective evaluation procedures dating back from August 2014 till October 2014 could be used for establishing the entire end of design phase 1 evaluation procedure.

Taking into account a lesson learned from the previously performed procedure in 2014, each of reports (functional, technical) being part of the End-of-Phase#1 report of the six suppliers was allocated to in minimum six independent reviewers or reviewing organizations, respectively.

1. At least two of the reviewers represented the technical domain making sure that mainly the aspects of technical specification and – later on – implementation were properly taken into account for defining the marks and the respective ranking.
2. At least three other reviewers represented the PREFORMA internal application domain meaning that the respective media file type did match the interest of the respective memory institutions in a way that these three organizations were – due to their own experience with the respective media type – able to foresee the benefits of the implementation and integration of the conformance checker for the respective file type into their own environment.
3. Last but not least, one external reviewer was invited to look at the submitted technical and functional documentation from an outside view nonetheless also representing the view on a particular media file type.

Without describing in detail the allocation of the three categories of reviewers to the six submitted sets of report, the following list contains the representatives (not persons) of the three individual categories of reviewers:

- Technical experts: FRAUNHOFER, PACKED
- Memory domain experts: RA, EVKM, LGMA, SPK, KB, KIK-IRPA, BEELD EN GELUID, AJGI, GFC
- External experts: National Archives Croatia, National Archives Denmark, Österreichische Mediathek, Austrian State Archives.

During the course of the evaluation and in addition to what has been said in the previous sections, PREFORMA defined the evaluation matrix (D8.1) and the respective mathematical formulas for the calculation forming the basis of the ranking. It was specifically important to guide all reviewers the same way on how to evaluate the different designs provided by the suppliers with regard to the three media file types.

Moreover, the evaluators were asked to particularly pay attention to aspects like:

- How is the form and extent of the documents provided?
- Did the suppliers use standard modeling languages (e.g. UML)?



- Did the suppliers explain the necessary functionality based on models for use cases and user scenarios?
- Did the suppliers go beyond the PREFORMA requirements in order to better understand the needs of the community?
- Did the suppliers carry out user-centered design activities?
- Did the suppliers involve established standards and specifications?
- Did the suppliers build on open-source software or frameworks?
- Did the suppliers understand the effort / budget relationship?

Based on the individual results of the reviewers and evaluators regardless whether inside or outside the PREFORMA project, the decision making process defined before could eventually be kicked off.



## 8 THE DECISION MAKING PROCESS

After finalization of the formal review process and the evaluation procedures alike, and as also foreseen in the conclusions of D8.1, the decision making process had to be established according to the call for tender and the challenge brief as well as on the legal constraints as it was laid down in the PREFORMA handbook.

The consortium decided to combine the former step of the evaluation of the functional specification, the technical specification, the workshop presentation, and the end of design phase 1 interim administration report on the one hand, and the planned evaluation of the new bids of the suppliers on the other. It does not make sense to rush through a challenging evaluation process within 8 days, and then having a lot of time for the suppliers just to add a price to their anyway provided specification that forms the foundation of the prototype phase bid. The revised schedule (as planned) now looks therefore as follows:

<b>Fri MAR 6</b>	<b>Presentation and Q&amp;A based on deliverables (functional and technical)</b>
Mon MAR 9	Start of the design phase 1 evaluation, based on the available deliverables
Sat MAR 14	Deadline for the <b>end of phase report</b> , including the final technical and functional specifications and the feedback from the Q&A in track changes
Fri MAR 20	Consensus meeting for only the <b>eligibility check</b> - delivered in due time; content is complete but not yet on the quality of the content!
<b>Fri MAR 20</b>	<b>Deadline for the individual evaluation forms</b>
Mon MAR 23 – Fri APR 3	Organization of the 3 virtual evaluation meetings to end on Mon APR 6
Mon MAR 23	<b>Publication of invitation</b> to bid for prototyping (plus cost for realizing functional and technical specifications in the report including price breakdown)
Fri APR 3	Deadline for the suppliers' <b>bid</b> (mainly by adding price and cost breakdown)
Tue APR 7 (am)	Deadline for the final scores for each of the six designs
Tue APR 7 (pm)	Consensus meeting (final <b>ranking</b> ) to agree on the scores for each of the six designs, and to agree on their ranking
Fri APR 10 (am)	Consensus meeting ( <b>award decision</b> ) to agree on the designs that can enter the prototyping
Fri APR 10 (pm)	Award decision
Mon APR 14	Kick off meeting (virtual) for the prototyping phase



<b>Mon APR 20</b>	<b>D8.2 First design phase report v1.0</b>
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The time between the Brussels suppliers' workshop and the delivery of D8.2 can be grouped into three phases: (1) The phase to prepare the decision making process by collecting the individual results of the review in the form of the matrix; (2) the phase to harmonize and consolidate these individual evaluation and review results in order to form consolidated reports, and (3) the phase to draw conclusions from the consolidated reports in order to come to a decision, and to announce the awards to all six supplier teams.

In the following section, the three phases will shortly be introduced, and the process as well as the achievements will be described. It might be necessary to mention that phases 2 and 3 show an overlap but this was by purpose.

## 8.1 DECISION PREPARATION PHASE (MARCH 6<sup>TH</sup> TO 20<sup>TH</sup>)

According to the schedule for the decision making process in general, it was planned to run the first phase – the decision preparation phase – from March 6<sup>th</sup> to March 20<sup>th</sup>. So this phase did include the Brussels suppliers' workshop, and the individual review of all six suppliers' documentation by at least six reviewers (see section 6 for details).

As almost always, slight derivations from the plan are to be accepted. So the following table contains the real dates of the various activities planned and performed during the decision preparation phase.

<b>Fri MAR 6</b>	<b>Presentation and Q&amp;A based on deliverables (functional and technical)</b>
<b>Mon MAR 9</b>	Start of the design phase 1 evaluation, based on the available deliverables
<b>Sat MAR 14</b>	Deadline for the <b>end of phase report</b> , including the final technical and functional specifications and the feedback from the Q&A in track changes
<b>Fri MAR 20</b>	Consensus meeting for only the <b>eligibility check</b> - delivered in due time; content is complete but not yet on the quality of the content!
<b>Fri MAR 25</b>	<b>Deadline for the individual evaluation forms</b>

The submission deadline for the individual evaluation forms needed to be moved a bit in order to allow all reviewers to complete the evaluation, and to provide their forms for the values to be included into the calculation. The slight delay, nonetheless, did not cause a real problem for the procedure because the virtual consensus meetings to follow in the next phase were planned to take place not before March 31<sup>st</sup>. So at the beginning of the consensus phase, all results were available to the evaluation coordinator.

It was interesting to realize that the votes and values given by the technical partners PACKED and FRAUNHOFER were slightly different compared with the votes and values given by the memory institutions. The coordinators of the consolidation reports assumed that the memory in-



stitutions put their focus on the usability of the modules specified whereas the technical partners may have put more focus on the architecture, the completeness of the specification, and the implementation strategy. Nonetheless, the difference in the given votes and values did not cause any problem in harmonizing the review results, and the consolidation meetings were additionally used to sort out different interpretations of the meaning of the categories to be evaluated. Details are to be found in the final evaluation report.

## 8.2 CONSOLIDATION PHASE (MARCH 20<sup>TH</sup> TO APRIL 3<sup>RD</sup>)

Immediately following the decision preparation phase, the aim of this second phase was to appropriately harmonize the various individual evaluation reports received by the evaluators (in total 36 statements), and to consolidate the results of these reports in a way that the decision making process could be supported as much as possible.

According to the PREFORMA rules, all six suppliers had submitted all required documents on time and in a good quality. There thus were eligible for submitting a bid for the next phase. The invitation to all six supplier teams was published and distributed on time allowing the teams to create and submit their bids for the prototype phase on time, too (deadline April 3<sup>rd</sup>).

The only deviation of the table below in comparison to the table in the introductory part of this section was the decision on when to hold the three meetings, each dedicated to discuss and harmonize the review results of a particular media file type. The dates of the respective meetings are listed below, too.

Mon MAR 23 – Fri APR 3	Organization of the 3 virtual evaluation meetings to end on Mon APR 6
Mon MAR 23	<b>Publication of invitation</b> to bid for prototyping (plus cost for realizing functional and technical specifications in the report including price breakdown)
Tue MAR 31	<i>Virtual consolidation meeting for media file type AV</i>
Thu APR 2	<i>Virtual consolidation meeting for media file type TEXT</i>
Tue APR 7	<i>Virtual consolidation meeting for media file type IMAGE</i>
Fri APR 3	Deadline for the suppliers' <b>bid</b> (mainly by adding price and cost breakdown)

According to the completeness of the evaluation matrix files, and on the availability of the PREFORMA consortium members and the external reviewers, PREFORMA started its series of consolidation meeting with the media file type AV. The two suppliers who did bid for AV had achieved different values and marks so that the recommendation for a decision was quite easy to make. In terms of the TEXT specifications, the same appeared, and it was possible to make a decision, too. The most challenging decision was to be made with regard to the media file type IMAGE because here the marks provided by the technical partners and those provided by the memory institutions were a bit more different compared with the other media file types. None-



theless, the PREFORMA evaluation team was able to come to a conclusion with regard to all three media file types. This was an important step forward to the following decision making process because it allowed the PREFORMA Evaluation Committee and the PREFORMA consortium in total to proceed on time with the process of finding out whether or not there are three winners out of the six suppliers, and whether it was possible to find one winner per media file type, as originally intended.

### 8.3 DECISION MAKING PHASE (MARCH 23<sup>RD</sup> TO APRIL 10<sup>TH</sup>)

Sequentially following the consolidation phase but overlapping in terms of the preparation and information collection, the decision making process started with planning for the decision making process itself, and with collecting the reports from the three meetings, one per media file type. The appointed rapporteurs were able, based on the consolidated reports, to compile a list of arguments pro and contra each of the six suppliers that finally were used as an important input to the decision making as such.

Tue APR 7 (am)	Deadline for the final scores for each of the six designs
Tue APR 7 (pm)	Consensus meeting (final <b>ranking</b> ) to agree on the scores for each of the six designs, and to agree on their ranking
Fri APR 10 (am)	Consensus meeting ( <b>award decision</b> ) to agree on the designs that can enter the prototyping
Fri APR 10 (pm)	Award decision
Tue APR 14	Kick off meeting (virtual) for the prototyping phase

In the morning of April 7<sup>th</sup>, all final scores of the six suppliers had arrived. In a few cases, the rapporteurs needed to raise one or two clarifying questions to the suppliers; in other cases, the different scores of technical partners and memory institutions were harmonized (priority list of parameters, meaning of the given scores, mean values, etc.)

On April 10<sup>th</sup>, the PREFORMA consortium was able to make the award decision based on the final scores of the suppliers, and based on the bid for the prototype phase 1. The final scores, the decisions, and the arguments why PREFORMA decided to go for the three winning teams can be found in the internal section of the PREFORMA website. The results will not be published here in detail because this deliverable is considered to be publicly available.

In the evening of April 10<sup>th</sup>, the PREFORMA coordinator issued messages to the three winning suppliers teams inviting them for the virtual kick off meeting for prototype phase 1. This meeting was originally scheduled for April 13<sup>th</sup> but needed to be moved to April 14<sup>th</sup> because of the unavailability of several of the PREFORMA consortium members as well as of some of the supplier team members. So April 14<sup>th</sup> marked the beginning of the prototype phase 1 to start developing the modules and components. This prototype phase 1 will formally end on October 31<sup>st</sup> to proceed with the re-design phase (design phase 2).



## 8.4 SUMMARY

The PREFORMA consortium as well as the external reviewers made a very good experience with the Brussels suppliers' workshop. The consortium members were able to ask questions to the suppliers, to not only read a lot of pages but to see the summary of the functional and technical specifications in the form of a presentation. This good experience led to the conclusion that at the end of the re-design phase (design phase 2) in February / March 2016, a similar workshop shall take place, this time not in a confidential way as it was necessary for the March 2015 workshop (still all six suppliers were competing). It makes sense to combine various efforts to (1) allow the public to follow the progress, to (2) allow the PREFORMA consortium to have a project meeting along with the workshop, and to (3) reduce the need to traveling significantly.

So the **training event for Open Source companies** will take place in Stockholm in April 2016, in connection with the end of re-design phase, inviting also the suppliers, to contribute to the open source community around the developed tools. The **Experience Workshop** will take place in Berlin in December 2016, in connection with the second Prototype Demonstration, where the PREFORMA partners will share with memory institutions their experiences of working with suppliers under joint R&D services agreements. And last but not least, the **Final Conference** will take place in Stockholm in December 2017 to present the final results of the project.



## 9 DECISIONS MADE BY PREFORMA CONSORTIUM

The PREFORMA consortium went for the decisions as soon as all results were available, and the consolidation had taken place. This section presents all the decisions taken and their explanations. The full Final Evaluation Report is available in Annex 2 (confidential).

### 9.1 OVERALL SCORES

The review and evaluation phase results as well as the analysis of the bids submitted by all six suppliers led to the following table containing the results of each supplier as well as the submitted cost model. The individual tables will follow in the sectors below addressing the respective media file types.

	Impact on Challenge	Technical approach	Quality of the tender	Cost	Total
<b>VeraPDF</b>	4,59	4,16	4,77	1,42	<b>3,99</b>
<b>MediaArea</b>	4,51	4,29	3,71	1,36	<b>3,84</b>
<b>EasyInnova</b>	4,06	4,29	3,75	1,36	<b>3,69</b>
LIBIS	2,90	3,51	2,84	5,00	<b>3,42</b>
UCL	3,21	3,79	3,30	1,61	<b>3,18</b>
Preservica	3,33	3,01	3,48	2,10	<b>3,06</b>

On the basis of the ranking presented above, as well as based on the text documents listing the pros and cons for each supplier team and their bids, the following decisions have been taken by the PREFORMA Evaluation Committee:

- The following bids have been invited to sign a contract for phase of prototyping:
  - VeraPDF
  - MediaArea
  - EasyInnova
- VeraPDF will be invited to sign a contract for their basic offer, excluding the options that they offered to work on in addition to the basic offer (package). PREFORMA decided not to accept additional offers by now but to keep the ideas and inspirations in mind for a later phase, e.g. for the testing phase.
- For the bid of EasyInnova, a particular paragraph will be added to the contract for the prototype phase to explain that patent and IPR issues related to TIFF still have to be researched and resolved and the results need to be provided to the PREFORMA consortium but also to the public (the open source community).
- A small amount of money remains available to be used during the prototyping phase. PREFORMA Consortium will evaluate together with the three selected suppliers the best way to invest them.

The following sections contain more and detailed information about the review results of the six suppliers, and the scores as well as some overall comments that did lead to the respective decision on going for veraPDF, EasyInnova, and MediaArea.



## 9.2 MEDIA FILE TYPE TEXT

In the domain of medial file type text, the two supplier teams of veraPDF and Preservica did compete. The following sections comprise the general evaluation summary of the PREFORMA consortium and the evaluation committee members as well as the table of the scores.

### 9.2.1 veraPDF Consortium

The Evaluation Committee considers the veraPDF design proposal a project that deals comprehensively with all R&D issues addressed in the PREFORMA Challenge Brief. The Evaluation Committee appreciates the comprehensive business plan for bringing the tool to a wide audience, including the mentioned possibilities to extend the tool and organize the open source community. The Evaluation Committee appreciated the excellent functional and technical descriptions, clearly separating functionalities which enable extensibility, scalability and portability of the architecture. The Evaluation Committee appreciated the comprehensive and extremely detailed risk analysis, which has been applied through the design phase 1, e.g., the license/apache/greenfield conflict management.

veraPDFa

3.99

			E	T	T	D	D	D	External Expert	Technical Expert	Domain Expert	Total
									30%	30%	40%	
									30%	30%	40%	
C1	Impact on the Challenge	35%	4,45	4,45	4,65	4,65	4,9	4,6	4,45	4,55	4,72	4,59
	1 Basic Research Questions	10%	5	5	5	5	5	5	5,00	5,00	5,00	5,00
	2 Conformance Checker	20%	5	4	5	5	5	5	5,00	4,50	5,00	4,85
	3 Reference Implementation	20%	4	5	5	5	5	4	4,00	5,00	4,67	4,57
	4 Future Proof	5%	4	4	4	4	5	4	4,00	4,00	4,33	4,13
	5 Commercial Feasibility	15%	4	4	4	4	5	4	4,00	4,00	4,33	4,13
	6 Open Source Work Practices	5%	4	5	4	4	5	5	4,00	4,50	4,67	4,42
	7 Delivery and Installation	10%	4	4	4	4	4	5	4,00	4,00	4,33	4,13
	8 Open Source Interaction Pra	10%	5	5	5	5	5	5	5,00	5,00	5,00	5,00
	9 Open Source IPR Distributio	5%	5	4	5	5	5	5	5,00	4,50	5,00	4,85
									30%	50%	20%	
C2	Technical Approach	35%	4,06	4,06	4,17	4,22	4,11	4,94	4,06	4,11	4,43	4,16
	1 Architecture	30%	4	4	4	4	4	5	4,00	4,00	4,33	4,07
	2 Performance and Quality	10%	0	0	0	0	0	0	0,00	0,00	0,00	0,00
	3 Shell Services and Features	30%	4	4	4	4	4	5	4,00	4,00	4,33	4,07
	4 Implementation Checker Ser	10%	3	4	4	5	3	5	3,00	4,00	4,33	3,77
	5 Policy Checker Services anc	5%	4	4	4	5	5	4	4,00	4,00	4,67	4,13
	6 Reporter Services and Featu	10%	5	4	5	4	5	5	5,00	4,50	4,67	4,68
	7 Metadata Fixer Service and	5%	5	5	5	5	5	5	5,00	5,00	5,00	5,00
									30%	35%	35%	
C3	Quality of the Tender	15%	4,85	5	4,7	4,6	4,85	4,45	4,85	4,85	4,63	4,77
	1 Project Plan	15%	5	5	4	5	5	5	5,00	4,50	5,00	4,83
	2 Management Effectiveness	15%	5	5	5	5	5	5	5,00	5,00	5,00	5,00
	3 Resource Allocation	15%	5	5	5	5	5	5	5,00	5,00	5,00	5,00
	4 Risk Assessment / Risk Fact	15%	4	5	4	5	4	4	4,00	4,50	4,33	4,29
	5 Negotiation Protocol	40%	5	5	5	4	5	4	5,00	5,00	4,33	4,77
									30%	35%	35%	

The table above indicates the strengths and weaknesses of the veraPDF proposal and specifications in a more detailed manner than the overall review table in section 9.1, and the general evaluation comments above.



## 9.2.2 Preservica Consortium

The Evaluation Committee considers the Preservica design proposal a clear and well-defined proposal, but believes that the content of the proposal does not address the main challenge of the PREFORMA project, i.e. establishing a reference implementation of PDF/A. A major shortcoming of the proposal is that it does not include any details on developing an innovative implementation checker for PDF/A. The Evaluation Committee members have considered the proposal of realizing the implementation checker module by integrating several existing validators as a major shortcoming for the R&D ambition of the project. The Evaluation Committee considers the proposal for an 'integrated architecture', wrapping all functionalities into one package as a major shortcoming of the project, since it complicates the modularity and portability of the solution. The Evaluation Committee appreciates that the proposal contains a comprehensive description about how the open source community will be organized.

Preservica												
3.06												
			E	T	T	D	D	D	External Expert	Technical Expert	Domain Expert	Total
									30%	30%	40%	
C1	Impact on the Challenge	35%	4	2,65	2,9	2,45	3,9	3,4	4	2,78	3,25	3,33
	1 Basic Research Questions	10%	3	2	2	1	4	2	3,00	2,00	2,33	2,43
	2 Conformance Checker	20%	4	2	2	2	3	3	4,00	2,00	2,67	2,87
	3 Reference Implementation	20%	4	3	3	3	4	3	4,00	3,00	3,33	3,43
	4 Future Proof	5%	4	2	2	2	4	4	4,00	2,00	3,33	3,13
	5 Commercial Feasibility	15%	5	3	4	3	5	4	5,00	3,50	4,00	4,15
	6 Open Source Work Practice	5%	3	3	3	3	3	4	3,00	3,00	3,33	3,13
	7 Delivery and Installation	10%	4	3	4	3	4	4	4,00	3,50	3,67	3,72
	8 Open Source Interaction Pre	10%	4	3	3	2	4	4	4,00	3,00	3,33	3,43
	9 Open Source IPR Distributic	5%	4	3	3	3	4	4	4,00	3,00	3,67	3,57
									30%	50%	20%	
C2	Technical Approach	35%	3,94	2,22	2,56	2,61	3,61	3,22	3,94	2,39	3,15	3,01
	1 Architecture	30%	4	2	3	3	4	4	4,00	2,50	3,67	3,18
	2 Performance and Quality	10%	0	0	0	0	0	0	0,00	0,00	0,00	0,00
	3 Shell Services and Features	30%	4	3	3	3	3	3	4,00	3,00	3,00	3,30
	4 Implementation Checker Se	10%	3	1	1	1	3	2	3,00	1,00	2,00	1,80
	5 Policy Checker Services and	5%	3	2	2	2	3	4	3,00	2,00	3,00	2,50
	6 Reporter Services and Feat	10%	5	2	2	2	5	3	5,00	2,00	3,33	3,17
	7 Metadata Fixer Service and	5%	4	2	2	3	4	2	4,00	2,00	3,00	2,80
									30%	35%	35%	
C3	Quality of the Tender	15%	4,3	2,75	3,15	2,45	3,45	4,05	4,3	2,95	3,32	3,48
	1 Project Plan	15%	4	3	3	2	3	5	4,00	3,00	3,33	3,42
	2 Management Effectiveness	15%	5	3	3	4	4	5	5,00	3,00	4,33	4,07
	3 Resource Allocation	15%	5	4	4	3	4	5	5,00	4,00	4,00	4,30
	4 Risk Assessment / Risk Fac	15%	4	3	3	2	4	4	4,00	3,00	3,33	3,42
	5 Negotiation Protocol	40%	4	2	3	2	3	3	4,00	2,50	2,67	3,01
									30%	35%	35%	

The table above indicates the weaknesses and strengths of the Preservica proposal and specifications in a more detailed manner than the overall review table in section 9.1, and the general evaluation comments above.

## 9.2.3 Text Decision

According to the scores as well as the overall comments made by the PREFORMA consortium, the veraPDF supplier team was invited to go to the prototype phase 1.



## 9.3 MEDIA FILE TYPE IMAGE

In the domain of medial file type image, the two supplier teams of EasyInnova and LIBIS did compete. The following sections comprise the general evaluation summary of the PREFORMA consortium and the evaluation committee members as well as the table of the scores.

### 9.3.1 EasyInnova Consortium

The Evaluation Committee considers the Easy Innova design proposal a comprehensive project, though with some concerns about the practical implementation of the plan. The Evaluation Committee appreciates the ambitious plan for bringing the Conformance Checker to different user communities, and the research invested in researching potential patent and license issues that may affect the planned re-use of the listed software components. The Evaluation Committee considers the description of the technical architecture as comprehensive, but has some concerns if the ambition level for developing an innovative implementation checker for TIFF will be sufficient.

EASYINNOVA												
3.69												
			E	T	T	D	D	D	External Expert	Technical Expert	Domain Expert	Total
									30%	30%	40%	
C1	Impact on the Challenge	35%	3,85	4,65	3,9	4,3	4,25	3,6	3,85	4,28	4,05	4,06
	1 Basic Research Questions	10%	4	5	4	4	4	3	4,00	4,50	3,67	4,02
	2 Conformance Checker	20%	4	5	3	5	4	4	4,00	4,00	4,33	4,13
	3 Reference Implementation	20%	4	5	5	5	4	3	4,00	5,00	4,00	4,30
	4 Future Proof	5%	4	4	4	5	4	4	4,00	4,00	4,33	4,13
	5 Commercial Feasibility	15%	3	3	3	2	5	4	3,00	3,00	3,67	3,27
	6 Open Source Work Practices	5%	4	5	4	3	4	4	4,00	4,50	3,67	4,02
	7 Delivery and Installation	10%	5	5	4	5	5	4	5,00	4,50	4,67	4,72
	8 Open Source Interaction Practice	10%	3	5	4	5	4	3	3,00	4,50	4,00	3,85
	9 Open Source IPR Distribution	5%	4	5	5	4	4	4	4,00	5,00	4,00	4,30
									30%	50%	20%	
C2	Technical Approach	35%	4,22	4,67	4,11	4,78	4,06	3,67	4,22	4,39	4,17	4,29
	1 Architecture	30%	4	5	4	5	4	3	4,00	4,50	4,00	4,25
	2 Performance and Quality	10%	0	0	0	0	0	0	0,00	0,00	0,00	0,00
	3 Shell Services and Features	30%	4	4	4	5	4	4	4,00	4,00	4,33	4,07
	4 Implementation Checker Services	10%	5	5	5	4	4	5	5,00	5,00	4,33	4,87
	5 Policy Checker Services and Featu	5%	5	5	5	5	4	5	5,00	5,00	4,67	4,93
	6 Reporter Services and Features	10%	5	5	4	5	5	3	5,00	4,50	4,33	4,62
	7 Metadata Fixer Service and Featur	5%	3	5	3	3	3	3	3,00	4,00	3,00	3,50
									30%	35%	35%	
C3	Quality of the Tender	15%	4,25	3,45	4,05	2,7	3,45	3,85	4,25	3,75	3,33	3,75
	1 Project Plan	15%	4	5	5	1	4	5	4,00	5,00	3,33	4,12
	2 Management Effectiveness	15%	4	3	5	3	4	3	4,00	4,00	3,33	3,77
	3 Resource Allocation	15%	4	4	5	3	3	4	4,00	4,50	3,33	3,94
	4 Risk Assessment / Risk Factors	15%	3	3	4	3	4	3	3,00	3,50	3,33	3,29
	5 Negotiation Protocol	40%	5	3	3	3	3	4	5,00	3,00	3,33	3,72
									30%	35%	35%	

The table above indicates the strengths and weaknesses of the EasyInnova proposal and specifications in a more detailed manner than the overall review table in section 9.1, and the general evaluation comments above.

### 9.3.2 LIBIS Consortium

The Evaluation Committee considers the LIBIS design proposal a concrete and transparent project and appreciates the deliberate 'hands-on' approach, although it makes the proposal less comprehensive than other proposals. The Evaluation Committee appreciates the well-



researched specification of the TIFF/A profile, although it has some shortcomings in addressing long term preservation issues. The Evaluation Committee observes shortcomings in the plans for establishing an open source community that would further develop and disseminate the Conformance Checker. The Evaluation committee considers the description of the technical architecture too high level, compared to the other proposals.

LIBIS

3.42

		E T T D D D							External Expert	Technical Expert	Domain Expert	Total	
									30%	30%	40%		
C1	Impact on the Challenge	35%	2,75	2,75	3,15	2,7	2,55	3,65	2,75	2,95	2,97	2,90	
	1 Basic Research Questions	10%	4	5	4	4	2	3	4,00	4,50	3,00	3,75	
	2 Conformance Checker	20%	3	4	4	3	3	4	3,00	4,00	3,33	3,43	
	3 Reference Implementation	20%	2	2	3	3	2	3	2,00	2,50	2,67	2,42	
	4 Future Proof	5%	3	2	2	5	3	4	3,00	2,00	4,00	3,10	
	5 Commercial Feasibility	15%	2	2	2	1	2	3	2,00	2,00	2,00	2,00	
	6 Open Source Work Practices	5%	3	3	3	1	3	5	3,00	3,00	3,00	3,00	
	7 Delivery and Installation	10%	4	1	4	5	4	5	4,00	2,50	4,67	3,82	
	8 Open Source Interaction Practice	10%	2	2	2	1	2	4	2,00	2,00	2,33	2,13	
	9 Open Source IPR Distribution	5%	3	4	4	1	3	3	3,00	4,00	2,33	3,03	
										30%	50%	20%	
C2	Technical Approach	35%	3,67	3	3,56	4,61	2,89	4	3,67	3,28	3,83	3,51	
	1 Architecture	30%	4	3	4	5	3	4	4,00	3,50	4,00	3,75	
	2 Performance and Quality	10%	0	0	0	0	0	0	0,00	0,00	0,00	0,00	
	3 Shell Services and Features	30%	4	2	3	5	3	4	4,00	2,50	4,00	3,25	
	4 Implementation Checker Services	10%	3	5	3	5	2	5	3,00	4,00	4,00	3,70	
	5 Policy Checker Services and Featu	5%	4	5	5	4	3	5	4,00	5,00	4,00	4,50	
	6 Reporter Services and Features	10%	3	3	4	3	3	3	3,00	3,50	3,00	3,25	
	7 Metadata Fixer Service and Featur	5%	2	3	3	3	3	3	2,00	3,00	3,00	2,70	
										30%	35%	35%	
C3	Quality of the Tender	15%	3,65	2,55	1,95	2,7	1,95	3,55	3,65	2,25	2,73	2,84	
	1 Project Plan	15%	2	2	1	1	1	3	2,00	1,50	1,67	1,71	
	2 Management Effectiveness	15%	3	3	1	3	1	3	3,00	2,00	2,33	2,42	
	3 Resource Allocation	15%	3	1	2	3	2	4	3,00	1,50	3,00	2,48	
	4 Risk Assessment / Risk Factors	15%	3	3	1	3	1	3	3,00	2,00	2,33	2,42	
	5 Negotiation Protocol	40%	5	3	3	3	3	4	5,00	3,00	3,33	3,72	
										30%	35%	35%	

The table above indicates the weaknesses and strengths of the LIBIS proposal and specifications in a more detailed manner than the overall review table in section 9.1, and the general evaluation comments above.

### 9.3.3 Image Decision

According to the scores as well as the overall comments made by the PREFORMA consortium, the EasyInnova supplier team was invited to go to the prototype phase 1.

## 9.4 MEDIA FILE TYPE AUDIO-VISUAL

In the domain of medial file type AV, the two supplier teams of MediaArea and UCL did compete. The following sections comprise the general evaluation summary of the PREFORMA consortium and the evaluation committee members as well as the table of the scores.

### 9.4.1 MediaArea Consortium

The Evaluation Committee considers the MediaArea design proposal a comprehensive project, demonstrating expertise in both FFV1 and MKV file formats and proposing a convincing busi-



ness plan that meets the objectives of the PREFORMA Challenge Brief and the tender documents. The Evaluation Committee appreciates the plans for standardizing the MKV/FFV1 reference implementation through IETF and engaging the MKV community. The Evaluation Committee appreciated the user oriented approach, which demonstrated well-done research into community needs.

### MediaArea

3.84

			E	T	T	D	D	D	External Expert	Technical Expert	Domain Expert	Total
									30%	30%	40%	
C1	Impact on the Challenge	35%	4,55	4,65	4,7	3,8	5	4,3	4,55	4,68	4,37	4,51
	1 Basic Research Questions	10%	4	5	5	4	5	5	4,00	5,00	4,67	4,57
	2 Conformance Checker	20%	4	5	5	5	5	5	4,00	5,00	5,00	4,70
	3 Reference Implementation	20%	5	5	5	3	5	4	5,00	5,00	4,00	4,60
	4 Future Proof	5%	4	4	4	4	5	4	4,00	4,00	4,33	4,13
	5 Commercial Feasibility	15%	5	3	4	4	5	4	5,00	3,50	4,33	4,28
	6 Open Source Work Practices	5%	5	5	5	5	5	5	5,00	5,00	5,00	5,00
	7 Delivery and Installation	10%	4	5	4	2	5	4	4,00	4,50	3,67	4,02
	8 Open Source Interaction Practice	10%	5	5	5	4	5	4	5,00	5,00	4,33	4,73
	9 Open Source IPR Distribution	5%	5	5	5	3	5	3	5,00	5,00	3,67	4,47
									30%	50%	20%	
C2	Technical Approach	35%	4,5	4,22	4,22	4,06	4,28	4,11	4,5	4,22	4,15	4,29
	1 Architecture	30%	5	4	4	5	4	4	5,00	4,00	4,33	4,37
	2 Performance and Quality	10%	0	0	0	0	0	0	0,00	0,00	0,00	0,00
	3 Shell Services and Features	30%	4	4	4	4	4	4	4,00	4,00	4,00	4,00
	4 Implementation Checker Services and Fez	10%	4	4	4	4	5	4	4,00	4,00	4,33	4,07
	5 Policy Checker Services and Features	5%	5	5	5	3	5	4	5,00	5,00	4,00	4,80
	6 Reporter Services and Features	10%	5	5	5	3	5	5	5,00	5,00	4,33	4,87
	7 Metadata Fixer Service and Features	5%	4	5	5	2	4	4	4,00	5,00	3,33	4,37
									30%	35%	35%	
C3	Quality of the Tender	15%	3,85	3,15	3,85	3,7	3,85	3,85	3,85	3,5	3,80	3,71
	1 Project Plan	15%	4	3	4	4	4	4	4,00	3,50	4,00	3,83
	2 Management Effectiveness	15%	4	3	4	4	4	4	4,00	3,50	4,00	3,83
	3 Resource Allocation	15%	4	4	4	3	3	3	4,00	4,00	3,00	3,65
	4 Risk Assessment / Risk Factors	15%	3	3	3	3	4	4	3,00	3,00	3,67	3,23
	5 Negotiation Protocol	40%	4	3	4	4	4	4	4,00	3,50	4,00	3,83
									30%	35%	35%	

The table above indicates the strengths and weaknesses of the MediaArea proposal and specifications in a more detailed manner than the overall review table in section 9.1, and the general evaluation comments above.

## 9.4.2 UCL Consortium

The Evaluation Committee considers the UCL design proposal a comprehensive project, addressing all aspects and functionalities described in the Challenge Brief. The Evaluation Committee appreciated the deliberate research effort made in identifying the patent claims that may affect implementation of the JPEG2000 Part 1 specification and the detailed technical description. However, the Evaluation Committee observes a major lack of information on checking conformance of the MKV container and the way lossless JPEG2000 and LPCM streams are embedded.



UCL

3.18

		E	T	T	D	D	D	External Expert	Technical Expert	Domain Expert	Total
								30%	30%	40%	
<b>C1 Impact on the Challenge</b>	<b>35%</b>	<b>2,8</b>	<b>4,15</b>	<b>3,4</b>	<b>3,2</b>	<b>2,5</b>	<b>3,55</b>	<b>2,8</b>	<b>3,78</b>	<b>3,08</b>	<b>3,21</b>
1 Basic Research Questions	10%	2	5	4	4	2	4	2,00	4,50	3,33	3,28
2 Conformance Checker	20%	2	5	3	5	3	3	2,00	4,00	3,67	3,27
3 Reference Implementation	20%	3	4	3	2	3	3	3,00	3,50	2,67	3,02
4 Future Proof	5%	3	5	3	3	3	3	3,00	4,00	3,00	3,30
5 Commercial Feasibility	15%	3	3	3	3	3	4	3,00	3,00	3,33	3,13
6 Open Source Work Practices	5%	3	4	4	3	2	4	3,00	4,00	3,00	3,30
7 Delivery and Installation	10%	3	4	4	2	2	4	3,00	4,00	2,67	3,17
8 Open Source Interaction Practice	10%	3	4	4	3	1	4	3,00	4,00	2,67	3,17
9 Open Source IPR Distribution	5%	5	3	4	3	2	4	5,00	3,50	3,00	3,75
								30%	50%	20%	
<b>C2 Technical Approach</b>	<b>35%</b>	<b>3,67</b>	<b>4,06</b>	<b>3,5</b>	<b>4,17</b>	<b>4,22</b>	<b>3,61</b>	<b>3,67</b>	<b>3,78</b>	<b>4</b>	<b>3,79</b>
1 Architecture	30%	3	4	4	4	5	4	3,00	4,00	4,33	3,77
2 Performance and Quality	10%	0	0	0	0	0	0	0,00	0,00	0,00	0,00
3 Shell Services and Features	30%	4	4	4	5	4	4	4,00	4,00	4,33	4,07
4 Implementation Checker Services and Featu	10%	3	3	2	3	4	3	3,00	2,50	3,33	2,82
5 Policy Checker Services and Features	5%	4	5	2	2	4	2	4,00	3,50	2,67	3,48
6 Reporter Services and Features	10%	5	5	3	5	3	3	5,00	4,00	3,67	4,23
7 Metadata Fixer Service and Features	5%	4	4	3	3	4	3	4,00	3,50	3,33	3,62
								30%	35%	35%	
<b>C3 Quality of the Tender</b>	<b>15%</b>	<b>3,55</b>	<b>3,15</b>	<b>3,4</b>	<b>3,25</b>	<b>2,85</b>	<b>3,25</b>	<b>3,55</b>	<b>3,275</b>	<b>3,12</b>	<b>3,30</b>
1 Project Plan	15%	4	4	3	3	3	3	4,00	3,50	3,00	3,48
2 Management Effectiveness	15%	3	3	3	3	3	3	3,00	3,00	3,00	3,00
3 Resource Allocation	15%	3	3	3	2	3	3	3,00	3,00	2,67	2,88
4 Risk Assessment / Risk Factors	15%	3	3	3	3	2	2	3,00	3,00	2,33	2,77
5 Negotiation Protocol	40%	4	3	4	4	3	4	4,00	3,50	3,67	3,71
								30%	35%	35%	

The table above indicates the weaknesses and strengths of the UCL proposal and specifications in a more detailed manner than the overall review table in section 9.1, and the general evaluation comments above.

### 9.4.3 AV Decision

According to the scores as well as the overall comments made by the PREFORMA consortium, the MediaArea supplier team was invited to go to the prototype phase 1.



Supplier Name		Reviewer Name		Reviewer Type	
				<Technical   Domain   External> Expert	

Category	Category Weight	Item	Item Weight	Score [1-5]
<b>C<sub>1</sub> Impact on the Challenge</b>	<b>35%</b>			
		I <sub>1,1</sub> Basic Research Questions	10%	
		I <sub>1,2</sub> Conformance Checker	20%	
		I <sub>1,3</sub> Reference Implementation	20%	
		I <sub>1,4</sub> Future Proof	5%	
		I <sub>1,5</sub> Commercial Feasibility	15%	
		I <sub>1,6</sub> Open Source Work Practices	5%	
		I <sub>1,7</sub> Delivery and Installation	10%	
		I <sub>1,8</sub> Open Source Interaction Practice	10%	
		I <sub>1,9</sub> Open Source IPR Distribution	5%	
			<b>Category Total</b>	<b>0,00</b>
<b>C<sub>2</sub> Technical Approach</b>	<b>35%</b>			
		I <sub>2,1</sub> Architecture	30%	
		I <sub>2,2</sub> Performance and Quality	10%	
		I <sub>2,3</sub> Shell Services and Features	30%	
		I <sub>2,4</sub> Implementation Checker Services and Features	10%	
		I <sub>2,5</sub> Policy Checker Services and Features	5%	
		I <sub>2,6</sub> Reporter Services and Features	10%	
		I <sub>2,7</sub> Metadata Fixer Service and Features	5%	
			<b>Category Total</b>	<b>0,00</b>
<b>C<sub>3</sub> Quality of the Tender</b>	<b>15%</b>			
		I <sub>3,1</sub> Project Plan	15%	
		I <sub>3,2</sub> Management Effectiveness	15%	
		I <sub>3,3</sub> Resource Allocation	15%	
		I <sub>3,4</sub> Risk Assessment / Risk Factors	15%	
		I <sub>3,5</sub> Negotiation Protocol	40%	
			<b>Category Total</b>	<b>0,00</b>
<b>C<sub>4</sub> Costs</b>	<b>15%</b>			
		I <sub>4,1</sub> Price / Cost	100%	
			<b>Category Total</b>	<b>0,00</b>
			<b>Supplier Grand Total</b>	<b>0,00</b>



## **ANNEX 2: FINAL EVALUATION REPORT OF DESIGN PHASE 1 (CONFIDENTIAL)**

Confidential.



## **ANNEX 3: EVALUATION REPORT 2014 (CONFIDENTIAL)**

Confidential.