



HAL
open science

Characterising the IIF and Linked Art communities

Julien Antoine Raemy

► **To cite this version:**

Julien Antoine Raemy. Characterising the IIF and Linked Art communities: Survey report. University of Basel. 2023. hal-04162572

HAL Id: hal-04162572

<https://hal.science/hal-04162572>

Submitted on 15 Jul 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution| 4.0 International License

CHARACTERISING THE IIF AND LINKED ART COMMUNITIES

SURVEY REPORT

 **Julien Antoine Raemy**

Digital Humanities Lab
University of Basel
Spalenberg 65
CH-4051 Basel, Switzerland
julien.raemy@unibas.ch

July 15, 2023

ABSTRACT

This report presents the findings and analysis of a survey conducted between 24 March and 7 May 2023, exploring the socio-technical characteristics of two prevalent community-driven initiatives in Digital Humanities, namely the International Image Interoperability Framework (IIF) and Linked Art. With 79 participants, the survey investigates the practices and activities of individuals involved in these initiatives, which focus on developing and maintaining shared application programming interfaces (APIs) for enhanced interoperability and access to cultural heritage resources. It also seeks to situate these initiatives within a broader discourse of scholarly movements and principles. Additionally, it serves as a preliminary means of exploring the prospective impact of Linked Open Usable Data (LOUD) and its underlying design principles in the cultural heritage field.

Keywords Community Practices · Cultural Heritage · IIF · Linked Art · Linked Open Usable Data

1 Introduction

Preserving and providing access to cultural heritage resources relies on collaborative, community-driven initiatives. Within the cultural heritage domain, the International Image Interoperability Framework (IIF) and Linked Art have emerged as significant contributors. These initiatives aim to enhance interoperability and accessibility, encompassing a wider ecosystem of compliant tools and services. This report presents the findings and analysis of an online survey conducted with Google Forms between 24th March and 7th May 2023, which aimed to characterise the individuals involved in the IIF and Linked Art communities. The survey was conducted within the context of a PhD thesis in Digital Humanities titled "Linked Open Usable Data for Cultural Heritage: Perspectives on Community Practices and Semantic Interoperability"¹.

IIF was initially established in 2011, with the formal establishment of the IIF Consortium (IIF-C) following in 2015. The formation of the consortium marked a significant milestone in the development and coordination of efforts within the IIF community [Raemy, 2017, p. 15]. IIF focuses on establishing a standardised framework for delivering image-based resources [Snydman et al., 2015]. By adhering to a set of shared application programming interfaces (APIs) serialised in JSON-LD, IIF provides an interoperable and web-friendly environment for the presentation and annotation of various types of content, including images and audiovisual resources. The IIF community is also actively exploring avenues to formally disseminate 3D objects within its framework [Haynes, 2019, Raemy and Gautschi, 2023].

Linked Art is a community founded in 2017 that builds upon the CIDOC Conceptual Reference Model (CIDOC-CRM) and the Getty Vocabularies (AAT, TGN, ULAN) for describing cultural heritage resources [Page et al., 2020]. More specifically, it is an application profile, or a model, in JSON-LD as well as an API for conveniently interacting with the data [Newbury, 2018, Sanderson, 2018, 2019].

¹<https://phd.julsraemy.ch>

Both initiatives are community-driven approaches that are grounded in the cultural heritage domain. They can complement each other; IIF for presentation and annotation purposes and Linked Art for conveying semantic information, all in a standardised and interoperable fashion Raemy [2022]. A number of institutions, mostly museums, and individuals are also active in both communities.

The survey conducted as part of this research aimed to uncover the socio-technical characteristics of the IIF and Linked Art communities. It sought to reveal the practices and activities of individuals involved in these communities, including both explicit and implicit practices contributing to the development of standards and a broader ecosystem of compliant tools and services. Furthermore, the survey attempts to situate these grassroots initiatives within the broader context of movements and principles such as Open Science [Bezjak et al., 2019], Citizen Science [Zourou and Ziku, 2022], the FAIR Data Principles [Wilkinson et al., 2016] as well as the CARE Principles for Indigenous Data Governance [Carroll et al., 2020, 2021].

With the participation of 79 individuals, the survey generated valuable insights into the roles and relationships of key actors, groups, and apparatuses within the IIF and Linked Art communities. Through analysis, this report aims to illuminate the functioning and dynamics of these communities. The findings contribute to a deeper understanding of the impact of the IIF and Linked Art initiatives within the cultural heritage domain. Additionally, they highlight the potential of these initiatives to advance interoperability and accessibility to cultural heritage resources through a comprehensive approach that includes shared APIs, compliant tools and associated services.

The structure of the report, while drawing inspiration from the survey, has been adapted to present the findings in a more coherent and reader-friendly manner, allowing for a comprehensive understanding of the research. It is structured as follows: Section 2 provides background information and objectives of the research, section 3 outlines the structure of the survey and its questions, section 4 presents the findings. The report provides some insights around the limitations and perspectives of the survey as well as some recommendations targeted primarily to the IIF and Linked Art communities in section 5. The report concludes in section 6.

2 Background and Objectives

As indicated in the introduction, this survey is part of my PhD thesis and as the IIF community has already carried out several surveys targeted at institutions (in 2017, 2020 and 2023) implementing the standards, I thought it would be a good idea to focus entirely on individuals rather than institutions, and to include Linked Art to explore the overlaps and differences between these communities. Some preliminary results were already presented at the 2023 IIF Conference in Naples, Italy [Raemy, 2023a].

The aim was to examine the practices among both communities and to understand the roles and relationships of key actors, groups and apparatuses required to develop standards and underlying compliant-resources. When the intention was to gain insight from individuals involved in either community, I allowed people who identified themselves as not involved to participate in the survey, largely to find out some measure of awareness.

A subsidiary purpose, which has accompanied me throughout my PhD thesis, is to adopt a standpoint based on the Actor-Network Theory (ANT) as defined notably by Latour Latour [1996, 2005] and Callon [2001], and by means of the survey it was above all an opportunity to identify actors and actor-network dependencies within the IIF and Linked Art communities and to consider possible enablers and inhibitors therein, drawing on a study by Czahajda et al. [2022]. Another objective of the survey was to establish a series of initial contacts for future investigations concerning the Linked Open Usable Data (LOUD)² design principles and compliant standards including the IIF and Linked Art specifications, which are regularly referred to as LOUD.

3 Structure of the survey

As seen on Figure 1, the survey was structured into eight sections, with varying levels of mandatory participation and branching logic based on participants' community affiliations. The sections aimed to capture specific information and guide participants through the survey accordingly.

The survey's structure accommodated participants' varying levels of involvement in the IIF and Linked Art communities. Through branching logic and follow-up sections, participants were guided through the survey based on their responses, ensuring that their answers were accurately captured within the relevant sections. To lay out this structure, a brief text and the corresponding questions can be found in the subsequent subsections. A red asterisk* at the end of a question indicates that it was mandatory.

²<https://linked.art/loud>



Figure 1: Flow diagram of the survey structure showing the different sections and how they branch off from each other

3.1 Introduction and explanation of the survey context

This initial section provided all participants with an overview of the survey's purpose and context. After completing this section, participants proceeded to Section 2.

The introduction read as follows:

This is a survey on the socio-technical characteristics of the International Image Interoperability Framework (IIIF) and Linked Art, two community-driven initiatives that are prevalent within the cultural heritage domain. The aim is to examine the practices among both communities and to understand the roles and relationships of key actors, groups and apparatuses required to develop standards and underlying compliant-resources.

This survey should take between 10 and 20 minutes, is anonymous and email addresses will only be recorded if you wish to be contacted again for a follow-up discussion.

Please fill in the survey by Sunday 7 May. Do not hesitate to contact me if you have any questions or comments.

Many thanks for your time and consideration.

Julien A. Raemy

3.2 Involvement in communities

In this section, participants were asked about their involvement in the IIIF and Linked Art communities. Based on their responses, participants were directed to either Section 3 (IIIF and Linked Art), Section 4 (IIIF or Linked Art), or

Section 7 (Non-involvement). The branching logic allowed participants to proceed to the relevant sections based on their community affiliations.

Q1. Are you involved or have you already been in contact with the International Image Interoperability Framework (IIIF) and/or the Linked Art communities?*

- I have been involved in both the IIIF and Linked Art communities → Q2
- I have been involved in one of them (IIIF or Linked Art) → Q3
- None of them → Q24

3.3 IIIF and Linked Art

Participants who reported involvement in both the IIIF and Linked Art communities were directed to this section. It aimed to gather insights and perspectives from participants engaged in both communities. Only one open-ended question was asked.

Q2. What parallel do you draw between the IIIF and Linked Art communities?*

3.4 IIIF or Linked Art

Participants who indicated involvement in either the IIIF or Linked Art community proceeded to this section. They were then directed to either Section 5 (IIIF) or Section 6 (Linked Art).

Q3. In which community are you involved?*

- International Image Interoperability Framework (IIIF) → Q4
- Linked Art → Q15

3.5 IIIF

Participants who reported involvement in the IIIF community specifically were directed to this section. It focused on gathering information and opinions specific to the IIIF community. Additionally, participants were presented with a last question to determine if they were also involved in the Linked Art community. The last question of this section (Q14) is only a workaround in Google Forms that allowed for people active in both communities to go to the Linked Art section.

Q4. Since when have you been involved in the IIIF community?*

Q5. Which of the following IIIF events have you already attended?

- IIIF Annual Conference
- IIIF Online Meeting (previously Fall Working Meeting)
- IIIF Online Workshop/Training
- IIIF Hackathon
- A formal ad-hoc IIIF Meeting to focus on and develop the specifications (e.g. APIs, extensions)
- A regional/informal IIIF Event (not necessarily organised by the IIIF-Consortium)

Q6a. How frequently have you taken part in the following IIIF Calls over the past year? - Attending a IIIF Community Call

- Never
- Less than 5 times a year
- Between 5 and 10 times a year
- More than 10 times a year

Q6b. How frequently have you taken part in the following IIIF Calls over the past year? - Attending a IIIF Community Group Call (e.g. A/V, Outreach, Manuscripts)

- Never
- Less than 5 times a year
- Between 5 and 10 times a year
- More than 10 times a year

Q6c. How frequently have you taken part in the following IIF Calls over the past year? - Attending a IIF Technical Specification Group Call (e.g. Authentication, Discovery)

- Never
- Less than 5 times a year
- Between 5 and 10 times a year
- More than 10 times a year

Q6d. How frequently have you taken part in the following IIF Calls over the past year? - Attending a IIF Committee Call (e.g. TRC, CoCo, Exec)

- Never
- Less than 5 times a year
- Between 5 and 10 times a year
- More than 10 times a year

Q7. What other activities have you already taken part in?

- Subscribed to the IIF newsletter
- Submitted a news item to the IIF newsletter
- Subscribed to the IIF-Discuss mailing list
- Using the IIF-Discuss mailing list
- Using the IIF Slack workspace
- Filing, reacting or responding to an issue on one of the IIF GitHub repositories
- Creating or merging a pull request on one of the IIF GitHub repositories
- Watching video recordings on the IIF YouTube Channel
- Other (please specify)

Q8. What tools and services from the IIF-Consortium and the wider community do you often use? _____

Q9. What are your practices when you are faced with challenges in all things IIF? How and to whom do you turn? What do you use? _____

Q10. What makes the IIF community successful? _____

Q11. What prevents you or is a barrier to getting involved in the IIF community? _____

Q12. To what extent do you agree or disagree with the following statements?* — Situating IIF to movements (Open Science, Citizen Science) and principles (FAIR^a, CARE^b)

^aFAIR Data Principles: <https://www.go-fair.org/fair-principles/>

^bCARE Principles for Indigenous Data Governance: <https://www.gida-global.org/care>

IIF is essential to Open Science. Strongly disagree ○—○—○—○—○ Strongly agree

IIF helps with Citizen Science initiatives. Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: IIF helps with Findability Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: IIF helps with Accessibility. Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: IIF helps with Interoperability. Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: IIF helps with Reusability. Strongly disagree ○—○—○—○—○ Strongly agree

IIF is an asset for fulfilling the CARE Principles. Strongly disagree ○—○—○—○—○ Strongly agree

Q13. Do you have any additional comments related to the IIF community? _____

Q14. Are you also involved in the Linked Art community?*

- Yes → Q15
- No → Q27

3.6 Linked Art

Participants who identified with the Linked Art community were directed to this section. It aimed to gather insights and perspectives specific to the Linked Art community.

The questions in this section are practically identical to those asked in the previous one, with a few exceptions. There were no questions relating to the tools and services used by the participants, as the possibilities are still relatively limited given that version 1.0 of the Linked Art API had not yet been released at the time of the survey. Also, some of the questions were shortened, as IIF organise many different calls due to the different interest groups, whereas Linked Art has but one call scheduled.

Q15. Since when have you been involved in the Linked Art community?* _____

Q16. Which of the following Linked Art events have you already attended?

- Face-to-face Linked Art Meeting
- Online or face-to-face Linked Art Workshop/Presentation
- A regional/informal Linked Art Event (not necessarily organised by Linked Art)

Q17. How frequently have you taken part in the bi-weekly Linked Art Call over the past year?*

- Never
- Less than 5 times a year
- Between 5 and 10 times a year
- More than 10 times a year

Q18. What other activities have you already taken part in?

- Subscribed to the Linked Art mailing list
- Using the Linked Art mailing list
- Using the Linked Art Slack workspace
- Filing, reacting or responding to an issue on the Linked Art GitHub repository
- Creating or merging a pull request on the Linked Art GitHub repository
- Other (please specify)

Q19. What are your practices when you are faced with challenges in all things Linked Art? How and to whom do you turn? What do you use? _____

Q20. What makes the Linked Art community successful? _____

Q21. What prevents you or is a barrier to getting involved in the Linked Art community?

Q22. To what extent do you agree or disagree with the following statements?* — **Situating Linked Art to movements (Open Science, Citizen Science) and principles (FAIR^a, CARE^b)**

^aFAIR Data Principles: <https://www.go-fair.org/fair-principles/>

^bCARE Principles for Indigenous Data Governance: <https://www.gida-global.org/care>

Linked Art is essential to Open Science. Strongly disagree ○—○—○—○—○ Strongly agree

Linked Art helps with Citizen Science initiatives. Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: Linked Art helps with Findability Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: Linked Art helps with Accessibility. Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: Linked Art helps with Interoperability. Strongly disagree ○—○—○—○—○ Strongly agree

FAIR: Linked Art helps with Reusability. Strongly disagree ○—○—○—○—○ Strongly agree

Linked Art is an asset for fulfilling the CARE Principles. Strongly disagree ○—○—○—○—○ Strongly agree

Q23. Do you have any additional comments related to the Linked Art community? _____

3.7 Non-involvement

Participants who reported no involvement in either the IIF or Linked Art communities were directed to this section. It contained questions relevant to their non-involvement and if they had heard of either communities and why they were not active community members.

Q24. Have you already heard of either community?*

- I have heard of both.
- I have already heard of IIF.
- I have already heard of Linked Art.
- I have never heard of either.

Q25. What prevents you or is a barrier to getting involved in the IIF community? _____

Q26. What prevents you or is a barrier to getting involved in the Linked Art community? _____

3.8 Socio-demographic questions and conclusion

This final section was designed to collect socio-demographic information from all participants, providing valuable context for the survey findings. It served as the conclusion of the survey.

Q27. In which country are you based?* _____

Q28. Which of the following categories best describes the organisation you primarily work in?*

- Library
- Archive
- Museum
- University
- Service/Hosting Provider
- Aggregator
- IIF-Consortium
- I am self-employed
- Other (please specify)

Q29. What is the highest level of education you have completed or the highest degree you have received?*

- Less than high school degree
- High school degree or equivalent
- Vocational/technical school degree
- Some college/university but no degree
- Bachelor's degree
- Master's degree
- PhD
- Post-doctoral/Habilitation
- Prefer not to say

Q30. What gender do you identify as?*

- Male
- Non-binary
- Female
- Prefer not to say
- Other (please specify)

- Q31. What is your age?***
- Under 18 years old
 - 18-24 years old
 - 25-34 years old
 - 35-44 years old
 - 45-54 years old
 - 55-64 years old
 - 65 years or older
 - Prefer not to say

Q32. Do you have any further comments? _____

Q33. Are you interested by a follow-up discussion on Linked Open Usable Data (LOUD)? If yes, please provide your email address. _____

4 Findings

The survey findings presented in this report provide an overview of individuals involved within the IIF and Linked Art communities, identifying participation, involvement and connections. These findings contribute to an understanding of the current landscape and can help guide future directions and initiatives within these communities and the wider cultural heritage field. It is important to note that as the survey administrator, I have access to the contact information of individuals who voluntarily provided their email addresses for further communication. However, their identities remain anonymous in the presentation of the findings. As for the pseudoanonymised dataset, it is available on Zenodo as a CSV³.

The structure of the survey loosely guides the organisation of the findings. It starts in 4.1 by focusing on socio-demographic data to understand the geographical distribution and demographic profile of respondents. This is followed by subsection 4.2 which is an exploration of the involvement of participants in either or both communities, shedding light on the extent of involvement and affiliation, as well as the individuals who are not involved.

The following subsections (4.3 and 4.4) explore specific aspects of each community, highlighting the respective activities undertaken by the survey respondents within the IIF and Linked Art communities. In the subsection 4.5, headed “Situating IIF and Linked Art”, the survey findings explore participants’ perspectives on the relationship between IIF and Linked Art and how both initiatives stand in relation to scholarly movements and principles.

Then follows subsection 4.6 which explores the perspectives of individuals who have not actively engaged with either community. Their reasons for non-involvement, as well as their potential interests and barriers, provide some useful guidance for future community outreach and engagement efforts.

Further comments made in Q32 of the survey, as well as feedback I received during the course of the survey, are summarised in subsection 4.7. This allowed respondents to provide additional feedback, observations and suggestions, capturing perspectives beyond the predefined structure of the survey.

4.1 Socio-demographics

The subsection begins by examining the geographic distribution, highlighting the countries where the respondents are based. It then delves into various socio-demographic variables, including gender identification, age range, educational background, and the types of organisations in which participants primarily work.

My focus here is on providing a high-level overview of the socio-demographic composition of the survey respondents while respecting their anonymity. The idea is to present overall socio-demographic data without delving into the more detailed aspects of who is involved in the IIF or Linked Art communities, both or neither. More detailed socio-demographic aspects are briefly presented in the relevant subsections.

4.1.1 Geographic Distribution

The survey respondents are based in 20 different countries (see Table 1). The largest number of participants (23 individuals) are based in the United States, followed by Switzerland with 12 participants and the United Kingdom with

³see [Raemy, 2023b]

9 participants. France and Germany are also well-represented, with 7 and 6 participants respectively. Other countries with multiple respondents include Belgium, Ireland, Brazil, Canada, Mexico, and Austria, each with 2 or 3 participants. Additionally, there is representation from various countries worldwide, including Cyprus, Estonia, India, Japan, the Netherlands, Nigeria, Poland, Portugal, and Spain, with one participant each.

Table 1: Q27 — *In which country are you based?*

Country (n=79)	Count	Percentage (%)
United States	23	29.11
Switzerland	12	15.19
United Kingdom	9	11.39
France	7	8.86
Germany	6	7.59
Belgium; Ireland	3	3.80
Brazil; Canada; Mexico	2	2.53
Austria; Cyprus; Estonia; India; Japan; the Netherlands; Nigeria; Poland; Portugal; Spain	1	1.27

As seen on Figure 2, this global distribution showcases the international reach and engagement within the IIF and Linked Art communities; however, it is important to acknowledge certain biases in the representation. While the respondents come from various countries, the distribution still exhibits a notable Western-centric or Global North bias. In other words, the asymmetries in the Southern hemisphere in terms of participation and opportunity are quite dramatic.

Furthermore, it is worth noting that there is a relative over-representation of individuals from Switzerland, which may be attributed to the survey's dissemination and reach within that particular region. Despite these biases, the participation from diverse countries and regions underscores the efforts of these communities to foster a global network of collaboration.

4.1.2 Demographic Profile

The respondents represented different types of organisations (see Table 2). The most common primary working environment was universities, with 26 responses. Museums were the second most common category, with 12 respondents identifying themselves as belonging to such organisations. Libraries and archives were also well represented, with 15 and 6 respondents respectively. The survey also included three individuals who reported being self-employed as well as those working for an aggregator and a (service or hosting) provider (two each).

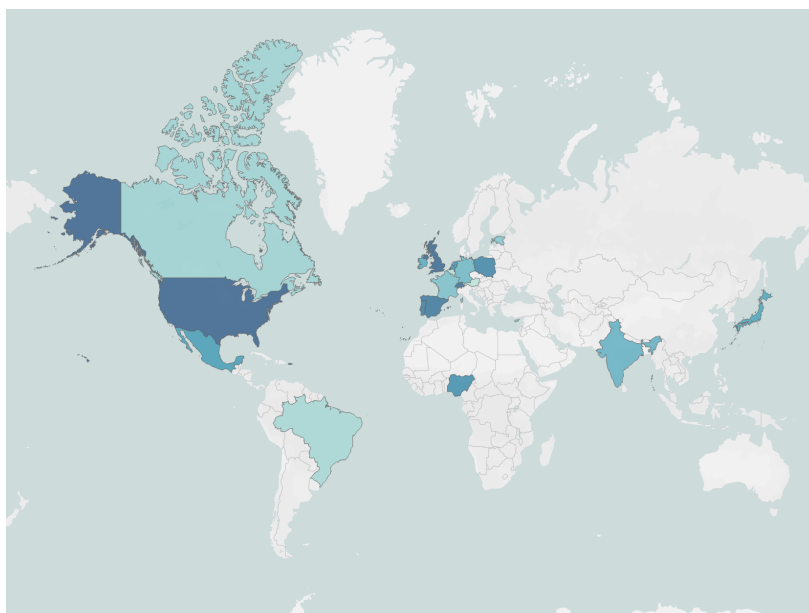


Figure 2: Q27 — Map distribution representing the countries in which the survey participants were based.

In addition, a subset of participants (13 individuals) provided specific details about the type of institution in which they work. These individuals were associated with various institutions including but not exhaustive of the following: a cultural institution supporting community archives, a data science startup, a design/development consultancy, a digital agency working with museums and archives, a digital repository, an NGO, a persistent identifier provider, a regulatory body, or a research infrastructure. Overall, the survey respondents predominantly worked in or around the fields of education and the cultural heritage sector.

Table 2: Q28 — *Which of the following categories best describes the organisation you primarily work in?*

Organisation (n=79)	Count	Percentage (%)
Library	15	18.99
Archive	6	7.59
Museum	12	15.19
Service/Hosting Provider	2	2.53
Aggregator	2	2.53
IIF-Consortium	0	0
I am self-employed	3	3.80
Other	13	16.46

The educational background of the survey participants demonstrated a high level of academic achievement (see Table 3). The majority of respondents held a Master's degree (45 individuals), followed by 16 individuals with a PhD and 12 individuals with a Bachelor's degree. Furthermore, five participants reported having completed post-doctoral or habilitation studies. One participant indicated having a high school degree or equivalent as their highest level of education.

Table 3: Q29 — *What is the highest level of education you have completed or the highest degree you have received?*

Education (n=79)	Count	Percentage (%)
Less than high school degree	0	0
High school degree or equivalent	1	1.27
Vocational/technical school degree	0	0
Some college/university but no degree	0	0
Bachelor's degree	12	15.19
Master's degree	45	56.96
PhD	16	20.25
Post-doctoral/Habilitation	5	6.33
Prefer not to say	0	0

The survey respondents were asked about their gender identification, and the responses reflect a varied distribution (see Table 4). The majority of participants (50 individuals) identified as male, while a significant number (26 individuals) identified as female. There were no respondents who identified as non-binary. Additionally, a small portion of participants (3 individuals) preferred not to disclose their gender.

Table 4: Q30 — *What gender do you identify as?*

Gender (n=79)	Count	Percentage (%)
Male	50	63.29
Female	26	32.91
Non-binary	0	0
Prefer not to say	3	3.80

The age range of the respondents was quite broad (see Table 5). The majority of participants fell into the 35-44 (22 individuals) and 45-54 (23 individuals) age categories, reflecting a significant proportion of mid-career professionals. In addition, there was a notable presence of respondents in the 25-34 age category, with 19 individuals representing the younger generation.

Table 5: Q31 — *What is your age?*

Age group (n=79)	Count	Percentage (%)
Under 18 years old	0	0
18-24 years old	0	0
25-34 years old	19	24.05
35-44 years old	22	27.85
45-54 years old	23	29.11
55-64 years old	13	16.46
65 years or older	0	0
Prefer not to say	2	2.53

4.2 Involvement in the communities

Among the respondents (see Table 6), 16 individuals reported being involved in both communities, while 38 participants mentioned their involvement in either the IIF or Linked Art community. However, it is noteworthy that a considerable number of respondents, specifically 25 individuals, indicated that they had no involvement with either community.

Table 6: Q1 — *Are you involved or have you already been in contact with the International Image Interoperability Framework (IIF) and/or the Linked Art communities?*

Involvement (n=79)	Count	Percentage (%)
I have been involved in both the IIF and Linked Art communities	16	20.25
I have been involved in one of them (IIF or Linked Art)	38	48.10
None of them	25	31.65

Among those who reported their specific community involvement (see Table 7), the majority of respondents (36 individuals) identified themselves as being part of the IIF community, while a smaller number (2 individuals) mentioned their involvement with Linked Art.

Table 7: Q3 — *In which community are you involved?*

Community (n=38)	Count	Percentage (%)
International Image Interoperability Framework (IIF)	36	94.74
Linked Art	2	5.26

Figure 3 cross-references these various aspects of community involvement.

4.3 IIF

52 participants answered the IIF section of the survey. Among them, there is a diverse range of socio-demographic profiles and institutional affiliations. The majority of respondents (36 individuals) identified as male, 13 as females, while 3 individuals did not specify their gender. In terms of age, there is a fairly even distribution across different age groups, with a concentration of respondents falling within the 35-54 year old range. The largest age category is 45-54 years old, comprising 21 individuals. Following closely behind are those aged 35-44 years old, with 15 individuals. There are also participants in the younger age bracket of 25-34 years old, with 7 individuals, and the older range of 55-64 years old, with 6 individuals. Additionally, there are 2 respondents who preferred not to disclose their age. Universities and libraries emerge as the most common types of institutions, with 20 individuals affiliated with universities and 10 individuals associated with libraries.

The geographic distribution of respondents involved in the IIF community is primarily centred around the United States, with 30 individuals based in the United States. Other countries represented include the United Kingdom (6 individuals), France (5 individuals), Switzerland (3 individuals), Germany (3 individuals), Canada (2 individuals), and one respondent each from Mexico, Poland, Ireland, Belgium, Brazil, Austria, Netherlands, Japan, Nigeria, Portugal, Spain, Cyprus, Estonia, India, and Cyprus.

4.3.1 Involvement in the IIF Community

As seen on Figure 4, the survey results show a wide range of involvement in terms of engagement years within the IIF community. The majority of participants have been involved since 2018 or later, with 6 participants joining in

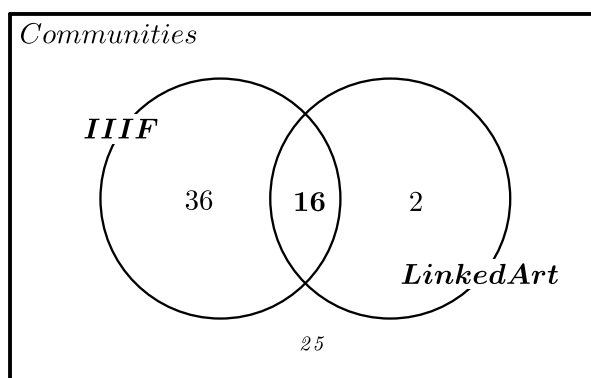


Figure 3: Compiled results of Q1 and Q3 — Venn diagram showing the extent to which survey participants are involved in the communities. IIF: 36 participants, Linked Art: 2, IIF and Linked Art: 16, Non-involvement: 25.

2018 and 7 participants each joining in 2019 and 2020. This suggests a relatively recent influx of new members. In addition, a smaller group of participants have been involved for a longer period, with 5 participants each reporting involvement since 2014, 2015, 2016 and 2022. The years 2009, 2011, 2013 and 2021 have fewer participants who started their involvement in those years. The data highlights the growth and evolving nature of the IIF community, with new members constantly joining while others have been involved for several years.

4.3.2 IIF Activities

IIF Events Among the surveyed participants, a significant number of them attended various IIF events (see Table 8). The IIF Annual Conference proved to be a popular choice, with 29 participants having attended this flagship event. The IIF Online Meeting, previously known as the Fall Working Meeting, also garnered significant attendance, with 32 participants having taken part. Additionally, 24 participants have participated in IIF Online Workshops/Training sessions to enhance their IIF knowledge and skills. While IIF Hackathons attracted a smaller group, with only 5 participants having attended, a notable 17 participants have taken part in formal ad-hoc IIF Meetings focused on developing specifications. Moreover, a considerable 30 participants have attended regional or informal IIF events, demonstrating the widespread interest and engagement within the IIF community.

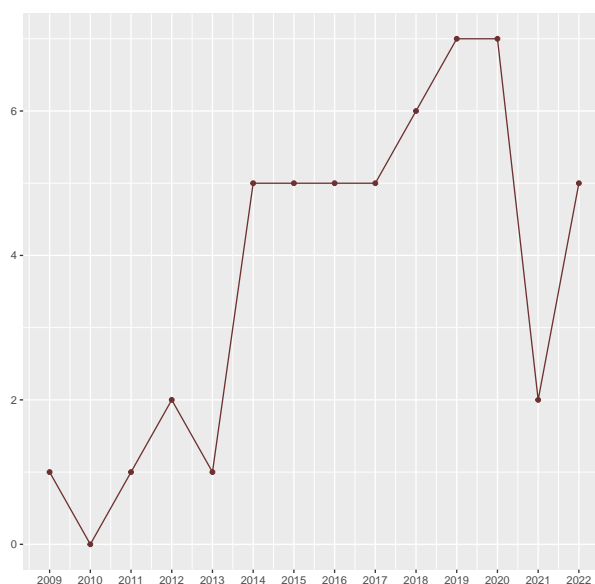


Figure 4: Q4 — Year of engagement in the IIF Community

Table 8: Q5 — Which of the following IIIF events have you already attended?

IIIF Events (n=52)	Count	Percentage (%)
IIIF Annual Conference	29	55.76
IIIF Online Meeting (previously Fall Working Meeting)	32	61.53
IIIF Online Workshop/Training	24	46.15
IIIF Hackathon	5	9.61
A formal ad-hoc IIIF Meeting to focus on and develop the specifications	17	32.69
A regional/informal IIIF Event (not necessarily organised by the IIIF-Consortium)	30	57.69

It should also be noted that, apart from one person, the other 51 people have at least taken part in one of the IIIF events listed. It shows that these events have provided opportunities for collaboration, learning, and contributing to the advancement of IIIF.

IIIF Calls As seen in Figure 5, it is evident that the majority of participants had limited attendance across the various call types, each represented by a different bar chart, within the IIIF community. A significant portion reported attending IIIF Community Calls less than 5 times a year, while a smaller group attended between 5 and 10 times annually. Participation in IIIF Community Group Calls was significantly lower, with a substantial number of participants reporting no participation. Similarly, the majority of participants indicated that they never participated in IIIF Technical Specification Group (TSG) Calls and IIIF Committee Calls. It is worth noting that for the latter, low attendance was expected due to the nature of the calls, such as the Technical Review Committee or Executive Committee calls, which are either restricted to individuals working for institutions affiliated to the IIIF Consortium (IIIF-C) or require election. Nevertheless, these findings suggest that active participation in these specific IIIF call sessions may be relatively low among the surveyed participants. Upon closer examination of the results, it is noteworthy that the most active participants in attending IIIF calls are often the same individuals.

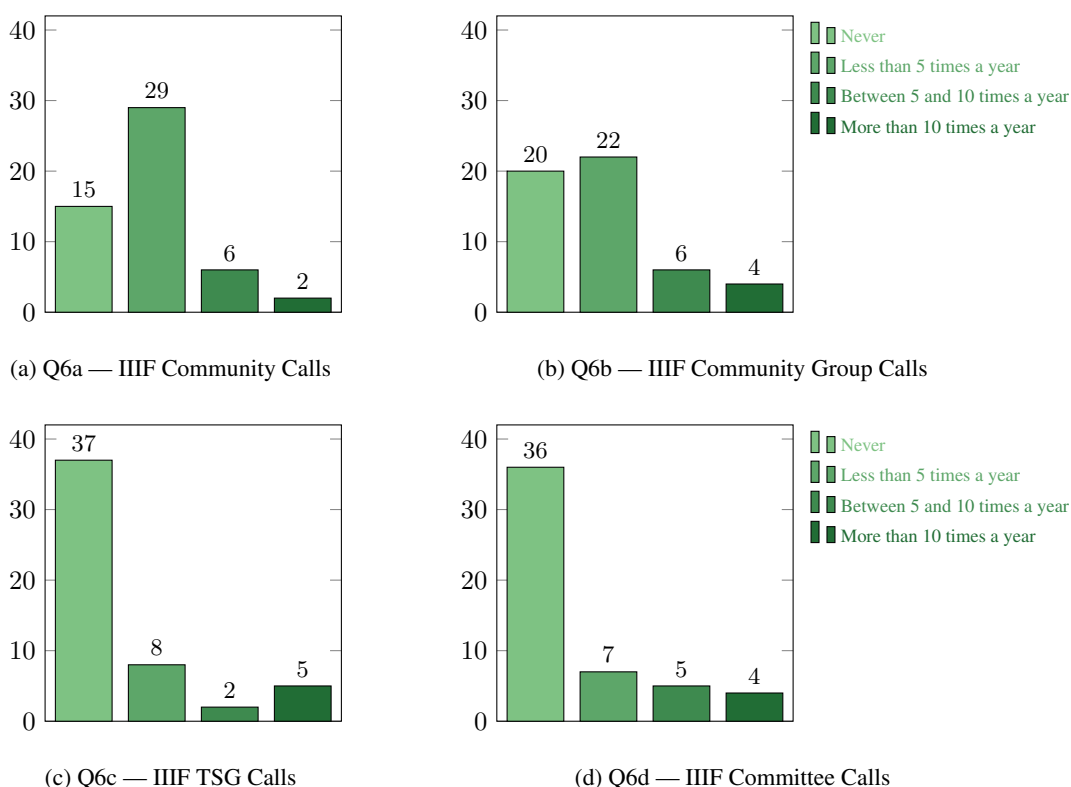


Figure 5: Q6 — Comparison of IIIF Calls Attendance over the past year

Further IIF Activities As seen in Table 9, which provides a breakdown of the further activities and their corresponding counts and percentages, the majority of activities related to IIF reported by participants are passive in nature.

The most common activity was subscribing to the IIF newsletter, with 82.69% of the participants indicating their subscription. Other activities included submitting news items to the IIF newsletter (21.15%), subscribing to the IIF-Discuss mailing list (69.23%), using the IIF Slack workspace (73.07%), and watching video recordings on the IIF YouTube Channel (67.31%). Some participants also mentioned engaging in other activities such as participating in the IIF project (TANC), taking an IIF training course, engaging in pre-IIF discourse (SharedCanvas), and contributing to Mirador enhancement.

Table 9: Q7 — *What other activities have you already taken part in?*

IIF Activities (n=52)	Count	Percentage (%)
Subscribed to the IIF newsletter	43	82.69
Submitted a news item to the IIF newsletter	11	21.15
Subscribed to the IIF-Discuss mailing list	36	69.23
Using the IIF-Discuss mailing list	18	34.62
Using the IIF Slack workspace	38	73.07
Filing, reacting or responding to an issue on one of the IIF GitHub repositories	19	36.54
Creating or merging a pull request	13	25
Watching video recordings on the IIF YouTube Channel	35	67.31
Other: IIF project (TANC); IIF training course; Engaged in pre-IIF discourse (SharedCanvas); Mirador enhancement	1	1.92

4.3.3 Tools and Services from the IIF-C and the wider community

The survey respondents reported using a variety of tools and services provided by the IIF Consortium, as well as those created collaboratively by the community and the wider IIF community. The IIF Specifications and the IIF Presentation API Validator were widely used by the participants, with a frequency of eight each. The IIF website, which serves as a central hub for documentation and resources, was mentioned by five respondents.

When it comes to image viewers, the Universal Viewer was mentioned the most, with a frequency of 13. Universal Viewer, another popular viewer, was used by 10 respondents. Other viewers like OpenSeadragon, Viewers (not specified), CanvasPanel, and Tify were also mentioned. In terms of IIF-compliant servers, Cantaloupe was mentioned five times, Loris and IIPImage once.

The IIF Training and IIF Cookbook, which provide training materials and best practices, were reported by two and four participants respectively. The IIF Awesome resource, offering a curated collection of IIF-related projects and implementations, was found valuable by three respondents.

In Figure 6, I have divided the tools and services on the x axis into four clusters depending on ownership and openness or possibility of collaboration: on the left the IIF-C tools and services, on the right those belonging to third-party entities, and in the middle those where collaboration is encouraged. The y axis shows the number of mentions made by survey participants. The range of tools and services mentioned reflects the diverse needs and interests of the IIF community, supporting collaboration, research, and implementation of IIF specifications.

4.3.4 IIF Practices

Most participants rely on the IIF Slack workspace as their primary resource for assistance and discussions (14). They also consult the IIF website and documentation, as well as resources such as GitHub repositories and the Awesome IIF list (5). Some participants seek help from colleagues within their organisation (3), while others mention specific individuals or groups within the IIF community for support (3). Additionally, a few participants mentioned using the IIF Google Group Mailing list, or searching online for information (4).

The most common co-occurrences found in the survey include asking the IIF community or other participants, which often goes hand in hand with using the IIF Slack for help and discussion. Consulting IIF websites, referring to documentation, GitHub or specific tools are also common practices. Collaborating with experts within their organisation is often mentioned alongside seeking help from developers. Additionally, reaching out to regional or local IIF communities/events sometimes complements other practices.

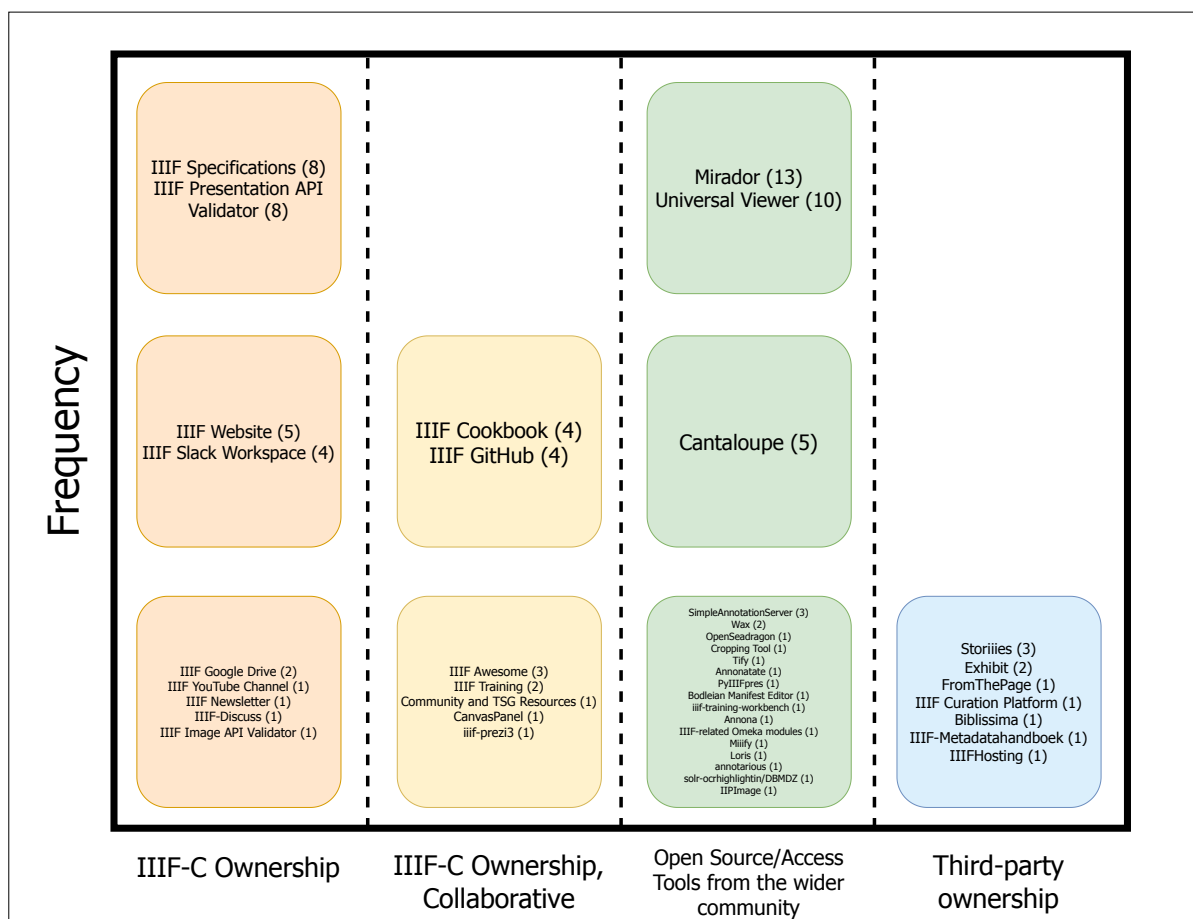


Figure 6: Q8 — IIF Tools and Services mentioned by survey respondents

Altogether, participants primarily turn to the IIF Slack workspace, the IIF website, and resources such as GitHub and the Awesome IIF list when faced with challenges. They also rely on colleagues and specific individuals within the IIF community for help, and consult documentation and online sources for information. The co-occurrence patterns show the interplay between different practices, highlighting the collaborative and resourceful nature of the IIF community in problem solving and knowledge sharing.

4.3.5 Enablers

The success of the IIF community can be attributed to several key factors (see Table 10). Participants emphasised the community's non-exclusionary approach, facilitated by interoperable APIs and multiple compatible implementations, which fill a useful niche. They also praised the community's openness, friendliness, and willingness to help others.

The collaborative nature of the community, along with the involvement of well-known players and the engagement of technical experts, was highlighted as contributing to its success. Participants appreciated the community's organisation, coordination, and the support provided by IIF staff in orchestrating events and facilitating collaboration.

The IIF community's commitment to providing comprehensive documentation and resources, its pragmatism, and its ability to address specific shared needs were mentioned as factors contributing to its success. Participants also recognised the community's focus on specifications, practical solutions, and continuous work in evolving the standard.

In summary, the IIF community's success stems from its inclusive and collaborative nature, the availability of interoperable APIs and compatible implementations, its openness and friendliness, and its commitment to providing resources and addressing specific needs.

Table 10: Q10 — Success factors for participation in the IIF community

Success factor (Enabler)	Frequency
Friendliness	14
Cooperation/Coordination	14
Openness	10
Pragmatism/Clear mandate	7
Dedicated community and interest groups	5
Compliant tools and services	3

4.3.6 Inhibitors

As can be seen in Table 11, time constraints emerged as the primary barrier, with some participants expressing a lack of time to engage more actively. The technical nature of IIF was also mentioned as a barrier, with some individuals finding it challenging to grasp the terminology and complexities quickly. Limited technical knowledge and the steep learning curve were cited as additional obstacles to entry.

Some participants highlighted the importance of in-person meetings for community building and specification development but noted the high costs associated with organising and attending such events. Lack of support from employers beyond a certain point and the perception of community work as separate from job responsibilities were mentioned as barriers to deeper involvement.

Language barriers and the absence of resources for newcomers and casual users were also raised as challenges, along with a perceived lack of real-world implementation examples that would facilitate adoption by cultural heritage organisations.

Overall, time constraints, technical complexities, limited resources for newcomers, challenges related to support and language were identified as the main barriers to getting involved in the IIF community.

Table 11: Q11 — Barriers to Involvement in the IIF community (IIF section)

Barrier (Inhibitor)	Frequency
Time constraints	15
Technical complexity	12
Limited resources for newcomers	5
Language barriers	4
Cost of in-person meetings	3
Limited institutional support	3
Questions that remain unanswered (Slack, mailing list)	2
Limited knowledge	2
Documentation of IIF-compliant tools	2
Integration of more complex features	1

4.3.7 Further comments

Participants expressed appreciation for the welcoming and inclusive nature of the IIF community, noting its openness, generosity, and willingness to share knowledge (2). They highlighted the community's successful implementation of the IIF specifications, its effective management structure, and the benefits of having IIF as a versatile tool in their work (3). Some participants also suggested areas for improvement, such as better communication beyond the technical community and the need for more focus on accessibility and simpler implementation methods (2).

In summary, participants praised the IIF community for its welcoming and generous attitude, successful implementation of the standard, and effective management structure. Suggestions for improvement included better communication, emphasis on accessibility, and simpler implementation methods.

4.4 Linked Art

In the examined section, 16 participants responded. Among them, two participants had initially expressed affiliation with both communities in section 2 but later provided a negative response to the last question in the IIF section. Consequently, the previously reported count of 18 participants (as shown in Figure 3) should be adjusted to reflect that only 16 participants completed this specific section.

The majority of participants, with a total of eight, are from the United States. France follows with two participants, while Switzerland, Belgium, and the United Kingdom each have one participant. In terms of gender identification, the survey respondents demonstrated a predominance of male representation, with 14 participants identifying as male. One participant identified as female. Additionally, one respondent chose not to disclose their gender. Regarding age, the participants fall within a range of 25 to 64 years old, with the most common age group being 35 to 44 years old, which is represented by six participants. There are also participants in the age groups of 45 to 54 years old, 55 to 64 years old, and 25 to 34 years old, with one participant each.

The respondents involved in the Linked Art community represent different types of institutions. Given the nature of the data collected and the foundation of the Linked Art model, it is not surprising that museums were the most prominent among the respondents, with a total of seven individuals working in museums. Universities and digital agencies working with museums and archives were the next most common, each represented by two respondents. In addition, there was one participant from an archive, one from an aggregator, and one from a design/development consultancy. This distribution reflects the strong presence of museum professionals within the Linked Art community, supported by academic institutions and specialised agencies involved in the cultural heritage domain.

4.4.1 Involvement in the Linked Art Community

The survey responses shed further light on the involvement of participants in the Linked Art community. Interestingly, as seen on Figure 7, a significant majority of respondents (nine out of sixteen) indicated that they began their involvement in the first three years following the inception of the community, with four participants joining in 2016. This finding suggests a good foundation for long-term engagement within this community. Furthermore, the responses from the remaining participants indicate a continuous growth in community membership over time, despite the smaller numbers. Their reported involvement reflects a steady progression and ongoing expansion of the Linked Art community.

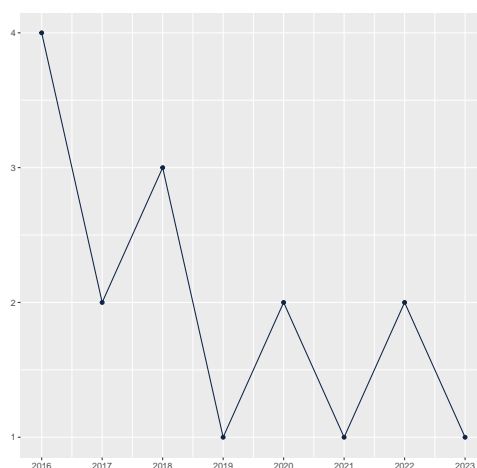


Figure 7: Q15 — Year of engagement in the Linked Art community

4.4.2 Linked Art Activities

Linked Art Events As can be seen in Table 12, a significant number of respondents have actively participated in Linked Art events. Of the 16 people who responded to the question about event participation, the majority reported that they had participated in all of the Linked Art events listed. Specifically, 11 respondents have attended face-to-face Linked Art meetings, 14 respondents have attended online or face-to-face Linked Art workshops/presentations and 15 respondents have attended regional/informal Linked Art events. This high level of participation suggests that the respondents have a good knowledge of the activities and discussions within the Linked Art community, as they have participated in various events and meetings organised by or related to Linked Art.

Linked Art Calls The survey results reveal varying levels of participation in the fortnightly Linked Art Call over the past year (see Figure 8). 5 respondents indicated that they had never participated in the call. In addition, 4 respondents reported participating less than 5 times per year, while only 1 respondent reported participating between 5 and 10 times per year. On the other hand, a significant number of individuals, 6 respondents, had participated in the fortnightly Linked Art Call more than 10 times a year. These results indicate a range of participation in the regular call, with a

Table 12: Q16 — Which of the following Linked Arts events have you already attended?

Linked Art Events (n=16)	Count	Percentage (%)
Face-to-face Linked Art meeting	11	68.75
Online or face-to-face Linked Art workshop/presentation	14	87.50
A regional/informal Linked Art event	15	93.75

significant proportion of respondents demonstrating consistent and frequent participation, while others have participated less frequently or not at all.

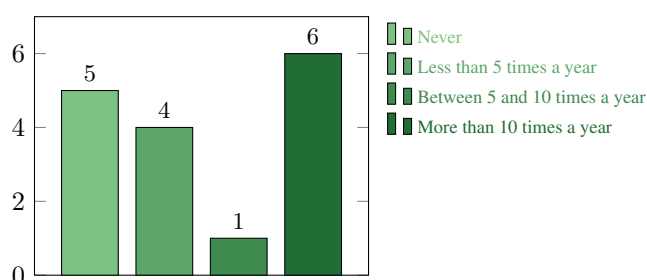


Figure 8: Q17 — Attending the bi-weekly Linked Art Call over the past year

Further Linked Art Activities As can be seen in Table 13, of the 16 respondents, 14 subscribe to the Linked Art mailing list, 8 use the Linked Art mailing list, 12 use the Linked Art Slack workspace, 8 file, react to, or respond to an issue on the Linked Art GitHub repository, 5 create or merge a pull request on the Linked Art repository, and 2 respondents say they are involved in other activities such as organising informal meetings and creating a Shapes Constraint Language (SHACL)-based validator against the forthcoming specification.

Table 13: Q18 — What other activities have you already taken part in?

Linked Art Activities (n=16)	Count	Percentage (%)
Subscribed to the Linked Art mailing list	14	87.50
Using the Linked Art mailing list	8	50.00
Using the Linked Art Slack workspace	12	75.00
Filing, reacting or responding to an issue on the Linked Art GitHub repository	8	50.00
Creating or merging a pull request on the Linked Art repository	5	31.25
Other: organisation of an informal meeting; SHACL-based validator	1	6.25

4.4.3 Linked Art Practices

When faced with challenges related to Linked Art, individuals involved in the community demonstrate diverse practices for seeking support and finding solutions. Many respondents expressed that they turn to the community as their primary resource, using various channels such as community calls, Slack and the mailing list. Others mentioned specific actions such as opening issues on GitHub, communicating directly with Robert Sanderson via email or collaborating on problem solving, and attending workshops to gain basic knowledge. Some respondents mentioned consulting documentation, searching for issues on GitHub, and consulting sample documents.

Responses also highlighted the importance of collaboration, with individuals sharing their experiences, posting messages, commenting on issues, and submitting pull requests to GitHub repositories.

4.4.4 Enablers

According to the survey respondents, there are several factors that contribute to the success of the Linked Art community (see Table 14). Firstly, similar to IIF, the community is known for being friendly and welcoming, making it easier to connect with people. Additionally, its smaller size compared to IIF allows for better networking and relationship building.

The Linked Art community's success is also attributed to its open approach towards questions and data modelling. Furthermore, the presence of a dedicated core group of participants contributes to the community's success. Despite some notable progress, there is a call for more institutions to actively implement the standard to further enhance its impact.

Table 14: Q20 — Success factors for participation in the Linked Art community

Success factor (Enabler)	Frequency
Friendly and Welcoming Atmosphere	4
Openness	3
Dedicated Participants / Common Goal	3
Small Community	2
Data Modelling	2

4.4.5 Inhibitors

Several barriers and challenges were identified by respondents regarding their involvement in the Linked Art community (see Table 15). Time constraints emerged as a significant obstacle, as individuals already had commitments to other communities like IIF or personal responsibilities. The lack of awareness and limited availability of tools and services were also mentioned, hindering broader engagement. Additionally, some respondents found it less clear why they should use or implement Linked Art compared to IIF, which has more obvious benefits. Some respondents were uncertain about the community's success and emphasised the need for practical applications rather than just discussions and meetings.

Another barrier highlighted by respondents was the perception that the community's leadership structure might hinder productive discussion and conflict resolution. The complexity of CIDOC-CRM and a perceived lack of tangible use cases for Linked Open Data (LOD) were identified as additional barriers to participation. Call for greater diversity and inclusivity was also identified as factors affecting engagement.

Table 15: Q21 — Barriers to Involvement in the Linked Art community (Linked Art section)

Barrier (Inhibitor)	Frequency
Time constraints	6
Lack of awareness	3
Lack of tools and services	2
Perceived Clarity of Benefits	2
Leadership structure	2
CIDOC-CRM Complexity	2
Lack of diversity	1

4.4.6 Further comments

In the additional comments section, only six respondents provided feedback, with four of them offering substantial perspectives. One respondent expressed bias, while another acknowledged the smaller and less established nature of the Linked Art community compared to IIF. One respondent expressed gratitude for being part of the community, emphasising the value of knowledge sharing and future contributions.

In addition, one participant emphasised the crucial role of key individuals in ensuring the success of the community. Furthermore, one respondent highlighted the challenge of defining the community and the need to bridge the gap between the core group and broader museum/cultural digital communities.

Finally, the difficulty of data management and standardisation was also pointed out, noting that data-related issues pose a greater challenge for Linked Art in comparison to the IIF's focus on image-based resources.

4.5 Situating IIF and Linked Art

This subsection is in two parts, the first summarising the comments submitted by survey participants identifying themselves as active in the IIF and Linked Art communities, and the second focusing on the perceived relationship between movements and principles and the prospects offered by the standards of both communities.

4.5.1 Parallels drawn between the two communities

The respondents draw parallels between the IIF and Linked Art communities in terms of their focus on interoperability and linked data solutions in the cultural heritage sector (3 occurrences). Both communities prioritise usability and the creation of usable linked data (or LOUD), with a shared emphasis on the adoption of APIs (2).

There is recognition of the common involvement of individuals like Robert Sanderson, who plays a significant role in both initiatives (2). Moreover, the communities are characterised by technical competence and an interest in leading-edge technologies (2). They share a collaborative approach to standards, development, and meetings, fostering a culture of community-led work and shared knowledge (2).

Additionally, both IIF and Linked Art aim to facilitate the sharing of content and metadata (2). They provide valuable resources for cultural heritage organisations (2). However, there are also notable differences between the two communities.

IIF has expanded beyond cultural heritage, branching out into other areas due to its generic and applicable technology. In contrast, Linked Art remains primarily focused on art-related objects, catering to a smaller audience. Furthermore, the IIF use case has been articulated and understood more clearly, perceived as a common problem, and has gained momentum over time. In contrast, Linked Art faces challenges in establishing, modelling, illustrating, and obtaining permission to explore its use cases, making it a more complex and less widely adopted initiative.

Overall, the IIF and Linked Art communities converge in their goals of interoperability and linked data solutions, usability, and community collaboration. However, they differ in the scope of their applications, the level of adoption and understanding, and the challenges they encounter in their respective domains.

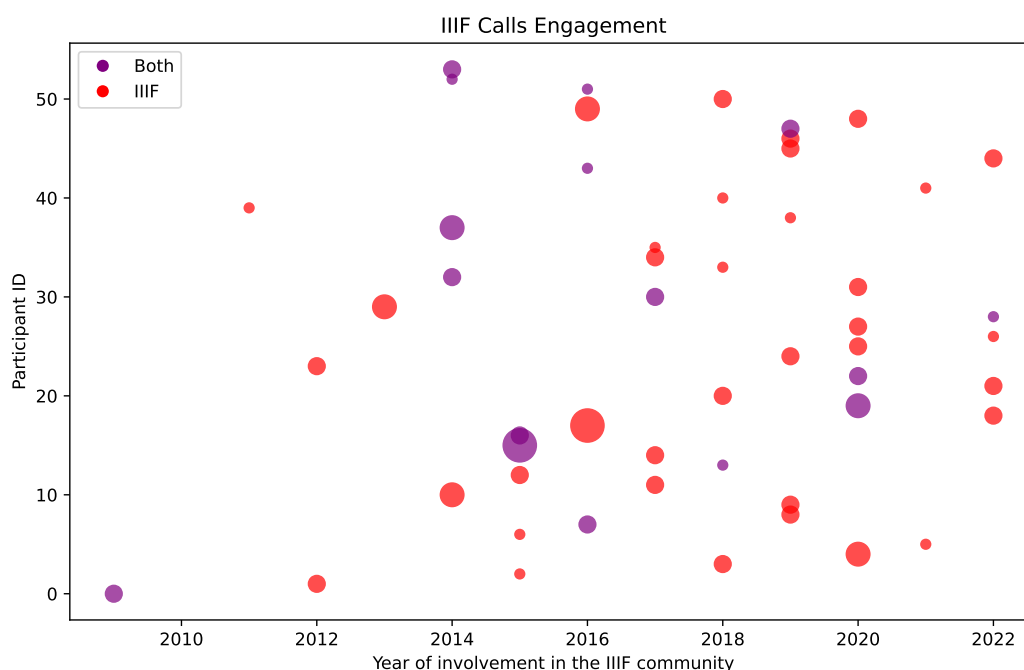


Figure 9: IIF Calls Engagement by individuals involved in IIF or in both communities. The Participant ID was recalculated to ignore participants that are not involved in either community.

To go a step further, a scatter plot (see Figure 9) has been created. It shows the year of involvement in the IIF community on the x-axis and the participant IDs on the y-axis. Each point represents an individual's involvement in the IIF community, and the size of the point indicates the level of involvement in IIF calls over the past year. Participants who are only involved in the Linked Art community are not included in this plot.

When analysing the scatter plot, several notable observations can be made. First, among the individuals who participate in both the IIF and Linked Art communities, the majority of them (9 out of 16) have been involved in the IIF

Situating IIIF to movements and principles (n=52)

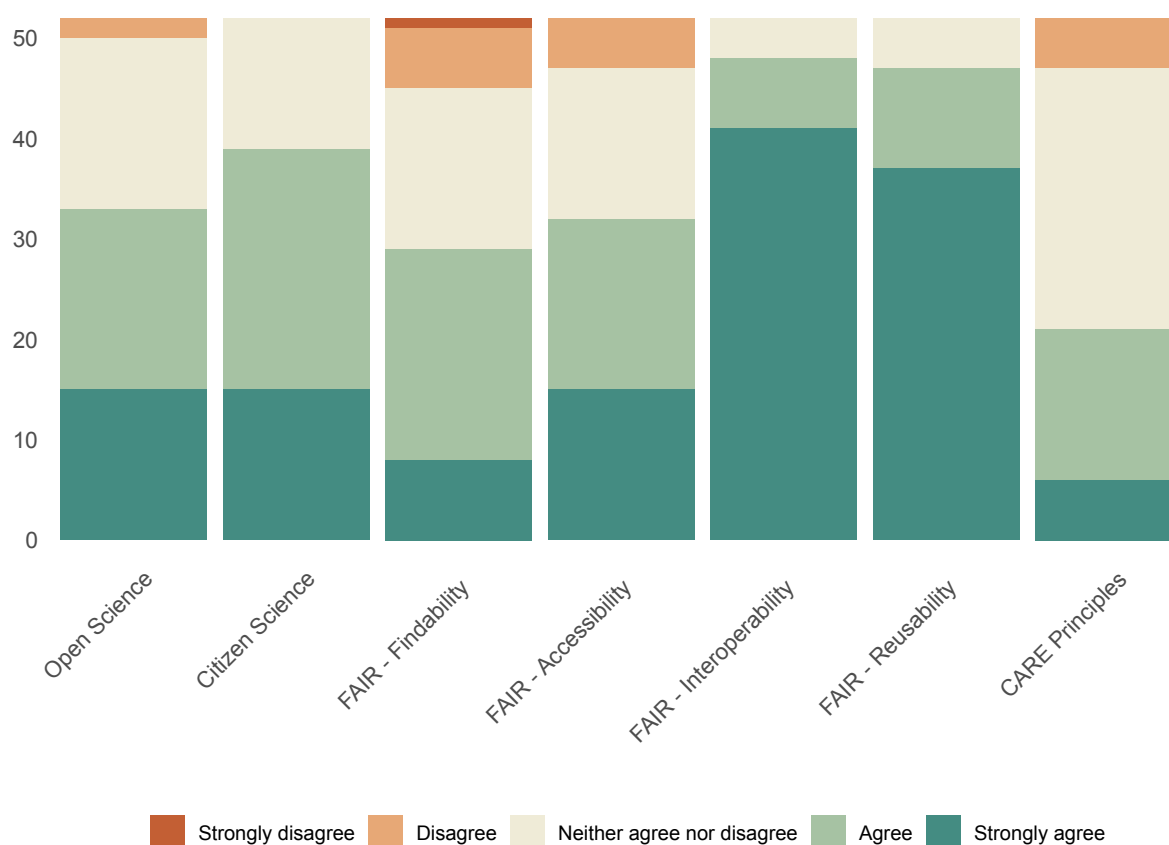


Figure 10: Q12 — Situating IIIF to Movements and Principles

community since 2016 or even earlier, with some having joined as early as 2014 or 2015. This indicates a strong and sustained commitment to the IIIF community for these participants.

Secondly, a trend is emerging where individuals who have been active in the IIIF community prior to 2021 tend to have higher levels of engagement. This suggests that those who have been involved for a longer period of time are more likely to actively contribute and participate in IIIF calls. This finding highlights the importance of sustained engagement and the cumulative nature of involvement within the community. The findings could also support the cross-pollination of individuals involved in several interest groups and committees within the IIIF community.

Finally, an interesting insight comes from one participant who felt that their involvement in the IIIF community started in 2009. This perception suggests that their sense of belonging and connection to the IIIF community goes beyond the official records, possibly indicating prior efforts and engagement in the years prior to their officially recognised participation. This finding underlines the existence of earlier activities and initiatives, such as SharedCanvas [Sanderson et al., 2011], that contributed to the formation and development of the IIIF community.

4.5.2 Movements and principles

Based on the responses from 52 participants (see Figure 10), it is evident that IIIF is recognised as a valuable tool in various contexts. A majority of participants (33) agree or strongly agree that IIIF is essential to Open Science, helps with Citizen Science initiatives (39). Regarding the FAIR principles, IIIF contributes to some extent to the findability (29) and accessibility (32). It is really valuable in terms of interoperability (48) and reusability (47). Further exploration is needed to fully understand the extent of IIIF's alignment with the CARE Principles for Indigenous Data Governance.

With responses from 16 participants (see Figure 11), the findings suggest a lower level of agreement regarding Linked Art's role in Open Science (7) and Citizen Science initiatives (10). Participants acknowledge some potential in terms of

Situating Linked Art to movements and principles (n=16)

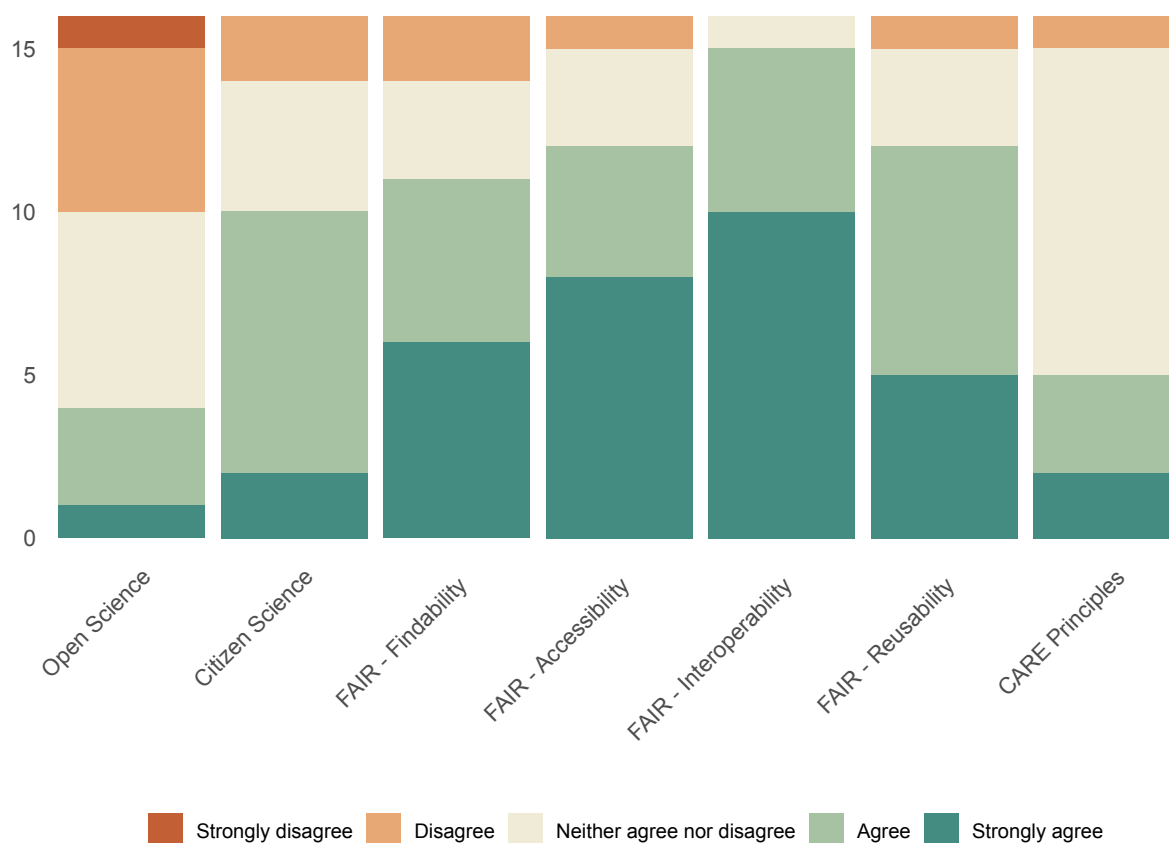


Figure 11: Q22 — Situating Linked Art to Movements and Principles

contributing to the findability (11), accessibility (12), and reusability (12) aspects of the FAIR principles. Above all, there is a higher level of receptiveness in terms of the interoperability capabilities (14) of Linked Art. It is important to note that the number of participants is relatively small, warranting additional research to assess the specific alignment of Linked Art with the CARE Principles for Indigenous Data Governance.

4.6 Non involvement

The sample of 25 individuals who do not consider themselves to be part of the IIF or Linked Art community is geographically dispersed, with individuals based primarily in Switzerland, Germany, the United States, the United Kingdom, Mexico, India, Belgium, Spain, France, Ireland and Portugal. There is a fairly balanced gender distribution among the participants, with 11 females and 14 males, resulting in a male/female ratio of approximately 1.27:1. The age of the participants ranges from 25 to 64 years, with the majority between 25 and 44 years.

The primary work settings of these individuals include museums, universities, libraries, archives, regulatory bodies, secondary education, or they are self-employed.

4.6.1 Familiarity with IIF and Linked Art

Among the 25 survey respondents that stated that they were not involved in either communities, there were varying levels of awareness regarding IIF and Linked Art (see Table 16). A significant portion of participants (10 individuals) reported being familiar with both, indicating their prior knowledge of both IIF and Linked Art. Additionally, 11 respondents stated that they had heard of IIF, demonstrating a broader awareness of this community specifically. Interestingly, none of the participants indicated prior awareness of Linked Art without being aware of IIF. This suggests a relatively lower level of familiarity within this specific group regarding Linked Art. However, it is worth noting

that this lack of awareness is not necessarily surprising, as the survey respondents might have primarily encountered information or discussions related to both communities of practices together rather than specifically focused on Linked Art. Furthermore, four individuals admitted to having no prior knowledge of either community.

Table 16: Q24 — *Have you already heard of either community?*

Awareness (n=25)	Count	Percentage (%)
I have heard of both.	10	40
I have already heard of IIF.	11	44
I have already heard of Linked Art.	0	0
I have never heard of either.	4	16

4.6.2 Barriers to Involvement in the IIF Community

Several barriers to participation in the IIF community were identified. A common barrier was the need for technological support to implement IIF for their collections, particularly in making artworks and objects accessible online. Respondents highlighted the importance of having a digital asset management system to organise images and multimedia content that would provide integrated IIF Manifests.

Some respondents expressed satisfaction with the current specifications and tools, indicating that they did not see the need for further involvement. Lack of awareness about IIF was another constraint, with some respondents stating that they had never heard of it or had never considered getting involved.

Time constraints and the fear of not having enough to contribute were significant barriers mentioned by several respondents. Professional commitments and general workload were also cited as barriers to involvement. Lack of knowledge about IIF concepts and events, technical complexity and the perceived need for technical expertise were additional barriers.

Limited institutional support and resources, including insufficient staff and funding, were cited as barriers to participation. The cost and time required to travel to conferences or invest in online forums were also cited as challenges. Some respondents mentioned a lack of clear definition or understanding of how IIF could be used in their specific field of activity.

Overall, the barriers to involvement in the IIF community encompassed technological, knowledge, time, resource, and institutional constraints, as well as individual factors such as awareness and career stage (see Table 17).

Table 17: Q25 — Barriers to Involvement in the IIF community (non-involvement section)

Barrier (Inhibitor)	Frequency
Technological assistance / Technical complexity	7
Time constraints	7
Limited institutional support / Limited resources / Work duties and workload	7
Lack of awareness / Unawareness of the community	5
Fear of inadequate contribution	4
Insufficient knowledge	2
Travel expenses	1
No perceived need for involvement	1
Current tools are sufficient	1

4.6.3 Barriers to Involvement in the Linked Art Community

Based on 16 responses, several barriers to participation in the Linked Art community were identified. Some respondents expressed difficulty in understanding how to use CIDOC-CRM and Linked Art when using relational collection and museum management databases that do not natively support LOD. They stressed the need to make Linked Art user-friendly for all museum and collection staff.

Time constraints and the fear of not having enough to contribute were significant barriers mentioned by several respondents. Some individuals stated that they needed to implement Linked Art in their projects but had not yet done so. Lack of knowledge about Linked Art concepts and events and never having heard of Linked Art were also cited as barriers to participation.

Technical complexity and the perception that Linked Art is too technical were mentioned by a few respondents. Lack of introduction to the Linked Art community, lack of suggestions on how to engage with the community and digital barriers were other barriers identified.

Some respondents indicated that they were already involved in other communities and did not have much time to actively participate in the Linked Art community. Lack of institutional support and limited resources, including staff, were other barriers identified.

In summary, the barriers to engaging with the Linked Art community included technical difficulties, lack of knowledge, time constraints, limited resources and lack of exposure or suggestions for engaging with the community (see Table 18).

Table 18: Q26 — Barriers to Involvement in the Linked Art community (non-involvement section)

Barrier (Inhibitor)	Frequency
Technical complexity	5
Time constraints	4
Lack of awareness	2
Insufficient knowledge	2
Fear of inadequate contribution	2
Absence of proposals to engage with the community	1
Limited institutional support	1
Lack of knowledge	1
Not involved in the art/museum community	1
Need to implement Linked Art in projects but not done yet	1

4.7 Additional feedback and comments regarding the survey

Several comments received at the end of the survey provided valuable insights and reflections on various aspects of IIF and Linked Art. Some respondents expressed surprise that they had not heard of these initiatives before, particularly from the perspective of arts education and librarianship. They emphasised the need for greater awareness and understanding of IIF and Linked Art, prompting questions about their respective themes and definitions. In addition, one respondent shared their familiarity with Linked Art, mentioning their subscription to the mailing list, although they had not actively engaged with the community.

Accessibility emerged as an important consideration for IIF, with the recognition that it has the potential to significantly improve accessibility. However, some respondents highlighted the need for more expertise in this area and the development of resources or guidelines to maximise the accessibility benefits of IIF. They expressed the importance of ensuring that IIF continues to effectively support accessibility, while acknowledging its current neutral stance on the issue. One respondent mentioned the WorldFAIR project⁴, which explores cultural heritage FAIR data sharing, emphasising the application of FAIR principles in conjunction with technologies like IIF for image sharing.

A couple of respondents expressed curiosity about the growth paths and potential risks associated with these initiatives, acknowledging the different stages and problem-solving approaches of IIF and Linked Art. Furthermore, participants extended their support for further discussion, demonstrating a willingness to engage and contribute to the exploration of IIF and Linked Art. In this respect, 33 people (41.77%) provided their email address for a possible follow-up discussion on LOUD.

Feedback on the survey design was positive, with one participant praising its thoughtful structure. The inclusion of demographic questions at the end was also appreciated. However, I received messages when the survey was being circulated that it would be better to use tools other than Google Forms for privacy reasons. Admittedly, I had asked myself this question and opted for this tool, as I didn't have sufficient institutional support to deploy an alternative solution quickly.

5 Insights

This section — with the generic name of “Insights” and divided into three subsections — is intended to be a discussion and to offer some suggestions, mainly aimed at the actors involved within the IIF and Linked Art communities, although some of the recommendations could be applicable to all individuals and institutions involved in the cultural heritage field more generally.

⁴<https://worldfair-project.eu/>

5.1 Participants

The key findings presented in this report are based on survey responses from mostly individuals involved in the IIIF and Linked Art communities but did also capture individuals that identified as not being involved in either communities.

Of the survey participants, 16 individuals reported active involvement in both the IIIF and Linked Art communities, indicating a significant overlap between the two. In addition, 38 respondents indicated that they belonged to either the IIIF or Linked Art communities, demonstrating engagement within each community.

However, it is important to highlight that a significant proportion of respondents, namely 25 individuals, indicated that they were not involved in either community. The inclusion of non-participants in the survey was a valuable aspect to consider. It allows us to recognise that common barriers, such as time constraints and technical complexity, can affect respondents across the board, regardless of their affiliation with IIIF or Linked Art. By acknowledging the presence of common challenges among survey respondents, we gain a broader understanding of the barriers faced within the wider cultural heritage community. This recognition underscores the importance of addressing these barriers collectively, regardless of specific community affiliation, in order to promote broader accessibility and participation.

Among those who reported their specific community involvement, the majority of respondents (36 individuals) identified themselves as being part of the IIIF community, while a smaller number (2 individuals) mentioned their involvement with Linked Art.

While the survey aimed to capture insights from a wide range of participants, it's important to note that the survey sample represents a small subset of the overall population. The reported number of 52 respondents involved in the IIIF community and 18 respondents involved in Linked Art may not fully reflect the full populations of these communities. In addition, the total number of members of 2,788 in the IIIF Slack workspace and 208⁵ in the Linked Art Slack workspace indicate a larger population that could potentially be engaged in these communities. However, it's important to recognise that participation in Slack environments does not necessarily equate to active participation within these communities. There may be individuals who are members but do not actively contribute or participate. As a result, while the survey results provide some important insights, it's important to acknowledge the potential biases and limitations inherent in the sample size and number of members of Slack workspaces.

The predominantly male representation among the respondents within the IIIF and Linked Art communities shows a potential imbalance, possibly influenced by a higher presence of male developers in the field. It is crucial to emphasise that this gender disparity should not be seen as an excuse but rather as an opportunity to actively promote and encourage greater inclusion of individuals from diverse gender identities. Efforts should be made to create an environment that values and welcomes participation from people of all genders, fostering a more inclusive and representative community. Some further reflections on this topic have already been explored by Dohe [2020].

As the distribution on the map shows, there is a significant gap between the northern and southern hemispheres. It is therefore imperative to translate awareness-raising efforts into concrete capacity-building actions within both communities. The continued provision of comprehensive documentation, multilingual resources and tutorials is essential to facilitate the adoption and integration of the IIIF and Linked Art specifications.

5.2 Communities

In this subsection are a few ideas and suggestions for each community.

5.2.1 IIIF

Inspired by the four pillars of the IIIF Strategic Planning⁶ as conceived and overseen by the IIIF-C Executive Committee, I highlight key areas that align with these pillars.

- **Advocacy & Leadership:** the survey did not adequately address this particular issue, highlighting the need for further investigations.
- **Technical Development:** The success of the IIIF Community relies heavily on the maintenance of essential IIIF-compliant servers and clients (viewers/players) such as Cantaloupe, Mirador and UV. With an increasing number of individuals depending on these software tools, their continuous upkeep becomes absolutely vital.
- **Scholarly Community & Annotation Support:** The IIIF community is growing and evolving with new members joining regularly, while some long-standing members remain involved. The analysis done in Figure 9

⁵As of 23 June 2023.

⁶As per the following video recordings from December 2022 and June 2023 available on the IIIF YouTube Channel: <https://youtu.be/5xGDbcwEtdU> and <https://youtu.be/zNRmr7jTKd8>

reveals a strong association between long-term engagement and active participation, highlights the importance of sustained engagement, and suggests the existence of previous community-building efforts that contribute to participants' sense of belonging. However, newer individuals who joined in the past four to five years are not actively participating, particularly in TSGs.

- **Membership & Value:** An area that demands significant attention is the aspect of costs associated with in-person meetings, along with the inadequate employer support in engaging with the IIF community.

As for my suggestions to the IIF community, I would argue to establish some sort of mediation mechanism within its ambassadors program⁷, as outlined in the program's documentation. By actively participating in this program, I propose that ambassadors not only report their findings and how they can expand the socio-technical networks of the wider community but also be provided with tangible incentives that extend beyond mere acknowledgement. These incentives are crucial to motivate and reward the active involvement of ambassadors, encouraging them to contribute meaningfully and consistently to the IIF Community.

This recommendation resonates and supplements with the ongoing efforts of the IIF-C Executive Committee in their strategic planning, which includes the implementation of distinct tiers for current and prospective consortium members based on alignment with the World Bank Income Group classifications. This approach recognises the varying resources and capacities available to different organisations and fosters a more inclusive and equitable participation within the IIF community.

5.2.2 Linked Art

In analysing the results of the survey regarding Linked Art, I identified key barriers that prevent wider engagement and inhibit the growth of the community. Time constraints emerged as a prominent barrier, with individuals already involved in other communities such as IIF, or burdened with personal responsibilities. In addition, limited awareness and availability of tools and services have hindered wider participation. To overcome these challenges, I emphasise the importance of raising awareness within the community through targeted outreach initiatives such as workshops, webinars and documentation. By showcasing the practical applications and tangible outcomes of Linked Art, we can demonstrate its unique value proposition and address the perception that the benefits of implementing Linked Art are less clear compared to IIF.

Linked Art is not confined solely to museums and should be recognised as a valuable resource for fostering interoperability within various cultural heritage institutions and beyond. LUX⁸, the Yale Collections Discovery platform, is a good example and can be a flagship for showcasing the usage of Linked Art in the cultural heritage field.

In addition, I stress the need to foster an inclusive environment that encourages active participation and reinforces the practicality of discussions and meetings within the community. I propose leveraging existing structures and engaging with dedicated individuals who are eager to contribute to its advancement. Specifically, I suggest tapping into the expertise and commitment of the Editorial Board and encouraging their involvement in shaping the community's trajectory. By clearly defining roles and responsibilities, we can ensure efficient management of community resources and enable a more collaborative environment.

Moreover, there are ongoing efforts within the Linked Art community to facilitate metadata mappings between Linked Art and other standards. Prominent examples include Records in Context (RiC) and Schema.org. These efforts aim to establish bi-directional mappings that enable seamless data exchange and facilitate the creation of Linked Art resources. By promoting interoperability with established frameworks, the Linked Art community can benefit from existing metadata models and leverage their strengths.

Finally, the community recognises the need to create compliant tools and services, particularly with the release of the Linked Art API V1.0 in the coming months. This milestone represents a significant step forward in the community's infrastructure. Once the API is available, attention can be focused on developing user-friendly tools that streamline the creation and management of Linked Art resources.

5.3 Situating LOUD in the Cultural Heritage Field

The investigation and exploration of (so-called) LOUD-compliant standards and LOUD design principles is currently in the stage of being situated and assessed. While there is still much to discover and understand about these standards and principles, it is an endeavour that can be effectively pursued by raising awareness of their value.

⁷<https://iif.io/community/ambassadors/>

⁸<https://lux.collections.yale.edu/>

The process of situating LOUD-compliant standards and design principles involves thorough research, analysis and evaluation to determine their applicability and potential impact. The aim is to develop a comprehensive understanding of how these standards and principles can be effectively implemented and integrated into different contexts and projects leveraging other community-led standards. Hopefully, the follow-up discussions and the systematic literature review that I am undertaking as part of my PhD will help to achieve this.

There is indeed a recognition of the value and importance of both IIF and Linked Art in relation to movements such as Open Science and Citizen Science, as well as principles such as FAIR. The consensus among participants suggests that both IIF and Linked Art have an important role to play in improving the findability, accessibility, interoperability and reusability of cultural heritage data. However, further research is needed to assess the extent to which these frameworks align with the CARE Principles for Indigenous Data Governance.

6 Conclusion and Future Work

These data still need to be carefully cross-referenced, not only with other data sources, but also with direct observations and primary data generated by the communities involved. I cannot stress enough the importance of engaging with these communities, working alongside them to gather additional descriptions, and using them to visualise the complex dependencies at play. In this context, it is particularly important to emphasise the value of collaboration within the IIF and Linked Art communities, which have demonstrated a collective commitment to advancing knowledge and practice across their relevant areas.

In order to truly advance our understanding and make a meaningful contribution, I recognise the need to seek feedback from the people who engage with these communities, and I hope to better understand how my work can complement and build on existing efforts.

I will also undertake further research around the LOUD concept. It is important to broaden the scope of this research beyond those who have shown initial interest in the survey. It is therefore my intention to draw on or contact individuals and institutions in the cultural heritage field who have already mentioned LOUD in terms of how they (intend to) approach and publish linked data, such as Alexiev [2018], Pohl et al. [2018], Cossu [2019], Paquet [2020], Romein et al. [2020], Brown et al. [2021], Adamou [2022], Petz [2023], as well as initiatives such as the Linked Infrastructure for Networked Cultural Scholarship (LINCS⁹) in Canada, lobid¹⁰ in Germany or the Pelagios Network¹¹. By establishing communication with these individuals and entities, I aim to gain insights and perspectives that contribute to a more comprehensive and representative understanding of the subject matter.

Broadening the scope and involving a wider range of actors allows for a more accurate mapping of the intricate socio-technical networks at play. This approach, rooted in ANT, recognises the importance of including not only interested parties, but also those who may have tangential connections, also in a more inclusive manner as suggested by Quinlan [2012] and Kreimer [2022]. By embracing a range of methods, I hope to unravel the multifaceted dynamics of those grassroots communities, how technologies such as the IIF and Linked Art specifications “get transported” [Law and Mol, 2001], their controversies [Venturini, 2010] and gain a more holistic understanding of the phenomena under investigation.

References

- Julien Antoine Raemy. *The International Image Interoperability Framework (IIF): raising awareness of the user benefits for scholarly editions*. Bachelor’s thesis, Haute école de gestion de Genève, Geneva, Switzerland, July 2017. URL <https://sonar.ch/hesso/documents/314853>.
- Stuart Snyderman, Robert Sanderson, and Tom Cramer. The International Image Interoperability Framework (IIF): A community & technology approach for web-based images. In *Archiving Conference*, volume 2015, pages 16–21, Los Angeles, CA, May 2015. IS&T. URL <https://pur1.stanford.edu/df650pk4327>.
- Ronald Haynes. To Have and Vehold: Marrying Museum Objects and Virtual Collections via AR. In M. Claudia tom Dieck and Timothy Jung, editors, *Augmented Reality and Virtual Reality*, pages 191–202. Springer International Publishing, Cham, 2019. ISBN 978-3-030-06245-3 978-3-030-06246-0. doi:10.1007/978-3-030-06246-0_14. URL http://link.springer.com/10.1007/978-3-030-06246-0_14. Series Title: Progress in IS.

⁹<https://lincsproject.ca/>

¹⁰<https://lobid.org/>

¹¹<https://pelagios.org/>

- Julien Antoine Raemy and Rita Gautschy. Élaboration d'un processus pour les images 3D reposant sur IIF. In *Recueil des communications du 4e colloque Humanistica*, Genève, Suisse, June 2023. URL <https://hal.science/hal-04099506>.
- Kevin R. Page, Emmanuelle Delmas-Glass, David Beudet, Samantha Norling, Lynn Rother, and Thomas Hänsli. Linked Art: Networking Digital Collections and Scholarship. In *DH2020 Book of Abstracts*, pages 504–509, Online, 2020. URL https://dh2020.adho.org/wp-content/uploads/2020/07/139_LinkedArtNetworkingDigitalCollectionsandScholarship.html.
- David Newbury. LOUD: Linked Open Usable Data and linked.art. In *2018 CIDOC Conference*, pages 1–11, Heraklion, Greece, September 2018. International Council of Museums. URL https://cidoc.mini.icom.museum/wp-content/uploads/sites/6/2021/03/CIDOC2018_paper_153.pdf.
- Robert Sanderson. Shout it Out: LOUD, May 2018. URL <https://www.slideshare.net/Europeana/shout-it-out-loud-by-rob-sanderson-europeatech-conference-2018>.
- Robert Sanderson. Keynote: Standards and Communities: Connected People, Consistent Data, Usable Applications. In *2019 ACM/IEEE Joint Conference on Digital Libraries (JCDL)*, page 28, Urbana-Champaign, Illinois, USA, June 2019. IEEE. doi:10.1109/JCDL.2019.00009.
- Julien Antoine Raemy. Améliorer la valorisation des données du patrimoine culturel grâce au Linked Open Usable Data (LOUD). In Nicolas Lasolle, Olivier Bruneau, and Jean Lieber, editors, *Actes des journées humanités numériques et Web sémantique*, pages 132–149, Nancy, France, 2022. Les Archives Henri-Poincaré - Philosophie et Recherches sur les Sciences et les Technologies (AHP-PRéST); Laboratoire lorrain de recherche en informatique et ses applications (LORIA). doi:10.5451/unibas-ep89725.
- Sonja Bezjak, Philipp Conzett, Pedro L. Fernandes, Edit Görögh, Kerstin Helbig, Bianca Kramer, Ignasi Labastida, Kyle Niemeyer, Fotis Psomopoulos, Tony Ross-Hellauer, René Schneider, Jon Tennant, Ellen Verbakel, and April Clyburne-Sherin. *The Open Science Training Handbook*. March 2019. doi:10.5281/zenodo.2587951. URL <https://book.fosteropenscience.eu>.
- Katerina Zourou and Mariana Ziku. Citizen Enhanced Open Science in Cultural Heritage - Review and analysis of practices in Higher Education. Technical Report 2020-1-BE02-KA203-07427, April 2022. URL <https://www.citizenheritage.eu/wp-content/uploads/2022/07/CitizenHeritage-01-July-2022.pdf>.
- Mark D. Wilkinson, Michel Dumontier, IJsbrand Jan Aalbersberg, Gabrielle Appleton, Myles Axton, Arie Baak, Niklas Blomberg, Jan-Willem Boiten, Luiz Bonino da Silva Santos, Philip E. Bourne, Jildau Bouwman, Anthony J. Brookes, Tim Clark, Mercè Crosas, Ingrid Dillo, Olivier Dumon, Scott Edmunds, Chris T. Evelo, Richard Finkers, Alejandra Gonzalez-Beltran, Alasdair J.G. Gray, Paul Groth, Carole Goble, Jeffrey S. Grethe, Jaap Heringa, Peter A.C 't Hoen, Rob Hooft, Tobias Kuhn, Ruben Kok, Joost Kok, Scott J. Lusher, Maryann E. Martone, Albert Mons, Abel L. Packer, Bengt Persson, Philippe Rocca-Serra, Marco Roos, Rene van Schaik, Susanna-Assunta Sansone, Erik Schultes, Thierry Sengstag, Ted Slater, George Strawn, Morris A. Swertz, Mark Thompson, Johan van der Lei, Erik van Mulligen, Jan Velterop, Andra Waagmeester, Peter Wittenburg, Katherine Wolstencroft, Jun Zhao, and Barend Mons. The FAIR Guiding Principles for scientific data management and stewardship. *Scientific Data*, 3:160018, March 2016. ISSN 2052-4463. doi:10.1038/sdata.2016.18. URL <https://www.nature.com/articles/sdata201618>.
- Stephanie Russo Carroll, Ibrahim Garba, Oscar L. Figueroa-Rodríguez, Jarita Holbrook, Raymond Lovett, Simeon Materechera, Mark Parsons, Kay Raseroka, Desi Rodriguez-Lonebear, Robyn Rowe, Rodrigo Sara, Jennifer D. Walker, Jane Anderson, and Maui Hudson. The CARE Principles for Indigenous Data Governance. 19(1):43, November 2020. ISSN 1683-1470. doi:10.5334/dsj-2020-043. URL <https://datascience.codata.org/articles/10.5334/dsj-2020-043>.
- Stephanie Russo Carroll, Edit Herczog, Maui Hudson, Keith Russell, and Shelley Stall. Operationalizing the CARE and FAIR Principles for Indigenous data futures. *Scientific Data*, 8(1):108, April 2021. ISSN 2052-4463. doi:10.1038/s41597-021-00892-0. URL <https://www.nature.com/articles/s41597-021-00892-0>.
- Julien Antoine Raemy. The LOUD Social Fabrics of IIF, June 2023a. URL <https://doi.org/10.5281/zenodo.7825411>.
- Bruno Latour. On actor-network theory: A few clarifications. *Soziale Welt*, 47(4):369–381, 1996. ISSN 0038-6073. URL <https://www.jstor.org/stable/40878163>. Publisher: Nomos Verlagsgesellschaft mbH.
- Bruno Latour. *Reassembling the social: an introduction to actor-network-theory*. Clarendon lectures in management studies. Oxford University Press, Oxford ; New York, 2005. ISBN 978-0-19-925604-4.
- M. Callon. Actor Network Theory. In Neil J. Smelser and Paul B. Baltes, editors, *International Encyclopedia of the Social & Behavioral Sciences*, pages 62–66. Pergamon, Oxford, January 2001. ISBN 978-0-08-043076-8. doi:10.1016/B0-08-043076-7/03168-5. URL <https://www.sciencedirect.com/science/article/pii/B0080430767031685>.

- Radoslaw Czahajda, Neda Čairović, and Mitja Černko. Live Online Education Efficiency Mediators From the Actor Network Theory Perspective. *Frontiers in Education*, 7, 2022. ISSN 2504-284X. URL <https://www.frontiersin.org/articles/10.3389/educ.2022.859783>.
- Julien Antoine Raemy. Characterising the IIF and Linked Art communities (pseudonymised dataset), July 2023b. URL <https://zenodo.org/record/8143828>.
- Robert Sanderson, Benjamin Albritton, Rafael Schwemmer, and Herbert Van de Sompel. SharedCanvas: a collaborative model for medieval manuscript layout dissemination. In *Proceedings of the 11th annual international ACM/IEEE joint conference on Digital libraries*, JCDL '11, pages 175–184, New York, NY, USA, June 2011. Association for Computing Machinery. ISBN 978-1-4503-0744-4. doi:10.1145/1998076.1998111.
- Kate Dohe. Care, Code, and Digital Libraries: Embracing Critical Practice in Digital Library Communities, February 2020. URL <https://www.inthelibrarywiththeleadpipe.org/2019/digital-libraries-critical-practice-in-communities/>.
- Vladimir Alexiev. Museum Linked Open Data: Ontologies, Datasets, Projects. *Digital Presentation and Preservation of Cultural and Scientific Heritage*, 8:19–50, September 2018. ISSN 2535-0366, 1314-4006. doi:10.55630/dipp.2018.8.1. URL <https://dipp.math.bas.bg/dipp/article/view/dipp.2018.8.1>.
- Adrian Pohl, Fabian Steeg, and Pascal Christoph. lobid – Dateninfrastruktur für Bibliotheken. *Information-spraxis*, 4(1), December 2018. ISSN 2297-3249. doi:10.11588/ip.2018.1.52445. URL <https://journals.ub.uni-heidelberg.de/index.php/ip/article/view/52445>. Number: 1.
- Stefano Cossu. Labours of Love and Convenience: Dealing with Community-Supported Knowledge in Museums. *Publications*, 7(1):19, March 2019. ISSN 2304-6775. doi:10.3390/publications7010019. URL <https://www.mdpi.com/2304-6775/7/1/19>. Number: 1 Publisher: Multidisciplinary Digital Publishing Institute.
- Anna P. Paquet. Linked Data and Linked Open Data Projects for Libraries, Archives and Museums: Constructing Pathways to Information Discovery and Cultural Heritage Sector Collaboration. December 2020. URL <http://jhir.library.jhu.edu/handle/1774.2/63875>. Accepted: 2021-04-16T20:31:05Z.
- C. Annemieke Romein, Max Kemman, Julie M. Birkholz, James Baker, Michel De Gruijter, Albert Meroño-Peñuela, Thorsten Ries, Ruben Ros, and Stefania Scagliola. State of the Field: Digital History. *History*, 105(365):291–312, 2020. ISSN 1468-229X. doi:10.1111/1468-229X.12969. URL <https://onlinelibrary.wiley.com/doi/abs/10.1111/1468-229X.12969>.
- Susan Brown, Erin Canning, Kim Martin, Sarah Roger, and Zach Schoenberger. Linking Communities of Practice. In *CSDH-SCHN 2021*, Virtual event, 2021. doi:10.17613/w6r2-n763. URL <https://hcommons.org/deposits/item/hc:39049/>.
- Alessandro Adamou. Shout LOUD on a road trip to FAIRness: experience with integrating open research data at the Bibliotheca Hertziana. *Journal of Art Historiography*, (27s), December 2022. ISSN 2042-4752. URL <https://arthistoriography.wordpress.com/27s-dec22/>. Number: 27s Publisher: Department of History of Art, The University of Birmingham.
- Georg Petz. Linked Open Data. Zukunftsweisende Strategien. *Bibliothek Forschung und Praxis*, June 2023. ISSN 1865-7648. doi:10.1515/bfp-2023-0006. URL <https://www.degruyter.com/document/doi/10.1515/bfp-2023-0006/html>. Publisher: De Gruyter.
- Andrea Quinlan. Imagining a Feminist Actor-Network Theory. *International Journal of Actor-Network Theory and Technological Innovation (IJANTTI)*, 4(2):1–9, 2012. ISSN 1942-535X. doi:10.4018/jantti.2012040101. URL <https://www.igi-global.com/gateway/article/www.igi-global.com/gateway/article/66873>. ISBN: 9782012040106 Publisher: IGI Global.
- Pablo Kreimer. Constructivist Paradoxes Part 1: Critical Thoughts about Provincializing, Globalizing, and Localizing STS from a Non-Hegemonic Perspective. *Engaging Science, Technology, and Society*, 8(2):159–175, September 2022. ISSN 2413-8053. doi:10.17351/ests2022.1109. URL <https://estsjournal.org/index.php/ests/article/view/1109>. Number: 2.
- John Law and Annemarie Mol. Situating Technoscience: An Inquiry into Spatialities. *Environment and Planning D: Society and Space*, 19(5):609–621, October 2001. ISSN 0263-7758, 1472-3433. doi:10.1068/d243t. URL <http://journals.sagepub.com/doi/10.1068/d243t>.
- Tommaso Venturini. Diving in magma: how to explore controversies with actor-network theory. *Public Understanding of Science*, 19(3):258–273, May 2010. ISSN 0963-6625. doi:10.1177/0963662509102694. URL <https://doi.org/10.1177/0963662509102694>. Publisher: SAGE Publications Ltd.