Report of the Task Force on Preparing Europeana for IIIF involvement

August 2017

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1.Introduction

In recent years, the International Image Interoperability Framework (known as "IIIF", see http://iiif.io/) has emerged as a set of standards to facilitate the enhanced and flexible access to image resources on the web. It has the potential to improve the online presentation, retrieval, and enrichment of images within the digital humanities and cultural heritage sector, and is consequently "*fundamental to research, scholarship and the transmission of cultural knowledge*".[1] In the past few years IIIF has seen an increasing adoption by cultural heritage organisations, as well as in research institutions. At the same time, it comes with an active and engaged community with a strong focus on interoperability, cohesion and participation, that collaboratively drives forward development. This was demonstrated at the 2017 IIIF Conference, http://iiif.io/event/2017/vatican, which took place on 5-9 June 2017 with more than 200 participants from all over the world.

1.1.   IIIF - an introduction

The following information about the role, purpose and benefits of IIIF is lifted from the About section[2] of the IIIF website, and a Europeana blog post[3] written by Valentine Charles and Antoine Isaac that takes a view on the potential for IIIF within the Europeana ecosystem.

Access to image-based resources is fundamental to research, scholarship and the transmission of cultural knowledge. Digital images are a container for much of the information content in the Web-based delivery of images, books, newspapers, manuscripts, maps, scrolls, single sheet collections, and archival materials. Yet much of the Internet's image-based resources are locked up in silos, with access restricted to bespoke, locally built applications.

A growing community of the world's leading research libraries and image repositories have embarked on an effort to collaboratively produce an interoperable technology and community framework for image delivery.

IIIF (International Image Interoperability Framework) has the following goals:

- ○ *To give scholars an unprecedented level of uniform and rich access to image-based resources hosted around the world.*
- ○ *To define a set of common application programming interfaces that support interoperability between image repositories.*

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[1] http://iiif.io/about/, par. 1, last access 13 June 2017

[2] "About IIIF — IIIF | International Image Interoperability Framework." http://iiif.io/about/. Accessed 19 Jul. 2017.

[3] "Europeana aligns with the International Image Interoperability ...." 8 Feb. 2016, http://pro.europeana.eu/blogpost/europeana-aligns-with-the-international-image-interoperability-framework-iiif. Accessed 19 Jul. 2017.

> ○ *To develop, cultivate and document shared technologies, such as image servers and web clients, that provide a world-class user experience in viewing, comparing, manipulating and annotating images.*

The Framework is currently being extended to include audio-visual materials, and this work is in development.

One of Europeana's main goals is to make it easier for institutions and individuals in the digital heritage sector to share better quality digital content. The International Image Interoperability Framework (IIIF) has huge potential to help us achieve this goal. If you're not familiar with it, IIIF is a standard for serving and consuming high quality images online, with the ability to instruct a server about the desired resolution, or image manipulations such as rotation and zooming. It also makes it more straightforward to publish complex aggregations of images, for instance bringing together a [medieval manuscript text and an illumination that was stripped away from it](#).

Europeana hopes to promote the adoption of the IIIF technology by demonstrating its value and, from a more technical perspective, by making Europeana's own technical stack (including the Europeana Data Model and the Europeana Collections portal) more interoperable with IIIF implementation initiatives.

1.2.   The Goal of the IIIF Task Force

Finding great value in IIIF's services and community, Europeana has adopted IIIF into its technical infrastructure. However a large proportion of the Europeana Network is unaware of how IIIF may be used to better support the distribution and use of digital images in research and scholarship, through collaboration and curation. To investigate why adoption is not more widespread the Europeana Network Association established the IIIF Task Force in February 2017.

The purpose of the IIIF Task Force was to '*identify the current trends and tendencies towards the adoption of IIIF technology among Europeana content providers'*. The Task Force was required to report on its findings and put forward recommendations, and to submit the final report report for review and consideration by June 2017. See the full IIIF Task Force brief at http://pro.europeana.eu/taskforce/iiif.

1.3.   Methodology

The IIIF Task Force presents its conclusions to the Europeana Foundation based on the discussions, knowledge and expertise of Task Force members, and the results of a survey identifying IIIF awareness and implementation issues among Europeana stakeholders. The Task Force provides recommendations to the Europeana Foundation and Network Association for future application of IIIF technologies within the Europeana ecosystem, and makes visible the first point of contact for partners who want to work with IIIF. The work of the Task Force was presented as a lightning talk at the [2017 IIIF Conference](#).

1.4.   Task Force members

– Pierre-Edouard Barrault, Europeana Foundation

- Emmanuelle Bermès, National Library of France (MC Representative)
- Christiane Fritze, Austrian National Library, (Chair)
- Karin Glasemann, National Museum of Sweden (MC Representative)
- Gill Hamilton, National Library of Scotland (MC Representative)
- Antoine Isaac, Europeana Foundation (EF Representative)
- Max Kaiser, Austrian National Library (MC Representative)
- Claire Knowles, University of Edinburgh
- Gregory Markus, The Netherlands Institute for Sound and Vision
- Georg Petz, Austrian National Library

1.5. Outcome

The main outcome of the Report is a recommendation to establish a IIIF Working Group with the remit to take forward the further recommendations of the Task Force. In making this main recommendation the Task Force recognises that for the benefits of IIIF to be realised within the Europeana ecosystem, Europeana Foundation staff cannot solely take on all the necessary responsibilities and activities for IIIF advocacy, promotion, support, development and technical infrastructure for the wider Europeana community. A Working Group from the Europeana Network Association was seen by the Task Force to be the most appropriate approach to ensure longer-term success and wider adoption of IIIF. See the section on Sustainability.

Additional recommendations address issues of raising awareness of and advocating for IIIF, building community both within the Europeana community but also in conjunction with the wider IIIF community, and developing options for technical implementation strategies.

Recommendation 1: Establish a IIIF Working Group
Based on the work presented in this entire report - and to facilitate the implementation of some of its other recommendations - the Task Force recommends that

- a IIIF Working Group is established to support the promotion and adoption of IIIF throughout the Network Association, and to take forward the recommendations set out in the Task Force Report. Further details on the possible content of the charter for this Working Group can be found on the section on Sustainability.
- the IIIF Working Group membership comprises representatives from Europeana staff, aggregators, content providers and those with knowledge and experience of IIIF
- the IIIF Working Group reports bi-annually on its activities and progress against the Task Force recommendations according to the rules set by the Europeana Network Association for working groups reports
- the IIIF Working Group be established at the time of the Europeana Network Association Annual General Meeting 2017, or earlier

2. IIIF in use

2.1. Implementation examples

To illustrate how individual Europeana partner institutions could potentially implement and use IIIF the Task Force collected three examples of best practice. A detailed description of the IIIF best practice examples is included in Annex 4.

There are two approaches currently followed by institutions in their IIIF implementation strategy. The first consists of upgrading/modernizing existing Digital Asset Management systems that rely on high quality material (TIFF, JPEG2000) to make them IIIF-compatible at a low cost. Thanks to shared developments on standardised viewers and APIs (e.g. the IIIF Image and Presentation APIs), it is possible to operate a significant upgrade in terms of flexibility, scalability, and end-user experience. The **University College Dublin** (UCD) followed this strategy in order to modernize its backend infrastructure, improve its publishing mechanisms, while ensuring a smoother experience for its users thanks to improved visualisation features.

The second approach consists of developing special IIIF solutions, often in the form of more complex (interconnected) systems. Institutions may have taken such a path because of specific distribution and partnership conditions e.g. in order to share or sell their solution to a close network of cultural institutions. While actively participating in the development of the IIIF components with the community, these institutions implemented their own IIIF solution first, but with the long term goal of distributing it more widely among their partners.

This approach made it possible for the **Bibliothèque Nationale de France** (BNF) to implement the regular IIIF framework with specific refinements in their already existing, complex architecture and to connect it to specific partners systems and third-parties services. The outcome being first to *"make Gallica's content available in more specialised interfaces, dedicated to specific usage by a niche of academic users"* [4] and later on to introduce it as a general upgrade for their whole digital library for all users.
The **Universitätsbibliothek Heidelberg** also followed this approach and chose to develop its own software as an integrated solution for digitization workflows and web presentation. It enabled them to present their content within various user interfaces (grid, pagination, scrolling), and through different channels. Relying on IIIF standards, the solution[5] is now being used by six additional institutions with important collections of old manuscripts and parchments, including the Biblioteca Apostolica Vaticana in Rome[6].

The common ground of these two approaches is the simplicity and flexibility offered by the IIIF framework, either to implement it as an "out of the box" upgrade for Digital Asset Management system, or to turn it into a refined standalone system.

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[4] See ANNEX 4 Use cases
[5] Dwork - Heidelberger Digitalisierungsworkflow http://dwork.uni-hd.de, last access 20 June 2017
[6] See http://www.ub.uni-heidelberg.de/helios/digi/dwork.html, last access 20 June 2017

2.2.   Europeana as a IIIF discovery and access node

In its role as a central point for European digital cultural heritage, Europeana Foundation has both developed its technical infrastructure to integrate IIIF technologies, and extended the Europeana Data Model (EDM) to accommodate links to IIIF end-points and manifests. To that end the Europeana service acts as a IIIF reference node serving up IIIF imagery to its interfaces . Furthermore, Europeana can encourage development of alternative IIIF interfaces, uses and applications (e.g. research projects, topic based websites, galleries of content), by aggregating and enabling access to IIIF images and manifests for others.

2.3.   Use cases for Education and Research

With the rise of IIIF, it is now possible to access, investigate, compare documents and collaborate around them with a flexibility of display and configurations, which makes it the perfect candidate for educational purposes and Digital Humanities initiatives. In the following paragraphs, we list several use cases for each of these core elements.

Access and view

Users need a seamless access to content across different institutions. This is hindered, among others, by the wide variety of viewers, as well as issues of authentication and browsers compatibility. The ability to fetch IIIF compliant resources referred in IIIF manifests URIs greatly simplifies the access to collections from different institutions.

Investigate

Digital user experience highly depends on the quality of the infrastructure it relies on. IIIF offers an extensive set of options for institutions to present the collections they are in charge of. It is possible to use IIIF services to digitally reconstruct the physical structure of a book that has been scattered in different places, and display it in an animated viewer thanks to virtual scrolling[7]. Beyond the appeal, such features will support researchers in their work.

Reunite, compare and manipulate

There are instances where items from physical collections may not be readily accessible to users, for example as a result of limited space to display a collection in its entirety, items from a collection being shared or scattered across several institutions, a bound manuscript having been spliced into individual leaves and then sold to individuals all over the world. When these physical collections are digitised and the digital images made IIIF compliant many of the shortcomings of the physical experience are challenged and overcome. Using IIIF manifests in conjunction with IIIF compliant viewers such as Universal Viewer, Mirador and OpenSeadragon, disparate collections or parts of an item can be reunited digitally. This enables users to view and examine collections and items in ways not possible in the physical environment. Furthermore, tools embedded in IIIF viewers offer greater utility compared to working with the physical resources: deep zoom enables close examination of items, images can be rotated or have their colour or tone adjusted, cropping features can be used to

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[7] Cf. manuscript example at the Universitätsbibliothek Heidelberg http://digi.ub.uni-heidelberg.de/touch/cpg848/, last access 20 June 2017

recompose pages based on several crops from different sources,[8] Users can also use tools to compare resources, for example bring together letters to and from a pair of correspondents, or layering images to compare the development of an artwork from the initial sketches, through to the finished oil painting.[9]

Collaborate

When working with and researching digital resources users may want to annotate items, transcribe them and add general notes, tags and comments., they then may want to share their work with others. IIIF supports this requirement in a standard way through its annotation services.[10]

The information gathered from researchers through their use of the annotation tools can, in the longer run, lead to global metadata quality improvement[11] thanks to an empirical refinement of the various informational elements describing collections (for example researchers supplying corrected data for incorrect creation date or language).

Recommendation 2: Collect and share further examples of best practice
The Task Force recommends that

- the proposed Working Group collates further examples of best practice, documents them, and makes them available to the Network Association
- and that this is done within 12 months of the Working Group being established
- the Working Group keeps a watching brief on new examples of best practice implementations and potential case studies, and adds them to the existing list

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3. Survey on *Sharing Digital Resources*

To gain an understanding of the level of awareness and adoption of IIIF technologies in the Europeana ecosystem the Task Force carried out an online survey, based on the Adopter's Survey of the IIIF Consortium[12], from 3 April 2017 until 28 April 2017. The survey titled *Sharing Digital Resources* was announced via several information channels according to a predefined promotion schedule. The recommendations given in this report are, in part, based

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[8] Biblissima demo presents a manuscript where illuminations had been cut out and then allows for reconstituting the manuscript by placing those images back into place (Cf. http://demos.biblissima-condorcet.fr/chateauroux/osd-demo/), last access 30 June 2017

[9] Cf. http://web.stanford.edu/group/dmstech/cgi-bin/wordpress/fellow-travelers-the-canterbury-tales-and-iiif/, last access 20 June 2017

[10] Cf. https://github.com/IIIF/awesome-iiif#annotations, last access 30 June 2017

[11] The Heidelberg and Westminster Chinese posters digital collection currently comprises the Heidelberg University and the University of Westminster collections of Mao-era chinese wall posters. Aix-Marseille, Heidelberg and Lyon researchers and students have subsequently been contributing to development of new transcriptions - making this one of the most comprehensively annotated collections of chinese posters internationally (Cf. https://www.data-futures.org/chinaposters.html), last accessed 30 June 2017

[12] https://docs.google.com/forms/d/e/1FAIpQLSdrncwXz7OGY95R4tHDvmJ1EFA3v1tRAW3uZgR8Jn4sFrK_wg/viewform?c=0&w=1, last access 26 June 2017

on the analysis of the survey results. The following summarises the results - the full detailed analysis of the survey including commentary are available in [Annex 1](#).

The survey received 69 responses from cultural heritage institutions across Europe and beyond. While the survey is not representative (4% of Europeana Network) it is however useful in gauging the challenges and issues that institutions face when implementing IIIF, and it can be expected that those institutions not represented in the survey may face similar problems.

Highlights and observations from the survey include:

- the predominant language of information and documentation about IIIF is English, and this may be a barrier to awareness and adoption
- awareness of IIIF is high among technical experts but low among curatorial and faculty staff and senior management
- resourcing in terms of time and technical capability is an issue
- there is much diversity in the technical infrastructure and publishing platforms, including a considerable number of custom/"home-grown" solutions

Recommendations drawn from the survey are included in the [recommendations section](#) of this report and below.

Recommendation 3: Raising awareness and advocacy

The Task Force recommends that

- the proposed IIIF Working Group lead on an awareness raising and information sharing campaign to address the issue of low levels of understanding and awareness of IIIF amongst Europeana content providers
- the Working Group works in collaboration with Europeana Foundation staff and content aggregators to achieve this
- that a marketing and communications plan be developed for the campaign and this is complete within 6 months of the Working Group being established
- the campaign target those individuals holding specific positions in cultural heritage institutions with information and messages appropriate to their role and influence, and outlining how they may support, use and implement IIIF.
- the Working Group will ensure that the campaign is multilingual.
- the target positions for the campaign include at least
  - Senior staff - providing a non-technical briefing, highlighting the benefits (collaboration, standards etc), and outlining need for and level of resource commitment required.
  - Curatorial and faculty staff - providing a non-technical briefing, explaining benefits to the use and curation of digital images (comparisons, annotations, search, collaboration etc), and demonstrating tools, where feasible
  - Technical staff - explaining the technical infrastructure, level or resource required, and the support available from the IIIF technical community
  - Aggregators - explaining benefits, supplying them with information and documentation so that they may explain IIIF to their content contributors.

At the IIIF Conference 2017 there was a discussion at the IIIF Community Engagement meeting on the issue of the predominance of the English language in documentation and within the community. Those contributing to the discussion recognised, in line with what had similarly been observed by the Europeana IIIF Task Force survey, that this predominance may be acting as barrier to the understanding and wider adoption of IIIF by those organisations and countries that do not use English as their operating language. To address the requirement for multilingual documentation and non-English language engagement and promotion it was proposed that a IIIF Community Translation Task Force be established. It was further suggested that the Europeana Network Association takes a leadership role in the Task Force, given the range of languages represented in its members.

Recommendation 4: Supporting multilingualism

The Task Force recommends that

- the proposed IIIF Working Group liaise with the IIIF Community and Communications Officer to scope and establish a IIIF Translation Task Force, within 3 months of the (Europeana) IIIF Working Group being established
- at least one (Europeana) IIIF Working Group member joins and co-leads the IIIF Translation Task Force.
- the (Europeana) IIIF Working Group member proactively works with the IIIF Translation Task Force to identify and prioritise documentation, materials and resources that require translation (such as technical, marketing, support, making the case for IIIF etc)
- the (Europeana) IIIF Working Group member(s) engage, through the IIIF Translation Task Force, with members of the IIIF Community, Europeana Network and others to assist in translation, and promotion of IIIF to non-English language communities and organisations

4. Community involvement present and future

The Europeana Foundation cannot be involved and represent the Network in all IIIF activities. This work needs to be distributed more widely. Summarised below are community activities and engagement being undertaken by the IIIF and Europeana communities, findings from the Survey relating to community engagement, and a case study on the community engagement undertaken by the Netherlands Institute for Sound and Vision in IIIF AV activities and development.

4.1.   Current IIIF Consortium activities

Founded in 2015, the IIIF Consortium (IIIF-C) is responsible for overseeing activities that support the ongoing development and wider adoption of IIIF including:

– Maintaining and updating the IIIF technical specifications

- – Moderating the [community discussion groups](#) that focus on technical, thematic and format issues (currently AV, Technical specification, Discovery, Manuscripts, Museums, Newspapers, Software developers)

- – Maintaining the IIIF community calendar

- – Organising the annual IIIF conference, the annual technical meeting, and providing support and advice to local and regional IIIF meetings organisers (such as the IIIF technical workshop and showcase in Edinburgh, Scotland)[13]

- – Maintaining a general FAQ

- – Collecting, collating and distributing materials for IIIF learning and outreach

- – Publishing and distributing the IIIF Newsletter on a regular basis

- – Supporting and moderating the IIIF Slack community

- – Maintaining a list of IIIF implementations and developments, also known as "Awesome IIIF"[14]

The above activities are supported, in part, through IIIF Consortium membership fees.

Recommendation 5: Encourage Network Association members to join the IIIF Consortium

The Task Force recommends that both the proposed Working Group and Europeana Foundation staff

- ● promote the benefits of the IIIF Consortium to **Network Association** members, and external content providers and aggregators
- ● encourage **Network Association** members to become Members of the IIIF Consortium to support it in its work and activities
- ● take immediate action on targeting those **Network Association** members, and external institutions, content providers or aggregators, that are most likely to be in a position to take up Founding Membership, and encourage them to join. This is required because IIIF Consortium Founding membership applications close in December 2017 (NB: non-Founding Member membership is not being withdrawn, and will continue to remain available)

4.2.   Current Europeana Foundation activities

The Europeana Foundation is a IIIF Consortium Founding Member and is represented on the IIIF Executive Committee. Foundation representatives have attended and presented at all major IIIF Community meetings in Europe since the meeting in Copenhagen in 2013. The 2016 Technical Meeting was hosted by Europeana in The Hague.[15] Foundation colleagues co-chair the IIIF Discovery technical specification group as its work is crucial to the development of innovative methods by which Europeana may gather data from its content

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[13] http://iiif.io/event/2017/edinburgh/, last access 26 June 2017

[14] https://github.com/IIIF/awesome-iiif, last access 13 June 2017

[15] https://iiifthehague2016.sched.com/, last access 23 June 2017

providers.[16] The Foundation is also represented on the Newspapers community group, notably via discussions that follow the work of the Europeana Cloud project.[17] It works with other members of the Network to foster relevant activity in IIIF communities (cf Sound and Vision and A/V in chapter 4.3.3 in this report).

The Foundation has extended the Europeana Data Model (EDM) to accommodate IIIF endpoints, and updated its infrastructure for aggregating and publishing metadata (API and Europeana Collections portal) to make IIIF collections from its data providers accessible. The data model extension is available via http://pro.europeana.eu/page/edm-profiles#IIIF.

A full list of Europeana content providers using the EDM IIIF profile is available at http://www.europeana.eu/portal/en/search?view=grid&q=sv_dcterms_conformsTo%3A*iiif*

As of August 2017 these are:

– Biodiversity Heritage Library
– University Heidelberg
– University College Dublin
– Swedish National Museum
– eCodices
– National Library of Wales (ingest in progress at time of writing)

In addition to these, some providers not yet using the EDM IIIF extension have their IIIF collections displayed by means of 'hacks' in the data.[18] These are

- Bibliothèque nationale de France
- Europeana Newspapers partners using the Europeana Shared Image Service (see below)

The Foundation's motivations for supporting rich media content are outlined in the Europeana Publishing Framework.[19] The latest version of the Europeana Publishing Guide[20] encourages provision of IIIF and includes IIIF as 'Tier 2' content.

A basic Europeana Shared Image (IIIF) Service based on the Europeana Cloud infrastructure has been developed. The service[21] allows batches of images to be uploaded via a REST-API, conversion to JPEG2000, and publication of the images compliant with the IIIF Image API. The service is currently in internal use only, and is used to serve up images of newspapers[22]. The following libraries of Europeana Newspapers have their scanned newspapers in the service: Staatsbibliothek zu Berlin – Preußischer Kulturbesitz, Hamburg State Library, Teßmann Library, National Library of Estonia, National Library of Latvia,

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[16] https://www.slideshare.net/NunoFreire2/new-approaches-for-data-acquisition-at-europeana-iiif-sitemaps-and-schemaorg-dans-seminar-2017, last access 30 June 2017
[17]
http://pro.europeana.eu/files/Europeana_Professional/Projects/Project_list/Europeana_Cloud/Deliverables/D4.4%20Recommendations%20For%20Enhancing%20EDM%20to%20Support%20Research%20Oriented%20Content.pdf, last access 30 June 2017
[18] Nevertheless, the EDM IIIF profile is the recommended way to provide IIIF resources.
[19] http://pro.europeana.eu/publication/publishing-framework, last access 30 June 2017
[20] http://pro.europeana.eu/publication/publication-policy, last access 30 June 2017
[21] API documentation available at
https://confluence.man.poznan.pl/community/display/ECLOUD/Europeana+Cloud, last access 30 June 2017
[22] see e.g. http://www.europeana.eu/portal/en/record/9200355/BibliographicResource_3000119062998.html, last access 30 June 2017

National Library of Luxembourg, National Library of Finland, National Library of Poland, and the University of Belgrade.

As a pilot the Swedish Museums Group Royal Armouries, Hallwylska Palace and Skokloster Castle have uploaded approximately 50,000 high-resolution images of museum artifacts to the service with the aim of also making them available in Europeana. Further development of this service is currently on hold.

Finally, the Foundation has published a number of papers, case studies, and presentations about its IIIF activities, including:

Europeana Blogs:

- General IIIF involvement: http://pro.europeana.eu/blogpost/europeana-aligns-with-the-international-image-interoperability-framework-iiif
- IIIF data acquisition http://pro.europeana.eu/blogpost/europeana-and-iiif-update-oct-2016
- Providing access to IIIF in the Europeana Collections portal and API http://labs.europeana.eu/blog/building-a-rich-media-experience-with-the-europeana-api-and-iiif
- Announcement of the IIIF Task Force http://pro.europeana.eu/blogpost/iiif-adoption-by-europeana-future-perspectives-for-the-network-1
- Case study: EDM and IIIF used in Nomisma http://pro.europeana.eu/share-your-data/data-guidelines/edm-case-studies/edm-in-nomisma-org
- Case study: University of Heidelberg http://pro.europeana.eu/share-your-data/data-guidelines/edm-case-studies/the-universitaetsbibliothek-heidelberg-case-study

Papers and presentations accepted at academic and professional conferences:

- Metadata aggregation of IIIF Resources at Europeana: status, plans and cooperation opportunities (IIIF Conference 2017)
- Web technologies: a survey of their applicability to metadata aggregation in cultural heritage (ELPUB 2017)
- Metadata aggregation: assessing the application of IIIF and Sitemaps within cultural heritage (TPDL 2017)
- Data quality in Europeana Designing extensive EDM records: The Universitätsbibliothek Heidelberg study case (DHBenelux17)

Recommendation 6: Integration into official Europeana documents on data quality.

The Task Force recommends that

- the Europeana Foundation updates all advocacy documents relating to data quality to include reference to IIIF whenever appropriate including the Europeana Publishing Framework, the Europeana Publishing Guide, and relevant documents of the Europeana Data Quality Committee[23]
- a first round of this activity be completed by December 2017 as this is an ongoing effort.

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[23] http://pro.europeana.eu/page/data-quality-committee, last access 30 June 2017

4.3.   Current and future Europeana Network activities

4.3.1. Implementation of IIIF within the Europeana Network

Of the 69 respondents to the Task Force survey, 43 were existing Europeana content providers, where 19 were not. Of those 43 that were providers, 6 were unaware of IIIF, 15 were aware of IIIF but had either not begun working with IIIF or not yet started to investigate its potential for use within their organisation. Twelve content providers were actively investigating using IIIF or had already implemented it locally. Finally, 10 content providers had fully implemented IIIF and were engaged in its ongoing development.

Although the results of the survey were not representative of the Europeana Network (4% response rate), they are useful in that they may be used to gauge likely awareness and adoption across the Network. It may therefore be assumed that there is a general level of awareness of IIIF in the Network, perhaps only amongst larger organisations, however there is likely a significant number of Network members that have little or no knowledge of IIIF. A programme of awareness raising to promote wider understanding and adoption, and support integration of IIIF resources into Europeana, is therefore recommended.

Recommendation 7: Liaising with institutions using IIIF

The Task Forces recommends that the proposed Working Group

- determines how Europeana Foundation should liaise with institutions currently working with or implementing IIIF
- Timescale: indefinite

4.3.2. EuropeanaTech and other Europeana Network communities

The EuropeanaTech community has included IIIF in some of its publications:

- EuropeanaTech Insight, Issue 3 http://pro.europeana.eu/get-involved/europeana-tech/europeanatech-insight/issue-3-open-data-and-data-re-use
- EuropeanaTech Insight, Issue 6 http://pro.europeana.eu/page/issue-6-iiif

Two presentations were given on Europeana activities at the IIIF Conference, Vatican City, 6-9 June 2017.

- IIIF at Europeana
- Europeana IIIF Task Force (lightning talk)

Both are available from the conference Google Drive https://drive.google.com/drive/folders/0B8biwZuDijgeZ2lnLWNJc2Z0RFU

Recommendation 8: IIIF and Europeana task forces, communities and other groups

The Task Force recommends that the proposed Working Group

- contact and liaise with Europeana task forces, communities and other groups (Aggregator Forum, Europeana Data Quality Committee etc) and require them to

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integrate IIIF into their activities; including awareness raising, documentation, presentations.
- commence this activity within 6 months of the Working Group being established

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Recommendation 9 : A IIIF track be organized at the 2018 EuropeanaTech conference

The Task Force recommends that

- the organisers of the 2018 EuropeanaTech conference include a IIIF track to promote awareness, discuss IIIF developments, and support those considering or starting IIIF implementation

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4.3.3. The case study of the Netherlands Institute for Sound and Vision as liaison with the IIIF Audio and Visual Community Group

The Netherlands Institute for Sound and Vision has been pro-active in its participation in IIIF groups and communities, sharing its expertise and knowledge in matters relating audio visual resources and formats. This case study of IIIF engagement coming from within the Network Association may act as model for wider participation in similar activities for other Network Association members, including but not limited to institutions, and aggregators.

Fifty percent of survey respondents indicated they had audio and video resources in their collections, and as IIIF support for these formats is in its early stages of technical development, Europeana should consider participating in and supporting the development of the related technical specifications.

In order to distribute the participation in and contribution to the AV related activities, the Netherlands Institute for Sound and Vision, is acting as Europeana's IIIF ambassador for these formats. The IIIF AV Group coordinates the gathering of requirements, the drafting of specifications, and the technical development relating to audio visual related resources.

The Institute has long been a Europeana partner providing expertise and network coordination for television and broadcast related matters through EUscreen[24]. It led a Task Force related specifically to AV media in Europeana[25] which noted "*Considering* [Europeana's] *involvement* [in IIIF] *and also the fact that Europeana is planning to invest in the implementation and support of the IIIF standard in the DSI projects, it's worth to take into account the possible development of a IIIF AV player that could fully support also video and audio playout.*"

The Netherlands Institute for Sound and Vision is particularly interested in IIIF development for audiovisual resources for three reasons and is already taking action with regards to them:

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[24] http://pro.europeana.eu/taskforce/audiovisual-media-task-force, last access 30 June 2017
[25] http://pro.europeana.eu/get-involved/task-forces/audiovisual-media-task-force, last access 30 June 2017

1. the Institute sees that IIIF related activities and development will be beneficial to its local network. It is working to develop its own use cases to further explore IIIF AV possibilities and thus provide future technical requirements to its network
2. the Institute is an expert in the field of audio visual resources and formats, and their presentation and access on the Web. Its knowledge and experience is openly shared with the IIIF AV working group to inform and drive further development
3. the Institute reports key findings and progress on IIIF AV back to Europeana while equally bringing Europeana's knowledge and unique use cases / specifications to the IIIF AV discussion

Recommendation 10: Europeana Network Association is represented at all IIIF discussion and working groups

The Task Force recommends that the proposed Working Group:

- identifies from the Network Association subject matter experts in line with IIIF discussion and working groups
- puts forward at least one of these experts to every discussion or working group, and requires them to share the knowledge and expertise, and represent Europeana
- commence this activity within 3 months of the Working Group being established

5. Europeana supporting IIIF technical activities

The Task Force survey, and the experience and knowledge from content aggregators and the Europeana Foundation has highlighted that many smaller institutions are unlikely to have technical expertise, and resources both in terms of personnel and budget to implement IIIF. The Task Force has identified three approaches that may go some way to lowering the barrier to IIIF adoption for such organisations. These are

- raising awareness of IIIF with software vendors
- encouraging Europeana Network members to participate in and contribute to the IIIF open source development community, and support integration of IIIF in other open source tools
- consider options for offering IIIF as a service

5.1.   Advocating for IIIF integration with software vendors

Many small institutions use commercial software products and services to support their digital activities, including digital asset management and presentation of these assets on the web. If software vendors were to implement and integrate IIIF technologies into their applications, this approach would assist such organisations that are unable to commit resources to implement IIIF locally.

The IIIF Museums Working Group recently distributed a letter[26], signed by major institutions to vendors of DAMS and Collection Management software - to raise awareness of the

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[26] http://iiif.io/news/2017/05/01/letter-to-dams/

benefits and importance of IIIF for the museum community, and to encourage vendors to integrate IIIF into their products. The IIIF Task Force assisted in this initiative by distributing the letter to potential signatories. The Europeana Foundation was a signatory to the letter.

Recommendation 11: Letter to vendors

The Task Force recommends that the proposed Working Group

- works with IIIF Community and Communications Officer to draft a letter or communication to software vendors for those communities other than the museum communities, in particular libraries and archives
- assist the IIIF Community and Communications Officer in identify vendors used by Europeana Network Association, and supply them with contact information
- assist the IIIF Community and Communications Officer in distributing the letter to potential signatories
- have the Europeana Foundation sign the letter
- to conclude this activity within 6 months of the Working Group being established, or as advised by the IIIF Community and Communications Officer:

5.2.　Open source and community development

The ethos behind, and success of, the IIIF Consortium and its activities is that of openness and collaboration. All IIIF tools and services are licensed as open source, however for IIIF development to remain successful it is necessary that it has a stable and sustainable developer community which is motivated and engaged, and supported by well written documentation that is maintained and updated. So far, the IIIF developer community has excelled in all of these aspects, with an expert group of developers from all over the world, contributing to and regularly meeting to discuss the development of tools and services within the context of IIIF and their institutions.

One way of encouraging institutions to adopt IIIF is to make its implementation as easy as possible, for example by including the IIIF as an extension that can be seamlessly added to and implemented in open source software that is in common use, for example Drupal, Omeka, Wordpress etc. The IIIF Survey highlighted that several of the respondents use such products.

There are are also open source options for IIIF image servers and image viewers, written in a variety of programming languages.[27] The Mirador and Universal Viewer image viewers have active communities and regularly hold meetings at IIIF Conferences. There are many examples of the open source development undertaken by the community on the IIIF Awesome GitHub site.[28]

For several years EuropeanaTech and the Netherlands Institute for Sound and Vision have been observing and assessing the standing of open source development within the EuropeanaTech community. As the Europeana Network members become increasingly engaged and interested in IIIF it will be useful to monitor how developer teams contribute to

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[27] http://iiif.io/apps-demos/#image-servers, last access 30 June 2017
[28] https://github.com/IIIF/awesome-iiif, last access 30 June 2017

and engage with the established IIIF developer community. EuropeanaTech can play a key role here to encourage product development and maintaining open lines of communication and coordination.

Core IIIF related Open Source products:

The following tools are examples of Open Source tools and services that are regularly implemented, built upon and promoted by the IIIF community.

- Mirador: https://github.com/ProjectMirador/mirador
- SeaDragon: https://openseadragon.github.io/
- Diva.js: http://ddmal.github.io/diva.js/
- IIPImage: http://iipimage.sourceforge.net/documentation/server/
- UniversalViewer: https://github.com/universalviewer
- Leaflet-IIIF: https://github.com/mejackreed/Leaflet-IIIF

Lists and examples of open source tools and plugins:

- IIIF Awesome: https://github.com/IIIF/awesome-iiif
- Generation of Manifests: http://dmt.bodleian.ox.ac.uk
- Cropping tool: https://github.com/jbhoward-dublin/iiif-imageManipulation
- Digital Tools for Manuscripts: https://digitaltoolsmss.library.utoronto.ca/
- Omeka Plugin https://github.com/klokantech/omeka-plugin-IIIF

Recommendation 12: Supporting IIIF open source activities

The Task Force recommends that EuropeanaTech and the proposed Working Group

- work together to raise awareness amongst European Network Association members of the IIIF open source tools and plugins, and encourage them to consider how their developer teams might contribute to their improvement, development and adoption**.**
- work together to encourage and support Europeana Network Association members in sharing tools and plugins as open source code for use by the IIIF Community.
- work together to report on past and current contributions that Europeana Network Association members have made to existing IIIF open source projects.
- research the level of use amongst Europeana Network Association members of common open source tools, including but not limited to Wordpress, Drupal and Omeka
- collaborate with IIIF developer community to fast track development of IIIF integration in the open source tools in common use by Europeana Network members
- highlight, report and promote Europeana Network Association members' contributions to IIIF open source development activities in blog posts, at the EuropeanaTech conference and in other appropriate meetings and communications

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5.3.   IIIF as a service

For those institutions that are unable to resource their own local IIIF service, an approach that may assist them in making their digital resources IIIF compliant is to offer them a hosted *IIIF as a service* solution. This would enable institutions to upload and store their images, and

make them available with all the utility and benefit of IIIF, via a managed service where all technical maintenance and development is undertaken by a third party or vendor.

Some companies and institutions that already offer such services or plan to develop them include:

– Klokan Technologies's IIIF Hosting: http://www.iiifhosting.com/

– Digirati Digital Library Cloud Services: https://dlcs.info

– LoCloud Collections "collections management as a service offering": https://www.locloudhosting.net/ plans to develop a IIIF support and out of the box data provision to Europeana.

– The University of Toronto has developed the concept of IIIF To Go, a proposal to develop an easily deployable IIIF instance

Furthermore, such a service already exists as one of the features of the Europeana Cloud project.[29] It holds and powers the millions of newspaper page scans of Europeana Newspapers.

Recommendation 13: IIIF as a hosted service

The Task Force recommends that the proposed Working Group

- undertakes research into, and reports on, options for making available a IIIF hosted service for those Europeana content providers and aggregators that may not have sufficient levels of technical capability, infrastructure or resource to implement IIIF locally.
- consider options including Europeana Foundation entering into a partnership with an existing IIIF hosted service provider, and/or establishing IIIF hosting independently within the Europeana technical infrastructure.
- within 12 months of the Working Group being established.

5.4.   Sustainability

Apart from the technical concerns described above, there is a strong need for persuading the institutions' management to engage with or adopt IIIF.

Each Europeana Task Force has per definition a limited duration. However, the survey has shown that the implementation of IIIF by Europeana data providers picks up speed and they would be more than happy to receive support from experts. As a sustainable way to provide support – in technical matters as well as in targeted sales pitch for the management level – it would be advisable to establish a permanent Europeana Working Group.

The Working Group, consisting of Europeana Network Association members already active with IIIF, is to be seen as the first contact point concerning IIIF within the Europeana community and it should proactively contact the institutes and "*investigate where they are at in the development phase and how this can be cultivated during future ingestions*

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[29] The service documentation can be found at https://confluence.man.poznan.pl/community/display/ECLOUD/Image+Service, last access 16 June 2017

processes."[30] The Task Force identified several areas of activity and involvement for a future Working Group to take on. The areas of work cover community involvement, advocacy aspects and technical implementation strategies.

In addition to the main recommendations in this report, the charter of the Working Group should include the following points:

On Advocacy

– Establish contact points in the Europeana community, identify areas of expertise with regard to IIIF

– Evaluate the impact of IIIF on the sharing of digital resources within the Europeana ecosystem.

– Inform about and encourage the use of IIIF in education, research and digital humanities.

– Maintain and update the FAQs on IIIF with relevance for Europeana (see Annex 2).

– Find and evaluate funding opportunities for the development and adoption of IIIF.

On technical implementation strategies

– Discuss the different opportunities of technical support that can be offered on the part of Europeana besides a core IIIF content service, e.g. offering a service to convert metadata into IIIF compatible manifests.

– Investigate the relevant organisation(s) for operating IIIF related services (EF, aggregators...)

6. All recommendations

For greater clarity, all given recommendations are repeated within this section. We identified recommendations for a) raising awareness and advocacy, b) community involvement and c) technical implementation strategies.

Recommendation 1: Establish a IIIF Working Group
Based on the work presented in this entire report - and to facilitate the implementation of some of its other recommendations - the Task Force recommends that

- a IIIF Working Group is established to support the promotion and adoption of IIIF throughout the Network Association, and to take forward the recommendations set out in the Task Force Report. Further details on the possible content of the charter for this Working Group can be found on the section on Sustainability.
- the IIIF Working Group membership comprises representatives from Europeana staff, aggregators, content providers and those with knowledge and experience of IIIF
- the IIIF Working Group reports bi-annually on its activities and progress against the Task Force recommendations according to the rules set by the Europeana Network Association for working groups reports

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[30] See Annex 1, chapter "Community involvement"

- the IIIF Working Group be established at the time of the Europeana Network Association Annual General Meeting 2017, or earlier

Recommendation 2: Collect and share further examples of best practice

The Task Force recommends that

- the proposed Working Group collates further examples of best practice, documents them, and makes them available to the Network Association
- and that this is done within 12 months of the Working Group being established
- the Working Group keeps a watching brief on new examples of best practice implementations and potential case studies, and adds them to the existing list

Recommendation 3: Raising awareness and advocacy

The Task Force recommends that

- the proposed IIIF Working Group lead on an awareness raising and information sharing campaign to address the issue of low levels of understanding and awareness of IIIF amongst Europeana content providers
- the Working Group works in collaboration with Europeana Foundation staff and content aggregators to achieve this
- that a marketing and communications plan be developed for the campaign and this is complete within 6 months of the Working Group being established
- the campaign target those individuals holding specific positions in cultural heritage institutions with information and messages appropriate to their role and influence, and outlining how they may support, use and implement IIIF.
- the Working Group will ensure that the campaign is multilingual.
- the target positions for the campaign include at least
    - Senior staff - providing a non-technical briefing, highlighting the benefits (collaboration, standards etc), and outlining need for and level of resource commitment required.
    - Curatorial and faculty staff - providing a non-technical briefing, explaining benefits to the use and curation of digital images (comparisons, annotations, search, collaboration etc), and demonstrating tools, where feasible
    - Technical staff - explaining the technical infrastructure, level or resource required, and the support available from the IIIF technical community
    - Aggregators - explaining benefits, supplying them with information and documentation so that they may explain IIIF to their content contributors.

Recommendation 4: Supporting multilingualism

The Task Force recommends that

- the proposed IIIF Working Group liaise with the IIIF Community and Communications Officer to scope and establish a IIIF Translation Task Force, within 3 months of the (Europeana) IIIF Working Group being established
- at least one (Europeana) IIIF Working Group member joins and co-leads the IIIF Translation Task Force.
- the (Europeana) IIIF Working Group member proactively works with the IIIF Translation Task Force to identify and prioritise documentation, materials and resources that require translation (such as technical, marketing, support, making the case for IIIF etc)
- the (Europeana) IIIF Working Group member(s) engage, through the IIIF Translation Task Force, with members of the IIIF Community, Europeana Network and others to assist in translation, and promotion of IIIF to non-English language communities and organisations

Recommendation 5: Encourage Network Association members to join the IIIF Consortium

The Task Force recommends that both the proposed Working Group and Europeana Foundation staff

- promote the benefits of the IIIF Consortium to **Network Association** members, and external content providers and aggregators
- encourage **Network Association** members to become Members of the IIIF Consortium to support it in its work and activities
- take immediate action on targeting those **Network Association** members, and external institutions, content providers or aggregators, that are most likely to be in a position to take up Founding Membership, and encourage them to join. This is required because IIIF Consortium Founding membership applications close in December 2017 (NB: non-Founding Member membership is not being withdrawn, and will continue to remain available)

Recommendation 6: Integration into official Europeana documents on data quality.

The Task Force recommends that

- the Europeana Foundation updates all advocacy documents relating to data quality to include reference to IIIF whenever appropriate including the Europeana Publishing Framework, the Europeana Publishing Guide, and relevant documents of the Europeana Data Quality Committee[31]

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[31] http://pro.europeana.eu/page/data-quality-committee, last access 30 June 2017

● a first round of this activity be completed by December 2017 as this is an ongoing effort.

Recommendation 7: Liaising with institutions using IIIF

The Task Forces recommends that the proposed Working Group

● determines how Europeana Foundation should liaise with institutions currently working with or implementing IIIF
● Timescale: indefinite

Recommendation 8: IIIF and Europeana task forces, communities and other groups

The Task Force recommends that the proposed Working Group

● contact and liaise with Europeana task forces, communities and other groups (Aggregator Forum, Europeana Data Quality Committee etc) and require them to integrate IIIF into their activities; including awareness raising, documentation, presentations.
● commence this activity within 6 months of the Working Group being established

Recommendation 9 : A IIIF track be organized at the 2018 EuropeanaTech conference

The Task Force recommends that

● the organisers of the 2018 EuropeanaTech conference include a IIIF track to promote awareness, discuss IIIF developments, and support those considering or starting IIIF implementation

Recommendation 10: Europeana Network Association is represented at all IIIF discussion and working groups

The Task Force recommends that the proposed Working Group:

● identifies from the Network Association subject matter experts in line with IIIF discussion and working groups
● puts forward at least one of these experts to every discussion or working group, and requires them to share the knowledge and expertise, and represent Europeana
● commence this activity within 3 months of the Working Group being established

Recommendation 11: Letter to vendors

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- consider options including Europeana Foundation entering into a partnership with an existing IIIF hosted service provider, and/or establishing IIIF hosting independently within the Europeana technical infrastructure.
- within 12 months of the Working Group being established.

7.Further references

– IIIF Website: http://iiif.io/about/, last access 16 May 2017
– Generals FAQs: http://iiif.io/community/faq/, last access 16 May 2017
– IIIF discussion list: https://groups.google.com/forum/#!forum/iiif-discuss, last access 16 May 2017
– IIIF Consortium: http://iiif.io/community/consortium/#staff, last access 16 May 2017
– IIIF Training Material: https://iiif.github.io/training/intro-to-iiif/, last access 16 May 2017
– IIIF Resources: https://github.com/IIIF/awesome-iiif, last access 16 May 2017

ANNEX

The following appendices are available via the page of the Task Force,
http://pro.europeana.eu/taskforce/iiif

APPENDIX A: Statistical analysis of the survey
APPENDIX B: Frequently Asked Questions
APPENDIX C: Technical benchmark
APPENDIX D: Implementation examples
  D.1 Bibliothèque nationale de France
  D.2 University College Dublin
  D.3 Universitätsbibliothek Heidelberg