

DELIVERABLE

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D8.8 - Monitoring of the Open Source Project implementation

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EXECUTIVE SUMMARY

Deliverable D8.8 reports on monitoring of the Open Source Project implementations. Based on development efforts for each supplier, this updated deliverable (version 2.1) provides feedback on their use of: an open work practice for development; frequent open releases; and promotion activities aiming towards a sustainable community. In particular, it focuses on establishing sustainable communities, together with an assessment of how this is succeeded. The deliverable presents an evaluation of how each open source project implementation adheres to requirements expressed in deliverable D4.3 and how projects and suppliers have acted upon feedback and recommendations from PREFORMA. In so doing, the deliverable provides an evaluation of the extent to which best practices from community driven open source projects have been adopted with adherence to full transparency for all digital assets. Specifically, the evaluation considers software and associated digital assets provided via links to developed and provided resources (including source code, executables, and test files) and tools (including software configuration management system, mailing lists, and build environment) used in each open source project. An important outcome from this evaluation is a report on adherence to requirements (as specified in D4.3 and clarified in feedback from PREFORMA) and an assessment of how contracted organisations have managed to provide open source software and establish thriving and long-term sustainable open source communities of relevance for memory institutions and other stakeholder groups. Based on these outcomes, recommendations are given for further actions by the suppliers, the PREFORMA Consortium, and any potential adopter of software from the Open Source Portal provided by the PREFORMA Consortium.

1 INTRODUCTION

PREFORMA (PREservation FORMAts for culture information/e-archives) is a Pre Commercial Procurement (PCP) project financially supported by the European Commission under its FP7-ICT Programme. The objective of deliverable D8.8 is to report on monitoring of the Open Source Project implementations. This is an updated version of deliverable D8.8 which reports on what suppliers have achieved at month 36 (i.e. December 2016). Hence, the updated version of D8.8 considers work conducted and provided (in stable releases) on the OSP during the PREFORMA prototyping phase (until October 2016), and work conducted and provided on the OSP during the extended PREFORMA prototyping phase (until December 2016). In order to maintain equal treatment among all six suppliers who prepared a bid for the prototyping phase, the analysis presented in the updated version of D8.8 does not consider software provided on the OSP after the extended prototyping phase as this would imply unequal treatment of suppliers, something which is not allowed in public procurement. Overall, in order to avoid discriminating against some suppliers, we specifically highlight the work conducted during the prototyping phase (until October 2016).

The initial version (1.0) of deliverable D8.8 complemented the main deliverable from the prototyping phase (deliverable D8.3). This updated version (2.1) of deliverable D8.8 complements the main deliverable from the second prototyping phase (deliverable D8.5). Deliverable D8.8 is supplementing deliverable D8.5 on how the suppliers have adhered to utilising effective open source work practices in their prototypes released on the Open Source Portal. Since the three suppliers provided their respective “intermediate report”¹ and their respective “final report”² in the prototyping phase 1, an overarching observation is that they have initially accounted for feedback from PREFORMA review comments³ and have gradually adjusted their work in order for the PREFORMA project. However, as the project evolved and the three suppliers provided their respective “intermediate report”⁴ and their respective “final report”⁵ in the prototyping phase 2, it seems clear that feedback provided from PREFORMA⁶

¹ From the “PREFORMA Prototyping Phase 1” after completion of their work in July 2015.

² From the “PREFORMA Prototyping Phase 1” after completion of their work in October 2015.

³ This includes the feedback from the Skövde partner concerning the “PREFORMA Prototyping Phase 1 – Intermediate Report” provided in August 2015 (and provided as part of the “Feedback on the intermediate release” concerning phase 1 from the PREFORMA consortium) and the feedback from the Skövde partner concerning the “PREFORMA Prototyping Phase 1 – Final Report” provided in November 2015 (and provided as part of the “Feedback on the final release” concerning phase 1 from the PREFORMA consortium).

⁴ From the “PREFORMA Prototyping Phase 2” after completion of their work in July 2016.

⁵ From the “PREFORMA Prototyping Phase 2” after completion of their work in October 2016.

has been accounted for to a lesser extent. Consequently, for all three projects there remain a number of unresolved issues which must be addressed before developed software can be distributed for use by memory institutions and other organisations during and beyond PREFORMA. Hence, there is a need for corrective actions⁷ by the suppliers in order for PREFORMA to successfully achieve its goals and fulfil the PREFORMA R&D challenge.

Based on development efforts for each supplier undertaken in relation to each open source project, this deliverable provides feedback on adherence to fundamental requirements (as specified in D4.3 and clarified in feedback from PREFORMA) and an evaluation of how each open source project use: an open work practice for development; frequent open releases; and promotion of activities aiming towards a sustainable community. In so doing, this deliverable reports on observations concerning achievements made so far.

The rest of this document is organised as follows. Section 2 elaborates on adherence to requirements for provision of open source projects, section 3 presents an evaluation of sustainability of open source projects and associated communities, and section 4 concludes the content of the deliverable.

⁶ This includes the feedback from the Skövde partner concerning the “PREFORMA Prototyping Phase 2 – Intermediate Report” provided in August 2016 (and provided as part of the “Feedback on the intermediate release” concerning phase 2 from the PREFORMA consortium) and the feedback from the Skövde partner concerning the “PREFORMA Prototyping Phase 1 – Final Report” provided in November 2015 (and provided as part of the “Feedback on the final release” concerning phase 2 from the PREFORMA consortium). Further, this also includes the feedback (dated 31 October 2016) from the Skövde partner to Easy Innova (“Response to Easy Innova on the feedback to PREFORMA: Comments and clarification of the PREFORMA feedback on the intermediate release”) which aimed to provide responses to specific questions from Easy Innova. After having received the response from the Skövde partner, we note that Easy Innova in subsequent dialogue with the PREFORMA consortium seem to have understood the response to the questions concerning the fundamental requirements in PREFORMA. Specifically, on 8 November 2016 Easy Innova expressed to the PREFORMA consortium that “the clarifications from Skövde are more than clear” (in email message from Miquel Montaner on 8 November to the PREFORMA consortium).

⁷ As identified by the Skövde partner for all three suppliers in the feedback on the final release in Prototyping Phase 2 (October 2016) and in feedback in this deliverable based on subsequent releases until 31 December 2016 (and for one supplier releases from 3 January 2017).

2 ADHERENCE TO REQUIREMENTS FOR PROVISION OF OPEN SOURCE PROJECTS

This section elaborates on establishment of long-term sustainable open source projects and highlights important aspects concerning what needs to be achieved in order to establish thriving and long-term sustainable open source communities.

To achieve long-term sustainable open source communities of relevance for memory institutions and other stakeholder groups there is a need for contracted organisations to successfully manage and conduct a number of fundamental activities. To this end, the section presents necessary activities for successfully addressing the PREFORMA R&D challenge, and in so doing elaborates fulfilment of requirements for provision of open source projects (as specified in the tender and deliverable D4.3). Successful establishment of long-term sustainable open source communities also presupposes adherence to business and user needs, whilst at the same time adhering to community norms, values, and established work practices in the broader open source communities.

2.1 ON DOCUMENTATION

Long-term sustainability of an open source project is promoted through effective communication of long-term vision of goals and plan for how the project will evolve over time. Such longevity is supported through a number of means, including: provision of roadmaps (and other documentation and information) tailored for different stakeholder groups; and documentation of source code and associated digital assets. For additional information on these means, please see deliverable D4.3.

For **provision of roadmaps** and associated information from each open source project it is essential to address: potential code contributors (external and independent of the PREFORMA project) with relevant information in order to attract interest and code contributions from external contributors. Similarly, information from each open source project also needs to address potential external users (and contents of roadmaps need to be tailored accordingly). Relevant information includes information concerning conditions for active participation. Similarly, relevant information also includes conditions for use and distribution of software. Further, conditions for involvement and handling of (and potential transfer of) copyright, trademarks, patents, and other aspects which impact on the extent to which it is possible to attract contributions for open source projects need to be addressed. Governance issues and organisation of long-term management for each open source project needs to be properly addressed (e.g. foundations⁸ and other forms of organisational entities should be considered). The scope for roadmaps needs to cover strategic plans and releases planned for software from each open source project at least for the time period until December 2020.

⁸ For example, the Document Foundation (initially established for the LibreOffice open source project, <https://www.documentfoundation.org/>) may constitute a relevant source for information and inspiration.

For provision of roadmaps and other documentation it is essential to address: stakeholders contributing to improved quality of the file format which is implemented in the open source project. Such information needs to address different stakeholder groups related to each file format, including: participants in the working group governed by the organisation maintaining the file format; representatives for other organisations interested in the precise interpretation of the file format and how it has been (and should be) implemented in software; and other individuals interested in technical, strategic, and policy aspects of how the file format has been (and should be) interpreted and implemented in software. Relevant information includes information concerning processes for how interpretations (and misinterpretations) of file formats and associated implementation in software can be made transparent. The important mission of achieving clarity and improved quality of file formats requires an ongoing process for scrutiny of interpretations that eventually promotes improved quality of both how technical specifications should be clarified and how technical specifications should be interpreted and implemented in software. Such ongoing processes need to be transparent and inclusive for all relevant stakeholders in an open collaboration hosted on open collaboration platforms (e.g. GitHub) as further elaborated in section 2.1 in deliverable D4.3.

For provision of roadmaps and other documentation aimed at other organisations and suppliers (including potential business partners) it is essential to address business, service, and support offerings in order to promote a sustainable business related to each open source project. To promote open collaboration, opportunities for collaboration with local partners⁹ should ideally be highlighted. Opportunities for use of, and services related to, integrated software should be highlighted. For example, software provided by the contracted PREFORMA supplier A (from the open source project it is contracted with) which has been integrated with software developed in open source projects provided by one (or both) of the other contracted PREFORMA suppliers B and C constitutes a potentially very valuable business offering for each supplier, as well as the broader community. With this approach, a supplier focusing on one media type may benefit from software developed by the two other suppliers focusing on the two other media types. Thereby each supplier can provide services and business offerings related to three open source projects (each one focused on a specific media type, i.e. text, image, and A/V) even if they primarily focus on one (for which they are contracted by PREFORMA). Further, information from each open source project should be exposed in a way which ideally attracts a broader business ecosystem.

For provision of **documentation of source code and associated digital assets** it is essential to adopt community values and norms as well as established practices amongst professional organisations providing open source software to customers (something which necessitates fulfilment of minimum basic requirements in established practices in framework agreements for

⁹ Successful collaboration related to sustainable open source projects often consists of a variety of business partners which collaborate. In many cases it is essential to have local knowledge of needs in specific domains and countries, whilst at the same time having access to specialised know-how often provided by internationally recognised partners which collaborate in vibrant open business ecosystems. For memory institutions it may be beneficial to develop good relations with local business partners that genuinely understand the domain in which they operate.

public sector procurement of open source software). For details on documentation of source code (with suggestions for informative references) see further section 2.1 in deliverable D4.3.

2.2 ON USE OF DEVELOPMENT PLATFORM AND TOOLS

Long-term sustainability of an open source project and associated communities is promoted through use of an open collaboration platform (such as GitHub) and use of open source tools with associated work practices. Such longevity is promoted by establishment of long-term sustainable communities by adoption of best practices from open source development which adheres to community norms and values. For additional information on these practices, please see deliverable D4.3.

An important overarching principle for development and use of the development platform is that all information provided on the platform for each open source project is self-contained with strict adherence to established licences to aid clarity concerning conditions for participation and involvement in the project. From previous research it is well known that unclear conditions for participation in, and use of, software from open source projects may cause significant tension in communities and consequently inhibit opportunities for collaboration and integration with other projects.

2.3 ON PROVISION OF SOURCE CODE

Long-term sustainability of an open source project and associated communities is promoted through provision of source code under clear licensing and IPR conditions. To aid longevity of software developed and maintained (on the open platform) in each open source project the option “or later” is required for the two specific copyleft licences used (“MPL v2.0 or later” and “GPLv3 or later”) for all software which is to be distributed to (and used by) memory institutions and the broader community. It is required that all software can be distributed in a cascade under these two specific copyleft licences which promote sustainability¹⁰. On a regular basis, software shall be distributed¹¹ to and provided on the Open Source Portal¹² (OSP), which is a site

¹⁰ “Since all software developed and used by each tenderer will be licensed under two specific Open Source licenses (“GPL v3 or later” and “MPL 2.0 or later”), there is no need for a tenderer to transfer copyright of developed software to PREFORMA.” (Deliverable D2.2 Tender Specifications, Revision: FINAL ver 2.1)

¹¹ The issue of when software can be considered to have been distributed is a complex one which has received researchers’ attention, see e.g.: https://fosdem.org/2016/schedule/event/triggering_copyleft/. See further: Katz, A., Lundell, B. and Gamalielsson, J. (2016) Software, copyright and the learning environment: an analysis of the IT contracts Swedish schools impose on their students and the implications for FOSS, *International Free and Open Source Software Law Review*, Vol. 8(1), pp. 1-28. However, it is clear that distribution has occurred when suppliers provide software under the PREFORMA licenses (i.e. “MPL v2.0 or later” and “GPLv3 or later”) on the OSP as required in PREFORMA. As distribution triggers copyleft obligations it is important that suppliers provide (monthly) stable releases of the software on the OSP in order to maximise availability long-term and minimise legal risks for users.

controlled by the PREFORMA consortium¹³. For further information concerning provision of source code and associated digital assets, please see deliverable D4.3.

2.4 ON PROVISION OF BUILD ENVIRONMENT

Long-term sustainability of an open source project is promoted through provision of build environment and its source code. The build environment (i.e. the specific tool chain used for creation of a running instance of the open source code) must be provided under an open source licence, i.e. a licence approved by the Open Source Initiative (www.opensource.org). For further information concerning provision of open source tools creation of an executable (i.e. a running instance of the open source code) for each deployment platform, please see deliverable D4.3.

2.5 ON PROVISION OF EXECUTABLES

Long-term sustainability of an open source project is promoted through provision of executables. There shall always be executables for several different deployment platforms (for details, please see D4.3). For each platform specific executable there shall always be an up-to-date corresponding open source code that can be downloaded as a single file from the OSP and the open collaboration platform. To promote longevity of software it is essential to provide effective instructions for how to create the executable from the source code. For further information concerning provision of executables, please see deliverable D4.3.

2.6 ON OPEN SOURCE IMPLEMENTATION OF STANDARDS

Long-term sustainability of a technical specification of a file format is promoted through implementation in open source software for which there is transparent information on how the specification of the file format has been interpreted. Such transparent information includes both the source code itself and associated documentation of precisely how different features in the technical specification of the file format have been implemented in software. Longevity of files is promoted when the file format used¹⁴ for each file is implemented in open source software which is provided under the two specific copyleft licences used (“MPL v2.0 or later” and “GPLv3 or later”). Such provision of open source software promotes quality of the technical specification

¹² Each supplier has a dedicated web page for download of software on the OSP. For veraPDF the software is provided via <http://www.preforma-project.eu/verapdf-download.html>, for Easy Innova the software is provided via <http://www.preforma-project.eu/dpfmanager-download.html>, and for MediaArea the software is provided via <http://www.preforma-project.eu/mediacnch-download.html>.

¹³ For this reason observations concerning achievements during the prototyping phase and how suppliers fulfil mandatory requirements is based on an analysis of software which suppliers have provided on the OSP. Hence, analysis is focused on precisely what suppliers have achieved (instead of claimed achievements). We acknowledge that suppliers also maintain and provide software via other channels.

¹⁴ In PREFORMA, it is a mandatory requirement in the public procurement that all digital assets “MUST be provided in open file formats, i.e. an open standard as defined in the European Interoperability Framework for Pan-European eGovernment Service (version 1.0 2004)” (PREFORMA Deliverable D2.2 Tender Specifications, Revision: FINAL ver 2.1).

of the file format and may significantly support standardisation processes. Establishment of an open source community for interpretation of synthetic test files (including files perceived to be “correct” and files perceived to be “incorrect” by the specific individual or organisation creating a specific file) promotes quality of the file format and supports individuals implementing the file format in software. As the set of synthetic test files available on the open collaboration platform increases (with associated interpretations and comments on each interpretation) evolves, this open collaboration supports consensus on how the file format should be interpreted and thereby contributes to improved standardisation. For further information concerning implementation of file formats in open source software, please see deliverable D4.3.

2.7 ON ACHIEVING SUSTAINABLE OPEN SOURCE PROJECTS

Long-term sustainability of a vibrant business ecosystem presupposes sustainable open source projects and associated communities. There are a number of business models used by companies involved in open source projects and fundamental to most is adherence to and appreciation of values and norms established in open collaborations. There are a number of factors which impact on establishment of successful and long-term sustainable open source communities. It has been noted that establishment of long-term sustainable communities is a challenge and some even consider it as an art¹⁵. For example, the extent to which an open source project successfully manages to attract and maintain contributions from talented contributors has shown to be an important aspect¹⁶. Previous research has shown mixed success for different open source projects concerning establishment of vibrant communities¹⁷. Similarly, another important aspect is collaboration between communities for a file format standard and communities for its implementation in open source software¹⁸. Further, an open source project needs to recognise and be adaptive to that there may be a number of different motivations for external contributors¹⁹.

¹⁵ See for example: Bacon, J. (2009) *The Art of Community: Building the New Age of Participation*, O'Reilly, ISBN: 978-0-596-15671-8.

¹⁶ See for example research results from the evolution of the LibreOffice project: Gamalielsson, J. and Lundell, B. (2014) Sustainability of Open Source software communities beyond a fork: How and why has the LibreOffice project evolved?, *The Journal of Systems and Software*, Vol. 89(1), pp. 128-145.

¹⁷ See for example: Teixeira, J., Robles, G. and González-Barahona, J. M. (2015) Lessons learned from applying social network analysis on an industrial Free/Libre/Open Source Software ecosystem, *Journal of Internet Services and Applications*, Vol. 6(14), pp. 1-27.

¹⁸ See for example research results on a widely adopted file format and its implementation in open source software: Gamalielsson, J., Lundell, B., Feist, J., Gustavsson, T. and Landqvist, F. (2015) On organisational influences in software standards and their open source implementations, *Information and Software Technology*, Vol. 67, pp. 30-43.

¹⁹ See for example: Bonaccorsi, A. and Rossi, C. (2006) Comparing Motivations of Individual Programmers and Firms to Take Part in the Open Source Movement: From Community to Business, *Knowledge, Technology & Policy*, Winter 2006, Vol. 18(4), pp. 40-64.

Use and reuse of software from different open source projects need to recognise and adhere to licensing and other (technical, legal, and cultural) conditions. For long-term sustainable open source projects (including software from PREFORMA) it is critical to adhere to all such conditions in order to successfully achieve intended goals. This includes strict adherence to licensing requirements when software is to be integrated with software from other projects. For example, if supplier A in PREFORMA wishes to integrate software from supplier B and C it is critical that all software strictly adheres to the same licensing requirements in order to allow for integration, distribution, and redistribution of integrated software.

For further information concerning achieving sustainable open source projects, please see deliverable D4.3.

3 EVALUATION OF SUSTAINABILITY OF OPEN SOURCE PROJECTS AND ASSOCIATED COMMUNITIES

This section presents an assessment of how contracted organisations have managed to establish open source projects with thriving and long-term sustainable open source communities of relevance for memory institutions and other stakeholder groups.

For each subsection we provide an overarching observation followed by an assessment of each open source project and recommendations on actions to take. The assessment is based on important aspects concerning what needs to be achieved in order to establish thriving and long-term sustainable open source communities (as raised in section 2 and detailed in deliverable D4.3). Our assessment of software related to each open source project has been conducted from November 2016 until early January 2017.

We refer (below) to the three open source projects as follows: “veraPDF” refers to the open source project implementing **text**; “DPF Manager” refers to the open source project implementing **image**; and “MediaConch” refers to the open source project implementing **AV**. Further, when referring to the supplier behind each open source project we refer to: “veraPDF consortium” when referring to the “veraPDF” open source project; “Easy Innova” when referring to the “DPF Manager” open source project; and “MediaArea” when referring to the “MediaConch” open source project.

3.1 ASSESSING DOCUMENTATION

Concerning an up-to-date road-map for the different versions of the software which includes detailed milestones for different (development version, stable version, and deployed (LTS) version) releases, we make the following observations.

From our assessment of the work conducted by the **veraPDF consortium** concerning this aspect we make the following observations. First, we note that the veraPDF consortium provides a roadmap (<http://verapdf.org/roadmap/>). However, the content of the roadmap currently provided²⁰ is primarily targeted at the PREFORMA consortium²¹ instead of targeting external potential contributors. For example, there is currently no roadmap with information focused on external contributors from different stakeholder groups beyond PREFORMA and there is no information concerning release plans for the time period until 2020. Such information may be fundamental to any potential contributor and collaborator interested in longevity of software. Second, at time for the review²², we note that source code has been provided on the OSP²³.

²⁰ As observed 5 December 2016.

²¹ In acknowledging that a detailed roadmap for the PREFORMA consortium may also have significant value, such a roadmap may also serve a worthwhile purpose.

²² As observed 5 December 2016.

²³ <http://www.preforma-project.eu/verapdf-download.html>

From our assessment of the work conducted by **Easy Innova** concerning this aspect we make the following observations. First, we note that Easy Innova does not provide a roadmap with information focused on external contributors from different stakeholder groups beyond PREFORMA and there is no information concerning release plans for the time period until 2020. Such information may be fundamental to any potential contributor and collaborator interested in longevity of software. Second, at time for the review²⁴, we note that source code has been provided on the OSP²⁵.

From our assessment of the work conducted by **MediaArea** concerning this aspect we make the following observations. First, we note that MediaArea does not provide a roadmap with information focused on external contributors from different stakeholder groups beyond PREFORMA and there is no information concerning release plans for the time period until 2020. Such information may be fundamental to any potential contributor and collaborator interested in longevity of software. Second, at time for the review²⁶, we note that source code has been provided on the OSP²⁷.

3.2 ASSESSING USE OF DEVELOPMENT PLATFORM AND TOOLS

Concerning use of an open collaboration platform (such as GitHub) and use of open source tools with associated work practices, we make the following observations.

From our assessment of the work conducted by the **veraPDF consortium** concerning this aspect we make the following observations. First, we note that the open collaboration platform (GitHub) is actively used by the veraPDF consortium. Second, a number of components and software (under several different open source licences) are maintained by the consortium on the platform. Third, the OSP has been used for provision of software from the open source project maintained on GitHub. However, we have been unable²⁸ to compile source code provided by the supplier on the OSP by use of open source tools.

From our assessment of the work conducted by **Easy Innova** concerning this aspect we make the following observations. First, we note that the open collaboration platform (GitHub) is actively used by Easy Innova. Second, a number of components and software (under several different open source licences) are maintained by the consortium on the platform. Third, the OSP has been used for provision of software from the open source project maintained on

²⁴ As observed on 5 December 2016.

²⁵ <http://www.preforma-project.eu/dpfmanager-download.html>

²⁶ As observed on 5 December 2016.

²⁷ <http://www.preforma-project.eu/mediaconch-download.html>

²⁸ The veraPDF consortium does not include an open source licensed build environment for the Windows platform. Instead, the provided build environment (as observed 5 December 2016 and as observed 10 January 2017) includes Oracle's JDK 1.7u79 for Windows (which is not open source software).

GitHub. However, we have been unable²⁹ to easily³⁰ compile source code provided by the supplier on the OSP by use of an open source tool chain.

From our assessment of the work conducted by **MediaArea** concerning this aspect we make the following observations. First, we note that the open collaboration platform (GitHub) is actively used by MediaArea. Second, a number of components and software (under several different open source licences) are maintained by the consortium on the platform. Third, the OSP has been used for provision of software from the open source project maintained on GitHub. It should be noted it is unclear if the supplier has fulfilled³¹ the PREFORMA requirement concerning provision of an open source tool chain on the OSP for compilation of source code provided on the OSP. We have been able³² to compile source code provided by the supplier on the OSP by use of the provided build environment for Windows. However, when trying to use the executable compiled from the source code for Windows, the executable does not work as

²⁹ We have been unable (as observed 5 December 2016) to create a running instance using the provided build environment due to that java libraries are missing. Further, there is a lack of a step-by-step instruction of how to create a running instance using the provided build environment and the supplier recommends use of a proprietary build environment (Oracle's JDK) instead (as observed 10 January 2017).

³⁰ It is expected that it shall be possible to use an open source tool chain for compiling the source code provided on the OSP by use of a simple command (e.g. "make all") via a script provided by the supplier.

³¹ We note that no build environment is provided in the zip-file "www.preforma-project.eu/downloads/MediaConch/2016-10-31/buildenv01-2016-10-31.zip" provided on the OSP during the prototyping phase (as observed 10 January 2017). Therefore, the supplier does not fulfil fundamental PREFORMA requirements. We note that a build environment is provided in the zip-file "www.preforma-project.eu/downloads/MediaConch/2016-12-19/buildenv01.zip" on the OSP during the extended prototyping phase (as observed 10 January 2017). However, the provided build environment does not fulfil PREFORMA requirements for several reasons (as observed 10 January 2017). First, there is a lack of a step-by-step instruction of how to create a running instance using the provided build environment. Second, the build environment is provided without any licence information and therefore it cannot be used. Third, from our investigations on the internet it is clear that different versions of the build environment have been made available under different conditions (mingw.org/license) including public domain which is not open source software (and since the provided build environment is provided without licensing information that clarifies the precise open source licence(s) PREFORMA requirements have not been fulfilled). Further, we note that the identified problems for the build environment provided in the zip-file www.preforma-project.eu/downloads/MediaConch/2017-01-03/CDP_buildenv01-2017-01-03.zip on the OSP remain (as observed 10 January 2017).

³² However, it is unclear whether an open source licensed build environment is provided for the Windows platform (as observed 10 January 2017). Consequently, if an open source licenced build environment for the Windows platform is provided in the zip-file www.preforma-project.eu/downloads/MediaConch/2016-12-19/buildenv01.zip on the OSP, it follows that the supplier fulfils PREFORMA requirements.

there are a number of dependencies to binaries³³ for which the source code is not provided. Further, we note that the provided build environment is dependent upon binaries which are provided under unclear³⁴ conditions. This implies that the supplier fails to provide a complete build environment and thereby does not fulfil the mandatory requirement concerning an open source licensed build environment.

3.3 ASSESSING PROVISION OF SOURCE CODE

The Table below shows an overview of how each supplier has provided monthly releases³⁵ of source code on the OSP. Each row shows different releases expected to be provided by each supplier in order to fulfil the PREFORMA requirement for time based (monthly) stable releases³⁶. The two rows representing months during which the PREFORMA consortium has reviewed the work³⁷ conducted by the suppliers is highlighted in bold face. Each cell in the table identifies each release with associated date for when it was released.

Month \ Supplier	veraPDF consortium ³⁸	Easy Innova ³⁹	MediaArea ⁴⁰
December 2016	0.28 ⁴¹ (21 Dec. 2016)	3.1 ⁴² (30 Dec. 2016)	19 December 2016 ^{43, 44}

³³ There are dependencies to several DLL-files for which the source code is not provided. Hence, it follows that the complete source code is not provided.

³⁴ Open source software is provided without fulfilment of licence obligations under the MIT licence (see further section 3.3).

³⁵ As observed on 10 January 2017. The table includes releases until 31 December 2016.

³⁶ For details on PREFORMA requirements concerning provision of time based (monthly) stable releases, see deliverable D4.3.

³⁷ It should be noted that PREFORMA partners considered reports (“PREFORMA Prototyping Phase 1 – Intermediate Report” provided to report on achievements made until July 2015, “PREFORMA Prototyping Phase 1 – Final Report” provided to report on achievements made until October 2015, “PREFORMA Prototyping Phase 2 – Intermediate Report” provided to report on achievements made until July 2016, and “PREFORMA Prototyping Phase 2 – Final Report” provided to report on achievements made until October 2016) from each supplier and all achievements made so far (including software made available by suppliers on GitHub and their own websites) at time for each review.

³⁸ <http://www.preforma-project.eu/verapdf-download.html>

³⁹ <http://www.preforma-project.eu/dpfmanager-download.html>

⁴⁰ <http://www.preforma-project.eu/mediaconch-download.html>

⁴¹ The release for the source code for the “Greenfield release (all platforms)” is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.28-GF-20161221.zip>.

November 2016	Not provided	3.0.1 (2 Dec. 2016)	1 December 2016
October 2016	0.26 ⁴⁵ (17 Nov. 2016)	3.0 ⁴⁶ (28 Oct. 2016)	31 October 2016 ⁴⁷
September 2016	0.24 (12 Oct. 2016)	2.6 (30 Sep. 2016)	30 September 2016
August 2016	0.22 (7 Sep. 2016)	2.5 (30 Aug. 2016)	31 August 2016
July 2016	0.20 (1 Aug. 2016)	2.4 (1 Aug. 2016)	28 July 2016
June 2016	0.18 (8 Jul. 2016)	2.3 (28 Jun. 2016)	30 June 2016
May 2016	0.16.3 (3 Jun. 2016) 0.14.3 (31 May 2016)	2.2 (30 May 2016)	31 May 2016
April 2016	Not provided	2.1 (29 Apr. 2016)	29 April 2016
March 2016	0.12.8 (31 Mar. 2016)	2.0 (4 Apr. 2016)	31 March 2016
February 2016	Not provided	Not provided	29 February 2016
January 2016	Not provided	1.4 (29 Jan. 2016)	27 January 2016
December 2015	Not provided	1.3 (24 Dec. 2015)	31 December 2015
November 2015	0.8.5 (11 Dec. 2015)	1.2.3 (10 Dec. 2015)	30 November 2015
October 2015	0.6.46 ⁴⁸ (4 Nov. 2015)	1.2 ⁴⁹ (28 Oct. 2015)	31 October 2015 ⁵⁰

⁴² For example, the release for the source code for Windows is provided via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip>.

⁴³ For MediaArea, the date format is used to name each release.

⁴⁴ For example, the release for the source code for Windows is provided via the link: http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_src01-2016-12-19.zip. This release is referred to as "SPECIAL CORE DISTRIBUTION PACKAGES RELEASE".

⁴⁵ The stable release for the source code for the "Greenfield release (all platforms)" is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip>.

⁴⁶ For example, the stable release for the source code for Windows is provided via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip>.

⁴⁷ For example, the stable release for the source code for Windows is provided via the link: <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip>.

September 2015	Not provided	1.1.1 (2 Oct. 2015)	39 September 2015
August 2015	0.4.11 (16 Sep. 2015)	1.1 (29 Sep. 2015)	31 August 2015
July 2015	0.2.9 (16 Jul. 2015)	1.0 (31 Jul. 2015)	31 July 2015

Concerning provision of source code under clear licensing and IPR conditions, we make the following observations.

From our assessment of the work conducted by the **veraPDF consortium** concerning provision of source code under clear licensing and IPR conditions we make the following observations. We note that source code (for stable releases) has been provided on the OSP. From our analysis of source code provided on the OSP we note that the source code has not been provided on the OSP under the two specific PREFORMA licences so that the complete software can be used and distributed (in a cascade) as required in PREFORMA. We make the following observations to support the outcome of this analysis.

First, we observe that the supplier initially chose to provide software under two different branches (one provided under “GPLv3 or later” and another provided under “MPL v2”) on the OSP. However, since the release 0.12.8 (31 March 2016) the supplier has chosen to release source in one branch (aiming to provide source code in one branch under “GPLv3 or later” and “MPL v2 or later”). In acknowledging that the initial choice to use more than one branch fulfilled PREFORMA requirements provided that software in both branches is identical in both branches, the initial release of D8.8 expressed that we do not recommend this (as it increases complexity) and we acknowledge that the supplier since release 0.12.8 adheres to the recommendation of providing the source code in only one branch. Further, we note that the supplier provides many source code files provided in zip-files on the OSP⁵¹ without any licensing information. In fact, we

⁴⁸ For example, the stable release for the source code under “MPL v2.0 or later” for Debian is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.6-20151104-MPL.zip>. Further, the stable release for the source code under “GPLv3 or later” for Debian is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.6-20151104-GPL.zip>.

⁴⁹ For example, the stable release for the source code for Debian is provided via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-1.2/Debian/src17-2015-10-28.zip>.

⁵⁰ For example, the stable release for the source code for Debian is provided via the link: <http://www.preforma-project.eu/downloads/MediaConch/2015-10-31/src17-2015-10-31.zip>.

⁵¹ e.g. “PDFValidationApplication.java” provided in <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip>.

have been unable to identify any source code file provided on the OSP⁵² under “MPL v2.0 or later” and “GPLv3 or later”.

Second, we note that the supplier explicitly uses⁵³ an earlier version of the Mozilla licence (MPL 1.1) than the required “MPL v2.0 or later” which fails to fulfil PREFORMA requirements. Even though use of “MPL v2.0” implicitly is to be interpreted with “or later” it is of uttermost importance for clarity and fulfilment of PREFORMA requirements that the version used of this licence is “MPL v2.0 or later” in order to promote long term sustainability of software⁵⁴.

Third, we note that the supplier explicitly uses⁵⁵ an earlier version of the GPL licence (GPL 2.0) than the required “GPLv3 or later”. Consequently, the supplier fails to fulfil mandatory requirements in PREFORMA.

Fourth, we observe that the software provided contains code licensed under Apache 2.0. In fact, there are a number of files containing source code provided under Apache 2.0 in a zip-file on the OSP, and consequently the complete source code is not provided under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”). The supplier has chosen to include software⁵⁶ under a different licence (Apache 2.0), which inhibits distribution of the complete

⁵² For example, we have been unable to identify any source code file which fulfils PREFORMA licensing requirements in both <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip> and <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.28-GF-20161221.zip>.

⁵³ For example, we observe that the supplier includes source code provided under “MPL 1.1” in the zip-file for Windows on the OSP: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip>. Further, we observe that this failure to fulfil PREFORMA requirements remains in the last release in 2016: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.28-GF-20161221.zip>.

⁵⁴ For example, it may be that “MPL v3”, “MPL v4”, or any later version of this licence may be drafted differently in the future (perhaps beyond the existence of the Mozilla Foundation). If, and when, software from this open source project will be incorporated in other projects, it is advantageous to be as clear as possible on licensing conditions (especially since there may be a complex interplay with existing and future licenses for SEPs that may inhibit use of the software under certain versions of the MPL license).

⁵⁵ For example, we observe that the supplier includes source code provided under GPL 2.0 in the zip-file for Windows on the OSP: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip>. Further, we observe that this failure to fulfil PREFORMA requirements remains in the last release in 2016: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.28-GF-20161221.zip>.

⁵⁶ For example, source code provided under Apache 2.0 is included in the zip-file for Windows on the OSP: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip> (e.g. the source code file “PropertyFileDefaultProvider.java”). Further, we observe that source code provided under Apache 2.0 is also included in the zip-file for Windows on the OSP in the last release in 2016: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.28-GF-20161221.zip> (e.g. the source code file “PropertyFileDefaultProvider.java”).

software (in a cascade) as required in PREFORMA. Consequently, software under Apache v2.0 cannot be used⁵⁷ in PREFORMA. This can be explained through the following illustrative usage scenario of relevance for PREFORMA. Please consider Figure 1.

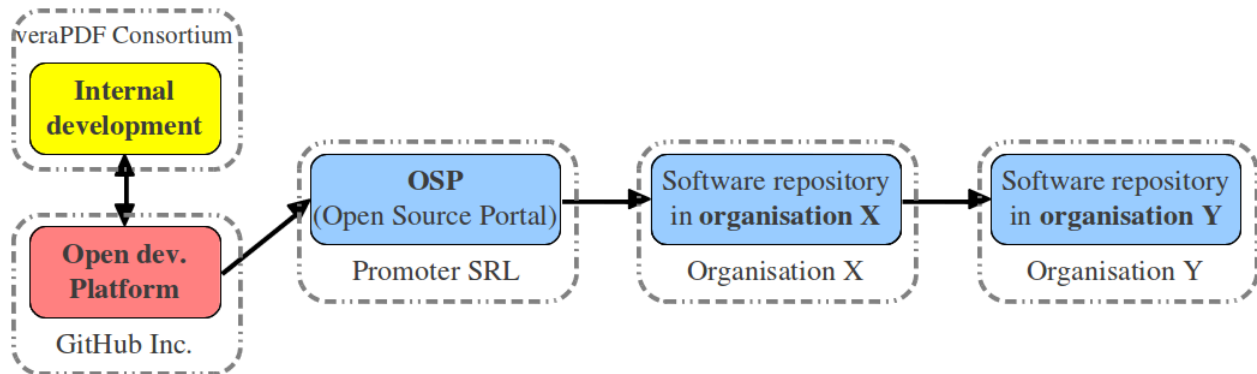


Figure 1. Usage contexts for software provided in PREFORMA (simplified overview)

It is important to recognise that if some source code in a zip-file provided on the OSP is provided under Apache 2.0 (instead of under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”) this would imply that organisation X (and organisation Y) cannot use the software under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) which is a fundamental requirement in PREFORMA and a fundamental requirement for longevity of software. Consequently, all necessary rights for use, modification and distribution of the software is not provided to organisation X if a representative for organisation X downloads the software from the OSP (since all necessary patent rights will not automatically be provided to a new organisation when the software is distributed under Apache 2.0). Further, all necessary rights for the software is also not provided to organisation Y if the software is distributed from organisation X to organisation Y. Related to this, for reasons of sustainability it is critical that the supplier openly clarifies to all individuals and organisations potentially interested in the software (beyond PREFORMA) that all the necessary rights (including all necessary patent licences for implementation of the file formats) since many members of broader open source communities are extremely sensitive to patent related issues (and this is specifically important for the provision of software on the OSP which implements PDF/A-2 and PDF/A-3 in light of existing declarations in the ISO database). The issue concerning that the supplier has obtained all necessary rights (including all patent licences) for implementation of the file formats in software⁵⁸ which is to be provided under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) on the OSP has been stressed from the start of the PREFORMA project,

⁵⁷ If there are any additional restrictions (which implies a need for inclusion of the Apache 2.0 license) it does not conform to “MPL v2.0”.

⁵⁸ There can be many reasons for why an organisation wishes to implement a technical specification of a specific file format in software. One reason may be that an organisation wishes develop and use software (in which the technical specification is implemented) for the purpose of assessing precisely how a specific file conforms to the technical specification of the file format.

including in the document “Feedback on the intermediate release” from the PREFORMA PMT. However, given that this issue has not yet been addressed it is now urgent that the supplier addresses this issue. In summary, we note that the supplier has failed to present requested information which demonstrates that they have obtained all necessary patent licenses (including for ISO 32000-1⁵⁹ and JPEG 2000⁶⁰). Further, we note that the supplier has failed to present any information which indicates that they have approached organisations that control patents in order to obtain all necessary patent licenses. We consider this to be a serious risk⁶¹ which has not yet been addressed. Consequently, since the supplier has not yet shown that all necessary rights has been obtained for the software provided on the OSP, it is unclear whether the software implementing each file format under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) can be used as planned in PREFORMA.

Fifth, considering the usage scenario in PREFORMA (see Figure 1) we observe that since the source code provided on the OSP contains software provided under Apache 2.0, the complete source code cannot be provided and distributed under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”. From a software licence perspective and for successfully being able to address sustainability and longevity requirements for software, it is evident that if organisation Y in the future will develop a new software solution which is to be provided under “MPL v4.0 or later” and “GPL v4 or later” it is clear that the source code provided in PREFORMA on the OSP under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) can be incorporated and constitute part of the new software. However, it is also clear that if the source code

⁵⁹ Hypothetically, it is essential to recognise that the supplier has failed to present any patent licence which allows for implementation of ISO 32000-1 in software as required in PREFORMA. When all such patent licences have been obtained it is possible to assess precisely what is allowed (and what is not allowed) concerning use of the file format. For example, it may be that a supplier has obtained a patent licence which only allows for a complete implementation of a specific version of a technical specification of a specific file format that is revocable and perhaps only allows for time-limited and non-commercial usage of the implementation in software. Such a patent licence would be useless with respect to implementation in open source software for use in organisations beyond PREFORMA. Further, as the technical specification of the file format (ISO 32000-1) is provided under conditions which do not fulfil the criteria for an open file format (as defined in the tender and European Interoperability Framework version 1.0) it is critical that the supplier has obtained all necessary rights (including all necessary patent licences) for implementation of the file format in software to be provided under “MPL v2.0 or later” and “GPLv3 or later”.

⁶⁰ JPEG 2000 is implemented in software provided on the OSP, something which is to be expected given that JPEG 2000 is a normative reference in PDF/A-2.

⁶¹ It should be noted that before an ISO standard can be used it is critical to obtain all necessary rights (including all patent licences for all SEPs) from all organisations involved in ISO standardisation as well as all other organisations not involved in ISO standardisation which may control SEPs. For some ISO standards (e.g. ISO 32000-1 and JPEG 2000) it may be that organisations which control SEPs may be unwilling to provide patent licences that allow for implementation of the standard in software. Further, it is a misconception to believe that all ISO standards can be used for implementation in software without first obtaining all necessary patent licences.

provided in PREFORMA on the OSP contains software under Apache 2.0 (or any other licence) it is inherently unclear if the source code provided in PREFORMA can be incorporated and constitute part of the new software. Consequently, any use of software under other conditions⁶² and other licences than under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) implies that it is unclear if the software can be used. Therefore, any use of software provided under other conditions and other licences inhibits fundamental requirements for sustainability and longevity of software. In summary, for all these reasons software provided on the OSP cannot use components, libraries, and software under Apache 2.0 as the software cannot be distributed and used as required in any scenario with requirements for sustainability and longevity of software and therefore cannot be used in and beyond PREFORMA.

Sixth, even if the supplier has obtained all necessary rights for implementation of a file format in software⁶³ so that it can be distributed under the Apache 2.0 licence it does not necessarily follow that such rights have been obtained for distribution of software under “MPL v2.0 or later” and under “GPLv3 or later”. Consequently, for all users⁶⁴ of open source software provided by PREFORMA on the OSP, for the broader open source community, and any potential external contributor it is essential to clarify that all necessary rights have been obtained.

⁶² For example, Public Domain.

⁶³ For example, we observe that the supplier includes source code implementing JPEG 2000 in the source code file “JPEG2000.java” (licensed under Apache 2.0) as part of the software provided during the prototyping phase in the zip-file “<http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip>” on the OSP. Further, we observe that source code provided under Apache 2.0 which implements JPEG 2000 is also included in the zip-file for Windows provided in the extended prototyping phase on the OSP: <http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.28-GF-20161221.zip> (e.g. the source code file “JPEG2000.java”). Further, we observe that the supplier includes source code implementing JPEG 2000 in the source code file “GFJPEG2000.java” (provided under conditions which is not open source software) as part of the software provided in the zip-file “<http://www.preforma-project.eu/downloads/veraPDF/src/all-platforms/veraPDF-0.26-GF-17112016.zip>” on the OSP. It should be noted that even if the supplier has obtained all necessary rights (including all necessary patent licences) for provision of this source code as proprietary software it does not necessarily follow that the supplier has obtained all necessary rights (including all necessary patent licences) for implementation of JPEG 2000 in software which allows distribution of the software under “MPL v2.0 or later” and under “GPLv3 or later”.

⁶⁴ For sustainability and longevity of software beyond PREFORMA it is critical for PREFORMA partners (and any other organisation in which software from PREFORMA may be used) that no software is provided on the OSP for which all necessary rights have not been obtained.

Seventh, we observe that there is a lack of information concerning how anyone can obtain the corresponding source code which has been used for building the executables⁶⁵ provided on the supplier's own web site. It is essential to provide information concerning how anyone can obtain corresponding source code on the relevant web pages controlled by the supplier. Therefore, it is essential that the supplier addresses this fundamental PREFORMA requirement in order to meet the PREFORMA R&D challenge and provide software which may be of significant value for memory institutions and other stakeholders.

Eighth, we observe that the supplier has not provided a stable release each month as required in PREFORMA.

Ninth, we note that the supplier indicates on the OSP that source code has been provided for a greenfield solution under the two specific licences "MPL v2.0 or later" and under "GPLv3 or later". However, we observe that this is not the case since the source code is provided under other licences.

From our assessment of the work conducted by **Easy Innova** concerning provision of source code under clear licensing and IPR conditions we make the following observations. We note that source code (for stable releases) has been provided on the OSP. From our analysis of source code provided on the OSP we note that the source code has not been provided on the OSP under the two specific PREFORMA licenses so that the complete software can be used and distributed (in a cascade) as required in PREFORMA. We make the following observations to support the outcome of this analysis.

First, we observe that the licensing conditions for the software provided on the OSP are unclear. For example, the file "README.md" which is included in the file "<http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip>" provided on the OSP refers to one file ("LICENSE") that contains the licence text for GPLv3. Since several files are provided under other licences⁶⁶ and some files lack information concerning licences⁶⁷ it

⁶⁵ For example, as observed 10 January 2017, we note that the supplier makes an executable available on its own web page without clear information on the web page concerning under which licence the software is provided and how the corresponding source code can be obtained (see <http://verapdf.org/software/>). We acknowledge that licensing information can be found at the bottom on a different web page (see <http://verapdf.org/home>). However, we recommend that this web page clarifies that software is provided under the PREFORMA licenses and how corresponding source code can be obtained.

⁶⁶ For example, source code files under Apache 2.0 are included in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> provided on the OSP during the prototyping phase. Further, source code files under Apache 2.0 are also included in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> provided on the OSP during the extended prototyping phase.

is important to clarify that the software is provided under the PREFORMA licenses (“GPLv3 or later” and “MPL v2 or later”). To clarify licencing and promote sustainability, it is necessary to clarify and provide all source code files under the PREFORMA licenses “MPL v2.0 or later” and “GPLv3 or later”.

Second, we observe that the supplier has chosen to include software under a different licence (Apache 2.0), which inhibits distribution of the complete software (in a cascade) as required in PREFORMA. In fact, the clear majority of all Java source code files are provided under Apache 2.0 in zip-files on the OSP⁶⁸, and consequently the complete source code is not provided under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”).

Third, we observe⁶⁹ that the supplier has chosen to include dual licensed source code (e.g. “Analyze.java”) provided under “EPL 1.0” and “MPL v2.0”. Consequently, the complete source code is not provided under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” and the complete source software cannot be distributed (in a cascade) under the two licences “MPL v2.0 or later” and “GPLv3 or later”.

Fourth, we observe⁷⁰ that the supplier has chosen to include dual licensed source code (e.g. “AdaptedLister.java”) provided under “GPL 2.0” and “CDDL”. Consequently, the complete source code is not provided under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” and the complete source software cannot be distributed (in a cascade) under the two licences “MPL v2.0 or later” and “GPLv3 or later”.

⁶⁷ For example, source code files which lack licence information are included in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> provided on the OSP during the prototyping phase. Further, source code files which lack licence information are included in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> provided on the OSP during the extended prototyping phase.

⁶⁸ For example, this is observed for the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> provided on the OSP during the prototyping phase. Further, this is also observed for the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> provided on the OSP during the extended prototyping phase.

⁶⁹ This has been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> on the OSP. Further, this has also been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> on the OSP.

⁷⁰ This has been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> on the OSP. Further, this has also been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> on the OSP.

Fifth, we observe⁷¹ that the supplier has chosen to include source code (e.g. “PostorderNodeListGenerator.java”) provided under Eclipse Public License v1.0. Consequently, the complete source code is not provided under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” and the complete source software cannot be distributed (in a cascade) under the two licences “MPL v2.0 or later” and “GPLv3 or later”.

Sixth, we observe⁷² that the supplier has chosen to include source code (e.g. “Attributes.java”) provided as Public Domain (i.e. “Attributes.java” is provided under conditions which are not open source software and not free software). Consequently, the complete source code is not provided under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” and the complete source software cannot be distributed (in a cascade) under the two licences “MPL v2.0 or later” and “GPLv3 or later”.

Seventh, we observe that the software provided contains code licensed under Apache 2.0 and several other licences. In fact, there are a number of files containing source code provided under Apache 2.0 in a zip-file on the OSP, and consequently the complete source code is not provided under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”). The supplier has chosen to include software⁷³ under several other different licences (including Apache 2.0), which inhibits distribution of the complete software (in a cascade) as required in PREFORMA. Consequently, software under Apache v2.0 cannot be used⁷⁴ in PREFORMA. This can be explained through the following illustrative usage scenario of relevance for PREFORMA. Please consider Figure 2.

⁷¹ This has been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> on the OSP. Further, this has also been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> on the OSP.

⁷² This has been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> on the OSP. Further, this has also been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> on the OSP.

⁷³ This has been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> on the OSP. Further, this has also been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> on the OSP.

⁷⁴ If there are any additional restrictions (which implies a need for inclusion of the Apache 2.0 license) it does not conform to “MPL v2.0”.

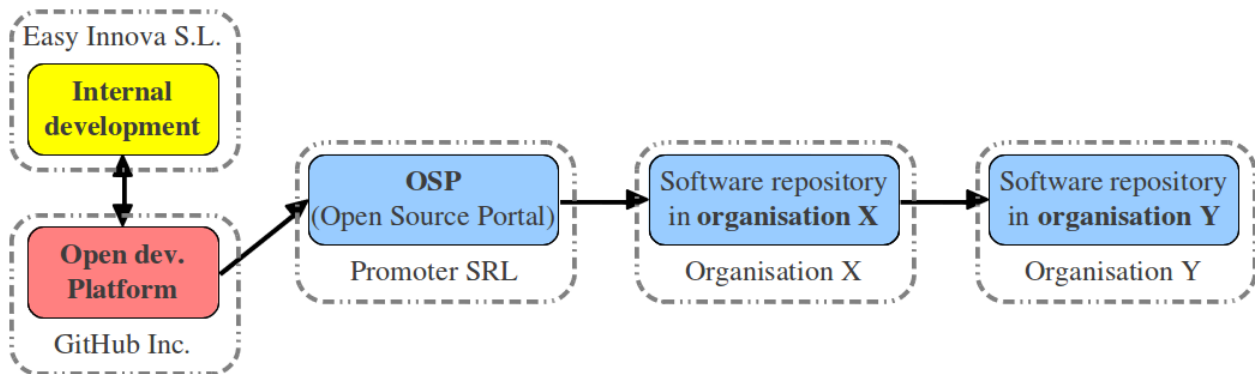


Figure 2. Usage contexts for software provided in PREFORMA (simplified overview)

It is important to recognise that if some source code in a zip-file provided on the OSP is provided under Apache 2.0 (instead of under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”)) this would imply that organisation X (and organisation Y) cannot use the software under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) which is a fundamental requirement in PREFORMA and a fundamental requirement for longevity of software. Consequently, all necessary rights for use, modification and distribution of the software is not provided to organisation X if a representative for organisation X downloads the software from the OSP (since all necessary patent rights will not automatically be provided to a new organisation when the software is distributed under Apache 2.0). Further, all necessary rights for the software is also not provided to organisation Y if the software is distributed from organisation X to organisation Y. Related to this, we take the opportunity to reiterate the importance that the supplier openly clarifies to all individuals and organisations potentially interested in the software (beyond PREFORMA) that all the necessary rights (including all necessary patent licences for implementation of the file formats) since many members of broader open source communities are extremely sensitive to patent related issues (and this is specifically important for the provision of software on the OSP which implements TIFF/EP in light of existing declarations⁷⁵ in the ISO database). The issue concerning that the supplier has obtained all necessary rights (including all patent licences) for implementation of the file formats in software which is to be provided under the two specific licences (“MPL v2.0 or later” and

⁷⁵ Given that several organisations which have declared that they control SEPs for TIFF/EP do not reveal which patents they control, it does not follow that SEPs do not exist. In this situation it is even more important for the supplier to present to any potential adopter of PREFORMA software that the supplier has obtained all necessary rights (including all necessary patent licences) for implementation of the technical specification of the file format TIFF/EP in software to be provided on the OSP under “MPL v2.0 or later” and “GPLv3 or later”. Hypothetically, assuming that the supplier would only partially implement the technical specification of TIFF/EP in software, this would imply that the supplier fails to fulfil the mandatory requirement related to TIFF/EP as expressed in the public procurement. Further, hypothetically, assuming that the supplier would fully implement the technical specification of TIFF/EP in software and thereby fulfil the mandatory requirement concerning implementation of TIFF/EP as expressed in the public procurement, this would imply that the supplier has implemented the file format without having obtained all necessary rights to do so.

“GPLv3 or later”) on the OSP has been stressed from the start of the PREFORMA project, including in the document “Feedback on the intermediate release” from the PREFORMA PMT. However, given that this issue has not yet been addressed it is critical that the supplier addresses this issue before promoting use and deployment of software from the OSP. In summary, we note that the supplier has failed to present requested information which demonstrates that they have obtained all necessary patent licenses (including for TIFF 6.0⁷⁶, TIFF/EP and “TI/A”). Further, we note that the supplier has failed to present any information which indicates that they have approached organisations that control patents in order to obtain all necessary patent licenses. We consider this to be a serious risk which has not yet been addressed. Consequently, since the supplier has not yet shown that all necessary rights has been obtained for the software provided on the OSP, it is unclear whether the software implementing each file format under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) can be used by any potential adopter during and beyond PREFORMA.

Eighth, considering the usage scenario in PREFORMA (see Figure 2) we observe that since the source code provided on the OSP contains software provided under Apache 2.0, the complete source code cannot be provided and distributed under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”. From a software licence perspective and for successfully being able to address sustainability and longevity requirements for software, it is evident that if organisation Y in the future will develop a new software solution which is to be provided under “MPL v4.0 or later” and “GPL v4 or later” it is clear that the source code provided in PREFORMA on the OSP under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) can be incorporated and constitute part of the new software. However, it is also clear that if the source code provided in PREFORMA on the OSP contains software under Apache 2.0 (or any other licence) it is inherently unclear if the source code provided in PREFORMA can be incorporated and constitute part of the new software. Consequently, any use of software under other conditions⁷⁷ and other licences than under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) implies that it is unclear if the software can be used. Therefore, any use of software provided under other conditions and other licences inhibits fundamental requirements for sustainability and longevity of software. In summary, for all these reasons software provided on the OSP cannot use components, libraries, and software under Apache 2.0 as the software cannot be distributed and used as required in any scenario with requirements for sustainability and longevity of software and therefore cannot be used in and beyond PREFORMA.

⁷⁶ The file format TIFF 6.0 does not fulfil the criteria for an open file format according to the European Interoperability Framework version 1.0. In PREFORMA, it is a mandatory requirement in the public procurement that all digital assets “MUST be provided in open file formats, i.e. an open standard as defined in the European Interoperability Framework for Pan-European eGovernment Service (version 1.0 2004)” (PREFORMA Deliverable D2.2 Tender Specifications, Revision: FINAL ver 2.1).

⁷⁷ For example, Public Domain.

Ninth, even if the supplier has obtained all necessary rights for implementation of a file format in software⁷⁸ so that it can be distributed under the Apache 2.0 license it does not necessarily follow that such rights have been obtained for distribution of software under “MPL v2.0 or later” and under “GPLv3 or later”. Consequently, for all users⁷⁹ of open source software provided by PREFORMA on the OSP, for the broader open source community, and any potential external contributor it is essential to clarify that all necessary rights have been obtained.

Tenth, we observe that there is a lack of information concerning how anyone can obtain the corresponding source code which has been used for building the executables⁸⁰ provided on the supplier’s own web site. It is essential to provide information concerning how anyone can obtain corresponding source code on the relevant web pages controlled by the supplier. Therefore, it is essential that the supplier addresses this fundamental PREFORMA requirement in order to meet the PREFORMA R&D challenge and provide software which may be of significant value for memory institutions and other stakeholders.

⁷⁸ For example, we observe that the supplier includes Apache PDFBox (licensed under Apache 2.0) and Apache Camel (licensed under Apache 2.0) as part of the software provided on the OSP for source code provided in zip-files (e.g. <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> during the prototyping phase and <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip> during the extended prototyping phase).

⁷⁹ For sustainability and longevity of software beyond PREFORMA it is critical for PREFORMA partners (and any other organisation in which software from PREFORMA may be used) that no software is provided on the OSP for which all necessary rights have not been obtained. We note that the supplier has failed to present any information which demonstrates that they have obtained all necessary rights (including all necessary patent licences) for implementation of file formats in software to be provided under “MPL v2.0 or later” and “GPLv3 or later” on the OSP. Further, since PREFORMA currently distributes software on the OSP which implements potentially problematic file formats (including TIFF 6.0, TIFF/EP and TIFF files which adhere to properties defined in the “TI/A” initiative), e.g. in the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/src01-2016-12-30.zip>, it is critical that the supplier provides all necessary patent licences they have obtained for implementation of the file formats in software which is to be provided under “MPL v2.0 or later” and “GPLv3 or later” before anyone uses this software.

⁸⁰ For example (as observed 10 January 2017), the supplier makes an executable available on its own web page (e.g. an executable for Windows is available via http://www.blueroominnovation.com/dpfmanager/Downloads/Current-release/Windows/dpf_manager-3.1.exe) without clear information concerning how the corresponding source code can be obtained. Further, there is a need to clarify if the software provided on the supplier’s own web site is identical to the software provided on the OSP. In assuming that the executable provided on the supplier’s own web site constitutes the latest version of a stable release, it is essential that the corresponding source code can be easily found. Hence, it is not sufficient to provide a general link to the open collaboration platform. We expect that the web page (<http://www.dpfmanager.org/#download>) clarifies how the complete source code which corresponds to each executable can be obtained.

Eleventh, we observe that the supplier has not provided a stable release each month as required in PREFORMA.

From our assessment of the work conducted by **MediaArea** concerning provision of source code under clear licensing and IPR conditions we make the following observations. We note that source code (for stable releases) has been provided on the OSP. From our analysis of source code provided on the OSP we note that the source code has not been provided on the OSP under the two specific PREFORMA licenses so that the complete software can be used and distributed (in a cascade) as required in PREFORMA. We make the following observations to support the outcome of this analysis.

First, we observe that the licensing information and conditions for the software provided on the OSP need to be clarified. For example, the file “License.html” which is included in the file “http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_src01-2016-12-19.zip” provided on the OSP states that “MediaConch is licensed under a GPLv3+/MPLv2+ License.”. Hence, this statement provides an impression that the software is provided under one single licence. It must be clarified that the software is provided under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”. Further, the same file (“License.html”) states that “The software relies on third party libraries. Such libraries have their own license”. However, some of the libraries (provided under other conditions than the two specific licences “MPL v2.0 or later” and “GPLv3 or later”) which are claimed to be provided (e.g. “md5.c”) are actually not included in the file “http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_src01-2016-12-19.zip” provided on the OSP. Consequently, the complete software is not provided as stated in the file “License.html” and as required in deliverable D4.3. Further, for the file “License.html” which is included in the file “<http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip>” provided on the OSP also states that “The software relies on third party libraries. Such libraries have their own license” and these files⁸¹ which the software relies on are actually included in the same zip-file and provided under other conditions (something which implies that the software is not provided under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”). It should be noted that information concerning whether a particular file can (or cannot) be relicensed is irrelevant for software provided on the OSP. Consequently, the file “License.html” needs to be clarified since what matters for longevity of software and long-term sustainability of solutions provided for use by memory institutions and other organisations during and beyond PREFORMA is precisely how specific files have been provided in zip-files on the OSP.

⁸¹ For example, the file “md5.c” is actually included in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> which is provided on the OSP during the extended prototyping phase.

Second, we observe that the supplier has chosen to include source code provided under several different open source licenses in zip-files⁸² on the OSP, including: BSD 2-clause⁸³, BSD 3-clause⁸⁴, and zlib/libpng license⁸⁵. Consequently, the complete source code is not provided in zip-files on the OSP under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”.

Third, we observe⁸⁶ that the supplier has chosen to include source code (e.g. “base64.h” and “md5.c”) provided as Public Domain (i.e. “md5.c” is provided under conditions which are not open source software and not free software). Consequently, the complete source code is not provided under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” and the complete source software cannot be distributed (in a cascade) under the two licences “MPL v2.0 or later” and “GPLv3 or later”.

Fourth, we observe that the supplier has chosen to include source code (e.g. “sqlite3.c”) provided under other conditions which are not open source software and not free software in several different zip-files⁸⁷ on the OSP. Further, since the conditions under which “sqlite3.c” is provided include additional restrictions such software (which is not open source software⁸⁸) is

⁸² This has been observed for source code in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip> provided on the OSP during the prototyping phase. Further, this has also been observed for source code in the zip-files <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> provided on the OSP during the extended prototyping phase.

⁸³ For example, the file aes.h is provided under this license.

⁸⁴ For example, the file sha2.c is provided under this license.

⁸⁵ For example, the file tinyxml2.cpp is provided under this license.

⁸⁶ This has been observed for source code in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip> provided on the OSP during the prototyping phase. Further, this has also been observed for source code in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> provided on the OSP during the extended prototyping phase.

⁸⁷ For example, this has been observed for source code provided in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip> on the OSP. Further, this has also been observed for source code provided in the zip-files <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> and http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/CDP_src01-2017-01-03.zip on the OSP.

⁸⁸ Software in the Public Domain is not open source software. It should be noted that Public Domain is inherently problematic for a number of reasons and interpretations vary between jurisdictions. Further, some software claimed to be in the Public Domain is provided with restrictions which make such software inherently incompatible with open source software. Such restrictions may also be incompatible with obtained patent licences which are necessary for implementation of file formats in software under “MPL v2.0 or later” and “GPLv3 or later”. For this reason, the design of the PREFORMA project aims to provide software under these two specific copyleft licences and thereby carefully ruled out use of any software available as Public Domain.

inherently problematic as identified in peer-reviewed research⁸⁹ and by a legal counsel for an open source Foundation⁹⁰ on this topic. Consequently, the complete source code is not provided in zip-files on the OSP under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” and the complete source software cannot be distributed (in a cascade) under the two licences “MPL v2.0 or later” and “GPLv3 or later”.

Fifth, we observe that the software provided on the OSP relies on software (provided under different conditions, including different open source and proprietary licenses) which has not been distributed as required by PREFORMA. For example, there are dependencies to software licensed under the MIT license⁹¹. Further, with respect to provision of permissive licences there are several critical issues which the supplier must resolve with respect to provision of software on the OSP. The supplier provides the file “LIBCURL.DLL” as part of the build environment⁹² and as part of the executable⁹³ on the OSP. From inspection⁹⁴ of the file “LIBCURL.DLL” it is

⁸⁹ For example, according to Greenbaum (2016) ‘the “no-evil” license clause falls afoul of one of the fundamental principles of open source software: the requirement that free and open source licenses not discriminate between potential users or uses of the software. According to this principle, open source software must be available to use for any purpose, without restriction.’ (p. 1298) See: Greenbaum, E. (2016) The Non-Discrimination Principle in Open Source Licensing, *Cardozo Law Review*, Vol. 37, pp. 1297-1343.

⁹⁰ For example, software provided under conditions with discriminatory conditions cannot be used in any Apache project according to a decision by Apache’s vice president of Legal Affairs, Jim Jagielski: <https://lwn.net/Articles/707586/>. This illustrates that legal experts avoid using software with discriminatory conditions which is not open source software.

⁹¹ For example, the file “Reader_libcurl.cpp” contains a statement “#include curl/curl.h” which refers to MIT-licensed open source software that has not been included in the files <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip>, <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> and http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/CDP_src01-2017-01-03.zip on the OSP. As the complete software must be provided on the OSP under the PREFORMA licenses (“MPL v2.0 or later” and “GPLv3 or later”) the supplier must include this software (i.e. “curl.h” and all other files in the complete source code for the Curl project) in all zip-files which must be distributed on the OSP.

⁹² For example, the file “LIBCURL.DLL” is included in the zip-file containing the build environment which is provided on the OSP: <http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/buildenv01.zip>.

⁹³ For example, the file “LIBCURL.DLL” is included in the zip-file containing the executable which is provided on the OSP: http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_exec01-2016-12-19.zip.

⁹⁴ Our analysis includes inspection of the content of the file (through analysis of meta-data properties of the file on Windows 7 and use of “hexdump” on Linux and other tools) and questions asked to the project leader for the curl project. It should be noted that this type of inspection of content in binaries is not what is to be expected for any open source project. Instead, clear communication of licensing and copyright information shall be provided in source code files and associated text files.

clear that this file includes a reference to the website for the curl open source project (<https://curl.haxx.se>) and “libcurl” (version 7.47.1). The curl project is a widely deployed open source project for which the source code for version 7.47.1 is provided⁹⁵ under a permissive (MIT) licence. The curl project is not provided as part of the underlying platform (Windows 7) and also not provided as part of any later version of the Windows platform⁹⁶. It follows that the supplier has failed to fulfil the mandatory requirement in PREFORMA concerning provision of the complete source code from which an executable can be created that can be distributed under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” (in a cascade). By providing software under a permissive licence, the supplier has also failed to fulfil the mandatory requirement concerning provision of software under the two specific copyleft licences “MPL v2.0 or later” and “GPLv3 or later”. Further, as the supplier has included software from the curl project (under the MIT licence) in software provided on the OSP without having included the licence text in the zip-files for the build environment and the executable this does not fulfil the obligations under the MIT licence. It is also the case that we are unable to identify the name of the project leader and all other copyright holders in the binary provided on the OSP (“LIBCURL.DLL”). It is also clear that the reference from the content of the provided file “LIBCURL.DLL” to “curl.haxx.se” refers to a more recent version of the software (i.e. the supplier refers to the wrong copyright information). It should also be noted that, besides the project leader, there are also several other individuals and institutions which control copyright of the curl project. However, from inspection of the meta-data properties⁹⁷ in the file “LIBCURL.DLL” it is evident that the name of the project leader is mentioned, whereas other copyright holders are not mentioned. Further, in the file “LIBCURL.DLL” (which the supplier provides on the OSP), there are also references to another person (Mark Adler) as a copyright holder, but this person is not directly affiliated with the curl project⁹⁸. In summary, as the supplier has ignored all feedback from PREFORMA concerning provision of all software under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” it is perhaps unsurprising that the software provided on the OSP now cannot be used because of these serious licencing issues.

⁹⁵ <https://curl.haxx.se/download/curl-7.47.1.zip>

⁹⁶ Personal communication with the project leader for the curl project (FOSDEM 2017, Brussels 5 February 2017).

⁹⁷ It should be noted that for any well organised distribution and provision of open source software, it is expected that clear licensing information is provided in text files which respect the specific licences. Hence, any potential user considering adoption of open source software should not be expected to inspect of meta-data properties for binaries in order to understand under which conditions software is provided.

⁹⁸ We suspect this copyright information concerns other open source projects provided under the zlib-licence (projects which are used by the curl project), but this is unclear. Mark Adler is not directly affiliated with the curl project and is not mentioned as a copyright holder on the website for curl.

Sixth, we observe that the supplier claims (in the file “License.html” provided in zip-files⁹⁹ on the OSP) that the software provided on the OSP relies on proprietary licensed software (“Visual C++ library” by Microsoft), something which inhibits sustainability and does not conform to PREFORMA licensing requirements.

Seventh, we observe that the software provided contains code under several different licenses and conditions which are not open source software. Consequently, the complete source code is not provided under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) on the OSP. Hence, we note that the supplier provides software on the OSP which does not fulfil mandatory requirements¹⁰⁰ and appropriate licensing practice¹⁰¹ that respects proper acknowledgement of copyright holders. Further, the supplier has chosen to include software¹⁰² under several other different licences and conditions, which inhibits distribution of the complete software (in a cascade) as required in PREFORMA. Consequently, software provided on the OSP cannot be used in and beyond PREFORMA. This can be explained through the following illustrative usage scenario of relevance for PREFORMA. Please consider Figure 3.

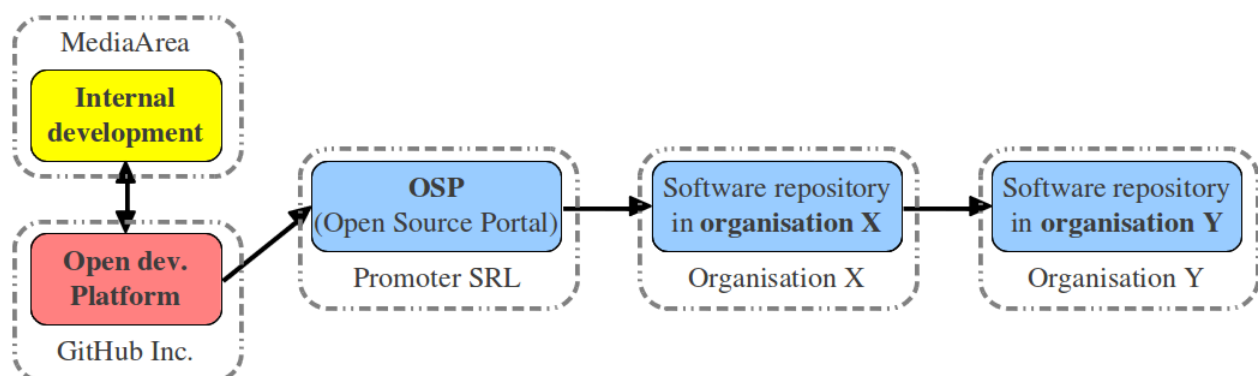


Figure 3. Usage contexts for software provided in PREFORMA (simplified overview)

It is important to recognise that if some source code in a zip-file provided on the OSP is provided under some other licence or under conditions which are not open source software (instead of under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”) this would imply that organisation X (and organisation Y) cannot use the software under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) which is a fundamental requirement in

⁹⁹ For example, in the files <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip> (provided on the OSP during the prototyping phase), <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> (provided on the OSP during the extended prototyping phase) and http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/CDP_src01-2017-01-03.zip (provided on the OSP during the extended prototyping phase).

¹⁰⁰ For example, the complete source code is not provided under any open source licence.

¹⁰¹ For example, software is provided on the OSP without fulfilment of fundamental licensing obligations.

¹⁰² This has been observed for source code provided in several zip-files provided on the OSP (see identified issues 1, 2, 3, 4, 5, and 6 above).

PREFORMA and a fundamental requirement for longevity of software. Consequently, all necessary rights for use, modification and distribution of the software is not provided to organisation X if a representative for organisation X downloads the software from the OSP (since all necessary patent rights will not automatically be provided to a new organisation when the software is distributed under other conditions than those required). Further, all necessary rights for the software is also not provided to organisation Y if the software is distributed from organisation X to organisation Y. Related to this, we take the opportunity to reiterate the importance that the supplier openly clarifies to all individuals and organisations potentially interested in the software (beyond PREFORMA) that all the necessary rights (including all necessary patent licences for implementation of the file formats) since many members of broader open source communities are extremely sensitive to patent related issues (and this is specifically important for the provision of software on the OSP which implements file formats in light of existing declarations in the ISO database). We note that the supplier has provided source code in zip-files on the OSP¹⁰³ for several potentially very problematic¹⁰⁴ file formats (including JPEG 2000¹⁰⁵, MPEG4¹⁰⁶, and MXF¹⁰⁷). Further, amongst supported file formats, we

¹⁰³ For example, in the files <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip> (provided during the prototyping phase) and <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> (provided during the extended prototyping phase). Further, the distribution of problematic file formats remains to be an issue for the software provided in this special core distribution: http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_src01-2016-12-19.zip.

¹⁰⁴ For individuals and organisations that may wish to use and deploy software in which closed file formats are implemented in software, it is essential to clarify that all necessary rights for the software have been obtained beforehand. This is in line with one of the recommendation presented in a report published by the Swedish Competition Authority to organisations that need to manage files in a several different close file formats: “acquire before procurement all necessary rights (including all necessary patent licences) for these closed file formats so that they can be implemented in software that can be used and distributed under different licences (including all licences for open source software).”

¹⁰⁵ For example, from inspection of source code files provided during the prototyping phase (e.g. in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip>) and files provided during the extended prototyping phase (e.g. in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip>) we note that several source code files (e.g. “File_Jpeg.cpp”) include references to the potentially very problematic file format JPEG 2000.

¹⁰⁶ For example, from inspection of source code files provided during the prototyping phase (e.g. in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip>) and files provided during the extended prototyping phase (e.g. in the zip-files <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip> and http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_src01-2016-12-19.zip) we note that several source code files (e.g. “File__Analyze.cpp”) include references to the potentially very problematic file format MPEG4.

note that the supplier also provides software on the OSP which implements several file formats that are closed file formats (i.e. file formats which do not fulfil the mandatory requirement for only implementing open file formats in software). For example, JPEG 2000¹⁰⁸ and QuickTime¹⁰⁹ are both closed file formats and thereby both these fail to fulfil the mandatory requirement for an open file format as expressed in PREFORMA¹¹⁰. It can be noted that the way by which PREFORMA expresses a mandatory requirement for file formats adheres to how Swedish governmental organisations are allowed to express mandatory requirements in public procurement of software when using framework agreements established by the National Procurement Services in Sweden¹¹¹. Further, in addition to providing software which implements closed file formats (e.g. JPEG 2000 and QuickTime) on the OSP, it is also the case that PREFORMA has promoted use of software from PREFORMA that implements the closed file format QuickTime in a public presentation¹¹². The issue concerning that the supplier has obtained all necessary rights (including all patent licences) for implementation of the file formats in software which is to be provided under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) on the OSP has been stressed from the start of the PREFORMA project, including in the document “Feedback on the intermediate release” from the PREFORMA PMT.

¹⁰⁷ For example, from inspection of source code files provided during the prototyping phase (e.g. in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/src01-2016-10-31.zip>) and files provided during the extended prototyping phase (e.g. in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip>) we note that several source code files (e.g. “File_Mxf.cpp”) include references to the potentially very problematic file format MXF.

¹⁰⁸ See, for example Lundell et al. (2015): Lundell, B., Gamalielsson, J. & Katz, A. (2015) On implementation of Open Standards in software: To what extent can ISO standards be implemented in open source software?, *International Journal of Standardization Research*, Vol. 13(1), pp. 47-73.

¹⁰⁹ See, for example: Apple (2012), which clarifies that “The QuickTime File Format Specification is provided for informational purposes. Apple may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. The furnishing of this document does not give you a license to any patents, trademarks, copyrights, or other intellectual property.”: Apple (2012) QuickTime File Format Specification, 14 August, Apple Inc.

¹¹⁰ All file formats used and researched in PREFORMA must be open file formats as defined in the European Interoperability Framework version 1.0, something which conforms to requirements for public procurement of software.

¹¹¹ See framework agreements for public procurement of software and services (“Programvaror och tjänster 2014”) established by the National Procurement Services (Statens inköpscentral) in Sweden: Kammarkollegiet (2015) Programvaror och tjänster 2014, Statens inköpscentral, Kammarkollegiet. <https://www.avropa.se/ramavtal/ramavtalsomraden/it-och-telekom/Programvaror-och-tjanster/>

¹¹² See the presentation “CHECK YOUR STANDARD: PREFORMA AND MEDIACONCH” from the conference “JTS 2016 – NMS Singapore”, https://mediaarea.net/Events/PDF/2016-03-08_JTS.pdf.

However, given that this issue has not yet been addressed¹¹³ it is now urgent that the supplier addresses this issue. In summary, we note that the supplier has failed to present information which demonstrates that they have obtained all necessary patent licenses¹¹⁴ (including for JPEG 2000, MPEG4, and MXF). Further, we note that the supplier has failed to present any information which indicates that they have approached organisations that control patents in order to obtain all necessary patent licenses. We consider this to be a serious risk which has not yet been addressed. Consequently, since the supplier has not yet shown that all necessary rights have been obtained for the software provided on the OSP, it is unclear whether the software implementing each file format under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) can be used as planned in PREFORMA.

Eighth, considering the usage scenario in PREFORMA (see Figure 3) we observe that since software provided in zip-files on the OSP contain source code provided under several different licences and conditions¹¹⁵, the complete source code cannot be provided and distributed under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”. From a software licence perspective and for successfully being able to address sustainability and longevity requirements for software, it is evident that if organisation Y in the future will develop a new software solution which is to be provided under “MPL v4.0 or later” and “GPL v4 or later” it is clear that the source code provided in PREFORMA on the OSP under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) can be incorporated and constitute part of the new software. However, it is also clear that if the source code provided in PREFORMA on the OSP contains software under other conditions it is inherently unclear if the source code provided in PREFORMA can be

¹¹³ We acknowledge that MediaArea claims (in its feedback to PREFORMA) to have “acted to significantly reduce (hopefully remove) patent risk in the code delivered to PREFORMA”. However, such a comment is of no value to any potential adopter of PREFORMA software and we conclude that MediaArea has failed to present all necessary patent licences which allow for implementation of file formats in software to be provided on the OSP under “MPL v2.0 or later” and “GPLv3 or later”. As a potential adopter it is a significant concern that the supplier also has failed to show any effort for obtaining all necessary patent licences.

¹¹⁴ Since the supplier has implemented several potentially very problematic closed file formats in software which is provided on the OSP it follows that all necessary rights (including all necessary patent licences) must have been obtained. The supplier has failed to openly demonstrate that they have obtained all necessary rights (including all necessary patent licences) for providing software on the OSP under “MPL v2.0 or later” and “GPLv3 or later”. We acknowledge that the supplier has implemented closed file formats not included in the tender. However, if any PREFORMA partner promotes use of and distributes such software (e.g. via the OSP) it becomes a risk for the PREFORMA partner as the partner lacks all necessary rights for such use and distribution of software provided on the OSP during the prototyping phase and the extended prototyping phase. For example, the partner University of Skövde has initially planned to use PREFORMA software in an open source tool chain (planned to be provided under “GPLv3 or later”) for e-archiving of digital assets developed in research, something which we cannot do since we lack all necessary rights.

¹¹⁵ Source code provided under several different licences and conditions has been observed in several zip-files provided on the OSP (see identified issues 1, 2, 3, 4, 5, and 6 above).

incorporated and constitute part of the new software. Consequently, any use of software under other conditions¹¹⁶ and other licences than under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) implies that it is unclear if the software can be used. Therefore, any use of software provided under other conditions and other licences inhibits fundamental requirements for sustainability and longevity of software. In summary, for all these reasons software provided on the OSP cannot use components, libraries, and software under other conditions as the software cannot be distributed and used as required in any scenario with requirements for sustainability and longevity of software and therefore cannot be used by any potential adopter during and beyond PREFORMA.

Ninth, even if the supplier has obtained all necessary rights for implementation of a file format in software¹¹⁷ so that it can be distributed under any other licence it does not necessarily follow that such rights have been obtained for distribution of software under “MPL v2.0 or later” and under “GPLv3 or later”. Consequently, for all users¹¹⁸ of open source software provided by PREFORMA on the OSP, the broader open source community, and any potential external contributor it is essential to clarify that all necessary rights have been obtained.

¹¹⁶ For example, Public Domain.

¹¹⁷ For example, it may be that the supplier has obtained all necessary patent licences for implementation of a specific file format in software that is provided on the OSP under BSD 3-Clause (i.e. a licence which lacks a patent clause), which does not allow for distribution of software under the two specific licences (“MPL v2.0 or later” and “GPLv3 or later”) that both contain strong patent clauses and in particular the “GPLv3 or later” which provides memory institutions maximum protection when the software is distributed in a cascade.

¹¹⁸ For sustainability and longevity of software beyond PREFORMA it is critical for PREFORMA partners (and any other organisation in which software from PREFORMA may be used) that no software is provided on the OSP for which all necessary rights have not been obtained. We note that the supplier has failed to present any information which demonstrates that they have obtained all necessary rights (including all necessary patent licences) for implementation of file formats in software to be provided under “MPL v2.0 or later” and “GPLv3 or later” on the OSP. Further, since PREFORMA currently distributes software on the OSP which implements potentially problematic file formats (including JPEG 2000, MPEG4, and MXF), e.g. in the zip-file <http://www.preforma-project.eu/downloads/MediaConch/2017-01-03/src01-2017-01-03.zip>, it is critical that the supplier provides all necessary patent licences they have obtained for implementation of the file formats in software which is to be provided under “MPL v2.0 or later” and “GPLv3 or later” before anyone uses this software.

Tenth, we observe that there is a lack of information concerning how anyone can obtain the corresponding source code which has been used for building the executables¹¹⁹ provided on the supplier's own web site. It is essential to provide information concerning how anyone can obtain corresponding source code on the relevant web pages controlled by the supplier. Therefore, it is essential that the supplier addresses this fundamental PREFORMA requirement in order to meet the PREFORMA R&D challenge and provide software which may be of significant value for memory institutions and other stakeholders.

3.4 ASSESSING PROVISION OF BUILD ENVIRONMENT

The Table below shows an overview of how each supplier has provided monthly releases of build environment on the OSP. Each row shows different releases expected to be provided by each supplier in order to fulfil the PREFORMA requirement for time based (monthly) stable releases¹²⁰. The two rows representing months during which the PREFORMA consortium has reviewed the work¹²¹ conducted by the suppliers is highlighted in bold face. Each cell in the table identifies each release with associated date for when it was released.

¹¹⁹ For example, the supplier makes an executable available on its own web page (e.g. executables for Windows are available via <https://mediaarea.net/MediaConch/downloads/windows.html>) without clear information concerning how the corresponding source code can be obtained. Further, there is a need to clarify if the software provided on the supplier's own web site is identical to the software provided on the OSP. In assuming that the executable provided on the supplier's own web site constitutes the latest version of a stable release, it is essential that the corresponding source code can be easily found. We expect that the web page (<https://mediaarea.net/MediaConch/downloads/windows.html>) clarifies how the complete source code which corresponds to each executable can be obtained.

¹²⁰ For details on PREFORMA requirements concerning provision of time based (monthly) stable releases, see deliverable D4.3.

¹²¹ It should be noted that PREFORMA partners considered reports ("PREFORMA Prototyping Phase 1 – Intermediate Report" provided to report on achievements made until July 2015, "PREFORMA Prototyping Phase 1 – Final Report" provided to report on achievements made until October 2015, "PREFORMA Prototyping Phase 2 – Intermediate Report" provided to report on achievements made until July 2016, and "PREFORMA Prototyping Phase 2 – Final Report" provided to report on achievements made until October 2016) from each supplier and all achievements made so far (including software made available by suppliers on GitHub and their own websites) at time for each review.

Month \ Supplier	veraPDF consortium ¹²²	Easy Innova ¹²³	MediaArea ¹²⁴
December 2016	Not provided ¹²⁵	3.1 ¹²⁶ (30 Dec. 2016)	19 December 2016 ¹²⁷
November 2016	Not provided	3.0.1 (2 Dec. 2016)	1 December 2016
October 2016	Not provided	3.0 ¹²⁸ (28 Oct. 2016)	31 October 2016 ¹²⁹

¹²² <http://www.preforma-project.eu/verapdf-download.html>

¹²³ <http://www.preforma-project.eu/dpfmanager-download.html>

¹²⁴ <http://www.preforma-project.eu/mediaconch-download.html>

¹²⁵ The supplier has not provided monthly releases of build environments for all platforms. Instead, for different platforms, one release of a single build environment has been provided. For example, one single non-open source licensed build environment for Windows (intended for all releases for Windows and last updated on 1 August 2016) is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/build/windows/windows.zip>.

¹²⁶ For example, an open source licensed build environment for Windows is provided (under GPL v2 with the Classpath Exception) via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/buildenv01-2016-12-30.zip>.

¹²⁷ A build environment is provided in the zip-file for Windows (www.preforma-project.eu/downloads/MediaConch/2016-12-19/buildenv01.zip) during the extended prototyping phase. However, this zip-file lacks information concerning precisely what version of the build environment and therefore the specific conditions (e.g. Public Domain or open source software) for provision of the build environment are unclear. Further, contradicting information is provided in file "README.md" in the zip-file http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_src01-2016-12-19.zip on the OSP, which contains instructions stating that "You need to install Microsoft Visual Studio 2013." Hence, the supplier suggests that a proprietary licensed build environment from Microsoft shall be obtained and used. Consequently, from the information provided concerning Windows we have been unable to determine if an open source licensed build environment is provided on the OSP.

¹²⁸ For example, an open source licensed build environment for Windows is provided (under GPL v2 with the Classpath Exception) via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/buildenv01-2016-10-28.zip>.

September 2016	Not provided	2.6 ¹³⁰ (30 Sep. 2016)	30 September 2016
August 2016	Not provided	2.5 (30 Aug. 2016)	31 August 2016
July 2016	Not provided	2.4¹³¹ (1 Aug. 2016)	28 July 2016
June 2016	Not provided	2.3 (28 Jun. 2016)	30 June 2016
May 2016	Not provided	2.2 (30 May 2016)	31 May 2016
April 2016	Not provided	2.1 (29 Apr. 2016)	29 April 2016
March 2016	Not provided	2.0 (4 Apr. 2016)	31 March 2016
February 2016	Not provided	Not provided	29 February 2016
January 2016	Not provided	1.4 (29 Jan. 2016)	Not provided
December 2015	Not provided	1.3 (24 Dec. 2015)	Not provided
November 2015	Not provided	1.2.3 (10 Dec. 2015)	Not provided
October 2015	Not provided	1.2¹³² (28 Oct. 2015)	Not provided
September 2015	Not provided	1.1.1 (02 Oct. 2015)	Not provided

¹²⁹ No build environment is provided in the zip-file for Windows (www.preforma-project.eu/downloads/MediaConch/2016-10-31/buildenv01-2016-10-31.zip) during the prototyping phase. Instead, the zip-file <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/src01-2016-10-28.zip> provided on the OSP contains instructions stating that “You need to install Microsoft Visual Studio 2013.” Hence, the supplier suggests that a proprietary licensed build environment from Microsoft shall be obtained and used. Further, there is no information provided in the zip-file for Windows (www.preforma-project.eu/downloads/MediaConch/2016-10-31/buildenv01-2016-10-31.zip) concerning which open source licensed build environment that can be used for creating a running instance from the source code.

¹³⁰ Only Apache Maven is provided (i.e. a complete open source licensed build environment is not provided).

¹³¹ For example, a non-open source licensed build environment for Windows is provided (since the zip-file includes Oracle JDK 8) via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-2.4/Windows/buildenv01-2016-08-01.zip>.

¹³² For example, a non-open source licensed build environment for Debian is provided via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-1.2/Debian/buildenv17-2015-10-28.zip>.

August 2015	Not provided	1.1 (29 Sep. 2015)	Not provided
July 2015	Not provided	1.0 (31 Jul. 2015)	Not provided

Provision of an open source licensed build environment by which the complete source code can be compiled is a PREFORMA requirement (as detailed in deliverable D4.3). However, as identified in the document “Feedback on the intermediate release” from the PREFORMA consortium to the suppliers, no such build environment was provided at that stage (September 2015). In subsequent discussions concerning achievements made so far in light of the PREFORMA “Feedback on the intermediate release” it was agreed between the PREFORMA consortium and all three suppliers that fulfilment of this PREFORMA requirement could be deferred until the Open Source Workshop¹³³ in Stockholm in April 2016.

From our assessment of the work conducted by **veraPDF** concerning provision of an open source licensed build environment on the OSP we observe that an open source licensed build environment has not been provided on a monthly basis on the OSP. Instead, for different platforms, one release of a single build environment has been provided¹³⁴. Hence, the conditions under which the build environment is provided do not fulfil the PREFORMA requirement and the supplier needs to resolve this.

From our assessment of the work conducted by **Easy Innova** concerning provision of an open source licensed build environment on the OSP we observe that the build environment provided is open source licensed.

From our assessment of the work conducted by **MediaArea** concerning provision of an open source licensed build environment on the OSP we observe that they provide a build environment under unclear conditions and at the same time provide instructions which state that a build environment that is not open source needs to be installed: “You need to install Microsoft Visual Studio 2013.”

3.5 ASSESSING PROVISION OF EXECUTABLES

The Table below shows an overview of how each supplier has provided monthly releases of executables on the OSP. Each row shows different releases expected to be provided by each supplier in order to fulfil the PREFORMA requirement for time based (monthly) stable releases¹³⁵. The two rows representing months during which the PREFORMA consortium has

¹³³ <http://opensourceworkshop.preforma-project.eu/>

¹³⁴ From this practice, it follows that the supplier does not fulfil mandatory requirements for the tender as expressed in D4.3.

¹³⁵ For details on PREFORMA requirements concerning provision of time based (monthly) stable releases, see deliverable D4.3.

reviewed the work¹³⁶ conducted by the suppliers is highlighted in bold face. Each cell in the table identifies each release with associated date for when it was released.

Month \ Supplier	veraPDF consortium ¹³⁷	Easy Innova ¹³⁸	MediaArea ¹³⁹
December 2016	0.28 ¹⁴⁰ (21 Dec. 2016)	3.1 ¹⁴¹ (30 Dec. 2016)	19 December 2016 ¹⁴²
November 2016	Not provided	3.0.1 (2 Dec. 2016)	1 December 2016
October 2016	0.26¹⁴³ (17 Nov. 2016)	3.0¹⁴⁴ (28 Oct. 2016)	31 October 2016¹⁴⁵
September 2016	0.24 (12 Oct. 2016)	2.6 (30 Sep. 2016)	30 September 2016
August 2016	0.22 (7 Sep. 2016)	2.5 (30 Aug. 2016)	31 August 2016

¹³⁶ It should be noted that PREFORMA partners considered reports (“PREFORMA Prototyping Phase 1 – Intermediate Report” provided to report on achievements made until July 2015, “PREFORMA Prototyping Phase 1 – Final Report” provided to report on achievements made until October 2015, “PREFORMA Prototyping Phase 2 – Intermediate Report” provided to report on achievements made until July 2016, and “PREFORMA Prototyping Phase 2 – Final Report” provided to report on achievements made until October 2016) from each supplier and all achievements made so far (including software made available by suppliers on GitHub and their own websites) at time for each review.

¹³⁷ <http://www.preforma-project.eu/verapdf-download.html>

¹³⁸ <http://www.preforma-project.eu/dpfmanager-download.html>

¹³⁹ <http://www.preforma-project.eu/mediaconch-download.html>

¹⁴⁰ The stable release of the executable for the “Greenfield release (all platforms)” is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/bin/all-platforms/verapdf-0.28-GF-20122016.zip>.

¹⁴¹ For example, the stable release of the executable for Windows is provided via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-3.1/Windows/exec01-2016-12-30.zip>.

¹⁴² For example, the stable release of the executable for Windows is provided via the link: http://www.preforma-project.eu/downloads/MediaConch/2016-12-19/CDP_exec01-2016-12-19.zip. This release is referred to as “SPECIAL CORE DISTRIBUTION PACKAGES RELEASE”.

¹⁴³ The stable release of the executable for the “Greenfield release (all platforms)” is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/bin/all-platforms/verapdf-0.26-GF-17112016.zip>.

¹⁴⁴ For example, the stable release of the executable for Windows is provided via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-3.0/Windows/exec01-2016-10-28.zip>.

¹⁴⁵ For example, the stable release of the executable for Windows is provided via the link: <http://www.preforma-project.eu/downloads/MediaConch/2016-10-31/exec01-2016-10-31.zip>.

July 2016	0.20 (1 Aug. 2016)	2.4 (1 Aug. 2016)	28 July 2016
June 2016	0.18 (8 Jul. 2016)	2.3 (28 Jun. 2016)	30 June 2016
May 2016	0.16.3 (3 Jun. 2016) 0.14.3 (31 May 2016)	2.2 (30 May 2016)	31 May 2016
April 2016	Not Provided	2.1 (29 Apr. 2016)	29 April 2016
March 2016	0.12.8 (31 Mar. 2016)	2.0 (4 Apr. 2016)	31 March 2016
February 2016	Not provided	Not provided	29 February 2016
January 2016	Not provided	1.4 (29 Jan. 2016)	27 January 2016
December 2015	Not provided	1.3 (24 Dec. 2015)	31 December 2015
November 2015	0.8.5 (11 Dec. 2015)	1.2.3 (10 Dec. 2015)	30 November 2015
October 2015	0.6.46 ¹⁴⁶ (4 Nov. 2015)	1.2 ¹⁴⁷ (28 Oct. 2015)	31 October 2015 ¹⁴⁸
September 2015	Not provided	1.1.1 (02 Oct. 2015)	30 September 2015
August 2015	0.4.11 (16 Sep. 2015)	1.1 (29 Sep. 2015)	31 August 2015
July 2015	0.2.9 (16 Jul. 2015)	1.0 (31 Jul. 2015)	31 July 2015

Concerning provision of executables, we make the following observations.

From our assessment of the work conducted by the **veraPDF consortium** concerning this aspect we make the following observations¹⁴⁹. First, we note that executables have been provided on the OSP. However, it should be noted that for each platform specific executable there shall always be an up-to-date corresponding open source code that can be downloaded as a single file from the OSP and the open collaboration platform. At time of writing¹⁵⁰, it has not

¹⁴⁶ For example, the stable release for the executable for Debian is provided via the link: <http://www.preforma-project.eu/downloads/veraPDF/bin/all-platforms/verapdf-0.6.46-04112015.zip>.

¹⁴⁷ For example, the stable release for the executable for Debian is provided via the link: <http://www.preforma-project.eu/downloads/DPFManager/Release-1.2/Debian/exec17-2015-10-28.zip>.

¹⁴⁸ For example, the stable release for the executable for Debian is provided via the link: <http://www.preforma-project.eu/downloads/MediaConch/2015-10-31/exec17-2015-10-31.zip>.

¹⁴⁹ As observed 10 January 2017.

¹⁵⁰ As observed 10 January 2017.

been confirmed that this PREFORMA requirement has been fulfilled. We note that the supplier has not provided easy to follow detailed step-by-step instructions for how to use the provided build environment in order to create a running instance of the provided source code. Further, we also note that the supplier failed to provide an open source licensed build environment for the Windows platform and no information is provided concerning how to use an open source licensed build environment on the Windows platform. The PREFORMA consortium¹⁵¹ has so far been unable to compile¹⁵² the source code provided on the OSP and therefore no resulting executable has been produced from the source code provided on the OSP. Consequently, the PREFORMA consortium has been unable to compare the executable provided by the supplier on the OSP with an executable produced from the source code on the OSP. Second, we note that it is difficult to find¹⁵³ a web page provided by the supplier for online use of the software via a standard web browser as required in D4.3. It is therefore important that the supplier makes it possible to easily find the web page for use of the software via a standard web browser.

From our assessment of the work conducted by **Easy Innova** concerning this aspect we make the following observations¹⁵⁴. First, we note that executables have been provided on the OSP. Second, we note that the supplier has not made the software available for use via a standard web browser¹⁵⁵ as required in D4.3. It is therefore important that the supplier makes it possible to use the software for conformance checking of the formats “TIFF/IT” and “TIFF/EP” via a standard web browser.

From our assessment of the work conducted by **MediaArea** concerning this aspect we make the following observations. First, we note that executables have been provided on the OSP. However, it is unclear if conditions for provision of executables on the OSP (as required in PREFORMA) are the same for executables provided on the supplier’s own website. For

¹⁵¹ The Skövde partner and other partners in the PREFORMA consortium.

¹⁵² The outcome of our analysis shows that we are unable to compile the source code using an open source licensed build environment as required in PREFORMA (the outcome of our analysis is based on use of OpenJDK, which is an open source licensed implementation of the Java platform that can be used for compilation of Java source code).

¹⁵³ As observed 5 December 2016 and 16 February 2017, we were unable to find the web page from the OSP and main web page at the supplier site (<http://verapdf.org/>). However, we were able to find the web page when using a standard search engine using the search string “vera online conformance checker site:verapdf.org”.

¹⁵⁴ As observed 5 December 2016.

¹⁵⁵ We note (as observed 8 February 2016) that the supplier does not provide online access to the software for conformance checking of the formats “TIFF/IT” and “TIFF/EP”. Failure to provide online access to the software for conformance checking of the formats “TIFF/IT” and “TIFF/EP” is a violation of mandatory requirements in PREFORMA as detailed in D4.3.

example, the supplier provides executables for several platforms on its own site¹⁵⁶ but the licence conditions for those executables are unclear. Second, we note that the supplier has made the software available¹⁵⁷ for use via a standard web browser as required in D4.3.

Confirmation of that each executable provided on the OSP is functionally equivalent with the corresponding executable built (through use of the provided build environment) from the source code provided on the OSP can be confirmed during the PREFORMA testing phase. Further, in order to assess that the PREFORMA R&D challenge has been fulfilled, conduct of the PREFORMA testing needs to confirm that each executable built (through use of the provided build environment) from the source code provided as “core release” on the OSP is functionally equivalent with the corresponding executable built (through use of the provided build environment) from the source code provided as “standard release” on the OSP.

3.6 ASSESSING OPEN SOURCE IMPLEMENTATION OF STANDARDS

Concerning implementation of file formats in open source software, we make a number of observations.

From our assessment of the work conducted by the **veraPDF consortium** concerning this aspect we make the following observations based on the information provided by the supplier. We note that the veraPDF consortium has been active related to international standardisation (ISO).

From our analysis of the content provided¹⁵⁸ on open collaboration platform (GitHub) it is evident that the veraPDF consortium provides¹⁵⁹ synthetic test files. However, there is a need to

¹⁵⁶ For example, the supplier provides executables for several different platforms, including windows (<https://mediaarea.net/MediaConch/downloads/windows.html>) and Debian (<https://mediaarea.net/MediaConch/downloads/debian.html>) without providing clarifying licence conditions. It is important to clarify that executables are provided under the PREFORMA licenses (“MPL v2.0 or later” and “GPLv3 or later”) on each webpage where an executable can be downloaded.

¹⁵⁷ <https://mediaarea.net/MediaConchOnline>

¹⁵⁸ https://github.com/veraPDF/veraPDF-corpus/tree/staging/PDF_A-1b

clarify licensing conditions for those files¹⁶⁰ on the open collaboration platform and fulfil PREFORMA licensing requirements for synthetic test files (see deliverable D4.3).

From our assessment of the work conducted by **Easy Innova** concerning this aspect we make the following observations based on the information provided by the supplier. We note that the Easy Innova has been active related to international standardisation (ISO).

From our analysis of the content provided on open collaboration platform (GitHub) it is evident that Easy Innova no longer provides¹⁶¹ test files. In acknowledging that file names used (when such files earlier were available) provided an indication of what aspect of the file format specific files¹⁶² are supposed to test. However, if the same files will be made available again, there is a need to clarify meta-data for each file and details concerning what aspects of each file format each different synthetic file it is supposed to test. Further, we acknowledge that licensing conditions for files (once such will be made available) have been clarified on the open collaboration platform which fulfils PREFORMA licensing requirements for synthetic test files (see deliverable D4.3).

From our assessment of the work conducted by **MediaArea** concerning this aspect we make the following observations based on the information provided by the supplier. We note that MediaArea has been active related to standardisation in the context of IETF.

From our analysis of the content provided on open collaboration platform (GitHub) it is evident that the MediaArea provides synthetic test files¹⁶³ and a dedicated web page¹⁶⁴ for

¹⁵⁹ We note that section 2 in the “Prototyping Phase 1 Final Report” from the veraPDF consortium contains detail concerning synthetic test files provided on the open collaboration platform. Further, section 2 also contains references to other websites containing test files. However, there is a lack of clarity concerning licensing of synthetic test files provided on the open collaboration platform, and synthetic test files provided via other web sites fail to fulfil PREFORMA licensing requirements (as detailed in D4.3). For example (as observed 8 February 2016), conditions for use of test files in the Bavaria suite (<http://www.pdflib.com/knowledge-base/pdfa/validation-report/>, specifically the files are available via <http://www.pdflib.com/fileadmin/pdflib/Bavaria/2009-04-03-Bavaria-pdfa.zip>) referred to in the “Prototyping Phase 1 Final Report” is licensed under the following conditions: “Redistributing all or parts of the Bavaria report or the accompanying test documents requires written permission of PDFlib GmbH.” However (as observed 10 January 2017), we note that a web page provided by the supplier (<http://verapdf.org/community/>) refers to a web page above which is now unavailable (<http://www.pdflib.com/knowledge-base/pdfa/validation-report/>).

¹⁶⁰ There is a need clarify licensing conditions for all files in each test file directory and in the meta-data of the file itself.

¹⁶¹ As observed 10 January 2017, we note that no test files are available at <https://github.com/EasyinnovaSL/DPFManager/tree/master/src/test/resources>. However, we acknowledge that test files were previously available (as observed on 8 February 2016) at the same web page.

¹⁶² From the information provided it is currently unclear which of the files provided that are synthetic files.

¹⁶³ Test files are available at https://github.com/MediaArea/MediaConch_SampleFiles.

demonstration of various features of conformance checking. However, there is a need to provide licensing conditions for all files¹⁶⁵ on the open collaboration platform and fulfil PREFORMA licensing requirements for synthetic test files (see deliverable D4.3).

Further, there are two important aspects related to implementation of file formats which need to be addressed by all open source projects. First, each project needs to address complete and consistent interpretation of the technical specification of each file format (as specified). This seeks to contribute to an improved technical specification of each file format (thereby contributing to improved quality in standardisation). Second, each supplier needs to address complete and consistent interpretation of the technical specification when implemented in software. This seeks to contribute to an improved congruence between the software implementation of a specific file format and its technical specification (thereby contributing to improved quality in faithful software implementation of file formats). These are important aspects for all projects which are key for sustainability and for successfully addressing the PREFORMA R&D challenge and all suppliers (and associated open source projects) need to increase attention¹⁶⁶ to these aspects.

3.7 ASSESSING ACHIEVEMENT OF SUSTAINABLE OPEN SOURCE PROJECTS

Concerning achieving sustainable open source projects with associated vibrant business ecosystems and communities, we make a number of observations. In this section we initially report on general observations for the three suppliers and thereafter provide observations and specific recommendations for each supplier.

From our assessment of the work conducted by all three suppliers concerning this aspect we make the following observations.

First, we note that roadmaps focused on external potential contributors and with content addressing a time frame well beyond the PREFORMA R&D project are lacking. For example, one would expect some indication concerning plans until December 2020. From our observations of the content of each roadmap, it seems clear that all suppliers have devoted very limited attention to longevity of software and sustainability of open source projects beyond the time frame for PREFORMA.

Second, we note that all three suppliers and their associated open source projects fail to provide software under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”,

¹⁶⁴ <https://github.com/MediaArea/MediaConch/tree/master/Demo>

¹⁶⁵ There is a need to clarify licensing conditions for all files in each test file directory and in the meta-data of the file itself.

¹⁶⁶ It is essential that suppliers successfully manage to engage the broader developer and user communities related to each file format (and media type) implemented in software in order to promote improved quality in technical specifications of file formats and in quality in software implementations of technical specifications of file formats.

something which significantly inhibits sustainability. Further, several closed¹⁶⁷ file formats are implemented in software for which suppliers have failed to present (to the PREFORMA consortium) the specific patent licences they have obtained which are necessary for implementation in software to be provided on the OSP under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”. In light of previous research results¹⁶⁸ which show that it may be difficult or even impossible to obtain all necessary rights for implementation of file formats, such failure by PREFORMA suppliers to present all patent licences needed imposes uncertainty for longevity of software and sustainability of open source projects beyond PREFORMA. Further, such uncertainty concerning that all necessary rights have been obtained contributes to uncertainty for any potential contributor, user, and organisation which consider engagement with each open source project.

Third, from observation it is still unclear to what extent external contributions have so far been attracted. For planning and action during the PREFORMA testing phase, we anticipate increased attention on sustainability of each project beyond the PREFORMA R&D project.

Fourth, from our assessment of software provided so far on the OSP we note that there is scope for improvement concerning code transparency¹⁶⁹ and software architecture¹⁷⁰ for all

¹⁶⁷ It should be noted that closed file formats and closed standards may cause significant obstacles for any organisation which seek to implement such in software, as recognised in official communication from the European Commission. For example, the European Commission clarifies that “FRAND licenses create barriers for Open Source projects” (EC COM(2013) 455 final & SWD(2013) 224 final).

¹⁶⁸ See for example: Lundell, B., Gamalielsson, J. and Katz, A. (2015) On implementation of Open Standards in software: To what extent can ISO standards be implemented in open source software? *International Journal of Standardization Research*, Vol. 13(1), pp. 47-73.

¹⁶⁹ Open source software which is developed and maintained in open source projects can be distributed to anyone for use, scrutiny, improvement, and redistribution according to its licensing conditions. When open source software is provided on open collaboration platforms and available via the web and other distribution channels, this promotes transparency and aid open collaboration. Previous research shows that open source projects may significantly promote transparency, both in terms of access to the source code and also in terms of a transparent open development model, something which facilitates scrutiny and external audit of open source software (von Krogh and Spaeth, 2007). There are a number of dimensions of transparency, which can be separately (or in combination) analysed. For example, coding practices is one important dimension of code transparency which has been analysed in previous research (e.g. Gamalielsson et al., 2012). See: Gamalielsson, J., Grahn, A. and Lundell, B (2012) Learning through analysis of coding practices in FLOSS projects, In Robles, G., González Barahona, J., Tebbens, W. and Hammouda, I. (Eds.) *Proceedings of FLOSSEdu 2012: FLOSS Education - Long-term Sustainability*, Tampere University of Technology, Department of Software Systems, Report 21, Tampere, ISBN 978-952-15-2938-2, pp. 13-19.; von Krogh, G. and Spaeth, S. (2007) The open source software phenomenon: Characteristics that promote research, *The Journal of Strategic Information Systems*, Vol. 16 (3), pp. 236-253.

open source projects¹⁷¹. For example, in case a memory institution wishes to deploy a software component in which only one specific tendered file format for each media type (e.g. PDF/A-1 for text, or TIFF/IT for image) is implemented, it is essential that only the specific subset of the software developed in which the specific file format is implemented can easily be identified and reused (e.g. if a memory institution is only interested in the subset of the software implementing TIFF/IT, it is critical that the software architecture promotes easy reuse of this subset of the software without a need for incorporation of any software that is specific for implementing TIFF/EP).

Fifth, concerning opportunities for integration, we acknowledge that some of these requirements are mandatory¹⁷² whereas some are optional¹⁷³. At the same time, it is clear that successful integration of software from the two other suppliers provides increased business opportunities. If identified licensing issues are resolved by suppliers in all open source projects and developed software becomes more stable and provided as required so that it can be distributed to memory institutions (and other organisations), it is essential that suppliers take an active part in evolving a business ecosystem related to developed software.

Concerning the work performed by the **veraPDF consortium**, we provide the following recommendations and requests in order to provide long-term sustainability of the open source project.

¹⁷⁰ Previous research shows the importance of a well-designed modular software architecture for open source projects which are developed in open collaboration. For example, Crowston et al. (2012) stresses that “Modularity has been seen as key to the feasibility of distributed development” (p. 7:16) and it is widely acknowledged that development of open source software is a successful exemplar of distributed development (Fitzgerald, 2006). Further, research shows that a clear, transparent, and well-designed software architecture is essential for attracting external contributions since many developers typically contribute to just a single module (Scacchi, 2007). See: Crowston, K., Kangning, W., Howison, J., and Wiggins, A. (2012) Free/Libre open-source software development: what we know and what we do not know, ACM Computing Survey, Vol. 44(2), Article 7.; Fitzgerald, B. (2006) The transformation of open source software, MIS Quarterly, Vol. 30(4), pp. 587–598.; Scacchi, W. (2007) Free/Open Source Software Development: Recent Research Results and Methods, Advances in Computers, Vol. 69, pp. 243-295.

¹⁷¹ Without code transparency and clear software architecture, open source projects may be less attractive for external stakeholders and more difficult to reuse software from the open source project. In the words of Gacek and Arief (2004): “An open source software system’s architecture might be available or not. An unintentionally unavailable software architecture suggests that the structure exists in some people’s minds only.” (p. 37) Such a situation is something which all open source projects in PREFORMA must avoid. See: Gacek, C. and Arief, B. (2004) The Many Meanings of Open Source, IEEE Software, Vol. 21(1), pp. 34-40.

¹⁷² Mandatory requirements are options 1, 5, 9, 13, 17, and 21 as specified in deliverable D4.3.

¹⁷³ Optional requirements are options 2, 3, 4, 6, 7, 8, 10, 11, 12, 14, 15, 16, 18, 19, 20, 22, 23, and 24 as specified in deliverable D4.3.

From our analysis we note that the veraPDF consortium is an active contributor to PDF/A and its further development¹⁷⁴ (currently termed “PDF/A-next”) within relevant working groups for standardisation of the file format within ISO. In this role, the veraPDF consortium may have unique opportunities to influence the further evolution of the file format in a way to ensure its future relevance for longevity of files produced in this format. One approach for achieving sustainability of “PDF/A-next” would be to promote that the ISO WG adopts a work practice for development of this new file format which is supplemented with development and maintenance of an open source-licensed reference implementation (licensed under “GPLv3 or later”) within the ISO standardisation process. If an open reference implementation of “PDF/A-next” is deployed in software licensed under “GPLv3 or later” it becomes an inherent part of the ISO standardisation process for new versions of the PDF/A file format within ISO. Such an open reference implementation would constitute a significant step towards ensuring long-term relevance of the file format for memory institutions. Even if the ISO WG would not adopt a work-practice involving use of an open reference implementation licensed under “GPLv3 or later” in the standards development process it is of uttermost importance for the longevity of files (which are created in the file format) that the IPR conditions (specifically concerning patents) are such that anyone can implement “PDF/A-next” in software which is provided and distributed under “GPLv3 or later”. In case this cannot be achieved the relevance of “PDF/A-next” would be significantly reduced, especially for application areas with requirements for long-term maintenance of files. However, as the veraPDF consortium has a unique opportunity (as leaders of the WG in ISO standardisation) we expect a positive development and for the PREFORMA consortium we would very much support and welcome initiatives for development of an open source reference implementation of “PDF/A-next” which is provided and distributed under “GPLv3 or later” as an inherent part of the standardisation process.

Further, from our analysis of the software provided by the veraPDF consortium on the OSP, it seems that the software provided implements file formats which have not been included in the tender (e.g. ISO 32000-1¹⁷⁵ and JPEG 2000). In noting that these file formats have been implemented in software provided on the OSP and that it is fine for a supplier to provide software beyond PREFORMA requirements it is of uttermost importance that the supplier clearly communicates and convinces any potential external contributor that the supplier has obtained all necessary rights (including all patent licences) for implementing and distributing software under the PREFORMA licences (i.e. “MPL v2.0 or later” and “GPLv3 or later”). One strategy which contributes to such clear communication concerns improvement of the content in the roadmap so that any potential contributor is convinced that the supplier has obtained all necessary rights. In addition, since the supplier provides software on the OSP (and via other channels) for use by organisations other than PREFORMA partners it is critical that the supplier provides a copy of all patent licences that are necessary for implementing and distributing

¹⁷⁴ For example, the veraPDF consortium reports (in “PROTOTYPING PHASE 1 FINAL REPORT”) that they ‘led the effort to create a new Part of PDF/A, currently termed “PDF/A-next”.’ Further, the veraPDF consortium reports (in “PROTOTYPING PHASE 2 FINAL REPORT”) that they have “driven awareness of the need for PDF/A-next, and led in its development”.

¹⁷⁵ It should be noted that ISO 32000-1 is a normative reference in PDF/A-2.

software under “MPL v2.0 or later” and “GPLv3 or later” to the PREFORMA consortium before promoting use and deployment of software from the OSP. In particular, before promoting use of software from the OSP it is critical that the patent licences required for implementation of ISO 32000-1 and JPEG 2000 can be assessed by PREFORMA partners in order to ensure that the PREFORMA project avoids a situation in which software provided on the OSP is distributed for use by external memory institutions and users in any other interested organisations without having obtained all necessary rights.

Concerning the work performed by **Easy Innova**, we provide the following recommendations and requests in order to provide long-term sustainability of the open source project.

From our analysis we note that Easy Innova has taken action to establish “TI/A” as a new file format within ISO (later presented by the supplier to be a new initiative). However, before taking further actions to promote the new initiative “TI/A” and implement “TI/A” in software, it is critical to ensure that the name “TI/A” can be used¹⁷⁶ (for legal reasons) and to communicate its relation to the TIFF/IT and TIFF/EP standards (which are the two standards being tendered in the PREFORMA project). Overall, it is essential to extend the information concerning these issues to the broader community (including the road-map provided by the supplier which aims at external contributors). For attracting external contributors to the open source project it is important to clarify the conditions¹⁷⁷ for use of these and the new initiative “TI/A” to the broader

¹⁷⁶ At time of writing (10 January 2017), we currently unaware of any documentation from the company behind the TIFF file format (Adobe Systems Incorporated) which clarifies that “TI/A” is unproblematic with respect to legal and licensing issues concerning trademarks, patents, and any other rights controlled by the company (Adobe Systems Incorporated) or any other organisation.

¹⁷⁷ There are a number of important reasons for this. For example, there are a number of patent declarations for TIFF/EP in the ISO database, whereas there are no such (at time of writing) for TIFF/IT. Therefore, in case a memory institution wishes to deploy a software component for checking conformance with only one of the file formats (e.g. TIFF/IT), it is essential that the software architecture easily allows this and for this reason code transparency is of paramount importance for developed software. Further, since many members of broader open source communities are extremely sensitive to patent related issues it is critical to clarify conditions for involvement in the open source project for potential external contributors.

community. Therefore, it is critical to clarify precisely the overlap between these file formats¹⁷⁸ and also clarify any potential impact (which potentially) may inhibit use of software in which one (or several) of these file formats is implemented to the broader open source community. The fact that the supplier has ensured (as part of the formal contract) the PREFORMA consortium that it has obtained all necessary rights for the work in PREFORMA (which includes that the supplier has obtained all necessary rights for implementing and distributing software under “GPLv3 or later”) is not transparent (and therefore of no relevance) to any external potential contributor. Clarification of the software architecture concerning which subset of the software implements TIFF/IT and which subset of the software implements TIFF/EP is essential for achieving code transparency with respect to the tendered file formats. Further, if the supplier aims to also implement “TI/A” (which may be a subset of TIFF/EP), it is also essential to clarify precisely which subset of the software implements “TI/A” for achieving code transparency. In addition, since the supplier provides software on the OSP (and via other channels) for use by organisations other than PREFORMA partners it is critical that the supplier provides a copy of all patent licences that are necessary for implementing and distributing software under “MPL v2.0 or later” and “GPLv3 or later” to the PREFORMA consortium before promoting use and deployment of software from the OSP. In particular, before promoting use of software from the OSP it is critical that the patent licences required for implementation of TIFF/EP can be assessed by PREFORMA partners in order to ensure that the PREFORMA project avoids a situation in which software provided on the OSP is distributed for use by external memory institutions and users in any other interested organisations without having obtained all necessary rights.

¹⁷⁸ In particular, for reasons of existing patent declarations in the ISO patent database related to TIFF/EP, clarifications concerning the precise relation and overlap between “TI/A” and TIFF/EP needs to be clarified through provision of all patent licences that the supplier has obtained for implementation of TIFF/EP in software which is provided on the OSP (and via other channels) under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”. We note (10 January 2017) that the supplier has failed, despite feedback to the supplier from the PREFORMA PMT on the intermediate release (provided in July 2016), and feedback to the supplier on the final release (provided 2 December 2016): to openly clarify “to all individuals and organisations potentially interested in the software (beyond PREFORMA)” that the supplier has obtained “all the necessary rights (including all necessary patent licences for implementation of the file formats) since many members of broader open source communities are extremely sensitive to patent related issues (and this is specifically important for the provision of software on the OSP which implements TIFF/EP in light of existing declarations in the ISO database)”. Consequently, it is critical that the supplier provides us with all necessary patent licences for implementation of TIFF/EP in software so that partners in PREFORMA can assess all necessary patent licences that have been obtained. Thereafter, as requested in previous feedback from PREFORMA to the supplier (on the “Prototyping Phase 2 intermediate report” and the “Prototyping Phase 2 final report”), it is also critical to openly declare that the supplier has obtained all necessary rights for implementing TIFF/EP in software under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” to the broader open source communities. It should be noted that many members of broader open source communities are extremely sensitive to patent related issues (and this is specifically important for the provision of software on the OSP which implements TIFF/EP in light of existing declarations in the ISO database).

Concerning the work performed by **MediaArea**, we provide the following recommendations and requests in order to provide long-term sustainability of the open source project.

First, from our analysis of the source code provided by MediaArea on the OSP we note that there are functions implementing the file format MPEG-4 and also other file formats (e.g. JPEG 2000 and MXF) not explicitly requested in the PREFORMA tender. For this reason, it is critical (for community and legal reasons) to clarify with respect to any potential external contributor (i.e. beyond the PREFORMA consortium) that the supplier has obtained all necessary rights (including all necessary patent licenses) for all implemented file formats. Overall, it is essential to extend the information concerning these issues to the broader community (including the roadmap provided by the supplier which aims at external contributors). For attracting external contributors to the open source project it is important to clarify the conditions¹⁷⁹ for use of these file formats especially since these file formats are not open standards¹⁸⁰ and many

¹⁷⁹ There are a number of important reasons for this. For example, there are a number of patent declarations made to ISO from several organisations for (several parts of) the MPEG-4 file format standard (ISO/IEC 14496). Therefore, it is essential to provide clarity on this issue for use of software which implements the MPEG-4 file format (and also for other implemented file formats). Further, in case a memory institution wishes to deploy a software component for checking conformance with only open file formats implemented in the software, it is essential that the software architecture easily allows this and for this reason code transparency is of paramount importance for developed software. Further, it is important to recognise that many members of broader open source communities are extremely sensitive to patent related issues.

¹⁸⁰ The requirements for the PREFORMA tender (see “Deliverable D2.1 Overall Roadmap” and “Deliverable D2.2 Tender Specifications”) define an open standard as follows: “The standard is adopted and will be maintained by a not-for-profit organisation, and its ongoing development occurs on the basis of an open decision-making procedure available to all interested parties (consensus or majority decision etc.); The standard has been published and the standard specification document is available either freely or at a nominal charge. It must be permissible to all to copy, distribute and use it for no fee or at a nominal fee.; The intellectual property - i.e. patents possibly present - of (parts of) the standard is made irrevocably available on a royalty-free basis.; There are no constraints on the re-use of the standard.” This definition is also used by the Swedish Governmental organisation “Statens inköpscentral vid Kammarkollegiet” which is responsible for establishing framework agreements for public sector procurement when expressing requirements for which standards may be referenced in procurement. Further, it should be noted that an open standard (as defined in the European Interoperability Framework EIF 1.0) can be implemented and distributed under different licenses for proprietary software and under different licenses for open source software, including “GPLv3 or later”.

organisations have declared that they control standards essential patents¹⁸¹ related to these file formats. The fact that the supplier has ensured (as part of the formal contract) the PREFORMA consortium that it has obtained all necessary rights for the work in PREFORMA (which includes that the supplier has obtained all necessary rights for implementing and distributing software under “GPLv3 or later”) is not transparent (and therefore of no relevance) to any external potential contributor. For the continued work it is critical that the supplier provides clarity on these issues and details precisely which file formats and parts thereof are included in the software provided on the OSP. In addition, since the supplier provides software on the OSP (and via other channels) for use by organisations other than PREFORMA partners it is critical that the supplier provides a copy of all patent licences that are necessary for implementing and distributing software under “MPL v2.0 or later” and “GPLv3 or later” to the PREFORMA consortium before promoting use and deployment of software from the OSP. In particular, before promoting use of software from the OSP it is critical that the patent licences required for implementation of MPEG-4, JPEG 2000, and MXF can be assessed by PREFORMA partners in order to ensure that the PREFORMA project avoids a situation in which software provided on the OSP is distributed for use by external memory institutions and users in any other interested organisations without having obtained all necessary rights.

Second, from our analysis we note that MediaArea refers to Debian in their feedback provided to the PREFORMA consortium on 14 December 2015 and 8 January 2016. In this feedback it is mentioned that MediaConch has been reviewed by Debian maintainers and it is mentioned¹⁸² that it “is being accepted in the official Debian repository”. However, it should be noted that Debian licensing requirements are different from the PREFORMA licensing requirements as expressed in the DoW, deliverables D2.2, D2.3, the tender, D4.3, and the tender (in the second round). Consequently, having MediaConch in the Debian repository is not relevant with respect to fulfilment of the PREFORMA requirements. From our analysis, we observe that MediaConch has not yet been provided on the OSP under the “MPL v2.0 or later” and “GPLv3 or later” licenses as required by PREFORMA.

To achieve long term sustainable open source projects, it is essential for any potential external contributor to be convinced that any contribution is well received and can be contributed without any legal and licensing issues. For example, it is important to recognise that any agreement between rights-holders, suppliers and the PREFORMA consortium is of limited (or no¹⁸³) value

¹⁸¹ “A patent that protects technology essential to a standard is called a standard-essential patent. It is impossible to manufacture standard-compliant products such as smartphones or tablets without using technologies covered by one or more SEPs. SEPs are different from patents that are not essential to a standard (non-SEPs), such as design patents, for example, which protect the design features of an invention. This is because, generally, companies can invent alternative solutions that do not infringe a non-SEP (whereas they cannot design around a SEP).” (EC, 2014) See: EC (2014) Standard-essential patents, Competition policy brief, Issue 8, European Commission, June, ISBN 978-92-79-35553-0, ISSN: 2315-3113.

¹⁸² See “Supplier Updated Response to Feedback on the final release - Oct 2015” dated 8 January 2016.

¹⁸³ What is important in this respect is the perception of conditions for contributing amongst potential contributors.

(especially when such are not publicly disclosed). Therefore, clarifying licensing conditions and information that the supplier has obtained all necessary rights¹⁸⁴ is especially important concerning software which handles synthetic test files as such test files have deliberately been designed to deviate from the technical specification of such file formats. This is fundamentally important for file formats for which it is known that organisations have declared standard essential patents which are necessarily infringed when such a file format is implemented in software. One example of such a file format for which such details are necessary to communicate in the road-map is ISO 32000-1. Lack of such details may significantly inhibit contributions from external contributors as many community members are very sensitive with respect to unclear conditions concerning potential patent infringements and the potential need for obtaining patent licenses.

¹⁸⁴ It should be noted that the specific rights a supplier has obtained through all patent licences the supplier has obtained may (or may not) allow for implementation of the file format in software which is to be provided on the OSP for use by organisations beyond PREFORMA. For this reason, it is of uttermost importance that the supplier presents all details concerning all patent licences they have obtained to any potential adopter of software from the OSP. Further, to successfully address sustainability it is of uttermost importance that the OSP (and all software provided via the OSP) will be maintained for the full life-cycle during which archiving of files in the specific file formats is relevant.

4 CONCLUSION AND FUTURE OUTLOOK

4.1 OVERVIEW

This deliverable reports on monitoring of the Open Source Project implementations. Based on development efforts for each supplier, this deliverable provides feedback on their use of: an open work practice for development; frequent open releases; and promotion activities aiming towards a sustainable community.

The monitoring is focused on assessment of the extent to which suppliers address establishment of sustainable communities. Specifically, an evaluation is presented of how each open source project implementation adheres to requirements expressed in deliverable D4.3. In so doing, the deliverable provides an evaluation of the extent to which best practices from community driven open source projects to be provided under two specific copyleft licences have been adopted with adherence to full transparency for all digital assets.

Besides an assessment of achievements made, outcomes from assessment reported in this deliverable may also provide valuable guidance for suppliers in their efforts concerning establishment of long-term sustainable open source communities.

4.2 ON ESTABLISHING SUSTAINABLE OPEN SOURCE PROJECTS

Longevity of software is a necessary, but not sufficient, pre-requisite for sustainability of open source projects and the success of the PREFORMA project. Establishing healthy ecosystems and active communities related to each open source project, promoted by PREFORMA, is an ongoing challenge for the suppliers during and beyond the time frame for the PREFORMA project. Previous research shows the long-term sustainability of open source projects can be a major challenge¹⁸⁵. There are many examples of open source projects that, for various reasons, are inactive even amongst projects where a substantial amount of software has developed. There may be many reasons for why an open source project over time becomes inactive; one

¹⁸⁵ See, for example, research results from the evolution of an open source project: Gamalielsson, J. and Lundell, B. (2014) Sustainability of Open Source software communities beyond a fork: How and why has the LibreOffice project evolved?, *The Journal of Systems and Software*, Vol. 89(1), pp. 128-145.

reason being a lack of interest amongst organisations, key contributors¹⁸⁶ and members of associated communities. It may be that organisations and contributors no longer are committed to drive and engage with the specific project.

The EU minister with responsibility for competition has publicly communicated that the European Commission received many complaints¹⁸⁷ concerning standard essential patents related to use of standards¹⁸⁸ and the Swedish minister responsible for competition has expressed concerns for use of standards which are not open standards as such inhibits

¹⁸⁶ There are examples of open source projects in which project representatives have initiated discussions amongst community members about a possible planned retirement (instead of just abandoning the source code) of an open source project. For example, the vice president of Apache OpenOffice (an open source project provided under a permissive open source licence) has initiated a discussion amongst community members concerning a possible planned careful retirement of the project. In a communication sent to community members it was expressed “I have regularly observed that the Apache OpenOffice project has limited capacity for sustaining the project in an energetic manner. It is also my considered opinion that there is no ready supply of developers who have the capacity, capability, and will to supplement the roughly half-dozen volunteers holding the project together.” (Hamilton, 2016). See: Hamilton, D., E. (2016) What Would OpenOffice Retirement Involve?, 1 September, http://mail-archives.apache.org/mod_mbox/openoffice-dev/201609.mbox/%3C008d01d204a9%24bd37caa0%2437a75fe0%24%40apache.org%3E.

¹⁸⁷ For example, the European Commission reports: “the frequency of patent litigation in general, and related to SEPs in particular, has increased considerably over the past 30 years” (EC, 2014). See: EC (2014) Standard-essential patents, Competition policy brief, Issue 8, European Commission, June, ISBN 978-92-79-35553-0, ISSN: 2315-3113.

¹⁸⁸ It should be noted that a minister with responsibility for competition issues in the European Commission have stated that “we have received many complaints related to standards-essential patents” (Almunia, 2012). See: Almunia, J. (2012) Competition enforcement in the knowledge economy, Speech/12/929, Vice President of the European Commission responsible for Competition Policy, European Commission, 20 September.

competition¹⁸⁹. For this reason it may be unsurprising that public procurement of IT systems may only express mandatory requirements for standards which are open standards¹⁹⁰.

Challenges related to implementation of IT-standards and file formats have received considerable attention by the European Commission including by an experts group with representatives from member states¹⁹¹. The experts group addresses public procurement of software including challenges which may inhibit implementation of standards and file formats in software. Amongst policy makers and experts, there is a variety of experiences of challenges and different obstacles related to whether it is possible to obtain all necessary patent licences for specific standards and file formats that are to be implemented in software¹⁹². Such challenges and obstacles have also been analysed and discussed amongst legal experts¹⁹³,

¹⁸⁹ The Director General for the Swedish Competition Authority expresses: "From a competition perspective it is often problematic when public sector organisations conduct IT procurement and express requirements for closed standards" (expressed by Dan Sjöblom, Director General for the Swedish Competition Authority, preface to the research study "IT-standarder, inlåsning och konkurrens" (commissioned by the Swedish Competition Authority, our translation). For reference to the research study "IT-standarder, inlåsning och konkurrens" published by the Swedish Competition Authority, see: Lundell, B., Gamalielsson, J. and Tengblad, S. (2016) IT-standarder, inlåsning och konkurrens: En analys av policy och praktik inom svensk förvaltning, Uppdragsforskningsrapport 2016:2, Konkurrensverket, ISSN: 1652-8089.

¹⁹⁰ "The Swedish framework agreements for software and related services have a rule that a public authority that wishes to use the framework may only state mandatory requirements for a certain IT-standard if it meets the requirements of an open standard defined in the European Interoperability Framework, the EIF 1.0." (The Swedish National Procurement Services: NPS at Kammarkollegiet, 2016). See: NPS (2016) Open IT-standards, The Swedish National Procurement Services, Kammarkollegiet, Dnr 96-38-2014, 7 March.

¹⁹¹ IT Sector Public Procurement Experts Meeting, organised by the Policy Officer in charge of IT Procurement Project, DG GROW G4, European Commission, Directorate General Internal market, Industry, Entrepreneurship and SMEs, European Commission, Ljubljana, 14 November.

¹⁹² For example, presentations by invited experts included reports on experiences concerning obstacles concerning clarification of conditions for implementation of specific file formats in software: Lundell, B. (2016) IT-standards, Lock-in and competition: Experiences from a study of how Swedish public sector organisations develop and procure IT-systems, Invited expert presentation @ IT Sector Public Procurement Experts Meeting, Directorate General Internal market, Industry, Entrepreneurship and SMEs, European Commission, Ljubljana, 14 November.

¹⁹³ Katz, A. (2016) FOSS and Standardisation: Improving the standards system, Presentation of position statement during panel discussion "The Open Source Movement" @ the conference, The 10th Annual Standards, Patents & Competition: Law and Litigation, Grange City Hotel, London, UK, 5-6 December; Lundell, B., Stürmer, M., Katz, A., and Chestek, P. (2017) "What legal and policy issues concerning FOSS need to be systematically researched?", Panel discussion @ Legal and Policy Issues devroom, FOSDEM 2017, Brussels, 4-5 February.

policy makers¹⁹⁴, and standardisation and open source experts invited by standardisation organisations¹⁹⁵. Such challenges have also received considerable attention amongst responsible governmental agencies at national level. For example, challenges and different strategies for minimising risks for public sector organisations related to deployment of software in which closed (and potentially very problematic) file formats are implemented have been discussed during invited seminars at The Swedish National Financial Management Authority (Ekonomistyrningsverket, ESV¹⁹⁶) and the National Agency for Public Procurement (Upphandlingsmyndigheten¹⁹⁷). Amongst participants, it was agreed that clarifying conditions for use of file formats is a fundamental first step. Specifically, related to the current task for the Swedish National Financial Management Authority the discussion focused on one of the recommendations focused on file formats which was presented in a report published by the Swedish Competition Authority: “To manage data and documents submitted to a public sector organisation in closed file formats, acquire before procurement all necessary rights (including all necessary patent licences) for these closed file formats so that they can be implemented in software that can be used and distributed under different licences (including all licences for open source software).” Further, related to the mission for the National Agency for Public Procurement, the discussion covered current practices concerning public procurement and elaborated on the importance of obtaining all necessary rights for file formats and standards which are to be implemented in software.

To address challenges related to obtaining all necessary patent licences and all necessary rights for implementation of a specific file format in software it is also critical to recognise that

¹⁹⁴ Lundell, B. (2017) ‘On implementation of file formats and standards in software under unclear conditions: How can public procurement avoid unequal treatment and the “emperor’s new clothes 2.0”?’, presentation at meeting with representatives for DG Connect and DG Grow (host: Thomas Reibe, Senior Expert, European Commission: DG Connect, Unit F2 – Innovation), European Commission, Brussels, 3 February.

¹⁹⁵ For example, an ETSI experts panel elaborated on these issues: Lundell, B. (chair), Marr, D., Opie, E., Piana, C. and van Rooijen, A. (2016) Panel discussion: Standpoint of the standardization community having a FRAND policy concerning the use of open source and standpoint from open source community to work with deliverables coming from the standardization world, In Workshop on Open source and standardization: legal interactions, ETSI, Nice, 16 September.

¹⁹⁶ Lundell, B. (2017) “Implementing file formats and standards in software under unclear conditions: How can public procurement maintain equal treatment and fair competition?”, invited seminar (host: Peter Norén, Head of Unit Implementation and Sourcing of Enterprise Applications), Ekonomistyrningsverket, Stockholm, 1 February.

¹⁹⁷ Lundell, B. (2017) “On file formats, standards, and competition: How can public procurement of software implementing file formats maintain equal treatment?”, invited seminar (host: Inger Ek, Director General for the National Agency for Public Procurement), Upphandlingsmyndigheten, Stockholm, 1 February.

different open source licences have different legal implications¹⁹⁸. Some open source licences have no explicit patent clauses (e.g. BSD 3-Clause), whereas GPL3 has an explicit and broad patent clause¹⁹⁹. For PREFORMA it has been important that all software provided to memory institutions are provided under a licence which provides maximum protection (“GPLv3”) and allows use of software in future versions of the licence (through use of “or later” with the licence, i.e. “GPLv3 or later”) as this choice promotes sustainability and provides a very strong legal protection to users of software from PREFORMA.

Establishing sustainable open source projects through public procurement requires that all mandatory requirements are fulfilled. Provision of sustainable solutions through public procurement of open source software²⁰⁰ includes mandatory requirements concerning licensing of software and implementation of file formats for which all necessary rights have been obtained. If a supplier fails to fulfil all mandatory requirements expressed in the public procurement the work conducted by a supplier shall not be evaluated²⁰¹. During the time-frame for the prototyping phase in PREFORMA, all suppliers have provided software on the OSP which implements several file formats without having demonstrated that they have obtained all necessary rights for doing so.

Several file formats researched²⁰² and implemented in software which is provided on the OSP during the prototyping phase²⁰³ are potentially very problematic. Further, previous research

¹⁹⁸ Piana, C. (2016) Presentation of position statement “My personal sample of Patent Provisions From Relevant Licenses” @ Panel discussion: Standpoint of the standardization community having a FRAND policy concerning the use of open source and standpoint from open source community to work with deliverables coming from the standardization world, In Workshop on Open source and standardization: legal interactions, ETSI, Nice, 16 September.

¹⁹⁹ As discussed during an ETSI workshop: Lundell, B. (chair), Marr, D., Opie, E., Piana, C. and van Rooijen, A. (2016) Panel discussion: Standpoint of the standardization community having a FRAND policy concerning the use of open source and standpoint from open source community to work with deliverables coming from the standardization world, In Workshop on Open source and standardization: legal interactions, ETSI, Nice, 16 September.

²⁰⁰ The responsible governmental agency for establishing framework contracts for public procurement of software and services, including open source software solutions, define open source software as “software which in its entirety is licensed under one or several licences which are approved by the Open Source Initiative.”

²⁰¹ The fundamental principles governing public procurement implies that establishment of that all mandatory requirements have been fulfilled must precede an evaluation of the software according to established evaluation criteria.

²⁰² As PREFORMA partners have promoted use of software for which the suppliers has failed to demonstrate all necessary rights all partners in PREFORMA which have promoted and distributed such software are exposed to risk. For example, see slide 17 a public presentation from a PREFORMA partner which shows that a closed file format (Quicktime) has been implemented. See the presentation “CHECK YOUR STANDARD: PREFORMA AND MEDIACONCH” from the conference “JTS 2016 – NMS Singapore”, https://mediarea.net/Events/PDF/2016-03-08_JTS.pdf.

results²⁰⁴ show that some of the implemented file formats (JPEG 2000 and TIFF/EP) are not open file formats. Consequently, all suppliers have failed to fulfil mandatory requirements in the public procurement. Further, all suppliers have failed to demonstrate that they have obtained all necessary patent licences and the situation is therefore unclear. This is especially troublesome in light of that all suppliers have ignored explicit requests to clarify the situation concerning all necessary patent licences and other rights. Specifically, for suppliers implementing JPEG 2000 and TIFF/EP (and other closed file formats), there are a number of open questions which concern all suppliers. First, it is unclear if each supplier has obtained all necessary patent licences which allow that the supplier can provide software on the OSP. Second, it is unclear if each supplier has obtained all necessary patent licences which allow that the supplier can provide open source software on the OSP. Third, it is unclear if each supplier has obtained all necessary patent licences which allow that the supplier can provide software under “GPLv3 or later” and “MPL 2.0 or later” on the OSP. Before the suppliers presents copies of all patent licences to PREFORMA and the broader community the software provided on the OSP cannot be used and distribution and use of software from the OSP implies a significant risk for any organisation considering use and deployment of software from PREFORMA. From analysis, it is clear that the suppliers have failed to demonstrate that they have obtained all necessary patent licences which allow implementation of all file formats researched in the PREFORMA project.

4.3 SUMMARY OF RECOMMENDATIONS FOR SUPPLIERS

This deliverable contains several observations and recommendations based on our assessment of the work performed during the prototyping phase which require further attention amongst suppliers during and beyond PREFORMA. These recommendations also require attention amongst individuals and organisations potentially interested to adopt, engage with, and deploy software from the OSP within (and beyond) their own organisation. For reasons of sustainability and in order to fulfil mandatory requirements in PREFORMA (and in order to successfully address the PREFORMA R&D challenge), it is critical that suppliers address all issues identified and recommendations so that software provided on the OSP can be used by any potential adopter beyond PREFORMA. To achieve sustainability and provision of open source software from PREFORMA that can be used under the two specific licences “MPL v2.0 or later” and “GPLv3 or later”, the following issues are of particular importance.

First, PREFORMA requires that a supplier provides the complete source code (i.e. a single zip-file containing all necessary files) under the two specific licenses “MPL v2.0 or later” and “GPLv3 or later” on the OSP. This is critical for sustainability and provision of software according to standard practice in public sector procurement of open source software. Further, clarity concerning provision of software (through distribution of software via the OSP) to memory institutions is of uttermost importance for successful community development and delivery of

²⁰³ The analysis includes the time-frame for the prototyping phase (until end of October) and the extended time window for the prototyping phase (until the end of December 2016).

²⁰⁴ See, for example Lundell et al. (2015): Lundell, B., Gamalielsson, J. & Katz, A. (2015) On implementation of Open Standards in software: To what extent can ISO standards be implemented in open source software?, *International Journal of Standardization Research*, Vol. 13(1), pp. 47-73.

software to users. At time of writing, no supplier adheres to this requirement. We acknowledge that all suppliers have communicated that they are committed to fulfil this PREFORMA requirement. However, it is an open question if (and if so when) they will do so.

Second, PREFORMA requires that a supplier provides an up-to-date roadmap for the different versions of the software, targeted at external contributors, on the development platforms for the time frame during and beyond the PREFORMA project (at least until December 2020). For reasons of sustainability and establishment of a health business ecosystem, this is a critical issue for all suppliers, which needs considerable attention by all suppliers. Especially since the current content in the roadmap is focused on PREFORMA partners instead of external contributors and potential business partners. This is a critical issue for the success of the PREFORMA R&D challenge as its current content lacks essential information for promoting external contributions.

Third, for reasons of community development and long-term sustainability of open source projects it is essential to improve code transparency and clarity concerning how specific subsets of software can be reused under the PREFORMA licenses. For memory institutions and other users it is essential that the specific subset of the software which implements a specific file format can be easily reused and distributed under the PREFORMA licenses for use in other applications and organisations. For example, an organisation may want to reuse only the specific subset of the software which implements the open file format PDF/A-1 without having to incorporate any specific implementation of PDF/A-2 or PDF/A-3.

Fourth, to promote external code contributions it is essential that all suppliers increase their attention to this issue. For example, we recommend that suppliers provide ‘easy hacks’ and provide increased clarity concerning interpretation of file formats in the code. This relates to requirements (as detailed in D4.3) for handling of synthetic test files directed to the broader external open source community beyond the time frame of the PREFORMA R&D project (i.e. beyond initiatives that are specific to the PREFORMA R&D project for handling of test files via cloud storage). Further, we also recommend that suppliers provide the complete source code (with test files, and associated digital assets), build environments, and executables via Live CDs/DVDs/USB sticks in order to promote distribution and use of the software without a need for installation.

Fifth, when the suppliers have fulfilled all fundamental PREFORMA requirements and demonstrated to PREFORMA partners and the broader open source community that they have obtained all necessary rights for provision of software on the OSP under the two specific licences “MPL v2.0 or later” and “GPLv3 or later” so that the software can be distributed (in a cascade) to other organisations wishing to use the software it will be possible to use provided software without risk. When the suppliers have fulfilled these requirements, software provided on the OSP can be used and it will be meaningful to start testing the software. It should be noted that in case the supplier will change the source code (for future releases) in order to fulfil all fundamental mandatory requirements, all tests need to be redone.

4.4 RECOMMENDATIONS FOR POTENTIAL ADOPTERS OF SOFTWARE

Based on our observations concerning software provided from the work performed during the prototyping phase we identify a number of recommendations for individuals and organisations potentially interested in adopting PREFORMA software. These recommendations require

attention amongst individuals and organisations²⁰⁵ potentially interested to adopt, engage with, and deploy software from the OSP within and beyond their own organisation.

First, we have observed that all three suppliers have failed to provide open source software on the OSP which can be used by organisations in and beyond PREFORMA due to a number of unresolved licencing issues. Therefore, it is critical for any potential adopter to avoid using the software before all licencing issues are resolved.

Second, we have observed that all suppliers provide software on the OSP which includes components under other conditions that are not compatible with “MPL v2.0 or later” and “GPLv3 or later”. Hence, software provided on the OSP cannot be distributed under “MPL v2.0 or later” and “GPLv3 or later”. Consequently, individuals and organisations are therefore unable to distribute such software, something which makes it impossible to achieve broad adoption of PREFORMA software. Therefore, it is critical for any potential adopter to avoid using and contributing to promotion of the software before all licencing issues are resolved.

Third, we have observed that all suppliers fail to openly demonstrate that they have obtained all necessary rights (including all necessary patent licences) for providing software on the OSP under “MPL v2.0 or later” and “GPLv3 or later”. Further, since the suppliers have failed to present to us (and to other PREFORMA partners) any evidence to suggest that they have made an effort to clarify licencing issues related to all file formats implemented, the IPR situation for software provided on the OSP is unclear. We find it especially troublesome that all suppliers fail to demonstrate any evidence to PREFORMA partners which suggest that the suppliers have obtained all necessary rights (including all necessary patent licences) for providing software on the OSP under “MPL v2.0 or later” and “GPLv3 or later”. Therefore, it is critical for any potential adopter to avoid using the software before all necessary patent licences are openly declared and all IPR issues are resolved. In summary, if an organisation beyond PREFORMA adopts software provided on the OSP by any of the suppliers, the organisation will be exposed to risk.

Fourth, we have observed that no supplier fulfils the mandatory requirement concerning provision of source code on the OSP under the two specific (copyleft) open source licences “MPL v2.0 or later” and “GPLv3 or later” and provision of a complete build environment on the OSP under recognised open source licences, something which inhibits sustainability. As suppliers instead provide software under other licences and conditions, the mandatory requirement which states that “there is no need for a tenderer to transfer copyright of developed software to PREFORMA” is consequently undermined. In retrospect, given that all suppliers have failed to fulfil the mandatory requirement concerning licensing of source code, an alternative formulation of the mandatory requirement concerning transfer of copyright would

²⁰⁵ For example, before considering organisational adoption of software from PREFORMA provided in zip-files on the OSP it is critical to clarify that all necessary rights (including all necessary patent licences) for distribution of software have been obtained. From our analysis of the work conducted by the suppliers during the prototyping phase (and the extended prototyping phase until December 2016) it is apparent that the software provided on the OSP cannot be used as expected in planned continued work in collaboration with other organisations beyond PREFORMA.

have been²⁰⁶ that all PREFORMA partners also would have had copyright of developed software. Since suppliers fail to demonstrate that they have obtained all necessary rights for implementation of file formats in software and do not provide the complete source code under the two specific (copyleft) open source licences (which have strong patent clauses), this inhibits sustainability. As suppliers instead provide software on the OSP under unclear conditions (including permissive open source licences and other conditions, e.g. public domain), it is an obvious risk for any potential adopter that suppliers (which control all copyright) will relicence and provide future versions as proprietary software when they are no longer bound by the contract with the PREFORMA R&D project. Therefore, before any potential adopter uses the software, it is critical to verify that all necessary patent licences have been obtained and that all software is provided under “MPL 2.0 or later” and “GPLv3 or later”.

Fifth, we have observed that no supplier provides an up-to-date roadmap targeting external contributors and users beyond the PREFORMA project. The absence of such a roadmap for the time period until (at least) 2020 may be a strong indication of a project in lack of prospects for the future. Therefore, it is critical for any potential adopter to assess the sustainability of the project in order to ensure that it is active and that the project has plans for the future.

²⁰⁶ We acknowledge that it is not allowed to change a mandatory requirement expressed in public procurement as any such change would be discriminatory and inhibit equal treatment.