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A sustainable approach to threatened digital cultural heritage

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A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

Information Studies
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University of Glasgow
November 2022

Abstract

Endorsed by UNESCO as an effective and timely way to facilitate action against illicit trafficking of cultural property, widespread digitisation of inventories and artefacts mitigates loss of movable heritage and can facilitate expedited restitution of displaced items in the future. However, the frameworks for undertaking expedited, pre-emptive digitisation are outdated. This research therefore aims to develop a new methodology for "responsive digitisation", via a systematic re-evaluation of digitisation strategies for at-risk materials. It will explore how such comprehensive digitisation practices can be situated for analytical evaluation, in line with the strategic values of collections use, access, and reuse in the heritage sector. This research explores the role of digitisation praxis for the preservation of contested cultural heritage under threat, where there is an immediate need for pre-emptive digitisation to mitigate the displacement of inventories and collections. It undertakes a gap analysis of relevant policy documents in the heritage sector, and thereby proposes a new framework and methodology for employing a strategy for digitisation of cultural heritage in under threat, prioritising methods that have the scope for long-term sustainability. It identifies four key challenges that a theory of responsive digitisation should address:

1. A lack of formal digital preservation planning in existing policy documents,
2. A lack of standardised procedures for digitisation,
3. A lack of emphasis on undertaking digitisation methods with digital sustainability integrated from the planning stage, and
4. Missing methods for disseminating digital information to parties situated in conflict.

In doing so, it provides a framework for cultural heritage under threat, focusing on long-term digital sustainability, informed by wider disciplinary narratives concerning preservation, destruction, information control and the role of museums in the future. Further, it develops a theoretical framework for undertaking pre-emptive and rigorous digitisation of heritage with regards to conflict and preservation, which will emphasise long-term digital sustainability.

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Acknowledgements

The writing of this PhD thesis has been an exceptional exercise in suffering.

There are several individuals involved who without their support and seemingly unending reserves in patience, this thesis would not have come to be. Thank you especially to my supervisory team: Dr Donna Yates and Dr Paul Gooding — it has been a supreme pleasure to work with you. Your constant support and understanding were the only reason we made it through these *disastrous* 4+ years.

Thank you to colleague Dr Hannah Louise Clark who surely is now only one miracle away from canonisation after the amount of moral support and kindness she has provided over the years.

Thank you to Dr Zoe Bartliff who provided invaluable support in the final stages of write up.

Thank you to my friends and colleagues for putting up with me. Especially Miriam.

A big un-acknowledgment to pandemics – without you I would have finished this thesis much sooner.

Chapter 1—Introduction to the research context

1.1 Introduction

Existing digitisation frameworks and extant policy recognise the effectiveness of pre-emptive digitisation as a means for preservation of cultural heritage materials under threat. In recent decades, the increased availability and ease of use of digitisation technologies has made the methods more viable, not only for dedicated heritage specialists, but for non-specialists as well. However, there is still a significant risk associated with endangered heritage, which in many cases has not been systematically documented or digitised.

There is a need to assess how existing frameworks deal with preservation and, in identifying any shortfalls or points of failure within these extant frameworks, explore mitigating actions. Use, reuse and public dissemination of digitised cultural heritage materials and information regarding lost, displaced and destroyed heritage can shift the narrative to rely on more democratic styles of collaboration to address the interests of various stakeholders.

Cultural heritage under threat can take several different forms, including geopolitical conflict, war, pandemic, displacement, loss, and destruction from looting or subsistence looting, and negative effects from climate change and global warming. Each threat has its own unique intricacies and complexities that make undertaking any kind of pre-emptive digitisation or preservation methods complicated.

Prevalent threats to cultural heritage have exacerbated the challenges for undertaking good professional practice in cultural heritage management. The resultant displacement and destruction of movable and immovable heritage material, combined with the need for fast-paced relocation of movable heritage, explicitly limits the actions that heritage professionals have available to them to mitigate risk, particularly for efforts that involve digitisation. For various reasons, post-conflict digitisation will likely not be able to collect a complete or

rich enough dataset[1] as too much of the original material and its description or metadata may be missing. In many cases there is little time for pre-emptive actions for preservation — digital or otherwise — and any actions taken are at risk of being impromptu and ad hoc. This has the potential to exacerbate many issues that arise when assessing preservation in a post-conflict, mitigated threat, environment, such as working from low quality digital captures, or incomplete captures. While these types of challenges are certainly not constrained to regions experiencing conflict, current global efforts to mitigate them are temporally relevant. This demonstrates how the environment of digitisation and digital methods of preservation is constantly changing, adapting, and advancing.

Through the investigation of examples and a field-wide policy gap analysis, the research provides a unique contribution to the sector by examining the efficacy of the current frameworks for digitisation, identifying gaps in practice, and assessing various solutions for addressing these shortfalls. Furthermore, this is done with the aim of developing a scalable, and workable framework for the role of digitisation in cultural heritage that is under threat to address some of these difficulties.

This introductory chapter will outline the overarching research question that is to be addressed throughout and present the various sub-objectives that will be investigated to expound on various themes that arise from the research questions. Further, it will outline the aims and objectives of each chapter and conclude with further scope for the research.

1.2 Research question

The overarching research question in this project is: What must be considered to develop a framework for digital cultural heritage under threat that focuses on long-term digital sustainability?

[1] The term rich data describes the notion that qualitative data and their subsequent representation in text should reveal the complexities and the richness of what is being studied, according to The SAGE Encyclopedia of Qualitative Research Methods.

The thesis begins by outlining relevant literature related to the digital content lifecycle, cultural heritage policy, theory, and methods of digitisation. Further, through the policy gap analysis, shortfalls will be addressed through the contribution of a template for a new critical framework, emphasising long-term digital sustainability in the context of operating within a period of conflict.

The framework can be integrated into guides for risk management of cultural heritage to capitalise on the limited availability of resources like time and skill capacity. The scalability of the project outcomes and the pressing need for such a framework make this especially timely.

1.2.1 Sub-objectives of this research

The sub-objectives to further investigate the overarching research question are as follows:

1. Analyse how increased availability of digital technology in the cultural heritage sector can emphasise maintaining public access to materials during periods of conflict,
2. Evaluate how digital technology used to digitise and document cultural heritage under threat is utilised in a way that emphasises long-term digital sustainability,
3. Define the way digitised cultural heritage can be protected within policy documents.

The first sub-objective provides an overview of what technology exists; how it has been used in the cultural heritage field, how publicly available digital outputs have been used in similar situations, and how they can further be applied to cultural heritage in conflict zones. Further, it addresses how heritage professionals might more widely adopt digitisation technologies, i.e., digital photography, scanning, in the cultural heritage sector as a method for mitigation to loss.

Building upon this, the second sub-objective addresses various digitisation projects with a focus on those examples which have specifically used digitisation techniques to preserve cultural heritage. Further, it explores how professional

practice is undertaken within an interdisciplinary field and how collaboration and mixing traditional field-specific methodologies can be beneficial in this context.

The third sub-objective delves into relevant policy documents relating to cultural heritage in conflict and digitisation, assessing how digitised heritage is protected under current frameworks and the efficacy of their measures. Further, it seeks to define how digitisation methods are represented in regulatory documents and identify shortfalls or single points of failure.

1.3 Statement of the problem: *responsive digitisation* of at-risk cultural heritage

This research addresses several issues that arise in relation to digitisation of at-risk cultural heritage. Imagining these issues as gaps in professional practice, there are significant improvements to be made across the sector. These gaps are:

1. Difficulties in long-term data management and data sustainability solutions,
2. Discrepancies in sector policies,
3. Lack of 'enforceability' of extant standards and frameworks,
4. A lack of stakeholder consultation in digitisation planning, and,
5. Issues surrounding accessibility of the digitised material for the public sphere, including use and reuse.

These issues contribute to an environment that is difficult to navigate, even under conditions outside of conflict, and even more so with aggravating factors that expedite procedures. A scalable framework for undertaking digitisation which takes these issues into account from the outset and acts to mitigate aggravating factors that arise from 'responsive digitisation' is especially needed.

Here we introduce the term *'responsive digitisation'* to refer to the idea that, when operating in the context of threat, actions undertaken for digital documentation will be done in an ad hoc manner. That is, documentation is done with the available resources, personnel and time that is feasible for the

situation. This assumes minimal pre-emptive work has been done for documentation due to the unpredictable timeframe of emerging threats and thus action for documentation must be undertaken to ensure the safety of the materials in imminent danger. When operating in the context of disaster, sometimes digital documentation must simply be 'good enough.' Those undertaking digitisation must consider that the materials might have a near-extinct status, be in imminent danger of displacement or damage, or a have an imminent likelihood of loss. While the documentation may not be perfect at the outset, if there is a strong foundation to work from, future work can always be done to ameliorate the initial responsive digitisation.

The real challenge emerges when this ad hoc digitisation has no means to be sustainable long enough to be added to, built upon, or improved. This study therefore investigates the baseline level of accuracy and technical rigour that can be expected when operating within various types of threat to ensure that the digital outputs can be used in the future. This is the overarching issue in long-term digital sustainability that will be developed and explored by this research.

1.3.1 Data sustainability: long-term sustainability and data management

Data management and data sustainability represent key shortfalls in the preservation of at-risk digitised materials in the long-term. For this reason, addressing aggravating factors related to these themes forms the basis for the mitigating efforts proposed in this research. Responsive digitisation does not always allow for any consideration for the long-term life of the digital material.

The DCC Curation Lifecycle model was developed as a curation-specific tool which can be used to plan preservation and management strategies (Higgens, 2008); depending on the situation, this can be an apt planning tool. However, this level of organisation cannot be guaranteed in conflict. The more complex DCC lifecycle model relies on several underlying factors to be guaranteed, such as a more complex infrastructure for ingesting data into a pre-existing repository or database. It is therefore too complex to be used as a tool for planning quick

responsive digitisation as preservation. A simplified model can be seen in the following Figures 1.2 and 1.3.

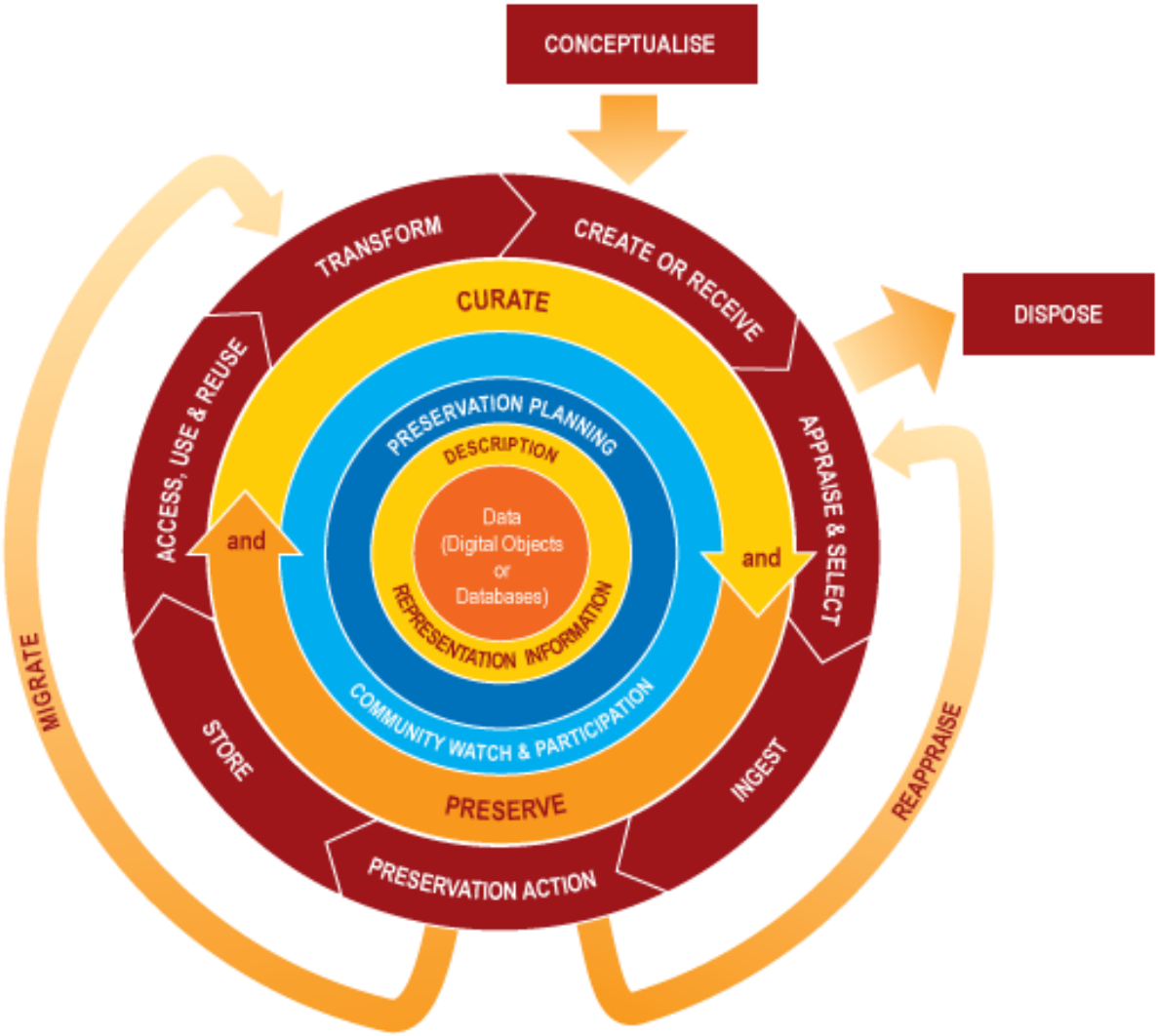


Figure 1.1: DCC Curation Lifecycle Model[2]

[2] Link to model: https://www.dcc.ac.uk/guidance/curation-lifecycle-model

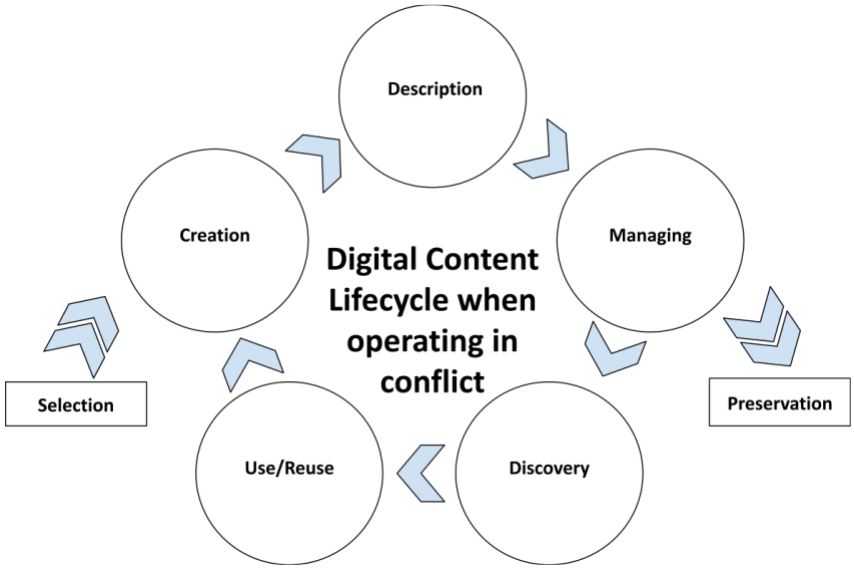


Figure 1.2: Simplified digital content lifecycle model[3]

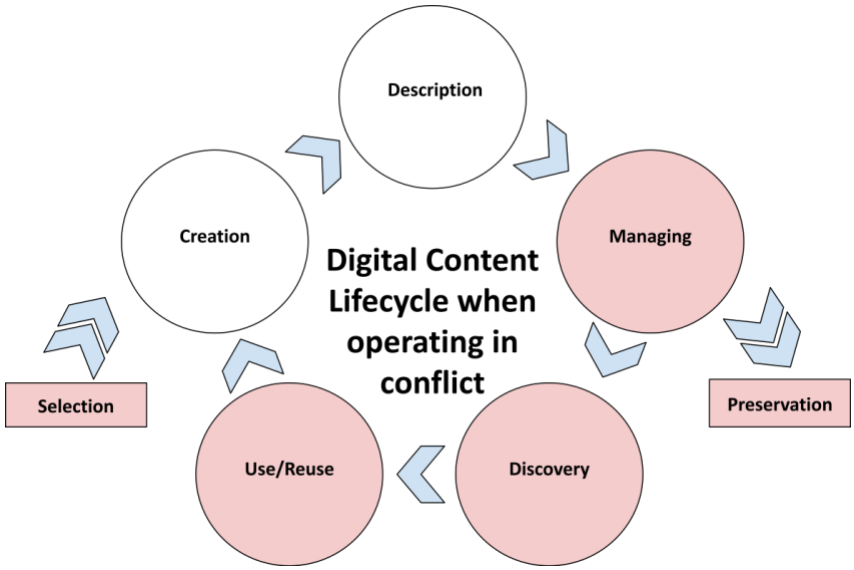


Figure 1.3: Digital content lifecycle when operating under threat, with aggravating factors.

[3] Adapted from "Traditional Digital Content Lifecycle": https://localcontexts.org/traditional-digital-content-lifecycle/ and Hughes, 2004.

The simplified digital content lifecycle model in Figure 1.2 shows the critical dimensions of data management workflows: creation, description, managing, discovery, and use/reuse.

In Figure 1.3, a simplified model has been colour-coded to indicate where these critical dimensions may be overlooked in a threat context. The selection dimension is overlooked in favour of a bulk creation phase which has general descriptors that can be gleaned from location, type of material, and collection details. However, the cycle is quickly subject to further break down as it becomes uncertain if the rest of the lifecycle dimensions can be undertaken. This simplified iteration of the digital content lifecycle was highlighted instead of more complex models, such as the DCC model presented in Figure 1.1.

These simplified models were created to quickly express visually each of the dimensions in data management workflows, while also highlighting areas that are at risk of being overlooked in the presence of aggravating factors. The digital lifecycle model is a straightforward cyclical process that needs the dimensions of ‘selection’ and ‘preservation’ to continue working. As described in the amended model in Figure 1.3, these important dimensions are currently at risk of being overlooked during responsive digitisation, which will not provide guaranteed long-term digital preservation.

Responsive digitisation, as defined in this research, can function within the simplified model, though some mitigating actions may need to be applied to avoid shortfalls in the ‘selection’ and ‘preservation’ dimensions.

The simplified version of the digital content lifecycle will be re-evaluated in the final chapter to analyse which dimensions can be adapted for good practice in reacting to responsive digitisation, as well as assess the impact of adopting sustainability recommendations. These are demonstrated by the changes to the simplified lifecycle which will be juxtaposed with Figure 1.3 in Chapter 6.

From a data management and sustainability perspective, there are several issues which can arise during post-threat examination of cultural heritage materials

that have undergone responsive digitisation. Digitisation efforts may be lacking in a robust level of accuracy; there may be incomplete digitisation due to several factors — which may include a lack of trained staff, lack of equipment, or lack of access to the collections. There is also a heightened threat of loss of data and loss of context — exacerbated in cases where the cultural heritage materials have been destroyed or displaced, whereby no further documentation activities can take place.

Digitally documented art, objects and sites that face material technical challenges to further preservation are susceptible to data loss under aggravating situations; these factors have been further outlined within Digital Preservation Coalition BitLists,[4] under the "critically endangered" classification (DPC, n.d). First published in 2017, the BitList of Digitally Endangered Species represents a community-sourced list of at-risk digital materials that highlight the need for actions to preserve digital content as well as to ensure digital legacy (DPC, 2020).

The risks associated with undertaking rapid digitisation can be mitigated in part by implementing and making available a set of standardised guidelines. These must be scalable to fit within the parameters of varying funding statuses, with a global scope to ensure broad dissemination. If made widely available and used as a resource for project planning, these guidelines could ameliorate professional practice inhibited by external factors like conflict, disaster, pandemic, and displacement. These guidelines and methods should be accessible to specialists as well as non-specialists and practices should be effectively communicated (Denard, 2012).

Data sustainability and data management represent crucial factors in developing a more comprehensive framework for digitisation. There is a strong link between sustainability and use and reuse of the data – as use and reuse plays an important part within the digital content lifecycle (Hughes, 2012). When outputs of a documentation project are available for use by the public, researchers, and

[4] Link to BitLists: https://www.dpconline.org/digipres/champion-digital-preservation/bit-list

other stakeholders, this can lead to a more substantial stream of resources allocated for maintenance of the digitised material. If the foundation of the documentation is strong enough, even when it is imperfect or has gaps in the recorded material, it can be built upon. Targeting the project planning and data management plan for stakeholder use and reuse will ensure that the material is sustained.

A series of examples will be assessed with a set of adapted criteria developed from relevant extant frameworks for digitisation, with an emphasis on good practice and long-term sustainability. The criteria selection and application to the examples will be discussed further in Chapter 2 and Chapter 3. Data sustainability dictates the longevity and opportunity for future use and reuse, and digitisation projects with digital outputs can be assessed for efficacy based upon how sustainable the assets are. Unsustainable digital outputs result in wasted time, resources and data loss that can eventually cause the undue disappearance of cultural heritage that might only be represented in a digital format (i.e., born digital material).

1.3.2 Policy gap analysis

To investigate policy in the cultural heritage sector, a gap analysis of relevant sector policy documents was undertaken to analyse documents that either explicitly focus on cultural heritage which operate in the remit of threat, conflict, and/or digitisation. If the policy suggested an indirect impact on the cultural heritage sector, such as discussing issues of copyright, ownership, and authorship, it was also included. The aggregation of issues that were identified in the context of responsive digitisation provided the basis upon which a new methodology and scalable framework were developed to outline best practice to mitigate the aggravating factors that inhibit long-term sustainability. This is derived from a synthesised compilation of existing literature. The framework is then assessed in comparison to best professional practice, both in the context of systematic use of digitisation and visualisation methods in the country of origin, and in the context of working with displaced cultural heritage material from regions that are experiencing threat or are at risk of threat. The gap analysis identifies several shortfalls that complicate the bridging of theory and practice.

These overarching gaps in policy include:

- Policy that is non-binding,
- Policy proposal that has no pathway to implementation,
- Policy that remains unpopular with signatory states or parties,
- Lack of standardisation of best practice for digitisation methods to be undertaken,
- Policy that is out of date,
- Policy that is not enforceable,
- Difficulties in dissemination of any digital outputs to stakeholders in conflict,
- Unresolved issues of intellectual property and control,
- Policy that predates digitisation/old frameworks that don't work well,
- No accountability for implementation

This policy gap analysis endeavours to not simply address shortfalls of policy documents as they relate to digital on a singular basis, but to gather a sector wide understanding of the nuances of coverage. Further, it shows how digitisation as a documentation or preservation method is currently underrepresented as a whole, ultimately putting digital outputs at a higher chance being unsuccessful from a sustainability perspective. This theme is further discussed in Chapter 4.

1.3.3 How to make standards and frameworks 'enforceable'

There is an inherent difficulty in making established and circulated standards enforceable within professional practice in the cultural heritage sector. This is exacerbated by several factors, with the first and most obvious question being: what exactly does enforceability look like in heritage sector policy? In developing this research project, the idea of enforceability had to be approached from a new perspective. Within sector policy documents, policy can be presumed enforceable when it's written into conventions and protocols with states as signatory parties. In effect, the idea of the enforceability of frameworks must change, rather working to demonstrate efficacy in using these frameworks.

‘Enforceable’ in this context is an imprecise term, as it is demonstrably evident that standards and frameworks cannot necessarily be made via legal consequences; within the cultural heritage sector, they remain elective. Alternatively, this research suggests that creating a set of guidelines with a higher rate of success, if integrated, can functionally build a reputation of good professional practice.

When operating within conflict to undertake responsive digitisation, challenges manifest in several different forms: the digitisation must be done on an ad hoc basis due to lack of time, resources, or personnel. Emphasis may be put on other actions to physically secure collections; there is no forewarning that there is a threat to the collection resulting in limited actions, to represent a few examples of severely aggravating circumstances. As post-threat digitisation efforts are naturally constrained to the surviving documentary records — which may not have been collected meticulously — emphasis must be placed on pre-emptive digitisation of collections, artefacts and sites informed by a common set of guidelines.

More standardised parameters in common guidelines would involve selection of digital documentation techniques to be used, data management plans, and metadata fields/data asset management. A full discussion of common guidelines is found in Chapter 6. Charting these methods constructs richer, more-detailed records of cultural heritage which — in the case of destruction, loss, or displacement — can provide the foundation for all future visualisations of the heritage in question. Emphasising the consequences associated with poor project planning works to encourage uptake of standardised frameworks and can incentivise compliance. In-depth explanation and justification for standardised methods for guidelines can be found in later chapters.

1.3.4 Stakeholder consultation and public access

In addition to data management and sustainability, digital outputs from responsive digitisation should also have a public presence with an emphasis on accessibility, specifically to groups from the affected region. Within this, there

must also be the additional intention of reaching a global audience (as may be permitted from stakeholder groups and stipulations of copyright).

A public-facing digital output that from the outset is written into a standardised and pre-emptive data management plan can alleviate contemporary issues in digitisation, such as parsing through copyright and intellectual property rights around a database or repository. Identifying, communicating with the intended audience, and advocating for this stakeholder consultation enables the process to be approached in a sensitive manner. Furthermore, discussing and collaborating in the process with professionals, and some of the public, from the materials' originating country fosters a sense of community. This keeps relevant stakeholders at the forefront of decision making, affecting their public access to and involvement with the digital outputs.

Making the digital material more publicly available and discoverable feeds back into the digital content lifecycle, and again harkens back to the role that use and reuse of data plays in long-term sustainability. A European Commission report (2016) on the digitisation and online accessibility of cultural material and digital preservation suggests that member states that strengthened long-term preservation strategies and action plans, as per 711/2011/EU recommendations saw progress in reuse of public domain material.[5]

It is important to address cultural sensitivity in making claims that increase attention about undertaking digitisation projects with stakeholder guidance, claiming that it fosters a sense of community towards their cultural heritage — some cultures and communities might not feel the same tie to cultural heritage as is an expectation in competing paradigms. Community relationship with cultural heritage is not a particular focus of this research, and it is important to remember that there is a multiplicity of experiences with cultural heritage — not all desire or benefit from digitisation. Digitisation projects should spend time

[5] Link to recommendations: https://ec.europa.eu/information_society/newsroom/image/document/2017-19/05_recap_recommendation_progress_reports_DE6E08D0-C6F6-01AF-46B47F4BE6CE161D_44648.pdf

engaging with community needs and their own conceptions of heritage, rather than prioritising competing models of heritage.

Another facet to this is the extent of public access to digital material and how it is determined. On one end of the spectrum there is open access, and on the other end, heavily vetted access through a cultural heritage gatekeeper. Each end of this spectrum has advantages and disadvantages and is largely dictated by the legal parameters, and licensing decisions of digitising projects or organisations, for the heritage materials being digitised, i.e., copyright, intellectual property rights, and data protection.

Examining to what extent professional practice can focus on integrating use, reuse and access into the project development side is a sub-objective for this research. Operating within the context of threat makes this a particularly challenging endeavour to engage all parties involved.

1.5 Project timeline summary

The following section provides a concise description of the changes that occurred over the course of this research project. The changes in the orientation and the framing of the project and methodology were a product of the emergent design considered at the outset. As this design developed, there were gradual shifts in the approach to the methodology, use of quantitative data collection, and criteria for used for the assessment of the examples.

1.5.1 Data collection

In the initial planning stages, data collection was anticipated to take the form of a small sample size of interviews to be recorded, transcribed, and coded. This data collection would have involved semi-structured interviews of heritage professionals working within the WANA (Western Asia and Northern Africa) region. This discrete geographical region was initially selected to investigate professional practice in an area with ongoing geopolitical conflict, and also aligned with Afghanistan becoming a signatory party to the UNESCO 1954 Hague Convention early in 2017 which would have allowed for an extremely relevant example of implementation of heritage sector policy. This scope ultimately

broadened to focus on a larger set of examples representing a global scale and various types of threat.

This data collection via interviews aspect of the project experienced significant delay and ultimately necessitated a change in approach to methodology. Initial points of contact were made at the end of the first year of the project, but the process proved to be extremely protracted. A point of difficulty was the need for 'gatekeepers', that is, intermediaries to communicate in the first instance with contacts operating within the region who could not be contacted directly for a variety of reasons. Due to the often-sensitive nature of the atmosphere in which the professionals were operating, there was often no opportunity to make a follow-up contact for an interview — even if there had been previous correspondence. These sensitive factors are outlined in the ethics form application found in Appendix III. Instead of applying the themes taken from coded interviews to inform and enrich Chapters 4 and 5, the interviews that were undertaken simply informed avenues of research, without extracting quotes, indexed themes, or generalisations. All interviews undertaken were off the record, informal, and were not used as substantive data for the framework assessment and data analysis.

The data collection instead shifted and utilised an adapted set of criteria to assess examples from multiple angles. Two sets of criteria were applied to the different projects: one developed to help choose which examples to focus the research upon (these can be found in Appendix IV), and a second set adapted from the Sustainability of Digital Resources Framework (SDRF) (a sample template can be found in Appendix V). Each application of the framework criteria is discussed in further detail in Chapter 2. The SDRF framework was developed as part of a larger project developed by a team based at the University of Glasgow for the AHRC-funded Living Legacies 1914-18 Engagement Centre activities surrounding Centenary events. Konstantelos and Hughes (2019) developed the framework as a tool that could be used to assess the likelihood of sustainability of digital heritage projects that were community-based. This framework synthesised earlier research on digital sustainability and used several

extant guidelines to create the final version of the SDRF framework.[6] The framework was documented in the final report "Digital Sustainability Review of HLF Funded Projects', Report of the AHRC Living Legacies First World War Engagement Centre" (Hughes, 2019). Following on from this project, the framework was adapted and used by a research team led by Prof Lorna Hughes to assess the sustainability of digital documentation funded by the Arcadia Fund (Hughes, et al., 2021). Subsequently, this framework was further adapted to suit the nature of this project by changing some dimensions and weighing criteria to better analyse projects that had to overlook certain sustainability dimensions, such as 'promotion'. This dimension was not given the same numerical weight for projects operating during or immediately after conflict. Similarly, as shown in the simplified digital lifecycle model (Figure 1.1), overly complicated processes for preservation cannot be guaranteed in threat and applying the same weight would not give a representative view of the success of the project from a digital sustainability standpoint within this specific context. The findings from the compiled SDRF framework assessments are discussed in depth in Chapter 6, and the template framework can be found in Appendix V.

By using this adapted framework for this research, a richer understanding of a large sample size of projects across the globe could be developed, as well as a greater understanding of how digitisation initiatives for heritage under threat have similar shortfalls or strengths. This compilation of data informed the development of a robust analysis of best professional practice, by assessing successes, single points of failure, and instances where mitigation techniques were utilised.

These examples show the global reach of documentation initiatives, as well as the relative success and shortfalls of the themes of digital cultural heritage preservation and documentation. There can also be generalisations gleaned by comparing funded with unfunded initiatives, and how best practices are dictated by this.

[6] These guidelines are described in later sections.

1.6 Dissertation Outline

This introductory chapter provides an overview of the research project, providing the research context and the research questions and sub-objectives of the thesis. This chapter also provides preparatory assessment as to why this previously overlooked research will fill a gap in the literature, and how it will provide a unique contribution. Further, it introduces the adapted framework for assessment of digital sustainability that was applied to the chosen examples.

The review of literature forms Chapter 2 and acknowledges gaps in practice observed in existing frameworks as outlined in policy documents concerning cultural heritage management and preservation and further explains how this research will address these gaps. The themes of the literature review follow some of the themes of the Digital Content Lifecyle Model.

Chapter 3 presents the research methodology, defining how quantitative and qualitative data collection was approached, and how the emergent design of the research undertaken has influenced the methodological approach of the study. It outlines the research methodology, the choice of examples, assessment criteria and how it is applied, data collection, ethics, and approaches to data analysis.

Chapter 4 will provide a gap analysis of policy frameworks within prevailing cultural heritage policy documents, dates inclusive: 1954 to present. This chapter will also further investigate to what extent these gaps in policy have affected professional practice in instances of responsive digitisation.

Chapter 5 will examine and analyse the use of digitisation methods as preservation tools for cultural heritage in conflict. This chapter introduces examples of digital preservation projects, identifying predominant methods of digitisation, virtual re-creation, and data visualisation used in projects, and will give a short overview of digitisation methods such as: user generated content, community generated content, crowdsourced digital content, 3D visualisation, photogrammetry, and 3D printing.

Chapter 6 presents the findings from the adapted sustainability framework that was applied to the various example analyses that were undertaken.

The summative Chapter 7 provides new insights on where the research is going, where future applications of this research may be effective, and further development to the framework and avenues for policy proposal.

1.7 Contribution

This research project provides an original contribution to the wider discourse by exploring how comprehensive digitisation practices can be situated for analytical evaluation, and by identifying and defining the strategic values of use, access, and re-use for the heritage sector on a comprehensive and systematic scale.

This research frames a narrative for praxis for digitisation and its role within the preservation landscape of contested heritage. It also explores the idea of 'responsive digitisation' as a term to describe digital preservation action undertaken in response to threat, or a result of conflict forcing preservation action under duress. Further, by undertaking a gap analysis of policy documents in circulation within the heritage sector, this compilation of notable issues and subsequent proposal of a new framework to mitigate them, yields a new methodology to be considered in the prevailing discourse. Having identified the gaps that disrupt the balance between theory and practice for undertaking digitisation, this research complements existing work to bring global attention to these issues and works to incorporate digitisation into wider disciplinary narratives concerning preservation, destruction, information control, conflict preservation and the role of museums and related cultural heritage institutions (CHIs) in the future.

Chapter 2—Literature review

2.1 Introduction

This research and literature review investigates what is needed to develop a framework for digital documentation and preservation of digital cultural heritage under threat that focuses on long-term digital sustainability in accordance with extant literature. Further, the review also highlights themes that are present in broader research that are imperative to consider when developing the theoretical and ethical framework for undertaking systematic and pre-emptive digitisation of heritage with regards to conflict, preservation, and return. Such frameworks for undertaking expedited pre-emptive digitisation ultimately rely on ad hoc mitigating action, leaving room for points of failure in the continued digital life of the heritage materials.

This literature review therefore explores broader research related to facets of technology, digitisation methods, material and digital conservation and preservation, policing entities, sector policy, and long-term digital sustainability. It explores the gaps around increased utilisation, availability, and pre-emptive use of digitisation methods in the cultural heritage sector that emphasise stakeholder and public access to digitised materials in the context of threat. This also includes difficulties of access in cases of displacement by conflict, loss, or destruction. Initial research into digitisation methods highlighted databases documenting heritage at risk, undertaken to mitigate spoliation of arts and artefacts and facilitate restitution of the materials.

The review of literature is broken down thematically by the themes of the digital content lifecycle model.

2.2 Definition of cultural heritage

Definitions of cultural heritage have been historically contested and can be fluid depending upon the context (Gray, 2009). In terms of policy documentation for digital preservation, the succinct definition by UNESCO is appropriate. It explains that the categories of heritage as including tangible, intangible culture heritage (oral tradition, performing arts and rituals), and natural heritage

(UNESCO 2021). Tangible cultural heritage is further broken down into moveable cultural heritage (paintings, sculptures, coins, manuscripts, etc.); immoveable cultural heritage (monuments, archaeological sites, etc.); and underwater heritage (shipwrecks, underwater ruins, and cities) (UNESCO, 2021). The remit of this research focuses on both moveable and immovable digital cultural heritage at risk, investigating the differences in methods for documentation and preservation. Digital cultural heritage has a further nuanced definition within UNESCO's Charter for the Preservation of Digital Heritage as:

> "Resources of human knowledge or expression, whether cultural, educational, scientific and administrative, or embracing technical, legal, medical and other kinds of information, are increasingly created digitally, or converted into digital form from existing analogue resources."

This digital cultural heritage can be comprised of, "texts, databases, still and moving images, audio, graphics, software, and web pages, among a wide and growing range of formats" and needs purposeful maintenance and management to be retained in the long term (UNESCO, 2003).

Changing public perceptions of the material importance and significance of digitised cultural heritage have long raised the issue of the integrity of the reproduction (Walter, 2008; Cameron, 2013; Jeffrey, 2015), and frameworks for digitisation of heritage must address concepts such as paradata and transparency. In the past, the term 'restoration' had been used, somewhat simplistically, to describe physically fixing broken or missing parts of an archaeological item (Jokilehto 1999, 47- 65), while today the term has grown to include digital reproductions. Archaeologists such as Winckelmann and Cavaceppi (1992), maintain that this 'restoration' should be carried out without falsifying the artistic concept of the original, being careful not to mislead the viewer of the reproduction. In other words, integrity to the original physical object is most important (Aslan, 2016). This view, and the developed concept of *anastylosis,* proposed by Camillo Boito (1893), are further described by Houbart (2020) wherein physical restoration must use the original architectural elements to the greatest degree possible. Others like Romanelli insisted that the "juxtaposition of materials in strong contrast with the ancients…could generate confusion." (Romanelli, 1971; Houbart, 2020). These views highlight the

perspective that maintains a sense of the 'original purity' in preservation. It should be noted that this seems to be a concept especially present in western thinking and is not shared globally. Policy documents such as the 1994 Nara Document on Authenticity have recognised these differing approaches to value and authenticity, positing:

> "All judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture. It is thus not possible to base judgements of values and authenticity within fixed criteria. On the contrary, the respect due to all cultures requires that heritage properties must be considered and judged within the cultural contexts to which they belong" (ICOMOS, 1994).

The early ideologies in archaeological preservation were the precursor to the Venice Charter of 1964 (ICOMOS, 1964), which dealt with questions of defining suitable means of physical intervention of archaeological sites and how to communicate the cultural meaning of the site or the artefact to the public. Thus, have incorporated this same sense of maintaining the 'purity' of the original. This concept of "purity" and maintaining the original is contracted within literature exploring ethical copyright and intellectual property rights as well as sector policy documents challenging traditional paradigms for value of documentation outwith the support of stakeholder groups.

Berducou (1990) writes that, in the field of archaeology, an item taken from the earth is less important as a commentary of evolution of artistic value and moreover that excavated material does not simply document aesthetic values, but instead provides important historical information. The historical information gleaned from items validates efforts for its future preservation. Feilden (1982) defines conservation as the act of prolonging the life of cultural and natural heritage, with the goal of presenting the cultural significance to a wider community of users. This contemporary ideological approach to the management of cultural heritage underscores the value of digitisation for wider public use. Stovel (1999) and Malliet (1998) elaborate that, for cultural heritage to be sustainable, practitioners must be concerned with long-term, preventive, and risk-sensitive solutions, with the same end goal of prolonging the life of the heritage.

Silverman and Ruggles (2007) point out that the significance of cultural heritage "is a concept to which most people would assign a positive value," and the preservation of which falls under a shared common good by which everyone benefits. That said, there may be differing interpretations of this universal value and how it sits alongside such a potential variety of community identities (Lindstrom, 2019) and values. This theme remains constant across most academic and political facets of cultural heritage: definitions and interpretations of meaning and value remain relative and unfixed. Among literature, this is acknowledged but seems to be largely unaddressed. This too is the case when it comes to considering stakeholders, and thus it is here that the core element of stakeholder identification and inclusion will be considered throughout this research.

2.3 Project management and development of digital outputs (Selection/Creation)

The Selection theme relates to how cultural heritage under threat is evaluated and selected for digital documentation and long-term curation and preservation. Further to this, the selected data should adhere to any relevant guidance, policies, or legal requirements for selection (JISC, n.d.). These requirements should be dictated by stakeholder groups that have a direct link with the cultural heritage under threat. The Creation theme relates to the creation of data and digital outputs. This created data should align with relevant collecting policies for archives, repositories, or specifications for the data creators (JISC, n.d.). This similarly aligned with any relevant guidance, policies, or legal requirements for selection theme; each should inform professional practice.

Cultural heritage can experience a wide array of iterations of threat, and each of these will change how cultural heritage is selected for documentation. These iterations of threat can include (but are not limited to): geopolitical conflict, war, pandemic, displacement, loss, and destruction from looting or subsistence looting, and negative effects from climate change and global warming. Each type of threat has its own corresponding nuances and complexities that make undertaking any kind of pre-emptive digitisation difficult. And as a result, there are many different risk assessment guidelines and frameworks for physical

intervention, however there is a marked lack of frameworks which explicitly seek flexible frameworks for long-term digital sustainability while operating under threat.

When operating under the notion of responsive digitisation, selection may be ad hoc and not represent the documentation of cultural heritage at the highest risk, or that has been specifically identified by stakeholder groups to be of the highest importance. This underscores one of the gaps in research and policy documentation that this project attempts to address: defining a more cohesive means of considerate and sustainable preservation in the face of such threats. Prevalent threats to cultural heritage have exacerbated the challenges for undertaking good professional practice in cultural heritage documentation. The resultant displacement and loss of movable and immovable heritage material, combined with the need for fast-paced relocation of movable heritage, explicitly limits the actions that heritage professionals have available to them to select the heritage materials at most risk, particularly for efforts that involve digitisation.

2.3. Identifying heritage at risk

The development and curation of searchable databases of information about art and artefacts in conflict has proven successful for policing agencies, for example the Italian Carabinieri and INTERPOL, in their efforts in fighting art crime and expediting repatriation of stolen materials. These types of databases compile data about moveable cultural heritage which is at risk and uses that data to facilitate return as well as disseminate information to aid in mitigating further risk to cultural heritage. Generally, these databases are used in a limited manner, for cultural heritage that has been stolen, looted during conflict, or lost or displaced, though the premise of the data gathering is scalable to be used for other types of threat.

The arts division of the Italian military police, the *Commando Carabinieri per la Tutela del Patrimonio Culturale*, has been integral in aggregating data about cultural heritage at risk, and cultural heritage actively lost and displaced, in their investigative practice. The Carabinieri actively works on maintaining

databases to help deter the trafficking of arts and cultural heritage objects. Founded in 1969, the specialised unit operates to facilitate the security and safeguarding of cultural heritage through prevention and repression of illicit activities (Poggioli, 2017). Since 1992, the agency's database *Leonardo* has been collecting the details and photos of nearly 6 million registered works of art, of which up to 1.2 million have been classified as having been stolen, missing, illegally excavated, or smuggled (Poggioli, 2017). In the case of policing agencies, the criteria for selection and inclusion in the database is strict; the heritage materials it documents are at risk of being spoliated or have already been lost or displaced.

Similarly, INTERPOL operates the Stolen Works of Art database. Initiated in 1995, the project seeks to centralise information about stolen cultural objects and collections to make that information more readily accessible to the public and to disseminate it globally. The INTERPOL database utilises an international standard for metadata navigation which bases its search terms on simple vocabulary or applied metadata to make the information accessible to non-specialists and specialists alike (INTERPOL, 2015). The specific attention to a wider, more accessible userbase is especially valuable as it is not applied across all similar databases. This regulation of uniform metadata is important as heritage professionals seek the implementation of standardised digitisation practices and will directly aid in the discoverability of digital outputs. This idea is explored further in policy documents such as the London Charter, Seville Principles and the ICOMOS ENAME Charter.

Since 2012, INTERPOL and the Carabinieri have collaborated on the PSYCHE scheme (Protection System for Cultural Heritage) to combine the agencies' information. This project seeks to improve INTERPOL's Stolen Works of Art Database and allow for the automatic transfer of searches through the *Leonardo* database (INTERPOL, 2015). The PSYCHE project was implemented to enhance and increase the exchange of information of displaced artworks in the Interpol database by facilitating policing agencies worldwide to catalogue stolen cultural heritage via standardised e-forms and create automatic data exchange systems.

Also integrated is an image comparison tool to automatically link to the INTERPOL database to compare images.

Various international actors, including UNESCO and the United Nations have highlighted the importance of centralising and sharing information about at-risk cultural heritage, citing the success of the PSYCHE database. The United Nations Security Council resolution 2347/2017 in section 17 advocates for the adoption of digitised and accessible inventories, as well as "the creation of databases for stolen goods, and for national legislation's usage and contribution to UNESCO's bases", and in subsection (f) highlights the benefit of Member States contributing to the INTERPOL database (UNESCO, 2017C).[7] Further to this the UN Assembly adopted Resolution 73/130, in Article 17 encourages Member States to contribute to national databases of stolen works of art, with the assistance of INTERPOL to advise.[8]

Other resources like ICOM Red Lists of Cultural Objects at Risk raise awareness by aggregating categories of cultural goods most vulnerable to illicit traffic, and similarly to policing databases can be used to mitigate arts and artefact trafficking through centralised data sharing (ICOM, n.d.). Tools like Art Loss Register (ALR) and the Cultural Heritage At Risk Database (CHARD) also aggregates data about heritage at risk, but with an at times commercial angle as due diligence providers. However, these tools have received critiques for their efficacy in accurately producing provenance (Burns, 2015). CHARD also works to proactively register object in situ within museums, archives, and sites, addressing the importance of pre-emptive solutions to kick start post-threat mitigation.

[7] "Using and contributing to the INTERPOL Database of Stolen Works of Art, UNESCO Database of National Cultural Heritage Laws, and WCO ARCHEO Platform, and relevant current national databases, as well as providing relevant data and information, as appropriate, on investigations and prosecutions of relevant crimes and related outcome to UNODC portal SHERLOC and on seizures of cultural property to the Analytical Support and Sanctions Monitoring Team"

[8] "*Encourages* all Member States to establish, where they do not yet exist, with the assistance of INTERPOL, upon request, specialized police units exclusively dedicated to the protection of cultural heritage to investigate cases of trafficking in cultural property, and a national stolen works of art database directly connected with the corresponding INTERPOL database"

Policing databases provide access to information that can be gathered about cultural heritage at risk at a pre-emptive level, though has not been utilised to its full potential and calls for improved infrastructure for centralised information sharing arises in policy documents and strategic assessments (Heritage and Cultural Property Crime National Policing Strategic Assessment, 2013). This type of information can be used to proactively identify heritage which may be at the highest risk of loss or displacement. They effectively aggregate information that can be used to inform sustainable practice, such as applied metadata structures which make the digital outputs more discoverable, facilitating continued access. While tangential as policing agencies and art loss databases highlight information relating to tangible, analogue cultural heritage, rather than digital cultural heritage, the premise for data collection and onus for pre-emptive selection criteria highlighting risk is applicable for sustainable documentation.

Natural and climate related disasters have also prompted the creation of frameworks for reduction in disaster risk, like the Yokohama Strategy[9], the Hyogo Framework for Action[10], and the Sendai Framework for Disaster Risk Reduction 2015-2030[11] which all seek to provide guidelines for natural disaster prevention, preparedness, and mitigation. In assessing the climate vulnerability of cultural and natural heritage, Day et al., (2020) writes that the observable effects of climate change, including extreme weather events, i.e., storms, floods, droughts, sea level rise and increased temperature, consequently, has become one of the main threats to cultural heritage materials. Because of the complexity of this type of threat, cultural heritage can be affected by large scale risks as well as micro scale risks (Coppola, D.P, 2011; Pedersoli, J.L, 2016; Paschalidou et al., 2022). These varied risks necessitate strategies and frameworks which are not prescriptive but can demonstrate flexibility based on the given context. Climate-related research with regards to risk assessment, frameworks for preservation is much more prevalent in recent decades due to

[9] Link to risk assessment document: https://drmims.sadc.int/en/documents/database/yokohama-strategy-and-plan-action-safer-world
[10] Link to risk assessment document: https://www.unisdr.org/2005/wcdr/intergover/official-doc/L-docs/Hyogo-framework-for-action-english.pdf
[11] Link to risk assessment document: https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030

climate change mitigation activities, though it is notable that such guidance for how this relates to digital cultural heritage documentation is notably absent in academic research and exists primarily as unenforceable policy recommendations. UNESCO and the Advisory Bodies to the World Heritage Committee (ICCROM, ICOMOS, IUCN) have developed and published various frameworks in response to ongoing need for capacity development in relation to disaster mitigation. The Guidance and Toolkit for Impact Assessments in a World Heritage context provides a methodology and tools to define value for sites under threat and evaluate impacts and mitigation options, and explicitly highlights its flexibility (Section 4.1.1) (UNESCO, 2022).

Further these types of assessment guidelines advocate for participation of rights-holders and stakeholders throughout the entire impact assessment process to address any consent or rights-based issues that may arise from the mitigating actions. Given the consistent recommendations of stakeholder and community consultation from the outset (or pre-emptively) of digitisation considerations, this is to be lauded. The flexibility of this type of framework can inform best practice for more targeted digital preservation-based frameworks and guidelines.

The above-mentioned resources approach the identification and assessment of risk differently. However, they commonly represent the value of an evidence-based foundation in the undertaking of risk assessment. When practitioners operate under threat considering the selection dimension for the digital content lifecycle can be unfeasible, if not impossible; rapid bulk documentation should be avoided wherever possible. This research attempts to simplify and alleviate this.

2.3.2 Protecting digital outputs and digital materiality

Digitisation is the process of converting information, in a physical format, to digital forms, with digital meaning “computer readable” in nature. Digitising materials should not be misconstrued to always be defined the same as digital preservation – as digital preservation must be situated within a long-term, sustainable, timescale (DPC, n.d.). The scope of this research focuses primarily

on digitisation methods being used for long-term digital preservation for outputs related to cultural heritage.

The term digital preservation describes all actions that are taken to preserve and maintain digital materials beyond the limitations of technological or organisational change, according to the Digital Preservation Coalition (2022). For the sake of this research, this also refers to actions taken to ensure continued long-term access to the digital materials. Digital content which is not being adequately digitally preserved is at risk of several avoidable risks, such as, obsolescence, impossible storage formats, lack of custodial support, and inaccessibility of the digitised materials.

Documentation, as it relates to cultural heritage, includes capturing information regarding monuments, buildings and sites and further organising, interpreting, and managing that recorded information (LeBlanc and Eppich, n.d.). Documentation of cultural heritage takes various forms within the selected examples in this research, utilised multiple methods of digital technology to produced digital outputs. The digital documentation is not undertaken only to create a digital replica of analogue materials, but also to inform further preservation and conservation activities. This can include assessing the value of cultural heritage, guide actions for conservation, and assist in developing tools for managing heritage via the digital records (LeBlanc and Eppich, n.d.). While thorough, such approaches to documentation tend to favour the researcher-archivist-historian type of practitioner rather than the laymen public or broader communities that may have cultural buy-in.

Sustainability can have several different connotations depending upon the context and today tends to be more commonly associated with environmental sustainability. While this is an especially important area of preservation research that fits within UNESCO's (2021) definition of natural heritage, environmental sustainability as it relates to digital outputs and digitised materials is not within the remit of this research[12]; rather the focus is more closely related to that of

[12] More information on this theme can be found here, defined by the United Nations: https://www.un.org/techenvoy/content/digital-environmental-sustainability

sustainability in digital preservation. Long-term digital sustainability relates to practices of maintaining access to digital outputs, by mitigating risks such as lack of access, obsolesce, loss of data, disintegration of data, etc. Digital sustainability can generally follow the digital content lifecycle (Digital Curation Centre, n.d.), which if it does not break down, can theoretically maintain digital outputs in perpetuity. Although in practice, this is inherently complicated and likely not feasible for most practitioners. Therefore, frameworks for sustainability should be scalable and flexible to accommodate aggravating factors.

The term data management can have multiple foci depending upon the thematic context. From a business perspective, data management describes the processes of collecting, keeping, and using data securely, efficiently and in a cost-effective manner (Oracle, 2022). The data that is managed is collected by an organisation and is a very important part of an IT systems approach to management (Stedman and Vaughan, n.d.). Data management for cultural heritage has further complexity whereby very diverse data can be generated which might require the management of multiple types of file formats, metadata standards, or damaged, partially complete, or fragile datasets. These factors can exacerbate difficulties in data integration and management (Bruseker, Carboni, and Guillem, 2017) across practices.

Digital materiality analyses the process of "moving away from linking materiality to notions of physical substances or matter" (Leonardi, 2010). With the aim of increasing public access to cultural heritage materials that have been displaced or destroyed through virtual means, the "tangibility" of the object in relation to its assumed importance to the historical discourse must be evaluated. Some argue that the physical and the conceptual exist on different levels, and are inherently valued differently, while others argue that "the boundaries between physical and conceptual are not fixed, but constantly negotiated in practice" (Leonardi, 2010; Jeffery, 2015).

Leonardi (2010) defines materiality from the Oxford English Dictionary, "material" which is defined as, "Having significance or relevance: Of serious

substantial import; significant, important, of consequence." This definition highlights a core component to the broader value that digital materiality can assist: the cultural significance of digital heritage is important in shifting public opinion to valuable digitised collections, and to facilitate a two-way engagement with heritage in the same way as interacting with the physical object (Cooke, King, et al., 2014).

This research recognises the changing perception of the digital as having material significance. Research at the Glasgow School of Art's School of Simulation and Visualisation in international heritage visualisation focuses on the use of new technologies digital recording, data visualisation and information gathering, and how these processes affect and transform relationships between the individual, academic, and communities with the heritage being studied (Glasgow School of Art (GSA, 2018). Continuing idea of transformed perceptions and the analogue and digital, Green (2018) highlights changing perceptions surrounding digitised manuscripts, positing that users of digitised manuscripts interact with a digital presence that is inextricably linked with the analogue equivalent (Green, 2018). Cameron and Kenderdine (2007) consider that there is limited analysis on the ways in which tangible heritage and 'digital culture' coexist under evolving narratives.

Changing perceptions also apply to the affordances of digital technologies to digitally document cultural heritage and how they are perceived and used. Shifting the narrative away from more physical descriptors being used to assign relative value (Leonardi, 2010), leads to a discussion on the way digital technologies are used to digitally document.

Responsive digitisation acknowledges that under certain aggravating circumstances heritage professionals may need to attempt documentation for as much content as feasibly possible, with extremely limited time, staff, and technical resources. In such instances, massive numbers of documents, photographs, artefacts, and ephemera may be processed using low quality scanners or digital cameras – emphasising amount over quality – with the outlook that such images may still be used for higher quality 3D models later using more

innovative and corrective technologies. This outlook, however, ignores the necessity for a stronger foundation from the outset; if frameworks for project planning digital outputs place too much emphasis on the innovative end-product, e.g., a 3D model, then there is a risk of losing sight of the basics, which much be valued and considered equally. Prescott and Hughes (2018) consider this rapid digitisation and propose a case for 'slow digitisation" whereby rapid reproduction and documentation avoids instances of "digital photocopying" in favour of a more complex "excavation" of the complexities of the heritage materials being digitised. Though it seems counterintuitive to the seemingly rushed nature of the type of digitisation that occurs under threat, this notion corresponds to the recommendations of pre-emptive planning, consideration and stakeholder collaboration that this research values.

Research on the breadth of the field of digitisation for cultural heritage management and preservation began with looking at the early examples of digital documentation — the highly regulated, yet less publicly-accessible, databases of policing agencies. While representing one end of the spectrum for heritage documentation (funded, vetted access, continually maintained databases), it also provides a good foundation from which to build upon as new methods of digitisation and new frameworks for undertaking digitisation enter the field.

2.3.3 Importance of stakeholder involvement

The World Heritage Advisory board defines stakeholders as "those who possess direct or indirect interests and concerns about heritage resources, but do not necessarily enjoy a legally or socially recognized entitlement to them." The fact that this definition acknowledges community buy-in despite legal or social recognition is especially valuable in that it attempts to address marginalisation that occurs within many nations' socio-political systems. It is these very communities who tend to be ignored or forgotten in by the institutions who may hold custodial or digital power over such heritage. Strategic planning of digitisation involves producing necessary decisions to develop sustainable projects that meet user demands. User demands do not only constitute audience

for the digitised materials, but the communities from where digitised materials originate from as well.

Ashworth and Howard (1999) point out that expertise in professional practice in heritage has evolved; with academics as only one of many stakeholders when it comes to cultural heritage management. In practice, stakeholders should now include diasporic communities, owners, governments, business entities and developers and tourists (Loulanski and Loulanski, 2016), which can all work together in a collaborative manner.

When discussing heritage studies and issues in heritage, according to Ashworth and Howard (1999), there can be a disconnect with the physical aspect of cultural heritage and a theoretical or conceptual idea of heritage. Loulanski and Loulanski (2016) use the example of the Fourth Conference of European Ministers, which called for the establishment of European methodology for heritage management, in relation to sustainable development (Council of Europe, 2001). Objectives that arise from this assessment of existing weak methodologies are, the "promotion of a culture of evidence-based policy-making, national, regionally and internationally", and the re-evaluation of existing "insufficient multidisciplinary research that takes a holistic and integrative view" (Loulanski and Loulanski, 2016). As has been discussed with the cultural arts fields and cultural policy more generally, however, the notions of evidence-based values can be challenging and may lead to conflating metrics with inherent value which remains ambivalently defined (Gray, 2007; Gray, 2009; Holden, 2006).

Projects that collaborate with stakeholders at the planning stage can help to facilitate use and reuse of the collected digital material post-production. In addition to aiding in the overall success of the project, it also aids in continuing the digital content lifecycle. Technological developments facilitate new mechanisms for engagement and co-production of digital cultural heritage from user groups (Tait et al., 2013).

Community generated historical content is becoming an increasingly significant component of the digital content ecosystem, with a growing number of largescale projects occurring in the last decade. This poses the notion that community generated digital heritage content may supersede the current information life cycle, according to Hughes (2021); core elements of selection including description, rights management, preservation, and access are challenging. Hughes also suggests that these materials are 'born fragile' (Hughes, 2021) and the Digital Preservation adopts similar terminology by noting that these types of materials are "born vulnerable" (Kilbride, 2020), in that their sustainability on a long-term basis cannot be guaranteed due to factors such as obsolescence, data loss, especially when faced with many aggravation conditions, as outlined by the Digital Preservation Coalition:

> "Poor documentation, lack of replication, lack of continuity funding, lack of residual mechanism, dependence on small number of volunteers, lack of preservation mandate, lack of preservation thinking at the outset, failure of digital legacy planning, conflation of backup with preservation, conflation of access and preservation, and accessibility to web archiving" (DPC, 2019).

These challenges align with issues found in information management, and access and use of analogue community generated archives, as presented by Flinn (2019). Indeed, one notable gap is the apparent lack of dialogue between policy research, documents, and other areas such as library sciences and digital humanities. As discussed earlier, the incorporation or collaboration with relevant community stakeholders key to appropriate, sustainable, and meaningful digital preservation. The following quote highlights the importance of this: 'Archives – as records – wield power over the shape and direction of historical scholarship, collective memory, and national identity, over how we know ourselves as individuals, groups, and societies.' (Schwartz and cook, 2002) Community generated content and community gathered information allows for increased stakeholder input and can moreover directly challenge some of the above noted issues relating to obtuse, vague, and overly legalistic wording that can obscure the context of cultural heritage.

2.4 Infrastructure and long-term digital sustainability (Managing/Preservation)

Tait (2013) highlights that challenges of sustainability do not end at the point of digitisation, but rather shift the challenges to other aspects of long-term preservation (Bradley, 2007). The timely need for digital sustainability for digital cultural heritage material has been communicated through several avenues. Defined within various intergovernmental policy documents such as the UNESCO (2003) Charter on the Preservation of Digital Heritage.

The DPC Bit List of Digitally Endangered Species identifies various digital materials that are at risk of shortfalls that would detrimentally affect digital preservation. Beyond this, it has also identified multiple iterations of digital outputs related to digital cultural heritage, i.e., community archives and community generated content, and born digital content. The Bit List, as a tool, has helped to identify this type of data as problematic and fragile, however, there is little existing research into the specific challenges of digital curation and the data lifecycle of digital cultural heritage under various types of threat. With more and more newly developed cultural content moving online onto liminal spaces, there is remains a lack of general understanding of the fragility of such 'spaces' for preservation.

To develop an effective management plan for the infrastructure, the practitioners who are actively creating such digital outputs must recognise the fragility of the digital content from the outset (Prescott and Hughes, 2018). This perceived and extant fragility can potentially negatively affect the use and reuse of the materials by users and stakeholder groups.

By undertaking pre-emptive actions to ensure long-term preservation and retention of the authoritative nature of data, preservation can ensure that data remains authentic, reliable, and usable while maintaining its integrity. Such actions include data cleaning, validation, assigning preservation metadata, assigning representation information, and ensuring acceptable data structures or file formats (JISC, n.d.). Preservation of digital outputs are at risk from aggravating conditions, which can be exacerbated by operating within the

context of threat. Digital outputs are especially vulnerable to data loss if professional practice is not robust enough to ensure upkeep due to extenuating circumstance or lack of resources. Some of these threats include (DPC, n.d.):

- Obsoletion of the software that is used to either host of ingest
- Multiple copies of the digital outputs have not been produced
- Lack of standardisation of preservation processes
- Accidental loss of material
- Lack of defined ownership and stewardship
- Issues in defining intellectual property rights
- Over dependence on web host

These issues are even more aggravated when operating with born digital materials if an analogue equivalent no longer exists. Single points of failure arise with the issue of funding and can cause a full breakdown of the digital preservation infrastructure. This will be seen in some of the assessed examples in Chapter 5. Long-term maintenance or sustainability of the digital outputs of research project is a stipulation to funding. However, in practice, this can be an area where professional practice breaks down.

The few preservation strategies for born-digital materials that are available mirror difficulties of preservation of digital cultural heritage under threat, particularly in relation to access. The Smithsonian Institution Archives strategy discusses bit-level preservation which cannot guarantee future accessibility due to obsolesce or proprietary software or file formats. This lack of access can be further exacerbated by rights-based copyright issues (Library of Congress, n.d.).

Fisher (2020) highlights that to develop robust capacities for born digital preservation existing rights frameworks related to copyright will need drastic changes. Jaillant (2022), corroborates this, positing that the main bottle neck for access to born-digital materials are data protection legalisation and copyright, as well as risk averse custodial practices due to discrepancies in rights-based issues.

Within funded initiatives, particularly when associated with a higher education institution, there are resources like institutional repositories in place which can host digital outputs after the end of a funding period and the cost of maintenance can be assumed to be absorbed by the normal running costs of the institution as it relates to research outputs (Kay and Bal, 2020).

2.4.1 Standardisation, guidelines, and processes

Existing policy documents seek to effectively manage cultural heritage, and encompass "such broad areas as monumental, ethnographic, documentary, industrial, artistic, archaeological and oral heritage." However, there is less standardising language which has been proposed for digital cultural heritage and how to preserve newly digitised material and 'born digital' collections (Virtual Archaeology International Network, 2011). Recent policy has dictated the need for standardisation within documents, such as in the Intergovernmental Committee for Promoting the Return of Cultural Property to its Countries of Origin or its Restitution in Cases of Illicit Appropriation, ratified in Paris in 2010, which represents that "legal guidelines could inspire the drafting of national laws and promote the standardization of terminology, the goal being to ensure that all governments have introduced sufficiently explicit legal principles on the matter"(UNESCO, 2010).

The London Charter for the Computer-based Visualisation of Cultural heritage (2006) was produced to improve the "methodological rigour" of computer-based visualisation for the purposes of research and communication and dissemination of this digital information to the public (Denard, 2012). While this document certainly provided the groundwork for the discourse about the implementation of internationally recognised principles for digitisation processes, these are non-binding to heritage institutions, rather representing guidelines for best practice rather than industry rules. Further to this Charter is the 2011 Seville Charter for the International Principles of Virtual Archaeology, building upon the earlier document to strengthen its recommendations for the standardisation of integrity and rigour in the cultural heritage field.

These documents highlight some of the core gaps in the existing templates for digitisation of cultural heritage materials. They frame how computer-based visualisations should be regulated for academic integrity to the original object as well as the paradata associated with decision making about these processes, which should be transparent to the user.

International treaties and national and international standards seek to develop and maintain a common set of principles that address the global nature of preservation, documentation, and conservation activities. These types of policy documents aren't seeking prescriptive, finite solutions to overarching issues as it has already been noted that the idea of "enforceability" is inexact in the context of heritage policy. The documents rather aid in providing a common framework that has flexibility based on individual context.

These documents also represent the effort of sector professionals to identify the minutia of very complicated problems. The treaties further represent the mitigating actions that authorities have collectively agreed on to be applicable in the wider scale for signatory states, or for practitioners. While the policy gap analysis has highlighted areas where the selected documents partially address digital cultural heritage, they represent foundational texts that can be used as templates for future iterations that build upon the latest agreed upon best practice.

Complexities also arise when discussing the use of metadata standards and controlled vocabularies to make digital cultural heritage discoverable. The DCC curation lifecycle model dictates that documentation projects should "Assign administrative, descriptive, technical, structural and preservation metadata, using appropriate standards, to ensure adequate description and control over the long-term" (JISC, n.d.), and is necessary for making digital outputs discoverable for users and stakeholder groups. Practitioners further should also,

"Undertake actions to ensure long-term preservation and retention of the authoritative nature of data. Preservation actions should ensure that data remains authentic, reliable, and usable while maintaining its integrity. Actions include data cleaning, validation, assigning preservation metadata, assigning

representation information, and ensuring acceptable data structures or file formats."

Use of metadata standards and controlled vocabularies have the capacity to foster an environment which may produce hidden histories, or description of the past which have obscured meaning due to the way information about the data creation is recorded. O'Hara (2018) posits that as new knowledge systems are created, they can inadvertently embed bias. There have been many evaluation studies, particularly in the higher education context, of libraries assessing cataloguing standards and determining areas where inclusive metadata is largely missing (Luke, 2022; Beezley and Palone, 2021; Bolam, et al., 2018). Community initiatives and stakeholder consultation can be avenue for highlighting historical biases within the metadata systems (DPC, n.d.).

Frameworks that are developed to address complexities related to various types of threat should be as inclusive as possible and consider any single areas where context related to created digital cultural heritage content can be lost. In the context of antiquities trafficking and loss of cultural heritage, loss of context is a single point of failure (Mackenzie, 2020; Yates, 2017; McMahon, 1997) and can render reproductions effectively unusable.

2.5 Copyright and intellectual property (Use/Reuse)

Defining copyright and intellectual property rights to fit within definitions of cultural heritage management is a deeply complex notion and cannot be described in overly legalist language at the risk of overlooking complex ideas of ownership, patrimony, and data sovereignty.

Matthes (2018) succinctly outlines the tension between competing methods for determining value of cultural heritage, universalism, and cultural specificity:

> "On the one hand, there is a pull towards conceiving of cultural heritage as universally valuable, grounding consequent rights or permissions for all concerning its use and ownership. On the other hand, there is a push for culturally specific rights and restrictions that recognize the special claims of particular cultural groups"

The concept of cultural property explores the idea that cultural heritage materials, can be the property of a cultural group (Appiah 2006: 118; Thompson 2003: 252) which would dictate rights for ownership, access, and use. However,

the relationship with culture and property further complicates defining the values associated with it (Matthes, 2018). Mezey (2007) writes, “Property is fixed, possessed, controlled by its owner, and alienable. Culture is none of these things. Thus, cultural property claims tend to fix culture, which if anything is unfixed, dynamic, and unstable.”

The Blue Shield Law Library resource demonstrates the evolving definitions of cultural heritage and cultural property represented within international policy documents as the relate to conflict and threat. Early laws relating to the protection of cultural heritage, including the Lieber Code of 1863 called for the protection of museums of fine arts (Article 34), Classical works of art, libraries, and collections (Article 35), but these definitions of cultural heritage evolved to become much more nuanced, moving away from vague language like in Article 53 of Protocol I and article 16 of Protocol II (1977) of the 1949 Geneva Conventions, which both prohibited “acts of hostility directed against the historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples“, whereby “historic monuments” does not give context as to who is defining the historic value of the monument. The 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict defines Cultural property with the clause that the outlined (CP) is “irrespective of origin or ownership”. This definition doesn’t consider competing paradigms for notions of historical importance. These definitions of cultural property align more closely with cultural nationalist position; this notion implies state supremacy over heritage, rather than a potential community, tribe or nation. Within a cultural nationalist view, states parities have an assumption that there is an attribution of national character to cultural heritage materials (Merryman 1986: 832). This notion can be seen supported in policy, like the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property: “Considering that cultural property constitutes one of the basic elements of civilization and national culture, and that its true value can be appreciated only in relation to the fullest possible information regarding is origin, history and traditional setting.”

Data sovereignty defines how data are subject to laws and governance structures depending upon where the data is collected and can represent a key piece to structures of self-governance structures. This definition is further nuanced for data sovereignty as it related to indigenous groups and further dictates indigenous sovereignty as a strategic resource (Rainie et al., 2017) Further to this, Indigenous intellectual property is used to describe intellectual property that is collectively owned, and dictates legal rights to cultural knowledge, cultural heritage, and even extends to facets of intangible cultural heritage. This is seen further outlined within policy in the UN's Declaration on the Rights of Indigenous Peoples (UNDRIP) (Article 31)

Sector policy has explored nuances of the rights of communities to determine what should and shouldn't be digitised. The World Heritage Advisory board defines rights holders, in terms of world heritage as:

> "Actors socially endowed with legal or customary rights with respect to heritage resources. In cases where there are Indigenous people involved, they have the right to free, prior and informed consent before approval of any project affecting their lands or territories and other resources and need to participate in impact assessment."

These ethical considerations for alterative definitions of copyright and IPR can challenge the legalistic view of the concepts of ownership, as mentioned in the previous section, which are found within extant frameworks for assessing long-term digital sustainability of digital outputs – an identified shortfall within the SDRF framework which is used as a data collection method in this research.

Further discussion on the shortfalls of vague wording surrounding copyright and its implications can be found in Chapter 6.

2.6 Conclusion

The review of literature thematically explored dimensions of the digital content lifecycle as they related to considerations for various aspects of developing a framework for digital documentation within extant academic research and broader policy.

This literature review explored research related to facets of technology and digitisation methods, digital conservation and preservation, methods for identifying cultural heritage under threat, heritage sector policy and international standards for best practice, and long-term digital sustainability. It explores how increased utilisation, availability, and pre-emptive documentation methods in the cultural heritage sector can emphasise stakeholder and public access to digitised materials in the context of threat. The research further considered ethical discussions on standardisation and guidelines which was further nuanced within considerations for definition of copyright and intellectual property rights.

Within this review, some of the notable gaps that arose were complexities with definitions of copyright and IPR rights, complexities with implementation of standards and guidelines within the context of threat and how old models may not completely represent ethical dimensions, and a weak translation of heritage policy theory to practice when undertaking documentation due to imprecise language or outdated frameworks. All these limitations have knock on effects to developing, implementing, and using frameworks for long-term digital sustainability.

Accordingly, this research attempts to address these limitations though the critical analysis of several relevant examples of projects that develops or manages digital cultural heritage. The first limitation will be addressed though analysis of a juxtaposition between relevant examples which effectively communicate copyright and IPR with those that do not consider ethical components attached to the digital outputs produced. The second limitation will be addressed though the policy gap analysis, which highlights further gaps within old frameworks, and further considers how this can affect the sector and what can be done with policy to address these shortfalls. The third limitation will be addressed by a critical analysis of the SDRF framework, how its limitations affected the data that was collected, and how future iterations of sustainability frameworks can avoid these points of failure.

Chapter 3—Methodology

This chapter will describe the methodology developed for this project. It will contextualise the research questions, the chosen methods of data collection and analysis for the selected examples. It will also outline the process for selecting these relevant examples. The methodological approach combines three complementary methods to gather information to investigate the primary objective and sub objectives discussed in Chapter 1. These methods provide a broader view of the landscape of digitisation methods of endangered cultural heritage.

The first method is an emergent research design to undertake a literature review, exploring the breadth of the field of digitisation, methods of digitisation, and digital preservation and conservation methods with a focus on long-term digital sustainability. The second method is a "case study analysis" of the examples by applying an adapted criteria-based framework by investigating the digital outputs, methods, project planning and practical digitisation of various examples. This observational analysis of the projects provided the quantitative aspect of this research study. The third method is a policy gap analysis of policy documents related to cultural heritage in general, digitisation of cultural heritage, and responses to threat related to cultural heritage. These three methods ensure that the research is robust, and data driven.

3.1 Positivist paradigm and mixed methodology

To gain a broader understanding of the theme of cultural heritage management in areas of conflict, a mixed methodology was determined to be the proper approach in this context (Humerinta-Peltomäki and Nummela, 2006, McKim, 2015, 203). It was noted that to conduct two different data-gathering methods would increase the amount of time it would take to complete the research project, however, adequate initial planning in the first year of the project left enough time for the process of qualitative and quantitative research in the second year (Creswell & Plano Clark, 2011; McKim, 202). As posited by O'Cathain, Murphy, & Nicholl (2010), more confidence in the overall research results can be expected from a project that utilises multiple data-gathering

methods. In the same vein, examples from multiple regions were analysed to better understand context and scope.

The adoption of several methods is not enough to demonstrate methodological rigour. As Pickard (2013, 10) warns, there can be an erroneous supposition that using a mixed methodology is done to compensate for the failings of one data collection method over another (Giddings and Grant, 2007). However, there is strength in mixed methods; researchers can triangulate data from multiple sources and combine the contexts to develop richer conclusions in relation to their research questions and can derive better inferences when studying phenomena (Jogulu and Pansiri, 2011).

A depth of analysis and generalisations of phenomena was sought to develop a representative view of the field for this project (Payne, 1990, 23). This was determined to be best met by utilising a mixed methodology, using multiple data collection techniques to investigate the objectives. According to Yin (2008, 92) the purpose of this approach can be used "to collect information from multiple sources but aimed at corroborating the same facts or phenomenon." A combination of examples and interviews was planned (though changed) to be used in this thesis to investigate the objectives with the aim that the two methods would complement each other to provide a depth of research (Miles and Huberman, 1994, 267). Considering the mixed methodology approach, this thesis more closely falls under the paradigm of positivist research (Pickard, 2013, 10). This aligns closely to these research goals, which seeks to explore existing integration of digitisation methods of cultural heritage materials, inventories, and historical sites, and further analyse the efficacy of these methods, and build a new framework for future work in the sector.

3.1.1 Interpretivist research

An interpretivist approach to research was also considered, whereby a greater understanding of the meanings of the actions of individuals may be analysed. This would then place the actions of certain groups or professionals within the wider context of threat and response to heritage destruction where further informed inferences could be made (Pickard, 2013,12). Interpretivism can seek

to understand actions in relation to both the macro- and micro-environmental level — bringing a depth and richness to the research (Pickard, 2013,12). The issue that arose in this approach was the concern with only individual contexts, with Dervin (1997, 14) writing that "research can only be particularized and generalization, in the traditional scientific sense, is impossible." The emphasis on generalisation, which is favoured in the positivist paradigm, as well as this project, seeks to show how the selected examples are applicable to a larger idea, and how actions are going to apply to other areas more widely. This limitation could fail to gain a deeper understanding of the examples within the context of a wider field, rather focusing on the individualised complexity of each case study (Cohen, Manion & Morrison, 2011). With the lack of generalisation, the assessments can produce a subjective ontological view (Mack, 2010). As an individual case study is inherently singular, partial, and possibly ad hoc, when analysed together they can overcome these limitations and demonstrate a more widely applicable theory or framework.

While the concept of critical theory, that is, ideologically oriented investigation which examines current thought and social structures (Pickard, 2013, 11) supported by interpretivism, in theory provided a method of interpretation for the investigation of the 16 selected examples. A further limitation as it relates to this project, is that critical theory can be prescriptive and normative; representing inherent difficulties working in the context of conflict where professional practice can be ad hoc (Cohen, Manion & Morrison, 2011, 26; Fay, 1987; Morrison, 1995). To achieve the sub-objective of the research question to propose standards for implementation of digitisation within the cultural heritage sector, wider approaches to this process must be emphasised; individualised ad hoc responses to conflict cannot inform the field. Best practices must be established.

3.2 Choice of examples

When developing this research, different methods of data-collecting instruments had to be assessed for efficacy in investigating the research question and various sub-objectives (Bell 1999,101). An emphasis on the use of examples was selected for this framework to draw on research about several different examples of

processes and procedures of digitisation methods and active digitisation projects and objectives. Further, to demonstrate that the research did not fit into experimental, survey or historical methods (Burns, 2000, 458). Utilising a mixed methodology in this research project allows for the integration of both quantitative and qualitative data, and through examples can provide a more thorough analysis and observation of the phenomenon at the centre of the thesis (Tellis, 1997). Yin (2008, 23) defines a case study as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used." To define the examples, predominantly instrumental cases were chosen (Stake, 1995) to "examine a certain pattern of behaviour."

In the initial iteration of the research project, the methodology planned to include an in-depth analysis of 4-5 case studies that would be based upon collected interviews from cultural heritage professionals. This methodology ultimately changed to focus on 16 broader examples due to difficulties in securing interviews on the record.

These 16 examples represent a sample of digitisation projects, that undertake digitisation of threated cultural heritage within a discrete region and produce and manage digital outputs. These digital outputs, and the digital infrastructure surrounding them, were analysed for their long-term digital sustainability. By undertaking a sample of examples with a global breadth, this allowed the research to investigate the various actions needed to respond to universal types of threat to analyse what will be most applicable across most circumstances.

The examples looked at many different iterations of threat and conflict, including:

Projects and the threat they address, Table 3.1[13]	
Project name	**Type of threat addressed**
The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project	- Threat of impacts of climatic, geological, or other environmental factors - Threat of looting and loss
The Scottish Ten and (HES) Historic Environment Scotland; Glasgow School of Art	- Threat of natural disaster - Threat of pollution - Threat of impacts of climatic, geological, or other environmental factors - Threat of urbanisation and tourist development
MicroPasts	- Threat of loss of historical authenticity - Threat of important loss of cultural significance
Cymru1900Wales	- Threat of loss of materials due to age of materials, and improper care by current custodians - Threat of important loss of cultural significance
Cypriot digitisation, CADiP	- Threat of previous looting, destruction, loss in the region
Manx National Heritage, Isle of Man Historic Environment	- Threat of impacts of climatic, geological, or other environmental factors
Global Digital Heritage	- Threat of impacts of climatic, geological, or other environmental factors - Threat of outbreak or threat of armed conflict
CyArk	- Full spectrum of 'Ascertained Dangers' and 'Potential Dangers'

[13] Based on categorisations by UNESCO List of World Heritage in Danger: https://whc.unesco.org/en/158/.

Project name	Type of threat addressed
Iraq Mosul Museum, Project Mosul/Rekrei	- Threat of outbreak or threat of armed conflict - Threat of serious deterioration of materials - Threat of serious deterioration of urban or rural space, or the natural environment - Threat of serious deterioration of structure and/or ornamental features - Threat of loss of historical authenticity - Threat of important loss of cultural significance
#NewPalmyra	- Threat of outbreak or threat of armed conflict - Threat of serious deterioration of materials - Threat of serious deterioration of urban or rural space, or the natural environment - Threat of serious deterioration of structure and/or ornamental features - Threat of loss of historical authenticity - Threat of important loss of cultural significance
Million Image Database/ Institute for Digital Archaeology (IDA)	- Threat of outbreak or threat of armed conflict - Threat of serious deterioration of materials - Threat of serious deterioration of urban or rural space, or the natural environment - Threat of serious deterioration of structure and/or ornamental features - Threat of loss of historical authenticity - Threat of important loss of cultural significance
University of Oxford, EAMENA	- Threat of outbreak or threat of armed conflict - Threat of serious deterioration of materials - Threat of serious deterioration of urban or rural space, or the natural environment - Threat of serious deterioration of structure and/or ornamental features - Threat of loss of historical authenticity - Threat of important loss of cultural significance
Syrian Heritage Archive	- Threat of outbreak or threat of armed conflict - Threat of serious deterioration of materials

	- Threat of serious deterioration of urban or rural space, or the natural environment - Threat of serious deterioration of structure and/or ornamental features - Threat of loss of historical authenticity - Threat of important loss of cultural significance
Project name	**Type of threat addressed**
The International Collection of Digitized Hebrew Manuscripts	- Threat of loss of historical authenticity - Threat of important loss of cultural significance
The Schøyen Collection	- Threat of loss of historical authenticity - Threat of important loss of cultural significance - Threat of contested origin and provenance
Virtual Magic Bowl Archive	- Threat of loss of historical authenticity - Threat of important loss of cultural significance - Threat of contested origin and provenance

3.2.1 Utility and limitations of case studies

Limitations of descriptive examples arise as a research project must begin "with a descriptive theory to support the description of the phenomenon or story" (Zainal, 2007, 3); if it does not provide enough context and establish the rigour with which each case will be analysed, this can prove to be a shortfall as the project unfolds (Yin, 1984, 21; Zaidah, 2007, 3). As Pickard (2013) asserts, "examples are not intended to produce generalizations," an unsought result of a poorly constructed analytical framework. As this research was less focussed on generalising the outcomes of various examples, rather gleaning a better understanding of how processes operate in different environments with differing contexts, this limitation is ultimately mitigated.

3.2.2 Data collection for examples

To determine data collection techniques and a data-gathering plan (Sake, 1995), a survey of literature was conducted with general parameters for research to determine possible candidates for further investigation as examples. When beginning the selection process, a case database was developed in the form of an Excel spreadsheet outlining each case study within its allotted subgroup, those being: practical digitisation examples, practical digitisation examples to demonstrate the scope of technology, and heritage policy documents assessed for gaps. These examples were further analysed by a set of criteria to identify possible issues or limitations of the examples. These criteria can be found in Appendix IV. This initial sample of cases was used to advance the approach to a more focused process of data collection. To explain the reasoning for the choice of criteria, sampling must first be discussed.

3.2.3 Sampling approach for examples

A similar sampling methodology was utilised for each of the three thematic groupings of examples. The choice of approach to the qualitative descriptive sampling was determined by the outlined research goals, those being to gain contextual information about examples and further investigate and analyse the functionality of each (Pickard, 2013, 59–60).

As information-rich cases to describe the phenomena were sought for this research, the method of purposive sampling was used (Patton, 2002, 169; Pickard, 2013, 64). Two approaches arise from these sampling methods; *a priori* sampling and snowball sampling. *A priori* sampling establishes a framework before the sampling begins and snowball sampling "grows" the sample size as the research progresses, maintaining the emergent nature of the research (Pickard, 2013, 64).

Initially, *a priori* criteria sampling was considered, which Pickard (2013, 64) describes as a mix of the two approaches; more structured in scope but does not eliminate the emergent design. For this project, criteria were established to analyse and categorise cases that are placed in a gridded sheet, and each cell needs to be populated and represented. As each Excel sheet was developed for the project, it was not part of the framework to choose one case from each established criterion, but to simply assess strengths and shortfalls in the cases being examined.

The snowball sampling technique was ultimately utilised. Denzin (1978, 89) has defined snowball sampling as a technique to identify a theoretical sample that makes initial contact with key groups, who as a result, indicate further information rich cases, characteristics, and issues to investigate. Seeking to maintain the emergent design of the research, while also embracing the strengths of the snowball sampling, the theoretical sampling approach provided a space where new theories in relation to the generalisations of the phenomena could emerge (Pickard, 2013, 66). Like grounded theory, this approach suggests guidelines for category identification, and classifies related subject matter between the examples.

3.2.4 Practical digitisation, documentation, data-gathering examples

Criteria were developed to establish how effective each case would be to help interrogate the broader research question and sub-objectives. While the act of establishing criteria can vary depending on the type of research paradigm that is undertaken, it is necessary to assess and distinguish research that best fits when

there are so many cases that could be applied. The following criteria were used to assess the effectiveness of digitisation projects:

- Does the project receive funding, and if so, does it take the form of private or government, or crowdsourced resources?
- Does the project support an online platform or a website?
- Is the research undertaken made accessible to the public?
- Does the project have scope for implementation or operation widely?
- Was the catalyst for the formation of the group or project a result of conflict?
- Has the project been recognised for its work; does it have clout on the international stage?
- Does the project work in conjunction or receive support from UNESCO, ICOM, ICOMOS, etc.?
- Is the project collaborative in nature?
- Is there an ease of licensing for the created digital information?
- Does the project actively provide specifics and technical aspects of digitisation processes to the public?

3.2.5 Programmes which produce and host digital repositories

By investigating digitisation initiatives which facilitate, maintain, fund and/or host digital repositories, several aspects related to the long-term digital sustainability of the digital outputs were explored. Making the material available to the widest possible audience via digital access, whether it be open access (like University of Oxford's EAMENA project) or not (like the Republic of Cyprus' STACHEM repository, which requires vetting for use), is an important development for long-term digital sustainability. By having the cultural heritage available in reliable, trusted, evidence-based networks, especially under the context of threat, there is a strong basis for further growth. If there is an emphasis on long-term digital sustainability, there is the potential as well for the digital content to be enriched, added to, or completed over time with the development of new technologies, post conflict work on collections, or securing funding (from governments, NGOs, or otherwise).

When operating in the context of conflict and disaster, what is most important for digital documentation is that it is "good enough", especially considering the near-extinct status of materials, the imminent danger there is for loss or

displacement in the near future. If there is a strong basis to work from, future work can always be done to ameliorate the initial responsive digitisation.

To select these examples of digital repository programmes they were also subjected to vetting by evaluative criteria. The criteria questions used to assess the programmes is outlined as such:

- Does the programme have potential for further growth?[14]
- Does the programme have a long-term sustainability plan?
- Was the applicable technology used developed outside the conflict zone?[15]
- Is the programme part of an international consortium?
- How was the programme founded and where?
- Is it a strategic lead for related projects?
- Does the programme liaison with partners *in situ*?[16]
- What are the types of material content kept in the repository?[17]
- How extensively is the repository disseminated?
- Is it actively disseminated to the public or stakeholders? If not, are there pathways for future dissemination?
- How is provenance managed?
- Does the programme have an existing relationship to policy?

The outlined examples for digital repositories can be found in Appendix IV.

3.2.7 Heritage policy documents assessed for gaps

This research will provide a gap analysis of relevant cultural heritage sector policy documents to assess where there is discontinuity for the protection of digital heritage. To create a new framework for how to address the gaps and integrate proposed policy amendments the following criteria were applied to the selected documents:

- When was the document written and/or subsequently ratified?
- Is the document date current?
- What is the number of ratifications by Member states?

[14] I.e., does it receive government support, forms of funding, is it an international project?
[15] E.g., was it developed in Western European countries, and implemented in the WANA region?
[16] I.e., Partnership agreement)
[17] I.e., digital heritage; material culture; physical objects.

- Where have the document obligations been implemented in legislation?
- Where is the evidence of impact?

A collection of documents with a wide range of inclusive dates was selected to provide a narrative of chronological expansion and improvement in cultural heritage policy. Using the emergent design of the research, as connection and influences between documents arose, it provided more policy documents to explore and expanded the research while also nuancing the emerging gaps.

Initially, the range of documents extended to The Berne Convention for the Protection of Literary and Artistic Works from 1886, the first international agreement governing copyright. However, this wide scope on policy documents detracted from the overarching theme, being so far before the date range for digitisation. More recent agreements governing copyright and intellectual property rights were selected.

1. 1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict
2. 1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property
3. 1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage
4. 1986 UNESCO's Intergovernmental Council Guidelines for the Use of the "Standard Form Concerning Requests for Return or Restitution"
5. 2003 UNESCO Charter on the Preservation of Digital Heritage
6. 2006 London Charter for the Computer-based Visualisation of Cultural Heritage
7. 2008 ICOMOS ENAME Charter for the Interpretation and Presentation of Cultural Heritage Sites
8. 2011 International Principles of Virtual Archaeology the Seville Principles

3.3 Introduction to examples

This research categorises examples into three main themes: Practical digitisation examples; Programmes which produce maintain and/or host digital repositories; and funded digitisation projects with digital outputs.

The study design includes example from all points on the spectrum, from projects with funding security with access to sustainability measures and longer timescales, to projects working on limited to no supplemental funding, lack of practical documentation resources, and limited timescales – in other words, and as I will argue, those undertaking *responsive digitisation*. Examining radically variable starting points to documentation with digital outputs by aggregating examples of best practice will help to provide projects actionable guidelines for building strong foundations that can be continually built on.

Desired funding access would be in perpetuity, however in the current climate, that funding ultimately cannot be guaranteed to this degree of permanence. This study instead borrows language from UK academic contracts to describe continual funding as indefinite.

The examples were selected as well, to represent different models of operation: un-funded, affiliation with higher education institutions or CHIs, or commercial/private operation. Each type of model was not inherently more or less likely to have severe problems, and the examples were not selected for the likelihood of uncovering underlying issues. As will be outlined in the findings in Chapter 6, some examples indeed did present severe issues in long-term sustainability, but they are not representative of the entire sector. Rather they demonstrate a trend.

3.4 Types of digitisation methods from the examples

Initial research on each of the examples focused on answering three core questions:

1. Is the project still active?[18]
2. What was the type of content produced from the digital outputs?
3. What were the general digitisation methods that were used in undertaking the documentation process?

[18] This likely affects the funding status.

The responses and details to the questions are compiled in the following tables. This information was readily available for each of the examples and can be found on dedicated project websites or affiliated webpages from the repositories who host the materials. A general overview of the projects reveals outputs including, but not limited to archaeological sites, texts (books, manuscripts, and documents), 2D artwork (paintings, prints, illustrations), photographs and maps, and born digital content such as 3D models or animations.

Digitisation methods examples, Table 3.2			
Project name	**Digitisation methods**	**Type of outputs (SDRF framework classification)**	**Reason for action**
The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project	Digital scanning, photography	Archaeological site, archive, artefact, book, coin, manuscript, maps, painting, photograph, print or drawing, textile (Documents, images)	Collaborative effort to conserve, catalogue and digitise material sensitive to human interaction
The Scottish Ten and (HES) Historic Environment Scotland; Glasgow School of Art	3D modelling; laser scanning, photogrammetry, high dynamics range photography, structured light scanning, gigapixel imaging, reflectance transformation imaging; multi-station scanning and Global Positioning System (GPS) equipment; underwater sonar; motion capture; infrared thermography	Geo-referenced registered cloud point; 3D images, animations, 3D models (Images, 3D objects and models)	Document sites that have cultural importance; conservation and management for virtual access
MicroPasts	Documentation site; massive online data collection	(Documents, images)	Crowdfunded and crowd-fuelled archaeological research
Cymru1900Wales	Digital archive, community generated content; visualisation	(Documents, images)	Mass digitisation undertaken at NLW; Community-generated content from community workshops

Project name	Digitisation methods	Type of outputs (SDRF framework classification)	Reason for action
Cypriot digitisation, CADiP	Digital scanning, photography	Digitized drawings, photographs, maps (Documents, images)	Response to looting
Manx National Heritage, Isle of Man Historic Environment	Digital scanning, photography	(Images)	Culmination of a four-year project to improve and make heritage sustainable enables access to the historic environment.
Global Digital Heritage	Scanners, FARO Edge Arm; Aerial Photogrammetry and imaging; Photography; 3D printer		Use of virtualisation technology to digitize entire collections, entire museums, and entire archaeological and paleontological landscapes. Makes virtual repositories available, scientific analyses of places, monuments, and collections on a global scale for community engagement with the digital outputs.
CyArk	Laser scanning, 3D visualisation	(3D objects and models)	Founded in response to the 2005 destruction of Bamiyan Buddhas in Afghanistan.

Project name	Digitisation methods	Type of outputs (SDRF framework classification)	Reason for action
Iraq Mosul Museum, Project Mosul/Rekrei	Digital photography, 3D visualisation, photogrammetric reconstruction	(Images, 3D objects and models)	Founded in response to the destruction of cultural heritage in northern Iraq, particularly the destruction of Mosul Museum in 2015.
#NewPalmyra	3D visualisation, photogrammetric reconstruction	(Images, 3D objects and models)	Effort to reconstruct the ancient city of Palmyra as an immersive virtual environment
Million Image Database/ Institute for Digital Archaeology (IDA)	Conventional and stereo photography, interactive virtual reconstruction	(Documents, Images, audio and video, 3D objects and models)	Photograph artifacts that are at risk of being destroyed; images taken before destruction could be used as a detailed visual record to create a reconstruction.
University of Oxford, EAMENA	Satellite imagery, remote sensing archaeology	(Images)	Rapidly record and evaluate the status of the archaeological landscape of the MENA, create an accessible body of data which can be used to target sites in danger and better plan and implement the preservation and protection of that heritage.
Syrian Heritage Archive	Digital photography, Satellite imagery	Geo-referenced photographs, digitised heritage items with metadata (Documents, images)	Provide a basis for reconstruction as well as to build a participatory platform

Project name	Digitisation methods	Type of outputs (SDRF framework classification)	Reason for action

The International Collection of Digitized Hebrew Manuscripts	Digital scanning, photography	Manuscripts (Documents, images)	Open access to all Hebrew manuscripts, on the internet, on computers and on mobile devices
The Schøyen Collection	Digital scanning, photography	Manuscripts (Documents, images)	Provide access to digital surrogates, independently of the physical objects.
Virtual Magic Bowl Archive	Digital scanning, photography	Manuscripts (Documents, images)	Provide an environment that will allow collaborative work on material that is otherwise difficult to access or unavailable

3.5 The study design

When initially considering the method of data-collection during the project, two procedures were considered: a Delphi study and recorded interviews (either via recorded Skype or Zoom interviews or email correspondence). Both methods seek the same information, that is, how the identified gaps from the policy gap analysis have affected procedures within institutions active throughout identified conflict zones as well as how third-party digitisation programmes have sought to address shortfalls in cultural heritage digitisation schemes. The Delphi study (Thorpe and Holt, 2008), through control option feedback and extensive questionnaires the researcher could indeed obtain a reliable consensus from a group of experts and this method is often used in the public sector for policy analysis. This approach was ultimately decided against, as Delphi studies often consist of at least two rounds of questionnaires (Thorpe and Holt, 2008). This would mean that a contact in a possible conflict zone would need to be reliably reached for comment several times, and this, due to possible constraints and demands of working through a "gatekeeper" contact, renders this approach unviable.

Consistent correspondence with contacts operating in the WANA region proved difficult. Initial contact with heritage professionals was facilitated by 'gatekeepers', that is, referral by UK or US-based contacts, either operating in the academic sphere with research interests in the field, or heritage professionals from the discussed regions but who were now operating in a different capacity within the UK. These referrals disseminated information about the research widely amongst professional institutions in Syria and Iraq, however points of contact were largely unsuccessful at returning information related to inquiries for information.

3.6 Data gathering

Acting on Sake's (1995, 64) theory that: "much of what we cannot observe for ourselves has been or is being observed by others," research into the development of an advance plan to undertake interviews of key museum and heritage professionals active within the selected institutions and programmes defined in the examples was developed. This data-gathering process was

determined to be an effective way to fill in missing gaps from case study analysis which may not be comprehensive in scope due to the nature of several of the examples representing geographical areas in sustained periods of conflict. Naturally, this could restrict or severely delay the dissemination of information open to the average researcher. The interviews with museum and heritage professionals sought to analyse how the identified gaps in heritage policy documents affect museum practice, function, and efficacy. Due to the difficulties mentioned previously, the methodology shifted to undertake criteria assessment through an applied framework to fill in the missing gaps in the case study analysis rather than by interviews.

3.6.1 Challenges with interviews

Brown (2001) juxtaposes several advantages and disadvantages of using interviews in a research methodology. Interviews represent a high return rate, include fewer incomplete answers, question and answering order can be better controlled and the dialog can be flexible and allow for follow-up questions (Ibid.). On the other hand, interviews can equate to a large time commitment (Ibid.). The interview process involves detailed planning and scheduling and transcription and coding of the data collected. This can represent several hours of work per interviewee. Dornyei (2007) quantifies this time commitment, suggesting that a one-hour interview may take roughly six to seven hours to transcribe and produce a transcript of fifty pages. Because of this time-consuming process, the researcher may opt for a small-scale study due to time constraints on the project; this difficulty was not relevant in this research project. Brown (2001) also suggests there can be a potential of subconscious bias and a risk of inconsistencies in the data collection process. This liability for perceived bias was also addressed by Brewerton and Millward (2001, 74), noting the possible unreliability of interviews, especially when seeking to draw comparisons between data sets (Pickard, 2013, 44).

An implied shortfall for this research was that it may not be entirely possible to keep all interviewees anonymised in the write-up of the research. This is due to some of the involved institutions being smaller, with a smaller staff; as a result, individual participation in the interview process could possibly be discerned if

the name of an institution is used. The participant was made aware in the informed consent form that there are limits to the promise of anonymity and were given every opportunity to decline the offer to participate in the study or to opt out at any point of the study should they decide that they could not proceed. Due to the disadvantages presented here for the utilisation of interviews as a data collection method, it was paired with the integration of examples in the mixed methodology, as none of the record interviews would be carried out. As Pickard (2013, p. 44) suggests, applying more than one data collection method not only provides a richer data set, but also seeks to overlap with the other methods to enhance the rigour of the evaluation of the three research sub-questions.

Because it was not possible to acquire an adequate sample size of interview on the record to be used in data analysis, any interview that were undertaken were simply used to guide further research. The insights gathered from the off the record interviews were invaluable in developing a better understanding of how professionals in the heritage sector the WANA region.

Due to the inability to carry out interviews as a methodology due to issues with gatekeepers to communication, the planned analysis of 4-5 case studies was substituted for a broader analysis of 17 relevant examples.

3.6.2 Criteria for assessment and digital sustainability framework

To further develop the research, a set of criteria that related to developing a framework for digital sustainability was adapted from the Digital Sustainability Resources Framework (SDRF). By using these adapted criteria to assess how examples operated with the digital lifecycle in mind, modes of best professional practice can be adapted for observed shortfalls within each example. The SDRF was developed as a deliverable for the AHRC-funded Living Legacies 1914-1918 activities surrounding the First World War centenary activities which sought to define a framework and methodology for evaluating the digital sustainability of community-generated content. The framework was developed with the aim of informing policy recommendations surrounding digital sustainability issues in relation to community generated digital content. The framework is similar in

scope to this project, which develops a new framework for undertaking digitisation of cultural heritage in conflict, and therefore can be aptly scaled as an assessment tool. This assessment tool was further used to assess the sustainability of digital documentation by projects supported by the Arcadia Fund, further demonstrating its utility.

The SDRF framework was selected for this research due to its ability to provide an adaptable foundation for a scalable framework that could be nuanced to focus on types of threats to digitised cultural heritage. The SDRF framework was originally designed to, in part, develop a rubric of criteria and metrics to evaluate digital resources for their digital sustainability by collating and analysing other extant frameworks. The SDRF was based on a broader definition of digital sustainability (Konstantelos and Hughes, 2019) and this wider scope aligned with the methodology of this research, which approached sustainability of cultural heritage under many different types of threat.

The SDRF framework also provided some room for expansion of the weighted criteria; when certain criteria were not pertinent to the study, the weighting could be adjusted, yet still meet the 25% Dimension weighting. Future iterations of this framework can also add in new criteria to expand the Dimensions with relative ease, mathematically.

The objectives of using the adapted criteria are similar to those of the SDRF: to review relevant frameworks and methods for assessing digital sustainability and see common practices in the examples; evaluate research methods and analytical tools that facilitate data collection; and to create a rubric of criteria, indicators, and metrics to evaluate to what extent digital resources are sustainable. The aim of application being to develop a better understanding of the global picture of the digital sustainability landscape projects. Investigation of online content, publicly available project reports, websites, and survey of the outputs themselves to populate the adapted SDRF dimensions for data analysis.

3.6.3 Assessment criteria

The assessment criteria of the SDRF are broken down into four Dimensions: Content, Technology, Preservation, and Promotion; each Dimension broken down into further subgroups. For the purposes of this research, the Promotion Dimension is less applicable for assessing projects that are operating under threat as it is unlikely that these aspects can be upheld or prioritised in this context. The aim of applying the SDRF was to better understand the digital sustainability landscape of each of the projects and provide a richer understanding of the examples. This particular methodology was adapted to address specific aspects of projects with a focus on open access digital outputs that are related to digital documentation and preservation of cultural heritage under threat. The data collected from desk research and research of public websites related to the projects was used as the datasets to populate the SDRF Dimensions for data analysis. Taking the established SDRF criteria and metrics for each Dimension, each field was run through the scoring system whereby each metric is given a "score" depending on each reviewed project's adherence to the SDRF sustainability criteria.

The Dimensions and criteria were derived from several extant digital sustainability frameworks illustrated in the following table. There are overlapping entries for the Dimensions, and duplicate criteria entries, but these have been synthesised within the SDRF framework (Konstantelos and Hughes, 2019).

Criteria and SDRF Dimensions derived from relevant sustainability frameworks, Table 3.3[19]		
Sustainability of Digital Outputs from AHRC Resource Enhancement Projects (AHRC)		
	Assessment criteria	Linked SDRF Dimension
Purpose	- Suitability and relevance of content - Contextualisation	Content
Availability and maintenance	- Location of resources - Maintenance plan and responsibility - Availability issues identified	Content
Technical sustainability	- Long-term maintenance of functionality - Technical issues identified	Technology, Preservation
Updating and currency	- Content maintenance - Content updates - Issues identified	Preservation
Value	- Value to audience identified	Content
Usage statistics	- Collection - Findings	Technology
Sustaining our digital future: institutional strategies for digital content		
Current owner	- Collection/resources owner identified	Content
External partners	- External partners names	Content

[19] Konstantelos and Hughes (2019)

	- Involvement in management; agreements	
	Assessment criteria	Linked SDRF Dimension
Ongoing support	- Staff identified - Funding/funder identified	Content
Updates	- Frequency of content updates - Frequency of interface updated	Technology
Preservation	- Metadata used - Preservation formats used - IPR issues defined	Preservation
Impact	- Impact metrics	Technology
Guidelines for sustainable online resources		
Technical characteristics	- Resource type	Content
Maintenance	- Type of organisation responsible	Content
Preservation	- Web harvesting and archiving - Indexed by search engines	Preservation
Quality	- Referrers; content quality - Consistency of quality - Audience identified (user base) - Descriptive metadata - Superfluous material	Preservation

	- Quality of external links - Content typography - Frequency of content updates	
	Assessment criteria	Linked SDRF Dimension
Usage statistics	- Web resource usage statistics collected	Technology
Promotion	- Direct promotion at relevant events - Inclusion of the site URL in print media and promotional materials - Placement of links on cognate websites - Advertising on social media and weblogs - Ability to share/embed resource content via different means - Dedicated social media presence	Promotion
IPR	- Copyright for artefacts identified - Trademarks identified - Terms and conditions available	Preservation
Technical issues	- Type of development platform used - Search engine optimization	Technology
Sustainable web design: Resources for building a cleaner, greener internet		
Findability	- Content search available - Keyword optimization and SEO - Customer friendly 404 error - Broken links	Content

	- 301 permanent redirects	
Performance optimisation	- Google page speed insights - HTTP requests; shared resources	Technology

A range of Indicators, which can be found in Appendix V, were applied to each project's outputs and each metric returns a "score" depending on the project's adherence to the SDRF sustainability criteria. The score reflects how each requirement is met; for example, current status of content types is scored 2 points if the content type is well maintained (i.e., kept in secure storage, archived,), 1 point is awarded if the content is publicly available, but hosted on a website but not maintained in a secure environment, like an institutional repository, 0 is awarded if it is not applicable, and -1 point is given if the content type is not maintained. This range of scores (-1 to +2) applies to all metrics, although not all Dimensions have the same number of metrics. If a field is determined to not be applicable, the maximum possible score for that Dimension is reduced by 2 (i.e., taking away a max of 2 points which within a criteria field, taking the Dimension from 31 total points in Content, to 29, for example).

For this research, this model deviates from this premise for 2 criteria in the Preservation Dimension. In cases where no information was found or available to the public for "On-going support: financial support" and "On-going support: staff support" instead of changing the metrics to "not applicable", causing the percentage for the Dimension to be calculated from a smaller, recalculated number, it was calculated as if they were marked as "No", a negative response. This change was made to reflect the importance of funding streams in the continued life of digital outputs, as informed by relevant literature. The importance for maintained preservation efforts for digital outputs of endangered heritage to ensure the digital lifecycle was the only necessary adaptation for this research.

The criteria "SEO rating"[20] and "Green rating" were also not applicable within this iteration of the adapted framework. All projects within the selected sample would need to have advanced knowledge of the internet landscape and have dedicate resources to analyse user statics. This was determined to be too

[20] A measure of how well the user interface and technical aspects of a website contribute to search engine optimisation.

complicated for projects that may be operating within conflict and had the possibility of skewing SDRF scores globally.

The total sustainability score for each project across the four Dimensions is expressed as a percentage. For the calculation, each Dimension is weighted by 25%, indicating that each Dimension contributes equally to the evaluation. For this thesis, characteristics were removed which do not relate to responsive digitisation (such as developing a social media presence with public engagement). For the purposes of this analysis, the SDRF framework has been followed exactly to the point, rewarding points based on the exact working of each criteria question.

For the purposes of this research, the promotion Dimension Criteria have been noted and added into the sustainability score however in instances of aggravating factors to documentation this Dimension should be overlooked. A self-assessment evaluating long terms digital stability for responsive digitising would be skewed, as it is exceedingly unlikely to score highly on these criteria.

A further breakdown of Dimensions, Criteria, and Indicators can be found in Chapter 5, framing the data collection and data analysis.

3.7 Conclusion

This discussion on methodology introduced the positivist research paradigm, which was used to investigate the research questions, and further broke down case study selection, sampling, and other planned methods for data collection to create a rich dataset. Selection criteria and brief introduction to the examples give context before moving on the data analysis in Chapter 4. Further, the parameters for the use of the SDRF framework was outlined and detailed, including templates for how the data was investigated, how the weighed Excel sheets produce scores, and how these scores relate to assessing long-term digital sustainability.

Chapter 4—Policy Gap Analysis

4.1 Introduction

The following chapter analyses relevant policy documents relating to cultural heritage in conflict and digitisation to assess both how digitised heritage is protected under current frameworks and the efficacy of those protections. Through a policy gap analysis, this chapter defines how digitisation methods are represented in these regulatory documents and identifies shortfalls or single points of failure. This policy gap analysis examines how each policy document addresses the theme of preservation for cultural heritage in conflict. This allows for an examination of how the policy documents have implication for best practice for preservation, and how policy relates to practical situations and to examples of preservation of cultural heritage under threat.

4.2 Documents Discussed

The examples were selected using 5 criteria:

1. When was the document written and/or subsequently ratified?
2. Is the document still in effect?
3. What is the number of ratifications by member states?
4. Where have the document obligations been implemented in legislation?
5. Where is the evidence of impact?

These selection criteria are presented in Table 4.1. The initial scope for policy documents and guidelines to be assessed was larger than the final iteration. Examples which were not analysed beyond initial selection are highlighted in blue in Table 5.3, however their review at this stage further informed the analysis, providing contextual information for the review of literature as well a broader understanding of the wider field of cultural heritage, digitisation, and heritage management and preservation.

Policy Documents selected for in-depth analysis, Table 4.1

Documents for gap analysis	When was it established?	Is it still in effect?	Ratification by states	Scope of implementation
1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict	14 May 1954; Ratified 7 Aug 1956	Supplement in 1999	131 parties; 109 states Parties to the First Protocol. The Second Protocol has 77 states Parties	Defining Cultural Heritage and respect for its effective safeguarding
1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	UNESCO meeting in Paris 12 Oct - 14 Nov 1970; effective 24 April 1972	Updated in 1995 UNIDROIT (still int'l standard)	136 countries have signed the treaty	Partners: European Union; INTERPOL; UNIDROIT; UNODC; WCO; ICOM
1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage	1972; entry into force 17 December 1975	Yes	198	World Heritage List
UNESCO Charter on the Preservation of Digital Heritage	15 October 2003	Yes	Integrate principles within the UN	195 UNESCO member states
The London Charter	2006	Yes (updated in Seville Principles)	Provides guidelines, not a ratifiable document	Standardisation of digitisation practice; paradata

ICOMOS ENAME Charter	16th Gen Assembly, Quebec, 4 October 2008	Yes	9,500 individual members in 144 countries, 110 national committees and 28 international scientific committees	Areas of authenticity, sustainability, and inclusiveness; training
Documents for gap analysis	**When was it established?**	**Is it still in effect?**	**Ratification by states**	**Scope of implementation**
Seville Principles	2011	Yes	Basis in London Charter; not ratifiable	Standardisation of digitisation practice; paradata

Evidence of impact, Table 4.2

Documents for gap analysis:	Evidence of impact/where do we see its effect
1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict	First international treaty that focuses exclusively on the protection of cultural property in armed conflict; established The Committee for the Protection of Cultural Property in the Event of Armed Conflict; Sanctions and individual criminal responsibility
1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	Three main pillars: preventive measures, restitution provisions, and international cooperation; party can seek recovery and assistance for recovery of stolen or illegally imported material
1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage	Proposed World Heritage List
UNESCO Charter on the Preservation of Digital Heritage	Public access to digital heritage; emphasis on preserving born digital collections; develop improved preservation strategies; establishing common standards; legal and institutional frameworks for protection of digital heritage
The London Charter	Defines principles for the use of computer-based visualisation methods in relation to intellectual integrity, reliability, documentation, sustainability, and access
ICOMOS ENAME Charter	Define basic principles of interpretation and preservation as essential components of heritage conservation efforts; establish 7 principles
Seville Principles	Theoretical framework for undertaking computer-based digitisation; cooperation and interdisciplinarity; transparency of documentation and processes; training programmes for specialists

Policy Documents which informed analysis, Table 4.3

Documents for gap analysis	When was it established?	Is it date current?	Ratification by states	Where the rules have been implemented	Evidence of impact/where do we see its effect
Text of the Convention for the Safeguarding of the Intangible Cultural Heritage	17 Oct 2003; Paris	Yes	150 states	Difference between tangible and intangible heritage	Renewed dialogue among communities; intolerance, to grave threats of deterioration, disappearance, and destruction of the intangible cultural heritage, in particular owing to a lack of resources for safeguarding such heritage
AHDS Guides to Good Practice for CAD (2002)	1998-2002	Updated	N/A	Potential user communities are largely unaware of the digital resources available. Making basic information about archaeological archives available can help	Legal frameworks requiring public access to archaeological records exist in both the UK (e.g., PPS5) and US (e.g., 36CFR79); provide information on the best way to create, manage, and document digital material produced during the course of an archaeological project; improves functionality of GIS, CAD and VR.

UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects	Rome 1995	Yes	self-executing; 28 parties	Illicit trafficking; inheritance transfer of ownership	Strengthen the main weaknesses of the 1970 UNESCO; fight the illicit trafficking of cultural property by modifying the buyer's behaviour, obliging him/her to check the legitimacy of their purchase; due diligence and burden of proof; time restriction on repatriation
Documents for gap analysis	**When was it established?**	**Is it date current?**	**Ratification by states**	**Where the rules have been implemented**	**Evidence of impact/where do we see its effect**
UNESCO's Intergovernmental Council Guidelines for the Use of the "Standard Form Concerning Requests for Return or Restitution" of 1986	Jan 1986	Yes	Those pursuant to The Intergovernmental Committee for Promoting the Return of Cultural Property to its Countries of Origin or its Restitution in Case of Illicit Appropriation	Established to promote bilateral negotiations between states' parties	Presents a flexible but comprehensive framework

The policy documents presented in Figure 4.1 and were selected for further consideration because of their explicit focus on cultural heritage within the context of conflict and/or their focus on digitisation methods. If the document suggested an indirect impact on the cultural heritage sector, such as discussing issues of copyright, ownership, and authorship, it was also included. The selection does not represent a comprehensive survey of all potentially relevant policy, however. The goal of this chapter is to survey a sample of the policy landscape with a focus on international instruments that apply to the themes of digitisation and preservation of heritage in conflict or heritage under threat.

A collection of documents with a wide range of promulgation dates was selected to provide a narrative of chronological expansion and improvement in cultural heritage policy. Using the emergent design of the research, as connection and influences between documents arose, it provided more policy documents to explore and expanded the research while also nuancing the emerging gaps.

Initially, the range of documents extended to The Berne Convention for the Protection of Literary and Artistic Works from 1886, the first international agreement governing copyright. However, this wide of a scope on policy documents detracted from the overarching theme, being so far before the date range for digitisation. More recent agreements governing copyright and intellectual property rights were selected.

4.3 Policy Analysis

Each of the following subsections represents an analysis of a single policy document. Each document is evaluated by two criteria:

- How is the policy partially addressing themes of responsive digitisation?
- What are the implications for practice and practical situations considering the identified gaps?

Each document is further considered alongside contextual information about the policy's formulation and focus. This contextual analysis informs the evaluation of the policy, and the documents are considered in chronological order.
These analyses explore how gaps within the policy present issues for responsive digitisation, and digitisation of cultural heritage in conflict.

4.3.1 1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict

The Convention for the Protection of Cultural Property in the Event of Armed Conflict, ratified at The Hague in 1954, was a response to the spoliation[21] seen in the First and Second World Wars by advocating in policy that cultural heritage is of value to all humankind rather than to a select group of individuals. The convention was inspired by earlier recorded principles in the Conventions of The Hague of 1899[22] and of 1907[23] and in the Washington Pact of 15 April 1935[24] (Sandoz, 2000). The overall effectiveness of the 1954 convention was called into question during the Second Gulf War and the War of the former Yugoslavia (Henckaerts, 2010, 27), spurring a review, and ultimately the organisation and implementation of the Second Protocol in 1998[25] (ratified in 1999) which addressed shortfalls in the original document. These deficiencies included: the exception of military, precautionary measures, the system of special protection, individual criminal responsibility and institutional aspects (UNESCO Doc. HC/1999/1, 9 October 1998). States may only become a party to the Second Protocol if they have ratified the 1954 Convention and any amendments must be unanimously voted on by all signatory parties, of which there were 95 at the time. Because of the necessity of unanimity and the unlikelihood of attaining this, the treaty would be an additional protocol that would not amend the 1954 Convention but instead be a supplement to the document and would be ratified on an individual basis by states. Signatory parties to the original 1954 document were not required to additionally ratify the Second Protocol (Henckaerts, 2010, 30).

Enforcement of the convention after becoming a signatory party is obligatory; contracting parties must follow the articles of the agreement. Instances of breaches of this obligation are where we see notable gaps in policy enforcement, though the Second Protocol sought to address this by mandating increased consequences for offending behaviours.

[21] The action of taking goods or property from somewhere by violent means.
[22] Link to convention: https://ihl-databases.icrc.org/ihl/INTRO/150
[23] Link to convention: https://ihl-databases.icrc.org/ihl/INTRO/195
[24] Link to treaty: https://ihl-databases.icrc.org/ihl/INTRO/325?OpenDocument
[25] Link to document: http://www.unesco.org/new/en/culture/themes/armed-conflict-and-heritage/convention-and-protocols/second-protocol/

The 1954 Convention established regulations against the destruction of cultural heritage as a military objective (via Article 15(1)(a)), unless the destruction was classified a military necessity. According to the Impact Assessment for the UK's Ratification of the 1954 Hague Convention, this recognition of the need to address the destruction of cultural heritage in military campaign was partially covered under Article 85(4)(d) of the *First Protocol to the Geneva Conventions 1977* (International Committee of the Red Cross, 1977) as well as via Article 8(2)(b)(ix) of the *Rome Statute of the International Criminal Court 1998* (Rome Statute, 1998; UK Gov, Impact Assessment, 2016).

Further to the Second Protocol, Article 12 *Immunity of cultural property under enhanced protection*, prohibits the use of cultural property that has been classified under enhanced protection or the World Heritage List (UNESCO WHC, 2019) to support a military effort. If this provision is deliberately circumvented, then the State party at fault is liable to criminal sanctions for war crimes. The Second Protocol addresses shortcomings about the limitations regarding the destruction of cultural heritage in military campaigns. Article 15 defines the serious violations that require criminal sanctions if the Convention is breached, including:

> "Making cultural property under enhanced protection the object of attack; using cultural property under enhanced protection or its immediate surroundings in support of military action; extensive destruction or appropriation of cultural property protected under the Convention and the Second Protocol; making cultural property protected under the Convention and the Second Protocol the object of attack; and theft, pillage or misappropriation of, or acts of vandalism directed against, cultural property protected under the Convention."

Article 3 of the 1954 Convention requires states to initiate preparatory measures in times of peace for the safeguarding of cultural property, but the Convention does not detail or suggest what kind of measures should be undertaken. The Second Protocol, however, provides more specific measures in Article 5 such as: the preparation of inventories, the planning of emergency measures for protection against fire or structural collapse, the preparation for the removal of movable cultural property of the provision of adequate *in situ* protection of such property, and the designation of competent authorities responsible for the safeguarding of cultural property (Second Protocol, Article 5).

How is the policy partially addressing themes of responsive digitisation?

The Second Protocol was adapted when foundational processes of digitisation technology, such as databases, were being developed. Article 29(b) of the Second Protocol also suggests a fund to be established for assistance in support of preparatory measures, but the proposal of compulsory contributions was ultimately rejected (Henckaerts, 2010). A similar fund was also proposed in the 1972 Paris Convention in Article 15; a *Fund for the Protection of the World Cultural and Natural Heritage of Outstanding Universal Value*, called "the World Heritage Fund." Due to the high overhead costs of digitisation, such a fund with likely mandatory contributions could allow for use of technology within the cultural heritage sector for pre-emptive preservation of cultural heritage in conflict. This can help to address instances of responsive digitisation more clearly.

There is often a discrepancy in understanding the differences between general and enhanced protection, terms used within the convention. (Henckaerts, 2010, 45). The enhanced protection regime implemented by the Protocol could provide another area for defining the value of digitisation. Should a heritage site fall under this category, and, as such be protected by preparatory measures already specified under a document similarly compiled, Article 5, digitisation could become a recommended or mandatory measure.[26]

What are the implications for practice and practical situations considering the identified gaps?

States party to the Convention are not uniformly distributed geographically, and states have also been slow to ratify. Due to the slow adaptation of primary and secondary legislation[27] to adhere to the required criminal offences for serious

[26] The criteria for the classification of enhanced protection, which are stated as the following in Article 10: It is a cultural heritage of the greatest importance for humanity; It is protected by adequate domestic legal and administrative measures recognising its exceptional cultural and historic value and ensuring the highest level of protection; and It is not used for military purposes or to shield military sites and a declaration has been made by the Party which has control over the cultural property, confirming that it will not be so used.

[27] Primary legislation is an act that has been passed by the Parliament. Secondary legislation can make small changes to an act.

violations of the Convention, State Parties intervention in conflict areas has been hindered (UK Gov, Impact Assessment, 2016).

Because the first Protocol was established before the development of digital technology, the provisions for these processes are not explicitly stated, though there are sections within the text where this could have been situated, particularly where recommendations for types of pre-emptive protective measures are introduced (Article 5 (a-g)). A future framework using the foundational text from these articles could more aptly address the missing provisions for pre-emptive digitisation of cultural heritage in conflict. There are several sections in the text that can be considered to include and apply (if not explicitly) digitisation now that it exists, but that the development of supplementary guidelines about how the digitisation should be considered given the existing Hague Convention and protocols would be useful in clarifying gaps.

There is an inherent difficulty in making policy and standards 'enforceable' within professional practice in the cultural heritage sector, especially within the context of conflict. Due to the difficulties of developing procedure during times of ongoing conflict, and the breaches of obligation due to conflict, programmes that focus on implementing pre-emptive digitisation of museum inventories, collections, and tangible and intangible cultural heritage and the subsequent publication of this information in a public sense, i.e., the form of interactive maps of digital repositories could show the value of digitisation in these regions. These are procedures seen in projects like EAMENA.

The overarching gaps for responsive digitisation within this document are: policy that largely predates digitisation, policy that is not enforceable (Second Protocol), and policy that is non-binding.

4.3.2 1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property

The *1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property* was drafted as

an extension of the *1964 Venice Charter for the Conservation and Restoration of Monuments and Sites*[28] to address shortfalls in the protection of cultural heritage, and to facilitate international collaboration in this area. The convention outlined and defined certain actions and terminology where there had previously been a gap in standardised vocabulary.

The 1970 Convention is not retroactive. While firmly establishing the need for provenance in all transfers of cultural heritage materials after ratification in 1970, movement of materials before this date fell into a grey area where proper scrutiny into provenance and history of ownership could not be implemented and fully explored. By stating that the Convention does not discount trade that could be illicit, having taken place before the ratification of the Convention by UNESCO, it leaves no room for interpretation that the obligations against illicit trafficking are negotiable.

How is the policy partially addressing themes of responsive digitisation?
This was a revolutionary document at its inception, but it does predate digitisation processes, and therefore does not directly or indirectly address the role of these types of technologies and documentation methods.

The Convention requires states parties to take actions in three main fields: preventative measures; restitution provisions; and international cooperation frameworks. These preventative measures reflect pre-emptive documentation and protection of cultural heritage materials, but partially addresses measures to avoid responsive digitisation. The pre-emptive measures include inventories; export certificates; monitoring of trade; imposition of penal or administrative sanctions, and educational campaign. All these provisions help to avoid instances of responsive digitisation but due to the implementation in an era before digitisation emerged, this is an obvious gap.

Some signatory states have neglected to pass legislation implementing the obligations of the Convention into national law. Thus, the Convention is not

[28] Link to Convention: https://www.icomos.org/charters/venice_e.pdf

effectively enforceable in domestic courts (Peters, 2011, 90), with Siehr (2005, 1077), asserting that the UNESCO Convention effectively "does not work properly."

What are the implications for practice and practical situations considering the identified gaps?

Due to the legislation being implemented before the adaptation of relevant types of digital technologies that could be used in place of physical restitutions, there is obviously a marked gap in the document's scope. This leaves the concept of digital documentation without a pigeon-hole to easily fit into a similar document or framework.

The overarching gaps for responsive digitisation within this document are policy that predates digitisation and lack of enforceability.

4.3.3 1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage

The Paris Convention Concerning the Protection of the World Cultural and Natural Heritage of 1972 was developed over a seven-year period (1965–1972), coming into force in 1975. One aspect of the convention was to facilitate the International Register of Cultural Property under Special Protection (outlined in the Second Protocol of the 1954 Hague Convention). The Convention manages immovable cultural heritage, such as monuments, groups of buildings and special sites of archaeological interest (Article 1). Article 11(2) establishes the World Heritage List which are determined to be of "outstanding universal value", pursuant to the definitions of 'Cultural Property' in Articles 1 and 2. In cases of ongoing conflict, among other threats, there is the "List of World Heritage in Danger," which includes an approximation of overhead costs to cover the expenditures for displacing the movable heritage or implementing protective measures.

With 193 signatory parties that have ratified the convention, this is one of the most widely recognised international agreements related to cultural heritage and has the largest scope for the public dissemination of information. The World

Heritage List provides a collated collection of heritage to be protected due to its cultural significance. By assembling such a repository of information which outlines in explicit criteria the cultural significance of cultural heritage materials and sites, with its availability and dissemination to the public, it is an apt tool for bringing attention to vulnerable movable and immovable heritage.

How is the policy partially addressing themes of responsive digitisation?
The primary disadvantage for this convention, within the context of digitisation, is its age. It was developed before modern digitisation practices. The frameworks it was built upon, within this context, are now outdated.

What are the implications for practice and practical situations considering the identified gaps?
Digitisation projects which highlight creating publicly accessible databases, with some ad hoc actions in response to conflict, show the importance of the creation of information repositories as well as the necessity of standardisation of guidelines and terminology and international cooperation. This is discussed further in Chapters 5 and 6. Due to the scope and reach in relation to the number of signatory parties that have ratified the document, this potential must not be overlooked.

Analysis by ICOMOS in 2004 determined that there were gaps in the uptake of the World Heritage List. The reasons for these gaps fell into two categories:

1. Structural – relating to the nomination process for the Heritage List and the management of protecting the historical properties, and
2. Qualitative – relating to the way properties are identified, assessed, and evaluated.[29]

The results of the analysis indicate that an action plan to incentivise states parties to undertake an evaluation of historical properties should be introduced. This action plan would evaluate potential target sites for the Heritage List as

[29] The World Heritage List: Filling the Gaps - an Action Plan for the Future An Analysis by ICOMOS February 2004

well as evaluate financial resources available to the States Parties to undertake the mitigating actions. The action plan further suggests:

> "…that strong partnerships will be needed between States Parties, the World Heritage Centre and the Advisory Bodies, linked to well-structured programmes with well-defined outcomes in order to allow States Parties to contribute to the development of a World Heritage List that may better reflect the cultural identity, significances and relevance of properties in defined regions of the world."

This lack of uptake of the Heritage List by states parties highlights the gap in of enforceability for this policy. The pre-emptive documentation of heritage sites of strong cultural importance can serve as an apt tool for preservation should these sites experience conflict, loss, displacement, or other imminent dangers. This kind of documentation is a good mitigating action against responsive digitisation in theory, but in practice, there have been lapses in uptake.

The overarching gaps for responsive digitisation within this document are: policy that predates digitisation and lack of enforceability.

4.3.4 2003 UNESCO Charter on the Preservation of Digital Heritage

Established in 2003, the *Charter on the Preservation of Digital Heritage* was created with the goal of promoting the safeguarding of cultural heritage through digitisation projects and establishing a published list of guidelines for these processes. The Charter classifies digital heritage as a common heritage, as valuable as tangible haptic objects, and as worthy of efforts of conservation, particularly in cases of "born digital" resources, whereby no analogue equivalent of the materials exist. The Charter is a response to the earlier gaps in frameworks for undertaking digitisation of materials. It addresses guarding against the loss of heritage, developing strategies in response to older policy frameworks and obligations of states parties for the preservation of its digital cultural heritage.

Article 3 of the Charter recognises that technology has augmented in efficiency, and frameworks for methods for preservation of these digitally created materials have proven lacking. With rapidly recorded information and a lack of standards

in procedure, the information is in threat of inadequate conservation, i.e., not addressing 'bit rot' or data degradation due to software rot or means for adequate public dissemination of information is not available, as elaborated in Article 2. It addresses the issue that the cost of such technologies is high, and some governments have not been able to develop a means for its maintenance. With these reservations in mind, the Charter (UNESCO, 2003) asserts that

> "Member states will benefit by encouraging legal, economic, and technical measures to safeguard the heritage. Awareness-raising and advocacy is urgent, alerting policy-makers and sensitizing the general public to both the potential of the digital media and the practicalities of preservation."

To protect digital heritage, legal and institutional frameworks should be developed. This gives an opportunity for the development and implementation of an internationally recognised series of standards of good practice to undertake digitisation, and the Charter's tie to UNESCO provides it weight in that it could serve as a reference point not only for Member states, but also relevant intergovernmental and international non-governmental organisations.

How is the policy partially addressing themes of responsive digitisation?

The Charter is overall very successful at addressing themes of digitisation which are also applicable to responsive digitisation. The theme of conflict is only partially addressed here, however. Several themes can tangentially be applied and related to conflict, or pre-emptive, mitigating actions related to conflict. These areas are highlighted in Article 12:

a) Takes the principles set forth in this Charter into account in the functioning of its programmes and promote their implementation within the United Nations system and by intergovernmental and international non-governmental organizations concerned with the preservation of the digital heritage,
b) Serve as a reference point and a forum where Member States, intergovernmental and international non-governmental organizations, civil society, and the private sector may join together in elaborating objectives, policies and projects in favour of the preservation of the digital heritage,
c) Foster cooperation, awareness-raising, and capacity-building, and propose standard ethical, legal, and technical guidelines, to support the preservation of the digital heritage,
d) Determine, on the basis of the experience gained over the next six years in implementing the present Charter and the Guidelines, whether there is

> a need for further standard-setting instruments for the promotion and preservation of the digital heritage.

Collaboration on defining objectives, raising awareness, standardising ethical, legal, and technical guidelines, and determining best practice of implementation of these guidelines all help to incentivise the use of such guidelines and can help to deter instances of responsive digitisation. However, an explicit application of conflict in this context is missing.

What are the implications for practice and practical situations considering the identified gaps?

If this Charter were to prove easier to implement, then it would have the scope to greatly affect institutional practice. To show the implication of an enforceable set of guidelines, examples that elaborate on widespread digitisation, such as a region or country-wide project that emphasises public dissemination of this digital information can be used to show shortfall for not having a standardised practice, but also the successes within those projects.

While this document is well intentioned and provides an onus for the creation of new frameworks for digitisation, it is lacking in enforceability. There are no protocols nor obligations of the UNESCO Member states to assimilate these ideas into their own institutional practice. While advocating for the implementation of new digitisation frameworks, the Charter does not continue to provide examples as to how the Member states could begin to implement them, or how they might more effectively utilise existing technologies.

A lack of standardisation in procedures is common in policy documents until this point. Though later documents, such as the *London Charter* in 2006 and the subsequent *Seville Principles* in 2009 would seek to address this issue.

The overarching gaps for responsive digitisation within this document are: no pathway to implementation, policy that is not enforceable, and no accountability for implementation.

4.3.5 2006 The London Charter for the Computer-based Visualisation of Cultural Heritage

Introduced in 2006, the *London Charter for the Computer-based Visualisation of Cultural Heritage* represents the desire to establish, through policy, an assurance of methodological rigour for computer-based visualisation by laying groundwork for methods of communication and dissemination of digital cultural heritage for heritage professionals and non-specialists alike (Denard, 2012). The preamble evokes the AHDS Guides to Good Practice for CAD (2002) and Virtual Reality (2002) and initiatives, including the Virtual Archaeology Special Interest Group (VASIG) and the Cultural Virtual Reality Organisation (CVRO) as examples for methodological accuracy and intellectual transparency for computer-based visualisation methods and subsequent dissemination of the created digital material (Beacham, Denard and Niccolucci, 2006). Effectively communicating paradata and maintaining transparency in a visualisation provides the obligation and onus for the London Charter. Addressed in the preamble, heritage visualisations "should accurately convey to users the status of the knowledge that they represent, such as distinctions between evidence and hypothesis, and between different levels of probability".

Methodologies addressed in the principles of the Charter are fundamental in nature to account for the continued augmentation of technologies and technological standards so that the obligations remain relevant in various contexts. Especially relevant in the last decade since its initial implementation are virtual reality (VR) and augmented reality (AR) platforms, more advanced photogrammetric software, and scanning hardware have entered the cultural heritage sector and methods of visualisation must maintain high standards for preservation and dissemination (Mason, 2019).

Denard writes that if the Charter is accepted and, "if adhered to, [it] would virtually guarantee the methodological integrity of a heritage visualization protect and act as a common yardstick for professional evaluation…" (Denard, 2012, 61). The Charter has also received praise within the EU, with Franco Niccolucci of the EU EPOCH Network of Excellence, a project comprised of +90 international groups of heritage professionals, positing that "EPOCH considers

The London Charter to be one of its most important achievements," further adding that "after several years of theoretical debate on this issue, the Charter finally proposes robust and authoritative guidelines for this important interdisciplinary subject" (European Commission EPOCH, 2019). This praise demonstrates the scope of the document as an international set of guidelines, as well as its importance for the heritage sector. By further developing the theoretical arguments for cultivating new frameworks for undertaking digitisation projects, of the Charter addresses some of the main gaps in prior policy regarding digital heritage.

How is the policy partially addressing themes of responsive digitisation?

Like the 2003 UNESCO Charter for Digital Preservation, the London Charter is overall successful at addressing themes of digitisation which are also applicable to responsive digitisation. Further, the theme of conflict is partially addressed in this instance, as well. The objectives of the Charter can help to provide guidelines for pre-emptive measures to address digitisation in conflict. To do so the Charter can:

1. Provide a benchmark having widespread recognition among stakeholders.
2. Promote intellectual and technical rigour in such uses.
3. Ensure that computer-based visualisation processes and outcomes can be properly understood and evaluated by users
4. Enable computer-based visualisation authoritatively to contribute to the study, interpretation, and management of cultural heritage assets.
5. Ensure access and sustainability strategies are determined and applied.
6. Offer a robust foundation upon which communities of practice can build detailed London Charter Implementation Guidelines.[30]

Several themes are tangentially be related to how to pre-emptively avoid responsive digitisation but are not explicitly related within the text. Extrapolation and adaptation of these guidelines would be needed to address digitisation of cultural heritage in conflict.

What are the implications for practice and practical situations considering the identified gaps?

[30] Link to Charter objectives: https://www.londoncharter.org/objectives.html

Denard (2012) believes that the Charter can act as a catalyst for establishing a *de facto* benchmark for heritage visualisation procedures and through international consensus on best practice. While the scope of the Charter is wide, the enforceability of its obligations seem lacking as the policy document is not ratifiable, representing only guidelines for good practice. The London Charter is not an enforceable document, and as such does not have the purview to fundamentally update any working frameworks for digitisation within the cultural heritage sector. It is flexible in nature, therefore more applicable to several different institution types, and provides guidelines for good practice.

The overarching gaps for responsive digitisation within this document are: no pathway to implementation, policy that is not enforceable, and no accountability for implementation.

4.3.6 2008 ICOMOS ENAME Charter for the Interpretation and Presentation of Cultural Heritage Sites

The ICOMOS ENAME Charter builds upon the *1964 Venice Charter for the Conservation and Restoration of Monuments and Sites* and its suggestion for standardisation of preservation methods. The 1964 document[31] posits that, "It is essential that the principles guiding the preservation and restoration of ancient buildings should be agreed and be laid down on an international basis, with each country being responsible for applying the plan within the framework of its own culture and tradition." These standardised principles for international guidelines provided the foundation for the purpose of the Charter which is: "to define the basic principles of Interpretation and Presentation as essential components of heritage conservation efforts and as a means for enhancing public appreciation and understanding of cultural heritage sites."

Ratified in 2008 by the ICOMOS General Assembly, the Charter was introduced as a response to earlier ICOMOS charters which included inconsistent terminology and lacked a systematic approach for more efficient public access, sustainability, and inclusiveness (Silberman, 2009, 7). The ENAME Charter

[31] Link to Charter: https://www.icomos.org/en/participer/179-articles-en-francais/ressources/charters-and-standards/157-the-venice-charter

produced seven “cardinal” principles by which the ideas of “Interpretation” and “presentation” should be based to ensure successful transparency and communication between professionals and the public. The principals are Access and Understanding; Information Sources; Attention to Setting and Context; Preservation of Authenticity; Planning for Sustainability; Concern for Inclusiveness; and Importance of Research, Training, and Evaluation. These cardinal principles align well with the Digital Content Lifecycle model and can be adapted to long-term digital sustainability.

While public access to a heritage site in a physical format is desired, this is not always feasible due to concerns of conservation, cultural sensitivities, adaptive reuse, or safety issues outlined in Principle 1.6. However, access to these sites must still be maintained in a remote sense as the public has a right to significant cultural sites. Silberman (2009, 9) posits the Charter provides an opportunity to address the issue of interpretive access and place it within the international heritage agenda. By dealing with cultural heritage of a non-tangible nature, as a precedent Silberman (2009) evokes *the 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage*, where in the same manner that historical knowledge is protected as intangible cultural heritage, interpretive digital alternative methods and processes are adequately protected within policy.

Principle 3 of the Charter recalls the *1972 UNESCO Convention’s* methods of protecting newly listed World Heritage Sites, notably including the surrounding area of sites within its interpretation, brought attention and recognition to immovable cultural heritage.

How is the policy partially addressing themes of responsive digitisation?
This Charter is aptly applied to cases of large-scale digitisation projects and how the information can be distributed to all stakeholders. Like the other digitisation-based charters, the seven previously mentioned main principles of the ENAME Charter can provide an apt framework that would address responsive digitisation. Of particular interest of these themes is how to disseminate the information to groups situated in conflict, and how it can be sustainably and

effectively presented to these groups. This user and stakeholder access is important for the post-conflict environment but does not explicitly address how this can be undertaken in conflict.

What are the implications for practice and practical situations considering the identified gaps?

This document certainly provides a basis for the case of standardisation of terminology and practices for the interpretation of digital cultural heritage to help bridge the gap between user and heritage professional. However, the document lacks provisions for enforceability. As it exists now, institutions do not have an onus to adopt the use of the cardinal principles and recommendation remain endorsements rather than standards.

The overarching gaps for responsive digitisation within this document are: no pathway to implementation, policy that is not enforceable, and no accountability for implementation.

4.3.7 2011 International Principles of Virtual Archaeology the Seville Principles

Addressing shortfalls in *London Charter*, the *Seville Principles* were developed in 2011 "to increase the conditions of applicability of The London Charter in order to improve its implementation specifically in the field of archaeological heritage, including industrial archaeological heritage, simplifying and organising its bases sequentially, while at the same time offering new recommendations taking into account the specific nature of archaeological heritage in relation to cultural heritage"

How is the policy partially addressing themes of responsive digitisation?

The same shortfalls in addressing cultural heritage in conflict remain from the London Charter, though there is an increased level of consideration for difficult to access heritage in Principle 3.3:

> "Nevertheless, computer-based visualisations might be an alternative approach when original archaeological remains have been destroyed (e.g., due to the construction of large infrastructures), are placed in areas with

> difficult accessibility (e.g., without roads) or at risk of deterioration due to the huge influx of tourists (e.g., rock paintings)."

This point begins to unpack issues of loss or inaccessibility, and therefor alternative methods for documentation are needed, however the scope is not wide enough to adequately address responsive digitisation.

What are the implications for practice and practical situations considering the identified gaps?

Again, the implications of the London Charter, and indeed through the updates of the Seville Principles, the onus for developing a new framework and methodology for digitisation and display is a positive step for professional practice. It is inherently needed in policy, especially if it's going to be used to advocate for the implementation of increased pre-emptive measures, or facilitate digitisation undertaken in times of conflict, where to ensure preservation of created digital information. However, at present, like the London Charter, the Seville Principles is not a ratifiable document.

The overarching gaps for responsive digitisation within this document are: no pathway to implementation, policy that is not enforceable, and no accountability for implementation.

4.4 Wider impacts for the sector

The gap analysis highlighted several common themes across sector policy, which are compiled in Table 4.4.

Compiled findings from gap analysis, Table 4.4	
Policy Document	**Identified Gaps**
1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict	Policy that largely predates digitisation Policy that is not enforceable (Second Protocol) Policy that is non-binding
Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	Policy that predates digitisation Lack of enforceability
1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage	Policy that predates digitisation Lack of enforceability
2003 UNESCO Charter on the Preservation of Digital Heritage	No pathway to implementation Policy that is not enforceable No accountability for implementation
2006 The London Charter for the Computer-based Visualisation of Cultural Heritage	No pathway to implementation Policy that is not enforceable No accountability for implementation
2008 ICOMOS ENAME Charter for the Interpretation and Presentation of Cultural Heritage Sites	No pathway to implementation Policy that is not enforceable No accountability for implementation
2011 International Principles of Virtual Archaeology the Seville Principles	No pathway to implementation Policy that is not enforceable No accountability for implementation

The most common limitation across the gap analysis was that policy was not legally enforceable whereby signatory states have not, or did not have the purview, to implement obligations of conventions into national law. Or similarly,

the framework proposed represented good practice guidelines, but not enforceable standards.

This does not suggest that sector policy does not work properly, but rather highlights a need for alternative incentivisation methods for widespread use and implementation, and a redevelopment of the concept of enforceability within policy. Guidelines for best practice, as seen in the London Charter and the Seville Principles cannot be enforceable, especially within the context of responsive digitisation, but they can become industry standards.

Some methods for framework popularisation can include:

- Incentivising compliance,
- Provide resources which outweigh the perceived difficulties of following the frameworks,
- Adding an outreach supplement to the guidelines,
- Popularisation components with and educative effect, i.e., if undertaking these guidelines would gain support of CHIs or intergovernmental groups like ICROM or the DPC,
- Investigating how to integrate the framework into pre-existing professional networks[32]

To what extent should we be paying attention to international treaties?

International treaties and national and international standards seek to develop and maintain a common set of principles that address the global nature of preservation, documentation, and conservation activities. These types of policy documents aren't seeking prescriptive, finite solutions to overarching issues as it has already been noted that the idea of "enforceability" is inexact in the context of heritage policy. The documents rather aid in providing a common framework that has flexibility based on individual context.

[32] An example of pre-existing professional networks could include: SAA (Society for American Archaeology) digital training lectures or V&A Culture in Crisis teaching toolkits that are available to be disseminated.

These documents also represent the effort of sector professionals to identify the minutia of very complicated problems. The treaties further represent the mitigating actions that authorities have collectively agreed on to be applicable in the wider scale for signatory states, or for practitioners. While the policy gap analysis has highlighted areas where the selected documents partially address digital cultural heritage, they represent foundational texts that can be used as templates for future iterations that build upon the latest agreed upon best practice.

What policy document should come next?

Since the 2011 Seville Principles, there has been further work related to the preservation of digital heritage. The 2015 Recommendation Concerning the Preservation of, and Access to, Documentary Heritage Including in Digital Form[33] directly builds upon the UNESCO Charter on the Preservation of Digital Heritage and addresses technical and strategic issues that arise with the preservation of documentary heritage (Hu, 2018). The Recommendation document provides practical points for mitigating action to address issues in preservation that can be used by governments, archives, libraries, museums, and practitioners. These actions are broken down thematically, by:

- Identification of documentary heritage at risk
- Preservation
- Access
- Policy Measures
- National and International Cooperation

This recommendation builds where previous documents have not adequately addressed issues of access highlighting that visible evidence of mitigating issues is an avenue to justify public expenditure on preservation, stating, “there is no point in preservation unless it leads to access” (UNESCO, 2015).

[33] Link to Recommendation: https://www.unesco.org/sites/default/files/medias/files/2021/12/2015_mow_recommendation_implementation_guidelines_en.pdf?TSPD_101_R0=080713870fab20004c60fd2d1c2ca3e146e33cfb52399e9c9e09ce2a02878b7c814a99ebda9cb49a08353968281430000cec713b2dd2b130a355e92faed5b49738056c6cdc49e93e9bbdb4574c9828b85307afce3c9fdbe7ee0119395fb00902

Future iterations of heritage sector policy can draw from previous policy documents to collate and further nuance positive aspects that may not have been as successful or implemented as well in the past. Based on the policy gap analysis, a future policy document may:

- Include avenues for resources (fiscal or otherwise) to be made available for assistance to support preparatory measures,
- Include pathways for independently maintaining, or adding to, records of cultural heritage that are under threat,
- Include outlined measure for preparatory measures during times of peace, or pre-emptive measures for other types of threat,
- Encourage legal, economic, and technical measures to safeguard heritage,
- Serve as a reference point for standards of good practice for digitisation.

4.5 Conclusion and identified gaps

By analysing this selection of policy documents and guidelines for professional practice, points where the themes of digitisation within the context of conflict fall through the gaps can be identified. These gaps in policy include:

- Policy that is non-binding,
- Policy proposals that have no pathway to implementation,
- Policy that remains unpopular with signatory states or parties,
- Lack of standardisation within policy of best practice for digitisation methods to be undertaken,
- Policy that is out of date,
- Policy that is not enforceable,
- Policy that neglects the difficulties in dissemination of any digital outputs to stakeholders in conflict,
- Unresolved issues of intellectual property and control,
- Policy that predates digitisation/old frameworks that don't work well
- No accountability for policy implementation

These documents highlight some of the core gaps in the existing templates for digitisation of cultural heritage materials in conflict. It is not feasible nor practicable to propose changes to any existing policy documents, especially regarding cultural heritage in conflict. Material can be lost due to the protracted

timescale that would be required for such action. Gaps that have been identified here represent inherent difficulties in adapting policy and guidelines which can be flexible and scalable to encompass the needs of responsive digitisation.

Chapter 5—Use of Digitisation Methods in Response to Cultural Heritage under Threat

5.1 Introduction

This chapter identifies predominant considerations for using digitisation methods for preservation, by utilising the SDRF Digital Sustainability Framework to identify the relative success of several project in terms of long-term digital sustainability. For this reason, it will focus upon analysing digitisation projects that have produced digital outputs as a method of preservation for cultural heritage in conflict.

Each case study has been allocated its own subsection which presents the findings from the SDRF digital sustainability framework, including the SDRF weighted Excel sheet which produces a sustainability score out of 100 — a numerical representation of the relative success of the project in this context. Finally, the chapter concludes by investigating the difficulties inherent in the methods' use by using examples that arose from the examples.

While the previous section explored digitisation in contexts where conflict related pressures were not an issue, this second section will further investigate digitisation projects that have produced digital outputs as a method of preservation for cultural heritage in conflict. It will analyse digitisation methods of digitisation, exploring the use of methods such as digitisation of inventories, creation of publicly accessible databases, use of photogrammetry, virtual and augmented reality, and 3D recreated spaces and environments. Considering the difference and similarities between these two corpuses of cases allows for the querying of long-term digital sustainability as the environment for undertaking digitisation of endangered cultural heritage is under present threat.

The following examples encompass advance documentation techniques, which would likely not be in scope for responsive digitisation, but also focus on documentation initiatives that use simple digital photography or document

scanning to produce digital outputs. This is foundation that can be built upon with further funding, partner involvement, or other insertion of resources.

5.2 Data Collection Strategy

To investigate how projects with digital outputs manage the issue of long-term digital sustainability, several examples with varying funding levels, content types, and digitisation and preservation methods were examined by filling out a series of template criteria. The questions used to investigate the examples will be referred to as the "questionnaire".

The guidelines were used in the final report for the Living Legacies project which outlined the Sustainability of Digital Resources Framework, and concurrently informed this project.[34] The SDRF framework structure is organised by Dimensions, Criteria, and Indicators. Dimensions are the highest-level entities in the framework and represent the four main areas for digital sustainability: Content, Technology, Preservation, and Promotion. The Criteria describe the factors that affect the sustainability of a Dimension. Each Criterion comprises several Indicators, which provide a measure of digital sustainability in a numerical value.

The following table breaks down the stratification of the Dimensions, Criteria, and Indicators. The SDRF framework has indicated which elements are mandatory and optional: All four Dimensions must be assessed with this framework and every Criterion should be assessed. There are some cases wherein a Criterion or Criteria are not applicable to a project, in which case these can be omitted so long as the reason for omission is specified. One Indicator per Criterion should be selected; there is one Criteria which can have multiple selections,[35] but this does not skew the weighting.

[34] Link to report: http://eprints.gla.ac.uk/213438/

[35] The Criteria: Quality — Is the digital content produced by the project accessible to the community, has three possible positive answers which could all be concurrently selected: 'Yes, at a physical location'; 'Yes, through a dedicated project website'; 'Yes, via a digital repository or digital archive'

Dimensions, Criteria, and Indicator breakdown, Table 5.1[36]		
Dimensions	Criteria	Indicators
Content	Currency	- Status of the project
	Content	- Documents (text, spreadsheets, etc.) - Images and Photographs - Audio and video materials - 3D objects and models - Website/web pages
	Relevance	- Project objectives - The audience for which the digital content has been developed - The value that the digital content aims to provide to the community
	Authority	- Details of the organisation responsible for content development - Information about the ownership of the digital content - Information about external stakeholders and partners that have been involved in its development and maintenance - Details of the source/body that has funded content development - Information about support for community members requiring assistance with the digital content
	Quality	- Is the digital content produced by the project accessible to the community?
Technology	Implementation and development	- Does the project use open technologies for web-based digital outputs?

[36] Konstantelos and Hughes, 2019.

	Best Practice	- Is the project's digital content harvested and archived by a digital repository or archive?
Dimensions	Criteria	Indicators
Preservation	Ongoing Support	- Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project? - Has the project identified/secured staff resources for ongoing support with digital content?
	Best Practice	- Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content? - Does the project use sustainable file formats for storing digital outputs?
	IPR	- Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term? - Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Promotion	Promotion	- Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows - Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters - Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content

The questionnaire used to assess each project comprises twenty questions which specify the Criteria as well as the indicators for each question. The grouped answers are then input into a weighted Excel sheet, with one sheet created for each respective project, to calculate answers based on the sustainability Dimension they correspond to. Each of the four Dimensions is weighted at 25%. The questionnaire used as the assessment tool for each of the examples can be found in Appendix V.

This sustainability assessment method was applied to twenty examples and was used to see where digitisation projects seem to report negative answers and points of failure most often, and where they most often report sustainable project management with a higher likelihood for long term digital sustainability.

The 16 examples that were evaluated using this framework are:

- The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project[37]
- The Scottish Ten and (HES) Historic Environment Scotland; Glasgow School of Art[38]
- *MicroPasts* and crowdfunded and crowd-fuelled archaeological research[39]
- Cymru1900Wales; community-generated content[40]
- CADiP, Cypriot digitisation in response to 1974 occupation and looting
- Isle of Man Historic Environment[41]
- Global Digital Heritage (GDH)[42]
- CyArk, projects based in Syria and Iraq[43]
- Iraq Mosul Museum, Project Mosul/Rekrei[44]
- #NewPalmyra[45]
- Million Image Database/Institute for Digital Archaeology[46]

[37] Link to project webpage: http://idp.bl.uk
[38] Link to project webpage: https://www.engineshed.scot/about-us/the-scottish-ten/
[39] Link to project webpage: https://crowdsourced.micropasts.org
[40] Link to project webpage: https://archives.wales/world-war-1-resources-guidance-and-commemoration-activities-2/cymru-1914/
[41] Link to project webpage: https://isleofmanher.im
[42] Link to project webpage: https://globaldigitalheritage.org
[43] Link to project webpage: https://www.cyark.org
[44] Link to project webpage: https://projectmosul.org
[45] Link to project webpage: https://newpalmyra.org
[46] Link to project webpages: https://www.millionimage.org.uk; http://www.digitalarchaeology.org.uk

- (EAMENA) Endangered Archaeology in the Middle East and North Africa[47]
- Syrian Heritage Archive[48]
- The International Collection of Digitized Hebrew Manuscripts[49]
- The Schøyen Collection[50]
- Virtual Magic Bowl Archive (VMBA)[51]

Section 3.2 outlines the utility of the selected examples. Each case study was investigated in order of the SDRF Dimensions: Content, Technology, Preservation, and Promotion. The following sections will further break down the Dimensions and Criteria from the SDRF Framework and how they relate to the questionnaire applied to each project.

5.2.1 Content

The Content Dimension defines several contextual aspects about the documentation project that is being assessed. “Currency” represents the status of the project, whether it is active or complete. “Content” outlines the types of material that are being stored, managed, documented, or in the case of poorer performing projects, the types of material that the project had used in the past but has not preserved digitally. The SDRF template allows for the selection of multiple types of content, and this also influences how the Dimension is calculated. The content types are Documents; Images and photographs; Audio and video materials; 3D objects and models; and Website/web pages. Each content type was represented within the selected examples, with 95% of cases maintaining more than one type.

“Relevance” outlines how well certain aspects about each project is communicated to the public and the users of the digitised material. This includes the project objectives, the audience for which the digital content has been developed, and the value that the digital content aims to provide to the community.

[47] Link to project webpage: https://eamena.org
[48] Link to project webpage: https://syrian-heritage.org
[49] Link to project webpage: https://www.nli.org.il/en/discover/manuscripts/hebrew-manuscripts
[50] Link to project webpage: https://www.schoyencollection.com
[51] Link to project webpage: https://humanities-research.exeter.ac.uk/vmba/about

“Authority” details further information that has been made known to the public, but is related to the development of the content, what other parties have been involved in its creation, has there been stakeholder involvement, and the ease of use of the material by the user communities. This criterion investigates: details of the organisation responsible for content development; information about the ownership of the digital content; information about external stakeholders and partners that have been involved in its development and maintenance; details of the source/body that has funded content development, and information about support for community members requiring assistance with the digital content

The “Quality” criteria relates if the digital content projected by the project is assessable to the community in either a bespoke project website, or a linked repository or digital archive. If the project does not allow for user access via these means, they lose points on the SDRF framework.

5.2.2 Technology

The front-facing presence of how the digital content is presented to the public as well as how it is organised on the back end is addressed in the Technology Dimension. The “Implementation and development” criterion applies to the use of open source and open technologies for the web-based digital outputs. Open-source technologies for databases and repositories allow for the highest level of customisation and are available for free, though this does not necessarily translate to ‘free to develop’.[52] Developing the API (application programming interface) can take significant time and, moreover, requires specialised web development knowledge. Even so, there are resources freely available online, such as via GitHub, which can provide a stable foundation from which to begin. Several of the examples in this research project use the Getty Conservation Institute (GCI) and World Monuments Fund (WMF) Arches open-source software.

[52] To qualify as open source, the distributor cannot restrict the redistribution of the software, not can a user be restricted from making modifications or making derivative works based on the source code. (Sahoo and Sahoo, 2016). Saraswati Experts. "2.5.3". COMPUTER SCIENCE WITH C++. Saraswati House Pvt Ltd. p. 1.27.

This software has extensive front-end (the user-facing aspects of the site) and back-end (database and technologies which enable user facing site) support. [53]

The "Best Practice" criterion spans two Dimensions, Technology and Preservation. To fulfil the Technology criterion, a project's digital content must be harvested and archived by a digital repository or archive. Digital repositories are well defined by Denison (2007, 172), who writes that:

"Digital repositories can be thought of as digital collections for which:

- content is deposited, whether by the content creator, owner or third party,
- the repository architecture manages content as well as metadata,
- the repository offers a minimum set of basic services e.g., put, get, search, access control; and,
- the repository must be sustainable and trusted, well-supported and well-managed"

Creating backups ensure that multiple copies of the digital content and records are maintained, deterring data loss should there be catastrophic technological issues for the documentation project.

5.2.3 Preservation

The Preservation Dimension outlines financial and personnel support, the use and maintenance of robust metadata, the use of sustainable file formats, and the definition of Intellectual Property Rights (IPR). The funding status of most projects is usually easy to find and, depending upon the funder agreement, having this information readily available may be contractual stipulated in some cases.

Best practice for the preservation Dimension seeks to find if the project provides metadata or other descriptive information for its digital outputs so that the user community can understand, interpret, and discover the content. Additionally, it ascertains if the project uses sustainable file formats for storing digital outputs.

[53] https://arches.readthedocs.io/en/latest/api/ Resources for downloading, developing, UI, API, Accessibility, and resource management. Arches is an open-source software platform freely available for cultural heritage organizations to independently deploy to help them manage their cultural heritage data.

The IPR criteria is defined by the legal underpinning of the digital outputs and digitised cultural heritage. To receive full points for the first criterion, the project must define legal, legislative, contractual, or financial obligations for maintaining the digital outputs in the long term. The second criterion requires projects to provide the user community with terms and conditions for the use, reuse, and access of the digital content. This must include information pertaining to copyright and licensing for use for the respective digital outputs.

5.2.4 Promotion

The Promotion Dimension is the most straightforward to investigate. To determine this, the following factors are queried: Is the project mentioned or has its digital content been published in public media such as newspapers articles, television programmes, or radio shows? Is the project or has its digital content been documented in academic publications such as journals and conference papers and/or posters? Does the project have a dedicated presence on social media, through which it promotes its activities and digital content? Promotion of activities and information dissemination on access to the digital content helps bring awareness to types of conflict, content, and actions for preservation of heritage in danger which can continue the digital content lifecycle. This further perpetuates the use of materials, reuse of materials, and continued avenues of funding and support.

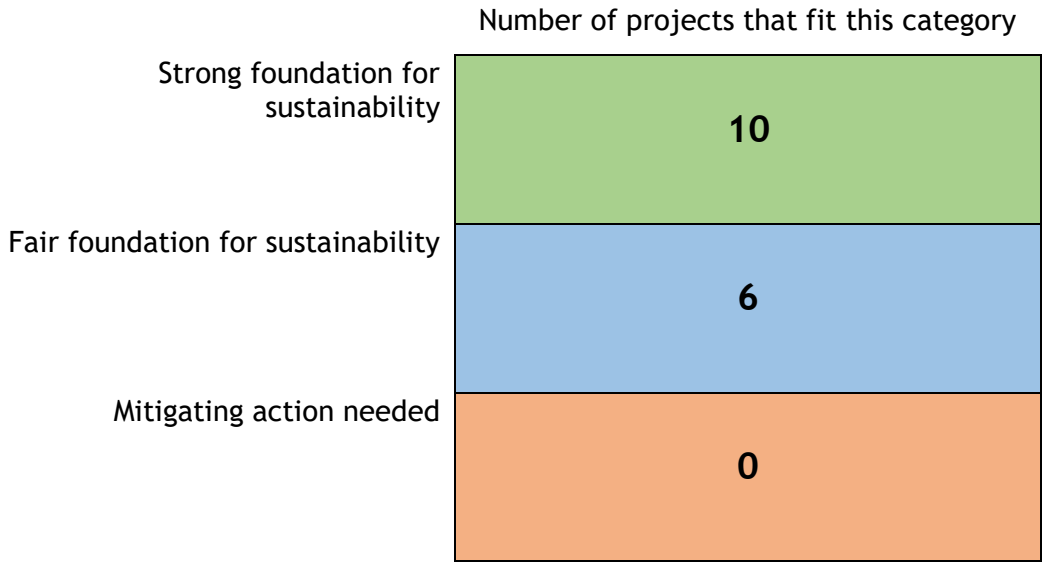
After a thorough investigation of each dedicated project website, associated databases or repositories, and any supplemental information that was required to adequately select an Indicator for each Criteria, the data was compiled into several tables stratified based on various parts of the SDRF hierarchy.

5.2.5 Numerical SDRF scores

The weighted Excel sheet produces a numerical interpretation of the questionnaire answers that gives a general idea of the relative health of the digital outputs from a long-term sustainability perspective.

Projects scores have been broken down into three categories: ‘Strong foundation for sustainability’ (100 – 90), ‘fair foundation for sustainability’ (89 – 80), and ‘mitigating action needed’ (<79).

The data indicated:



5.3 Analysis of examples

Each case study is discussed in more depth in the following section. Each template criteria questionnaire can be found in Appendix VI. The following table shows each project and its associated SDRF score taken from the weighted Excel sheets. These numbers will be analysed further within each case study subsection.

SDRF scores by project, Table 5.2	
Project name	Score (of 100)
The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project	**94**
The Scottish Ten and (HES) Historic Environment Scotland	**85**
MicroPasts	**88**
Cymru1900Wales	**82**
Cypriot digitisation, CADiP	**87**
Manx National Heritage, Isle of Man Historic Environment (IOMHER)	**90**
Global Digital Heritage (GDH)	**91**
CyArk	94
Iraq Mosul Museum, Project Mosul/Rekrei	87
#New Palmyra	94
Million Image Database/ Institute for Digital Archaeology (IDA)	80
University of Oxford, EAMENA	96
Syrian Heritage Initiative (Syrian Heritage Archive)	94
The International Collection of Digitized Hebrew Manuscripts	92
The Schøyen Collection	96
Virtual Magic Bowl Archive (VMBA)	92

The following table 5.3 presents the compiled responses from the SDRF questionnaires for each of the 16 examples. The table has been divided by Dimensions, Criteria, and Indicators. These more easily present the data to see where there are stronger correlations for certain indicators, and which Indicators have not been recorded at all.

The following tables are organised by Dimension, and further broken down by Criteria. Each group of indicators is listed on the left. A Criteria with the result "-" indicates that 0 projects recorded this answer in the questionnaire. The tables show the strong correlations for the questionnaire responses. These correlations are further broken down in Chapter 6.

Compiled SDRF Questionnaire Data, Table 5.3		
	Completed	Active
Currency - Current status of project	2	14
		100%

CONTENT Dimension			
	Neither maintained in secure storage, nor publicly available	Publicly available (e.g., on website) but not maintained in secure storage	Maintained in secure storage
Documents (e.g. text, spreadsheets, PowerPoint presentations)	-	-	9
Images and Photographs	-	-	15
Audio and video materials	-	-	3
3D objects and models	-	-	7
Website/web pages	-	-	-

CONTENT Dimension			
	Neither available to the community nor documented by the project	Not publicly available to the community, but the project has recorded it	Publicly available to the community
Relevance—Project objectives (the objectives which the digital content has been developed to address)	-	-	16
Relevance—Project history/context (the context within which the digital content has been created)	-	-	16
Relevance—the audience for which the digital content has been developed	-	-	16
Relevance—The value that the digital content aims to provide to the community	-	-	16

CONTENT Dimension			
	Neither available to the community nor documented by the project	Not publicly available to the community, but the project has recorded it	Publicly available to the community
Authority—details of the organisation responsible for content development	-	-	16
Authority—Information about the ownership of the digital content	-	1	15
Authority—Information about external stakeholders and partners that have been involved in its development and maintenance	-	-	16
Authority—Details of the source/body that has funded content development	-	1	15
Authority—Information about support for community members	2	3	11

requiring assistance with the digital content			

TECHNOLOGY Dimension					
	No, and there are no plans to make the digital content available to the community	No, but the project is planning to make digital content available to the community in future	Yes, at a physical location	Yes, through a dedicated project website	Yes, via a digital repository or digital archive
Quality—Is the digital content produced by the project accessible to the community?	1	1	-	15	

	No, only proprietary technologies used	Partly, a combination of open and proprietary technologies used	Entirely, only open technologies used	Information not discoverable
Implementation and development—Does the project use open technologies for web-based digital outputs?	-	0	15	1

PRESERVATION Dimension				
	No	No information available or the project hasn't considered this	Partly/partly defined	Entirely/ fully defined
Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?	1	4	2	9
Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?	1	5	2	8
Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?	-	-	-	16
Best practice—Does the project use sustainable file formats for storing digital outputs?	-	6	-	10
Best practice—Is the project's digital content harvested and archived by a digital repository or archive?	1	-	-	15
IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?	-	12	1	3
IPR—Does the project provide its user community with the terms and conditions (including copyright	-	3	1	12

and licensing) that apply to access and use of the digital content?				

PROMOTION Dimension			
	No	No information available or the project hasn't considered this	Yes
Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows	-	1	15
Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters	-	2	14
Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content	1	1	14

5.3.1 The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project[54]

The International Dunhuang Project (IDP) is an international collaborative effort with several external partners working in coordination. Since its inception, IDP has worked to conserve, catalogue, and digitise materials from the Mogao caves in the Western Chinese city that have been subject to endangerment due to age, moisture and tourism, or other human interactions. Image 4 shows the interior of one cave. The digital outputs produced from the project include digitally documented manuscripts, printed texts, painting, textiles, and artefacts.

From a digital sustainability standpoint, the IDP set a commendable example for communicating the project methodology and explaining technical specifications, and how all related technologies and standards are used to ensure the digital outputs are preserved.

The project has a dedicated technical team that works in conjunction with local technical staff to maintain the database web server as well as the database software through Timbuktu Pro — a cross-platform remote access software. The database employs XML file format, a simple, and flexible open format[55], using the TEI standard for cataloguing bibliographical data.

IDP's technical infrastructure and content management system is extensively outlined on the dedicated project website[56]. The thorough write-up explains the sustainable file formats which are used for storing the outputs and explains how the digital outputs are synchronised across all the hosted repositories. Each of the IDP Centres has maintained access to the data it has produced and is also available in a read-only version to all the other Centres that is immediately synchronised as changes are made to ensure that each of the centres always has an up-to-date dataset (IDP, 2021).

[54] The full criteria questionnaire for this documentation project can be found in Appendix VI (a).
[55] S.Y. Zoe Chao, in The Metadata Manual, 2013.
[56] Link to site: http://idp.bl.uk/pages/technical.a4d

The project lost points in a few areas. No information about the funded status of the project was available via public routes. The website is still active and maintained, evidenced through statistical metrics which update to show live numbers of collected data which are current to September 2021, but the IDP timeline for foundational support has not been updated since 2008. The project was well supported in the past, with funds from the Mellon Foundation.[57]

Copyright for use and reuse of the digital content is partially defined; the project website indicated that the copyright is held at the British Library, however further navigation to the relevant copyright webpage calls back a placeholder that the page is being updated.

According to Collections Trust, databases are automatically protected by copyright in the same vein as literary works pending the evidencing of the intellectual investment by the project.[58] If the explicit terms of use and reuse are not defined for users, there is a danger of the digital content lifecycle breaking down at this junction. Copyright can be complicated to navigate, and poor communication of precautions for using the data could dissuade use.

[57] Link to site: http://idp.bl.uk/pages/about_funding.a4d
[58] Link to site: https://collectionstrust.org.uk/resource/copyright-and-digital-content/

Image 1 Buddha mural in Dunhuang Caves; The reproduced mural was at "Dunhuang Silkroad, Eudaemonic Existence" exhibition, Shanghai Center, Shanghai, 2018; by Hiroooooo; CC-BY-SA-3.0. Resized.

SDRF score: 94

This project has a sustainability score which falls under ‘strong foundation for sustainability’; the project fails to demonstrate that there are further funding streams available, and along with this, staffing needs. It can be assumed that because the website and Centre databases are still active and maintained that there is funding available, but sustainability cannot rely on assumptions. There are also gaps in communication of copyright and licensing for the use and reuse of the data that hurt the overall score.

Despite these shortfalls, the rigorous outline of the project methodology, information about how the digital content is documented, thorough explanation of the technical specifications and website development make this a generally successful project. There are no single points of failure that need mitigating actions for preservation.

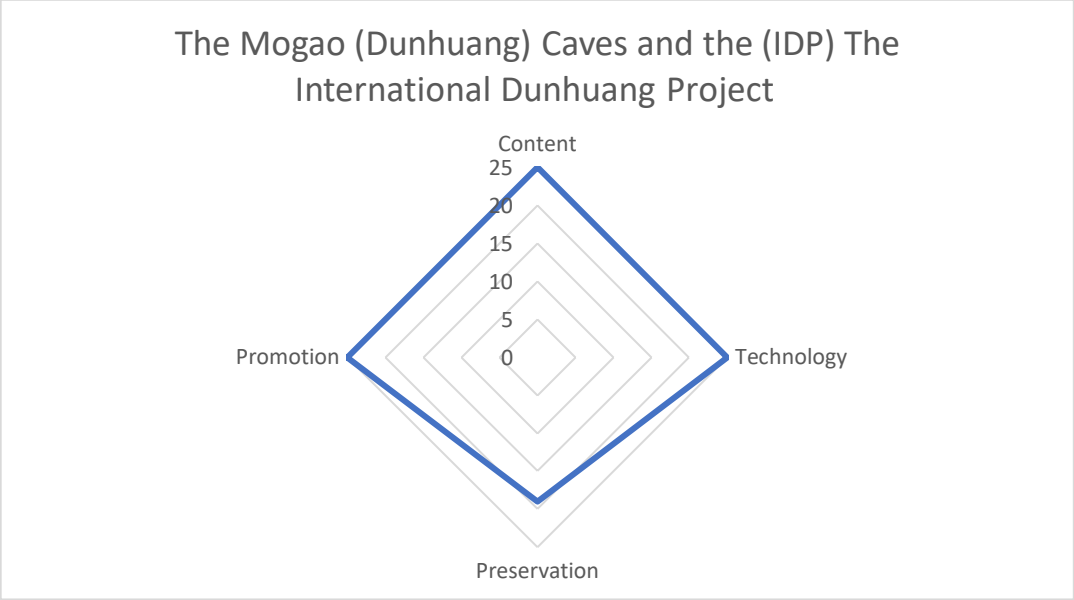


Figure 5.1: Radar visualisation for SDRF Dimensions, The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project

Figure 5.1 shows a radar visualisation[59] of the 4 Dimensions as 4 variables. A radar visualisation of a project that scores 100 on the SDRF framework would create a symmetrical square, having received 25 points per dimension. Deviations from this score will be represented by a skewed blue outline. Each case study presents a radar visualisation. This visualisation shows the missed points for the IDP were situated the Preservation and Technology Dimensions.

The following SDRF sustainability framework shows the breakdown of Indicators for each Criteria for the project. Cells shaded in green indicated full points were awarded. Cells in orange indicate partial points or missing points. Grey cells indicate the Criteria was not applicable, and the weighting will be adjusted for each of the relevant dimensions which show non applicable criteria.

This project was relatively successful, losing points in only a few places; in line with the most common attributes missing by projects: funding and staffing

[59] Radar visualisation can be used for comparing multiple quantitative variables. The visualisation shows which variables have similar values, or if there are any outliers. They can also show which variables are scoring high or low within a dataset.

streams and communication of legal requirements for maintaining digital outputs in the long term.

Figure 5.2 The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	Maintained (active/archived)	Maintained (active/archived)	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 29														Sustainability score for Content:	29	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Partly			Partly			Yes		Yes				Partly		Yes			
	1			1			2		2				1		2			
	Max possible points: 12														Sustainability score for Preservation:	9	75	19
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
															TOTAL WEIGHTED SCORE			94

5.3.2 The Scottish Ten and (HES) Historic Environment Scotland; Glasgow School of Art[60]

The Scottish Ten project began its first phase in 2009 with the goal of digitally documenting Scotland's five world heritage sites, as well as five other international heritage sites. The 3D data that was created would help in the conservation and management of the sites, and well as maintain virtual access to the sites. The digital content produced by the Scottish Ten project is covered by a highly sustainable process for storage of the digital outputs. The project stores its data with Historical Environment Scotland and CyArk, with the latter having developed OpenHeritage 3D[61] to make the datasets publicly available.

Scottish Ten uses entirely open-source technologies for the digital outputs. All 3D data is collected in non-proprietary ASCII format[62] and the metadata is kept on secure servers at Historic Scotland, the Digital Design Studio and with CyArk. A digital preservation report has been created to complement each of the 3D datasets, much like the technical specifications developed by the IDP as discussed previously. Clearly communicating the technical specifications for undertaking the practical digitisation can help to provide a good model for projects undertaking similar methods of digitisation.[63]

Copyright, Licencing, and IPR are clearly defined for international Scottish Ten sites, whereby the full 3D dataset and intellectual property is transferred from the Scottish Government to the national heritage body managing the documented site. However, points were lost because information about the ownership for all produced digital outputs is not communicated to the user community.

[60] The full criteria questionnaire for this documentation project can be found in Appendix VI (b).
[61] Link to site: https://openheritage3d.org
[62] American Standard Code for Information Interchange. It is a code for representing 128 English characters as numbers, with each letter assigned a number from 0 to 127. (https://www.webopedia.com/definitions/ascii/)
[63] Within the UK, technical appendices can be found for institutions like the National Archives. While not standardised, transparency and availability of resources like these is helpful for both non-professionals and professionals undertaking digitisation projects. Example technical appendix found: https://cdn.nationalarchives.gov.uk/documents/information-management/digitisation-at-the-national-archives.pdf

Moreover, information about ongoing financial support for the project was not discoverable; the project is in its second round of funding, called 'Phase 2';[64] though avenues for continued support are not publicly available via the dedicated project website.

The project also lost points by failing to define legal or contractual conditions for keeping the digital outputs for the long-term. This Criteria was consistently not communicated by most/any of the examples and was one of the main fault points identified by this analysis.

SDRF score: 85

The Scottish Ten project has a suitability score which falls under 'fair foundation.' Although there are no single points of major failure that call for mitigating action, a lack of clear funding streams and shortfalls in communication about support for or access to the materials, ownership of the digital content, and IPR details push the project down from a 'strong foundation'.

In the following SDRF framework, lost points can be seen in the orange shaded cells. The project is relatively successful for long-term digital sustainability of outputs.

[64] Link to site: https://www.engineshed.scot/about-us/the-scottish-ten/about-the-scottish-ten-project/

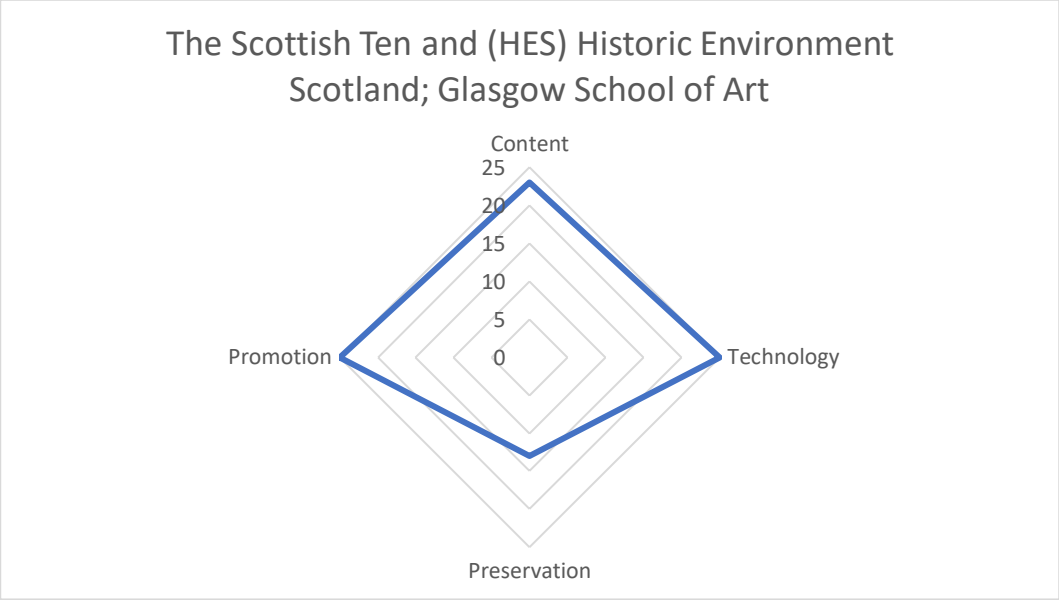


Figure 5.3: Radar visualisation for SDRF Dimensions, The Scottish Ten and (HES) Historic Environment Scotland; Glasgow School of Art

Figure 5.3 demonstrates how points were lost within the content Dimension and the Preservation Dimensions. The lack of explicitly defined continued financial and staffing support has the most noticeable impact upon the Dimension score. The project scored very similarly to the IDP and functionally performed many of the same digitisation efforts. Further points were lost in communicating certain project information to the user groups, but due to dimension weighting, did not prove detrimental to the score.

Figure 5.4 The Scottish Ten and (HES) Historic Environment Scotland; Glasgow School of Art, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	NA	Maintained (active/archived)	NA	Maintained (active/archived)	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Recorded	Available (online/physical)	Available (online/physical)	Not available	Project website		
	1	0	2	0	2	0	2	2	2	2	2	1	2	2	0	2		
	Max possible points: 24														Sustainability score for Content:	22	92	23
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured				Ongoing financial support (staff) secured		Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	NA				NA		Yes		Yes				NA		Yes			
	0				0		2		2				0		2			
	Max possible points: 12														Sustainability score for Preservation:	6	50	13
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				NA					
	0				2				2				0					
	Max possible points: 4														Sustainability score for Promotion:	4	100	25
																TOTAL WEIGHTED SCORE		85

5.3.2 *MicroPasts*, crowd-fuelled archaeological research[65]

MicroPasts is an open-source, crowd sourcing platforms which supports online data collection about the human past. Predominately examining projects which need widespread user contributions or human intelligence (such as geocoding or transcription),[66] MicroPasts was developed to investigate the viability of a community-led model of platform and project management with long-term sustainability. Further, it set out with the aim of informing heritage policy and practice in the UK in a way that could guide both private and public investments in participatory projects that use crowdsourcing and crowdfunding.

SDRF score: 88

The MicroPasts project has a sustainability score which falls under 'fair foundation', receiving full points across most Criteria. MicroPasts uses open-source technologies, including a forum section built using Discourse discussion software[67] and the crowdsourcing site from the PyBossa framework[68] for CrowdCrafting.

MicroPasts clearly communicated that it is not a permanent digital data repository, but that it is solely a crowd-sourcing platform, creating data, not storing it. To ensure the protection of the datasets it hosts, MicroPasts requires that all participating projects deposit their final datasets into an institutional, national, or international repository.[69] The long-term sustainability also scored highly, with a strong foundation that attempts to pre-emptively mitigate data loss that could otherwise be caused from poor internal data management. Depositing datasets with an institutional repository also establishes certain important obligations for the data in terms of management, access, and sustainability, requiring the use of specific file formats and specific metadata indicators, which adhere to standards for ingesting data.[70]

[65] The full criteria questionnaire for this documentation project can be found in Appendix VI (c).
[66] https://crowdsourced.micropasts.org/about
[67] https://www.discourse.org
[68] https://pybossa.com
[69] https://blog.micropasts.org/data-centre/
[70] Examples of these types of standards can be seen in: Guidelines for Archiving of Archaeological Projects (https://canmore.org.uk/sites/default/files/HESArchives_DepositorsGuidance_ArchaeologicalProjec

Initial funding for the project came from the UK Arts and Humanities Research Council (AHRC) call for Digital Transformations in Community Research Co-Production in the Arts and Humanities until 2015, with a follow up AHRC fund to continue research. After these initial funding streams, it is not clear if there are other avenues for support other than that which is crowdsourced. The on-going support criteria for financial support and staffing support is not known, so the project received 0 points in both instances. This had the most detrimental effect upon the global sustainability score of the project.

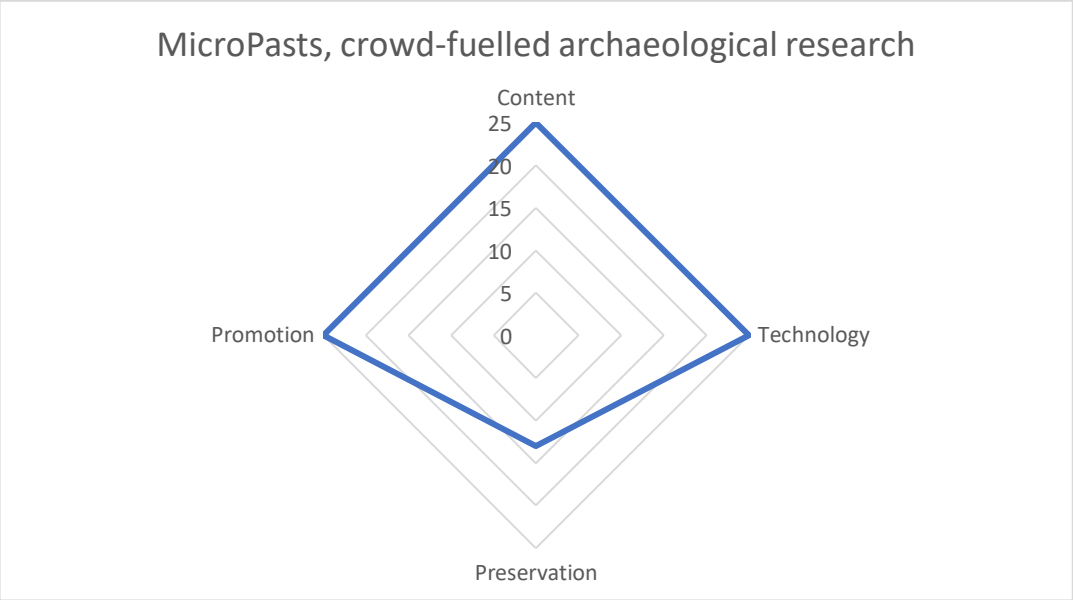


Figure 5.5: Radar visualisation for SDRF Dimensions, MicroPasts and crowdfunded and crowd-fuelled archaeological research

The following SDRF framework indicates a few places across the Preservation Dimension where the project lost points. The weighting of the framework determines this project to the generally successful, with a strong foundation for sustainability.

ts_2021.pdf); AHRC Research Funding Guide (https://www.ukri.org/wp-content/uploads/2021/07/AHRC-230821-ResearchFundingGuideV5.5-2021.pdf)

Figure 5.6 MicroPasts, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	NA	Maintained (active/archived)	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	2	2	0	2	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 27														Sustainability score for Content:	27	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	NA			NA			Yes		Yes				NA		Yes			
	0			0			2		2				0		2			
	Max possible points: 12														Sustainability score for Preservation:	6	50	13
PROMOTION	Digital content promoted at events			Digital content promoted via public media (TV, radio, newspapers etc.)			Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media							25%
	NA			NA			Yes				Yes							
	0			0			2				2							
	Max possible points: 4														Sustainability score for Promotion:	4	100	25
															TOTAL WEIGHTED SCORE...			88

5.3.4 Cymru1914Wales[71]

Cymru1914 Wales conducted mass digitisation of primary sources related to the First World War and was part of a larger collection of projects UK-wide which investigated the digital record of the Centenary. The project produced a digital collection revealing the history of the First World War as it impacted all aspects of Welsh life, language, and culture. This digital archive was developed from mass digitisation of materials from the archives and special collections at National Library Wales and community generated content, in the form of materials that were previously fragmented and frequently inaccessible including: newspapers, archives and manuscripts, photographs, journals, and recordings.

SDRF score: 82

The Cymru1914 project has a suitability score which falls under 'fair foundation'; however, it is very close to being classified under 'mitigation action needed'. There are several critical issues that hinder the long-term sustainability of the community generated content.

The most prominent of these the expired SSL[72] certificate for the website, which complicates access, especially for non-professionals who may not have prior knowledge of resources like the Internet Archive to access snapshots of site which are effectively broken. If you ignore the immediate error messages that are called back by the expired certificate, the user will receive the message: "The Cymru1914.org website is unavailable due to technical difficulties and the National Library of Wales no longer has resources needed to redevelop and maintain the website," highlighting the difficulties with loss of funding and continued public access to digital outputs. The only way to fully access the website and database is to search the Internet Archive's Wayback Machine which hosts several captures of the site. Even so, the interactivity is greatly inhibited, and navigation of the collections is slow. This breakdown in the integrity and discoverability of a database is a common occurrence when the period of

[71] The full criteria questionnaire for this documentation project can be found in Appendix VI (d).
[72] A digital certificate which authenticates the identify of a website and enables an encrypted connection, a "secured sockets layer".

funding ends. Websites are not self-sustaining, even less so when the project manages digital outputs which need consistent maintenance.

The project lost further points as there are no future funding streams; there is demonstrable shortfalls in continued staffing obligations to maintain the website and database. The collection was initially designed to develop over time and be open and free for all to access via the Jisc Archive Hub. Presently, in order to access this material via the Archive Hub, the user would need to email the repository, otherwise as image 6 demonstrates an error message is called back due to the expired SSL certificate. Levels of archival gatekeeping classically inhibit more active public access and use of online digital materials (Dreyer and Nofziger, 2021).[73] By hosting the digital content via the Archive Hub, this provides a stronger foundation for digital sustainability, though the complications in access hinder the overall score.

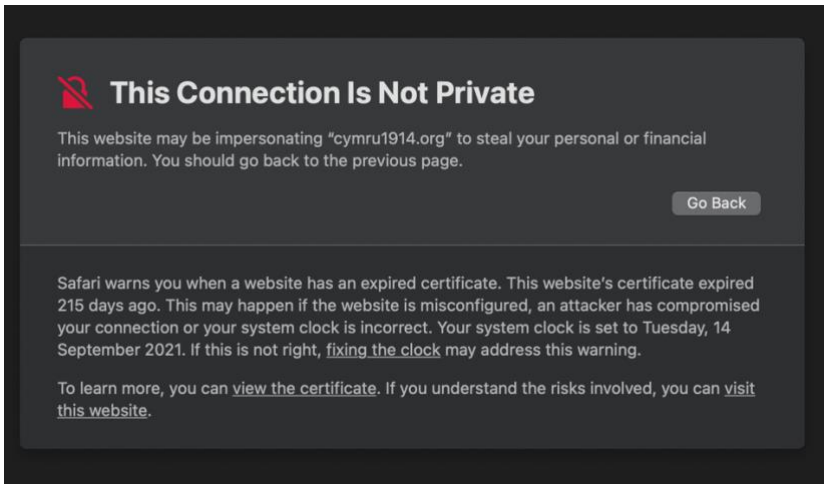


Image 2: Screen capture: trying to link via Jisc Archives Hub to the Cymru1914 repository calling back an error message (14.09.2021).[74]

The Archive Hub also uses primarily open-source technologies, utilising a cataloguing tool called the EAD Editor[75] for creating and editing descriptions. It creates descriptions in Encoded Archival Description, which is XML (open format) for archives and adheres to data quality standards.[76] The CIIM (Collections

[73] http://palrap.pitt.edu/ojs/index.php/palrap/article/view/237/870
[74] The certificate expired: Monday, 5 April 2021 at 09:42:07 British Summer Time
[75] https://archiveshub.jisc.ac.uk/ead/
[76] An example of data infesting standards can be seen in the UK Data Archive Data Processing Standards. https://dam.data-archive.ac.uk/controlled/cd079-dataingestprocessingstandards_08_00w.pdf

Information Integration Middleware) (Open source) interface is used to allow Archives Hub contributors to view and search their own descriptions.

The project as it now stands is static, like a snapshot in time. The content is available, though difficult, or impossible to discover without the Internet Archive and is no longer adding any new content to the repository. With extra barriers in place to access the online digital material, although maintain in the long term by an institutional repository, lack of avenues for public use can inhibit the digital content lifecycle.

The following SDRF framework and figures shows the same partial criteria points as many of the other projects; the difference in the overall score comes from the Criteria that had to be omitted because information wasn't accessible or was not applicable. This affected the weighting of the applicable Dimensions, causing the score to be lower overall. The framework would indicate that the project had relative success in long term digital sustainability. However, it's lack of discoverability and expired SSL certificate putting a barrier between the user and the material means mitigating action will likely be needed in the future to continue to preserve the digital outputs.

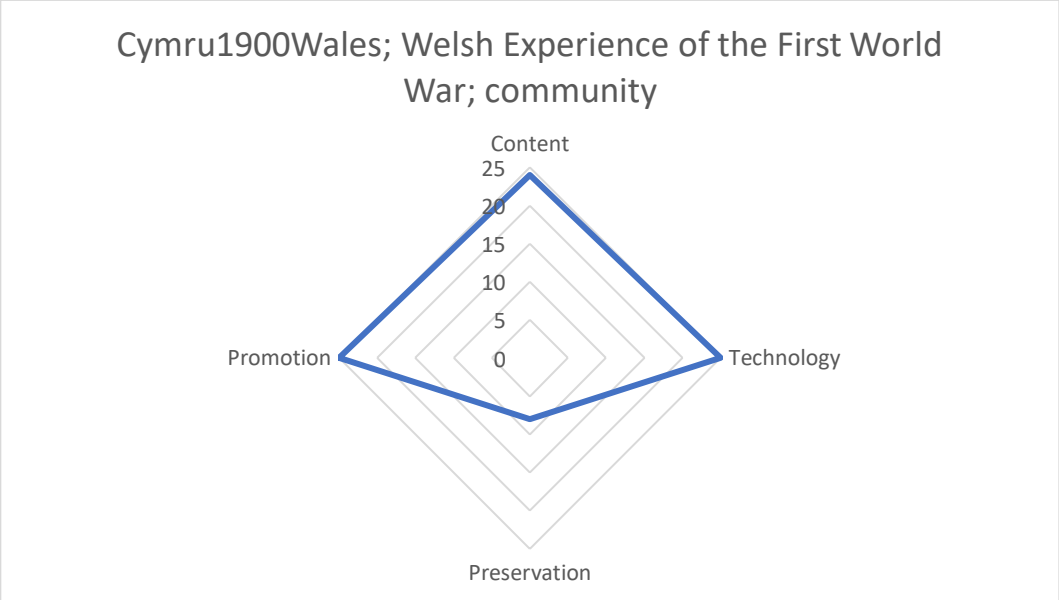


Figure 5.7: Radar visualisation for SDRF Dimensions, Cymru1900Wales

Figure 5.7 clearly demonstrates how many points were post within the Preservation Dimension. The lack of discoverability of the digitised materials was less detrimental than the lack of continued funding and staffing streams. Loss of points across both Dimensions contribute to the lower score for “fair foundation”. Mitigating action for preservation is not required for this project according to the research parameters for this research. However, in terms of access to materials, mitigating action is indeed needed but inhibited by funding streams.

Figure 5.8 Cymru1914Wales, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Completed	Maintained (active/archived)	Maintained (active/archived)	Maintained (active/archived)	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Before closure		
	1	2	2	2	0	0	2	2	2	2	2	2	2	2	2	1		
	Max possible points: 27															Sustainability score for Content: 26	96	24
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4															Sustainability score for Technology: 4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	No			No			Yes		Yes				NA		Yes			
	-1			-1			2		2				0		2			
	Max possible points: 12															Sustainability score for Preservation: 4	33	8
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6															Sustainability score for Promotion: 6	100	25
																TOTAL WEIGHTED SCORE..		82

5.3.5 CADiP and Cyprus Archaeological Digitisation Programme[77]

CADiP and the Cyprus Archaeological Digitisation Programme clearly communicate the focus of the digitisation: the Declared Ancient Monuments of the First Schedule, the Movable Antiquities exhibited in Cypriot museums, areas around scheduled monuments, and surveyed areas. These areas of focus produce content including digitised drawings, photographs, maps, and graphics. This data collection explicitly defines the "selection" Dimension of the digital content lifecycle.

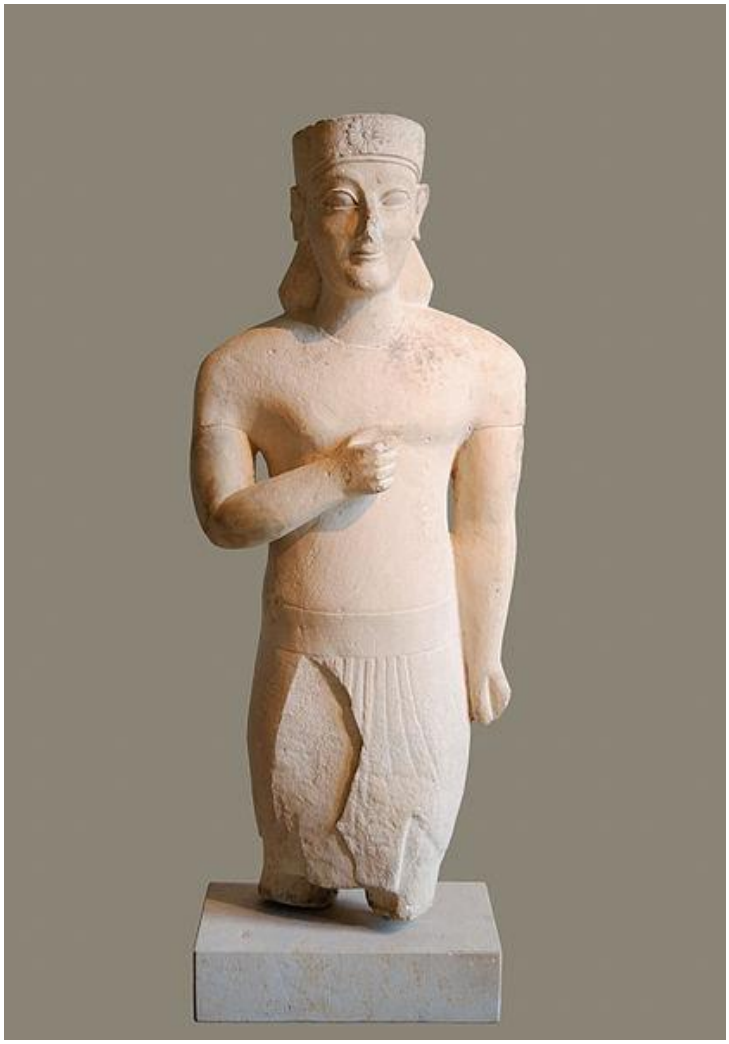


Image 3: Cypriot statue – Neues Museum, Male Statue with Rosette-diadem. Anonymous, Creative Commons Attribution-Share Alike 3.0 Unported (https://commons.wikimedia.org/wiki/File:Cypriot_statue_-_Neues_Museum.jpg)

SDRF score: 87

This project has a sustainability score which falls under 'fair foundation for sustainability.' The project is overall very secure in its management, in its terms

[77] The full criteria questionnaire for this documentation project can be found in Appendix VI (e).

of funding, staffing, and methodology for maintenance and use of the digitised outputs. This project loses points by not being assessable to the public – due to the weighting of each Dimension, lack of access to the materials in the Content Dimension pushes the project down below a strong foundation. Currently, CADiP outputs are only accessible to the Officers of the Department of Antiquities who are on site. The project was however, created with a provision in place for a selected sample set of the database to be made accessible to external users on the internet. The selection of the dataset depends upon publication status and copyright and other criteria which were not communicated on the project website. The external researchers can be authorised for pull records access but must seek independent verification from the Director of the Department of Antiquities.

The intention to make parts of the dataset freely available to the public raises the score in the Content Criteria; this is tied to the use/and reuse of digital outputs, which starts the digital content lifecycle over again.

The programme lost points in terms of public access. Due to the sensitivity of some of the digitised materials, access is limited to governmental officials in the country until there has been adequate curation and vetting of the information. Some aspects of the project are not discoverable by the public as it is currently accessible only to government entities; these include the use of open technologies, specific funding streams, specific staffing obligation, and the use of sustainable file formats.

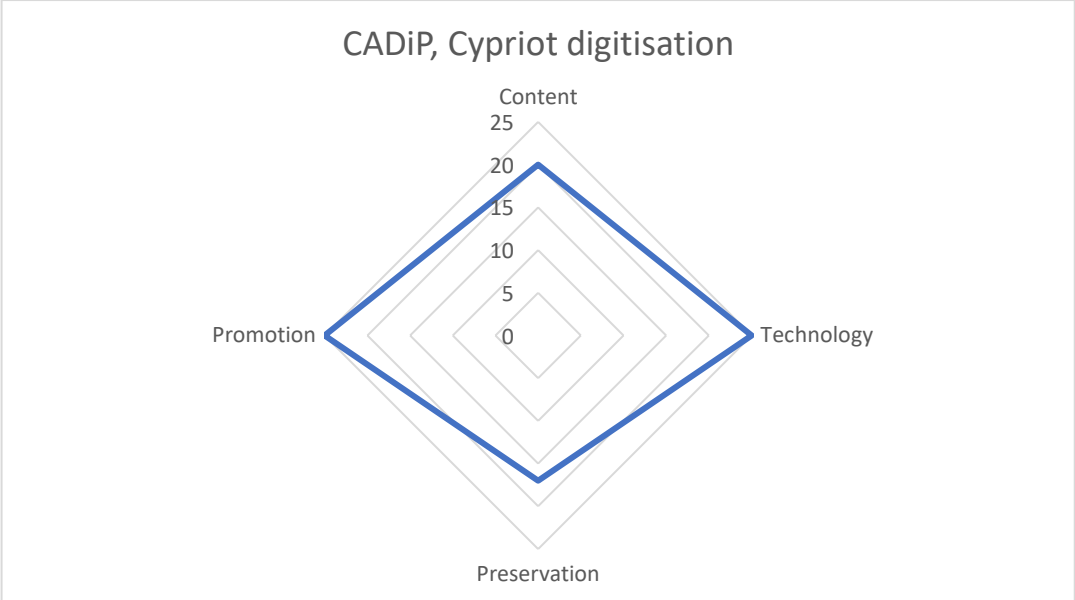


Figure 5.9: Radar visualisation for SDRF Dimensions, CADiP, Cypriot digitisation

The radar visualisation figure 5.9 shows the project performed generally. Points were lost within the Content and Preservation Dimensions. Certain aspects of the project were not made available to the community and this lack of communication and transparency contributes to the lower sustainability score. This scoring may improve as the project contributes to break down barriers to vetting use of the digital materials.

The following SDRF framework indicates where points were loss in the Content and Preservation Dimensions. Overall, the initiative represents a good foundation for a publicly accessible and discoverable database; full points are out of reach for the moment as access is vetted and available only to certain groups. The sustainability score of the project is likely to increase in the future and reports indicate that there are plans to make the databases more easily available to the public without vetting or gatekeeping. A timeline for this procedure has not been made public as of the time of this research project. This Content criteria would push the project into the category of “strong foundation for sustainability”.

Figure 5.10 CADiP and Cyprus Archaeological Digitisation Programme, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Completed	Maintained (active/archived)	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Not available	No		
	1	2	2	0	0	0	2	2	2	2	2	2	2	2	0	-1		
	Max possible points: 25														Sustainability score for Content:	20	80	20
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes			Yes			Yes		NA				Yes		NA			
	2			2			2		0				2		0			
	Max possible points: 12														Sustainability score for Preservation:	8	67	17
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				NA					
	0				2				2				0					
	Max possible points: 4														Sustainability score for Promotion:	4	100	25
																TOTAL WEIGHTED SCORE...		87

5.3.6 Isle of Man Historic Environment Record, Manx National Heritage[78]

Isle of Man Historical Environment Record (IOMHER)[79], managed by Manx National Heritage[80], represents the culmination of a four-year project to make the island nation's historic environment more sustainable and accessible to the public. The IOMHER project is inherently tied to its parent institution, and information about specific Criteria was discoverable through searching the Manx National Heritage sites. The SDRF spreadsheet represents data collection across both entities.

SDRF score: 90

The IOMHER project has received a score of "strong foundation for sustainability".

The programme has identified on-going funding and potential staffing streams, securing a further 3 years of funding to develop the new website to provide access to all the records of the Isle of Man's historic environment.[81]. Annual reports and the 2021-2023 Forward Plan indicate re-allocation for staffing, it is unclear if the project has full staffing support.[82] The programme received full points on most Criteria due to transparency with the public on all aspects of project goals, content, aims for community value. Further, there is a clearly defined funding body, context on stakeholders and partners, and information about ongoing support provided for community members accessing the content.

The programme has developed compiled databases to provide a research tool for members of the public, commercial operations and academics, making clear the emphasis for stakeholder access. The IOMHER project uses the Arches platform for the creation of its interactive map. Additionally, the programme ensures that

[78] The full criteria questionnaire for this documentation project can be found in Appendix VI (f).
[79] https://isleofmanher.im
[80] Link to site component: https://manxnationalheritage.im
[81] Link to site component: https://manxnationalheritage.im/news/the-isle-of-mans-first-major-historic-environment-resourcegoes-online/
[82] Link to site component: https://manxnationalheritage.im/wp-content/uploads/2021/05/1519-MNH-Forward-Development-Plan-2021-2023-V3.pdf

projects develop metadata and descriptive information for the digital outputs across a diverse range of content.[83]

The project lost points in the Ongoing Support Criteria due to uncertain staffing allocation based on public reports. This Criteria was adjusted to 1 point, and the SDRF form weighting adjusted accordingly.

In contrast to the other examples, the IOMHER have explicitly defined copyright obligations. Therefore, the programme was able to receive full points on both IPR Criteria, a common shortfall for the other examples. The IOMHER example represents a good model for best practice in this context.

It was not possible via the online portal to determine if the project uses sustainable file formats for storing digital outputs. This Criteria for Best Practice was adjusted to 0 points, and the SDRF form weighting adjusted accordingly. Lack of transparency in this area does not indicate a single point of failure, but it can contribute to an overall lack of global health for access and use of the materials if there are further missed criteria. Due to the weighting of the Preservation Dimension, lack of communication in this area has the same negative effect as a lack of funding or staffing streams.

[83] Collections include: Art Collection; Archaeology Collection; Furniture Collection; Costume & Textiles Collection; Isle of Man Newspapers (1792-1960) & Printed Publications Library; Manuscript Archive; Maps & Plans Archive; Photographic Archive; Print & Poster Archive; Sites & Monuments Record; Social History Collection' Natural History (Botany, Geology, Zoology); TT & MGP Database. https://www.imuseum.im/imuseum-faqs/

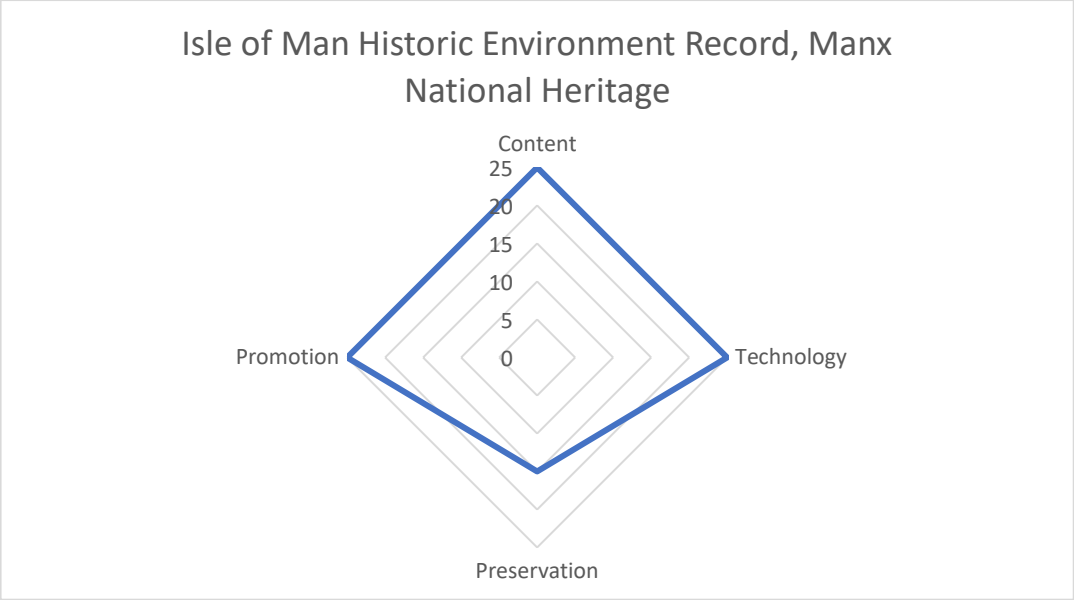


Figure 5.11: Radar visualisation for SDRF Dimensions, Isle of Man Historic Environment Record

Figure 5.11 shows that the project received 90 points on the SDRF framework. As seen in the following SDRF framework, the project lost points in the Content and Preservation dimensions, but neither shortfall require mitigating action. The project represents a strong foundation for digital sustainability.

Figure 5.12 Isle of Man Historic Environment Record, Manx National Heritage, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	NA	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	0	2	0	0	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 23															Sustainability score for Content: 23	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				75-100%				NA				Entirely					
	2				4				0				2					
	Max possible points: 8															Sustainability score for Technology: 8	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes			NA			Yes		NA				Partly		Yes			
	2			0			2		0				1		2			
	Max possible points: 12															Sustainability score for Preservation: 7	58	15
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				NA				Yes					
	0				2				0				2					
	Max possible points: 4															Sustainability score for Promotion: 4	100	25
																TOTAL WEIGHTED SCORE..		90

5.3.7 Global Digital Heritage (GDH)[84]

Global Digital Heritage is a not-for-profit, private research organisation which documents, monitors and preserves cultural and natural heritage all over the world. The organisation uses various digital visualisation, 3D virtualisation and geospatial information to provide an open access means for the public to engage with the digitally documented heritage.[85]

Most points in the framework were lost within the Technology dimension. By the terms of the SDRF questionnaire, the project does not have the digital content backed up in a third-party repository as it maintains the content itself as it is a commercial, private company. Global Digital Heritage maintains its own 200 terabytes of physical disk storage for the long-term digital sustainability of its digital outputs. The project website and outputs have been harvested by the Internet Archive with 28 snap shots collected by web crawl data, and this fulfils the Best Practice Criteria: "Is the project's digital content harvested and archived by a digital repository or archive (e.g. the Internet Archive)?"

Following the SDRF model, this project has a sustainability score which falls under 'Strong foundation for sustainability'.

SDRF score: 91

This case study was selected to represent a different model of operation as a private business, and as a result, may not be fairly represented within the original SDRF framework remit. The framework can suggest that mitigating action may be needed to maintain these digital outputs in the long-term due to the loss of possible within the Technology section; particularly the score of -1 for the criteria related to the archiving of the digital outputs. However, the outputs are indeed being archived, albeit privately as the project work independently of project partners providing repository or archival spaces to back up the outputs. There is have also been web crawl data harvested within the Internet Archive to suggest each related webpage has been recorded within this digital repository.

[84] The full criteria questionnaire for this documentation project can be found in Appendix VI (g).
[85] Link to site component: https://globaldigitalheritage.org

The programme lost a few points across multiple Criteria; Authority, Implementation and Development, and IPR. No information was discoverable for the use of sustainable file formats for all the digital outputs. Because the organisation has a focus on hosting 3D models, which links to an associated Sketchfab page, it can be assumed that the organisation may use the .STL (Stereolithography) file format which is technically classified as a proprietary format; the models also use a combination of glTF[86], USDZ[87] and MTL[88] (associated with OBJ) which are open source. A spot check of 3D models on the Sketchfab platform did not use this 'proprietary' file format.

Across the two IPR dimensions, multiple points were lost because the organisational landing page has links for Terms of Use, Licensing, and Support, however the links were broken and do not navigate anywhere. These aspects may be defined by the organisation, but this is not directly communicated to the user groups via the main website.

The organisation is transparent with the public on all aspects of project goals, content, aims for community value. The produced digital content is discoverable with fully defined metadata, with the data being privately archived by the organisation as described be the operations toolkit.[89]

Global Digital Heritage provides ample information on individual specifications for each method used for documentation and includes toolkits and operations explanations. This project is a good example as a model to develop a technical appendix. This can include aspects regarding overhead costs and operations for

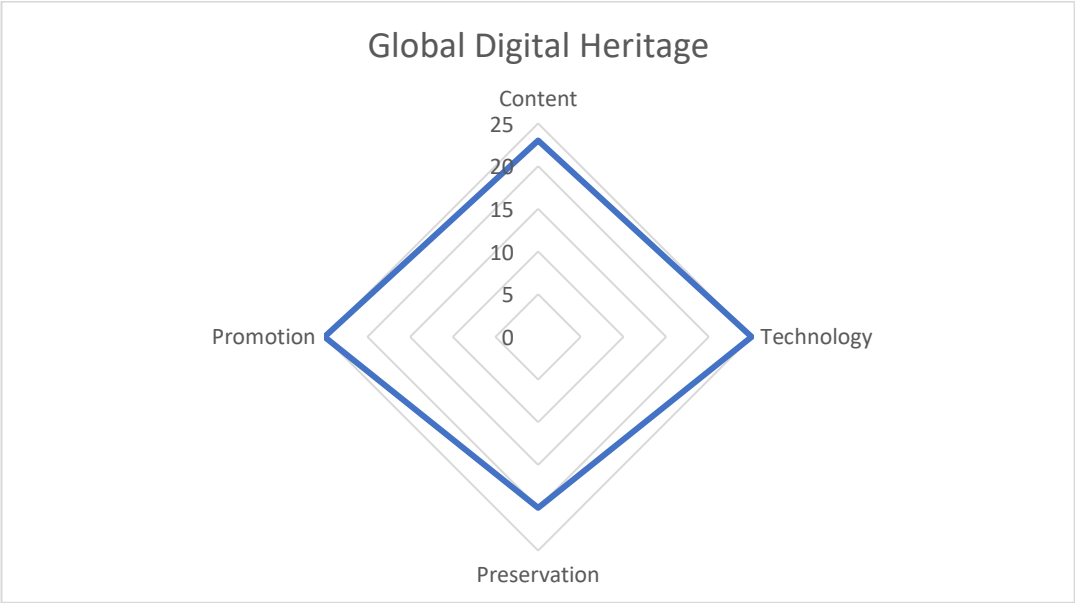
[86] "[glTF] is an all-purpose transmission format, but it has been adopted by Google as the format of choice for Augmented Reality (AR) on Android's Scene Viewer." https://help.sketchfab.com/hc/en-us/articles/360046421631-glTF-and-USDZ?utm_source=website&utm_campaign=model-3d-information

[87] "[USDZ] is a 3D file format created by Pixar. It has been adopted by Apple as their format for AR applications on iOS AR Quick Look." Ibid.

[88] " The OBJ format is very widely used for 3D printing, particularly for multi-color 3D printing with the colors specified in a companion MTL file" https://www.loc.gov/preservation/digital/formats/fdd/fdd000508.shtml

[89] The project storage specifications include 200 terabytes of physical disk storage and unlimited cloud storage.

documentation projects with access to funding streams.[90]



Figures 5.13: Radar visualisation for SDRF Dimensions, Global Digital Heritage

Figure 5.13 shows that the project lost points in the Preservation and Technologies Dimensions. In terms of long-term sustainability, the programme emphasises excellent good professional practice from the outset, barring some points of transparency to the user groups with communicating information about Best Practice and IPR Criteria. This is reflected in the following SDRF framework with slight changes in the weighting due to non-applicable Criteria.

[90] Link to site: https://globaldigitalheritage.org/equipment/

Figure 5.14 Global Digital Heritage (GDH), SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	NA	Maintained (active/archived)	NA	Maintained (active/archived)	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Not available	Project website		
	1	0	2	0	2	0	2	2	2	2	2	2	2	2	0	2		
	Max possible points: 25														Sustainability score for Content:	23	92	23
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured				Ongoing financial support (staff) secured		Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes				Yes		Yes		NA				NA		Partly			
	2				2		2		0				0		1			
	Max possible points: 10														Sustainability score for Preservation:	7	70	18
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE...		91

5.3.8 CyArk[91]

Founded as a non-profit organisation in 2003, CyArk endeavours to "digitally record, archive and share the world's most significant cultural heritage and ensure that these places continue to inspire wonder and curiosity for decades to come," according to its mission statement. While CyArk (n.d.) cites the 2001 destruction of the Bamiyan Buddhas by the Taliban government in Afghanistan as the onus for the creation of the project, the increasing rate of the loss of cultural heritage material due to armed conflict since this time has been their primary concern. CyArk is publicly transparent for all Relevance and Authority Criteria and received full points across the Content Dimension.

SDRF score: 94

This project has a sustainability score which falls under 'strong foundation'.

While focusing on the distinct areas of conservation, recovery, and discovery, the documentation undertaken at CyArk is inherently collaborative. The organisation works with heritage professionals to manage and preserve the sites by undertaking digital mapping and providing engineering drawings that can be used in conservation efforts (CyArk, n.d.). The digital mapping process seeks to provide a comprehensive record of the site, so that in a post-conflict environment, damages or loss can be identified and assessed while active documentation in a pre-conflict environment can be used by heritage professionals in the future, making up the methodology and praxis for the operation of the organisation (CyArk, n.d.).

Comparative analysis employing the data collected from the pre-emptive digitisation is further used to assess the damage to sites and monuments post conflict. CyArk cites the example of Bagan in Myanmar, which was sponsored by the Department of Archaeology, National Museum and Library, where early 3D mapping of the site was able to provide for easier reconstruction effort after the 2016 earthquake which damaged several temples in the city (CyArk, n.d.; Federal Foreign Office, 2018). The dataset is then used to inform upcoming

[91] The full criteria questionnaire for this documentation project can be found in Appendix VI (h).

restoration projects and from which the development of the methodology with each case is advanced. CyArk creates 3D surface models of sites using LiDAR (light detection and ranging) or laser scanning.[92] This scanning is combined with high resolution imagery from ground level to fully construct the 3D surface model. Since 2003, CyArk has documented over 200 sites around the world, from vastly different historical periods (CyArk, n.d.).

CyArk uses entirely open technologies, developing the initiative Open Heritage 3D to provide free access to high resolution 3D data of cultural heritage sites across the world. This is a joint project produced by CyArk, Historic Environment Scotland (HES), and the University of South Florida Libraries.

Additionally, CyArk clearly communicates to its user community the terms and conditions that apply to access and use of the digital content, fully defining the data licences, all data is licensed under a Creative Commons Attribution-Non-commercial 4.0 International License.[93] CyArk's relationship with how it defines copyright has been called in to question, however, and has been a stark critique of the organisation. CyArk owns the copyright for all the scans that it produces, rather than the countries where the various sites are located. This in turn means that source counties need to seek licensing permission to use the scans for any commercial purposes (Sydell, 2018). This calls into question whether the actions undertaken by CyArk constitute as digital colonialism, and would require the organisation to very clearly address way in which it is actively mitigating this – something that is not evident in the information that is presenting though it's online presence.

This view of copyright is one that is not supported within the SDRF framework. The framework rather looks at whether the copyright and IPR is communicated to user groups but does not assess ethical considerations for the type of licencing that is defined for the digital outputs. Following the exacting wording

[92] This technology is described by the National Oceanic and Atmospheric Administration (2021) as, "a remote sensing method that uses light in the form of a pulsed laser to measure ranges [which] generate precise, three-dimensional information about the shape of the Earth and its surface characteristics."

[93] Link to Creative Commons definition: https://creativecommons.org/licenses/by-nc/4.0/legalcode

of the framework, CyArk has not further lost points within the Preservation Dimension.

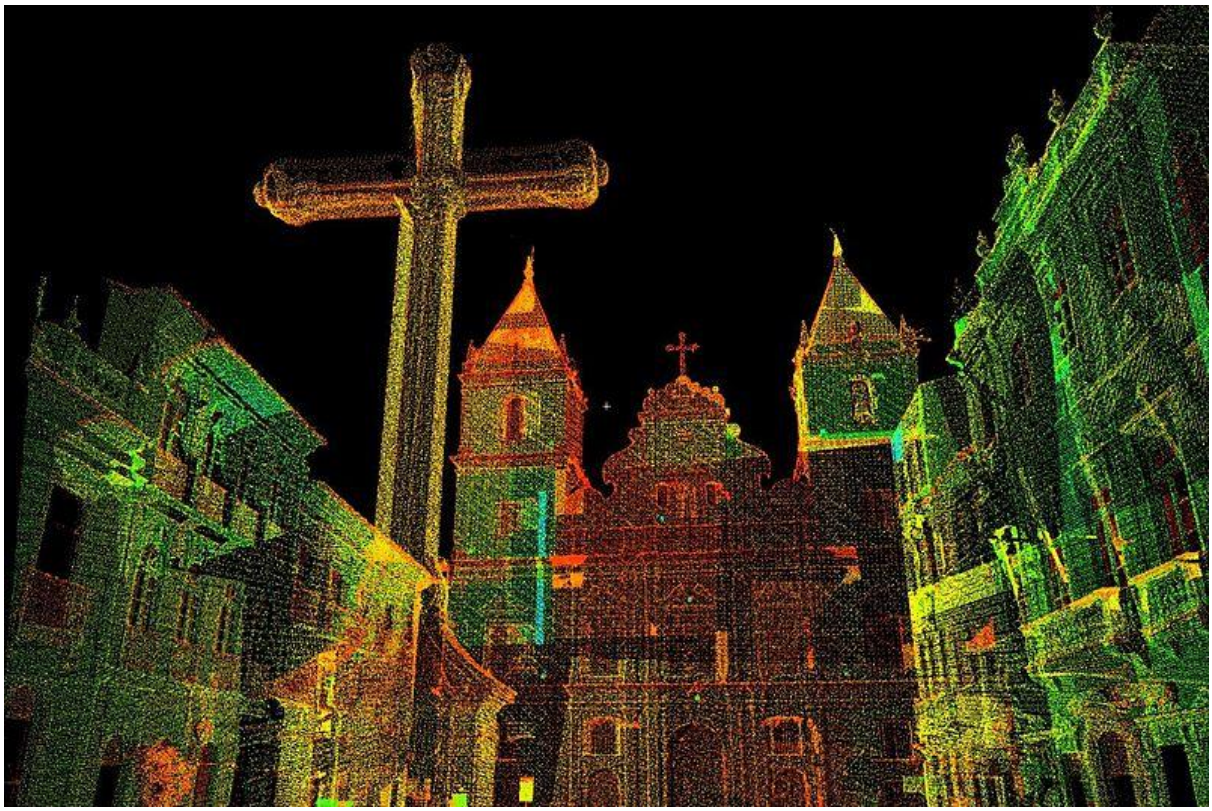


Image 4: Salvador Cross in Praca Anchieta Plaza, 2011 by CyArk; CC-BY-3.0

Images 4 and 5 demonstrate some of the advanced imaging techniques that are used to digital document historical sites and monuments.

Image 5: Documentation of Mt. Rushmore, South Dakota for the Scottish Ten Project, 2011 by Scottish Government; CC-BY-2.0

In terms of long-term sustainability, CyArk provides an apt model in a few key areas. The project clearly communicates information about the project and the methodology for the selection of the cultural heritage that is documented and outlines the inherent value in this for the user groups. The project also emphasises use a reuse of the material through the Open Heritage 3D initiative, affirming public access, making it easier to continue the digital content lifecycle model.

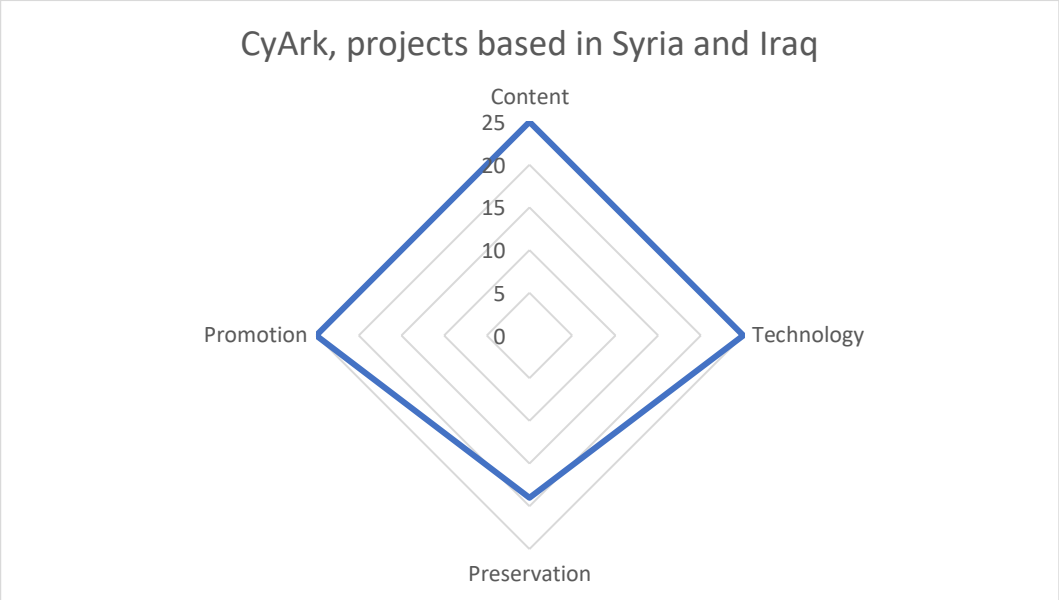


Figure 5.15: Radar visualisation for SDRF Dimensions, CyArk, projects based in Syria and Iraq

The SDRF framework and Figure 5.18 demonstrate the general success of the project for long-term digital sustainability. Receiving close to full points across all Dimensions and Criteria, CyArk can represent a good model for funded projects undertaking similar types of digital documentation.

Figure 5.16 CyArk, projects based in Syria and Iraq, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	NA	NA	NA	Maintained (active/archived)	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	0	0	0	2	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 23														Sustainability score for Content:	23	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured				Ongoing financial support (staff) secured		Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Partly				Yes		Yes		Yes				NA		Yes			
	1				2		2		2				0		2			
	Max possible points: 12														Sustainability score for Preservation:	9	75	19
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE..		94

5.3.9 Iraq Mosul Museum, Project Mosul/Rekrei[94]

REKREI (previously Project Mosul before 2015) is a crowdsourced, community generated initiative to collect photographs of monuments, museums and artefacts which have been damaged by natural disasters or human intervention and further use these images to create 3D representations. The initiative not only focuses on the geographical region of Mosul, but also has been broadening its scope to include sites and monuments which have been affected by natural disasters (Project Mosul, n.d.), a notable example is the virtual reconstruction of heritage sites in Kathmandu that were damaged the April 2015 earthquake. Following the destruction of cultural heritage in northern Iraq, Project Mosul was founded as a volunteer effort to aid in the restoration of heritage that is at risk of loss.

Working in cooperation with Project Mosul (REKREI), RecoVR Mosul is a virtual reality catered journalism piece by The Economist Media Lab that created a collective reconstruction of the Mosul Museum which was occupied by ISIL in 2015 (Prospero, 2016) when various statues and artifacts were destroyed in the museum with hammers and drills. Thousands of images had been uploaded to the Project Mosul repository by locals, tourists, and active-duty soldiers in the region during the Iraq War, motivating the collaboration with the Economist Media Lab to showcase the destroyed art in a public forum. The Economist states that they are conscious that digital reconstructions can raise important questions about ownership and use, and if substitutes can effectively replace the original objects (Prospero, 2016).

SDRF score: 87

This project has a suitability score which falls under ‘fair foundation’, primarily losing points by not communicating Criteria related to funding and staffing streams, a common shortfall for the selected projects.

In the content Dimension, REKREI receives full points across the Relevance and Authority Criteria, except it is not transparent with the body that funded the content development; the only example of this across the 20 examples.

[94] The full criteria questionnaire for this documentation project can be found in Appendix VI (i).

Information about the ongoing financial support and staffing obligations was also not discoverable via public means.

Sustainability of the digital outputs in terms of the technical specifications was strong in comparison. The project hosts the 3D models with Sketchfab, which does use proprietary file formats, therefore REKREI loses 1 point for Implementation and Development. Though, as previously mentioned, the .STL file format is classified as proprietary, but has been openly documented since the 1990s; this point loss is a technicality. The project also has the digital content harvest by DigitalOcean, a cloud-based developer storage.[95]

REKREI loses points for not defining contractual or legal reasons for keeping the outputs for the long-term, however, the project receives full points for defining the terms and conditions for use and reuse though copyright and licencing. A strength in this project is its collaboration for access to the 3D materials, uploading the models to a large repository and viewer such as Sketchfab, which has a larger user base and explicitly outlined information regarding use and reuse helps to continue to digital content lifecycle model. These lost points can be seen in Figure 5.17

[95] Link to cloud storage: https://www.digitalocean.com

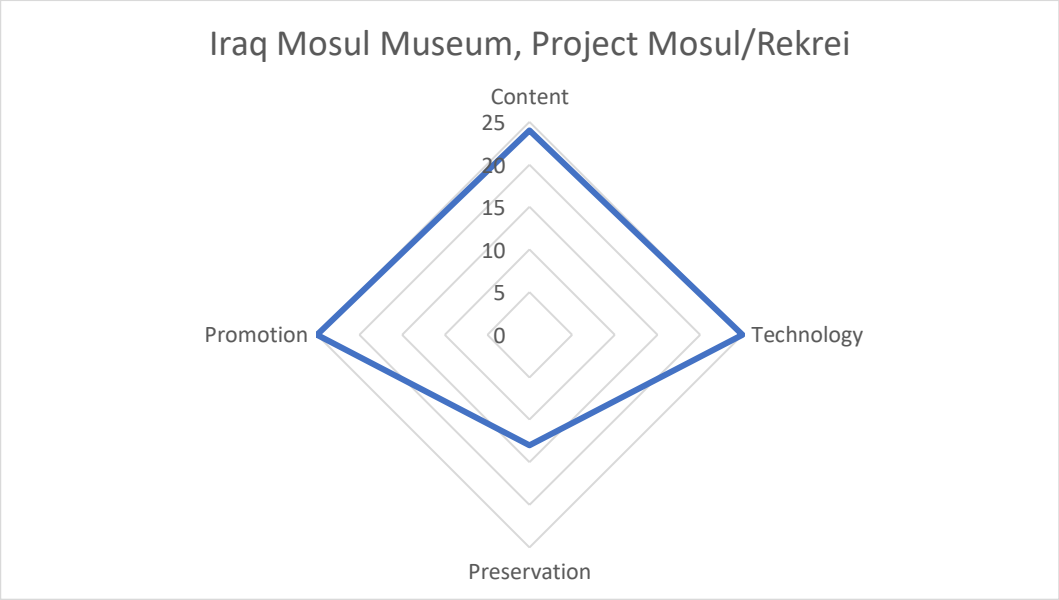


Figure 5.17: Radar visualisation for SDRF Dimensions, Iraq Mosul Museum, Project Mosul/Rekrei

Figure 5.18 Iraq Mosul Museum, Project Mosul/Rekrei, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	NA	Maintained (active/archived)	NA	Maintained (active/archived)	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Recorded	Available (online/physical)	Project website		
	1	0	2	0	2	0	2	2	2	2	2	2	2	1	2	2		
	Max possible points: 25														Sustainability score for Content:	24	96	24
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	NA			NA			Yes		Yes				NA		Yes			
	0			0			2		2				0		2			
	Max possible points: 12														Sustainability score for Preservation:	6	50	13
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
															TOTAL WEIGHTED SCORE..			87

5.3.10 #NewPalmyra[96]

The initiative #NewPalmyra, previously the New Palmyra Project, was the last project developed by Bassel Khartabil Safadi, a Palestinian Syrian open-source software developer and lead of Creative Commons Syria. Integral in the digital reconstruction effort in Palmyra, the project sought to recreate an open, 3D immersive virtual reconstruction of the ancient city. After the capture of the city of Palmyra in 2015 by ISIL, several historic sites in the region suffered damage, displacement of heritage materials, or were destroyed. Soon after the 2015 capture, the New Palmyra Project began to receive contributions of photographs, and the project began outfitting local archaeologists with inexpensive 3D cameras to be used to pre-emptive digital capture of monuments which may in imminent danger.

SDRF score: 94

This project has a sustainability score which falls under 'strong foundation'.

Like REKREI, NEW PALMYRA hosts its digital outputs with Sketchfab to take advantage of the large user base. Making it available to a larger community helps to facilitate the use and reuse Dimension of the digital content lifecycle. This can also have the effect of bringing awareness to the types of cultural heritage that are being documented due to conflict, which can in turn facilitate more active engagement with the digital outputs.

Information about copyright and licensing of the material is clearly communicated, as is information about additional streams of funding and financial support.

In terms of the Best Practice Criteria, digital outputs have fully defined metadata and well as sustainable file formats, and information about the status of harvesting of the information to a digital archive was discoverable.

New Palmyra does not to implement any mitigating factors to ensure the long-term health of the digital outputs. The project has been designed with a strong

[96] The full criteria questionnaire for this documentation project can be found in Appendix VI (j).

foundation for long-term digital sustainability. This can also be seen in the radar visualisation – very few points were lost in Preservation. The project would score higher if a continuous funding stream could be identified, however this is almost never a guarantee.

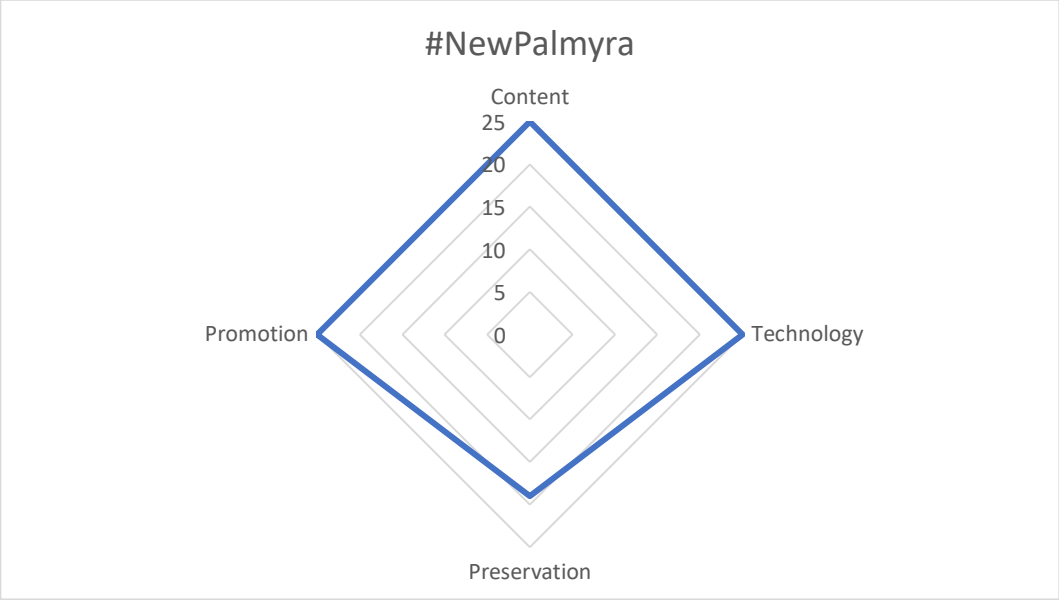


Figure 5.19: Radar visualisation for SDRF Dimensions, #NewPalmyra

Figure 5.20 #NewPalmyra, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	NA	Maintained (active/archived)	NA	Maintained (active/archived)	Maintained (active/archived)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	0	2	0	2	2	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 27														Sustainability score for Content:	27	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				No					
	2				0				0				0					
	Max possible points: 2														Sustainability score for Technology:	2	100	25
PRESERVATION	Ongoing financial support (maintenance) secured				Ongoing financial support (staff) secured		Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Partly				Partly		Yes		Yes				Yes		Partly			
	1				1		2		2				2		1			
	Max possible points: 12														Sustainability score for Preservation:	9	75	19
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE...		94

5.3.11 Million Image Database/Institute for Digital Archaeology[97]

The Institute of Digital Archaeology (IDA) is a joint venture between Museum of the Future Dubai and Harvard University that emphasises the development and use of digital imaging techniques. A subproject associated with IDP, the Million Image Database, is an open-source repository to host photographs and images of artefacts that are at risk of being destroyed. The mission statement of The Million Image Database indicates the project will compile and disseminate information focusing on heritage material object, architecture, and places. The project uses images taken before the destruction of site to create a visual record that can be used to create a virtual reconstruction via photogrammetry. This use of digital methods spans the full spectrum of relevant documentation technologies: simple digital photography to advanced reconstruction software to create 3D visualisations. The project emphasises the foundation in digital photography and provides volunteers with cameras to document at-risk cultural sites in several regions in the Middle East and North Africa (Farrell, 2015).

The Institute however has faced criticisms for the manner in which it has disseminated its haptic reconstruction of destroyed heritage, most notably with reproduction of a scale model of the destroyed Triumphal Arch from Palmyra using a combination of 3D printing and photogrammetry from photos of the original. The reconstruction was produced in Italy and made from Egyptian marble, then shipped to Trafalgar Square in London for a three-day exhibition of the project which was meant to bring awareness to conflict and heritage destruction in Syria (Dubai Future Foundation, 2016). This endeavour had mixed reviews as to the efficacy of the reconstruction and was severely critiqued for not involving stakeholders in the production process, as well as exhibiting the arch outside of Syria where stakeholders were very unlikely to be able to access the reconstruction.

SDRF score: 80

This project has a suitability score which falls under ‘fair foundation’

[97] The full criteria questionnaire for this documentation project can be found in Appendix VI (k).

The Million Image Database uses a photography team to work with a network of volunteers to undertake site surveys, taking conventional photography and well as 3D photography so in later stages of reconstruction the images can be used to create computer renderings.

In the Content Dimension, the project receives full points for the Relevance Criteria, and misses points in only one Criterion in Authority, failing to identify support for users who need assistance with the digital content.

The project loses points in Implementation and Development; information about the build of the website and repository was not discoverable. This skewed the weighting for the Technology Dimension, affecting the score to a greater degree as only one Criteria could be used for the Dimension weighting.
The IDP does not assert copyright for any of the digital images that it produces, indicating that the photographs may be used without payment or attribution. The project does include the caveat that because the Million Image Database accepts materials from all contributors, it is possible for the user community to upload a copyrighted image, though the project indicates there is technical support on a case-by-case basis for this if it occurs. The project has received full points for IPR Criterion related to copyright, although there can be complications with use, because of the level of technical support available to users.

Information related to the ongoing financial support and staffing obligations was not discoverable, losing the project points in the Preservation Dimension.

The project has developed a fair foundation for long-term sustainability for its digital outputs. Access to the materials has been highlighted as a priority, and terms for its use and reuse has been clearly defined, with support available should there be issues. The project lost more substantial points by not identifying funding and staffing support for the continued maintenance for the materials. This, in addition to the lack of information about the long-term sustainability and reusability of the website, digital archive and repository, dropped the project to a classification of ‘fair foundation’ for digital

sustainability. Any mitigating actions to be taken would be related to community communication of funding and archive development.

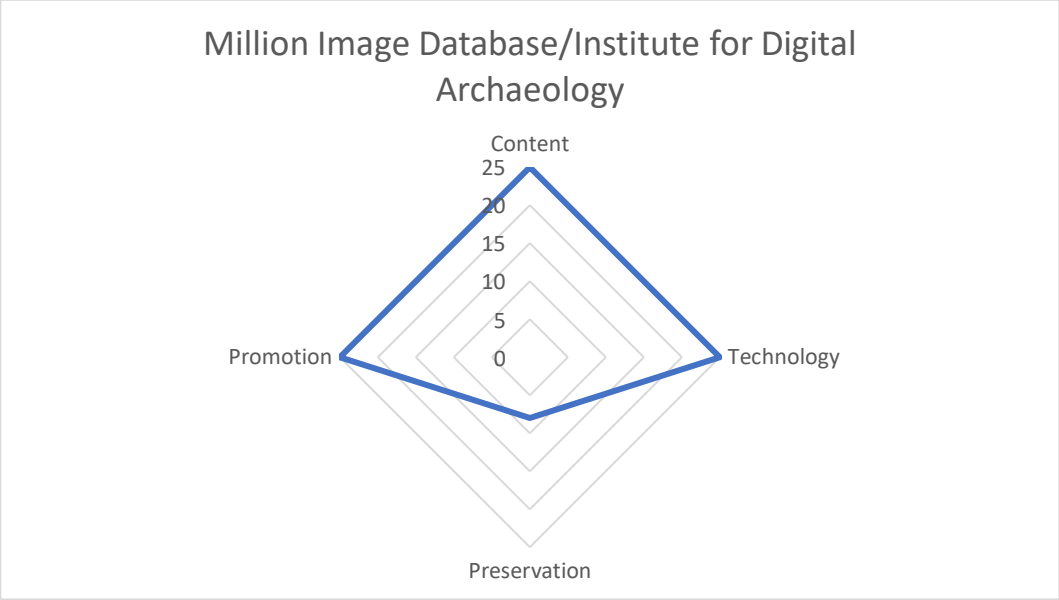


Figure 5.21: Radar visualisation for SDRF Dimensions, Million Image Database/Institute for Digital Archaeology

Figure 5.21 visualises the points which were lost across the Preservation Dimension.

Figure 5.22 Million Image Database/Institute for Digital Archaeology, SDRF weighed score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	Maintained (active/archived)	Maintained (active/archived)	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Not available	Project website		
	1	2	2	2	2	0	2	2	2	2	2	2	2	2	0	2		
	Max possible points: 29														Sustainability score for Content:	27	93	23
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	NA				NA				NA				Entirely					
	0				0				0				2					
	Max possible points: 2														Sustainability score for Technology:	2	100	25
PRESERVATION	Ongoing financial support (maintenance) secured				Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used			Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	NA				NA			Yes		NA			NA		Partly			
	0				0			2		0			0		1			
	Max possible points: 12														Sustainability score for Preservation:	3	25	6
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				NA				Yes					
	0				2				0				2					
	Max possible points: 4														Sustainability score for Promotion:	4	100	25
															TOTAL WEIGHTED SCORE..			80

5.3.12 (EAMENA) Endangered Archaeology in the Middle East and North Africa[98]

The spatial database project EAMENA (Endangered Archaeology in the Middle East and North Africa) has been funded since 2015. The project seeks to aggregate important information about heritage sites and monuments in regions of conflict and compile them into a database to assess the danger with certain criteria (EAMENA, 2017). The database provides basic information on each site, an assessed level of risk and how each site relates to each other.[99] Methods for collecting data are used for their expediency; using satellite imagery allows the project to rapidly record information about the sites so that it can be made available for specialists and non-specialists.[100] The emphasis on the database is for the information to be made public to bring awareness to the conflict and liaise with national authorities about findings, while also actively monitoring and deterioration of the site. This technology gives a measurable figure to the looting damage in this region. [101]

The EAMENA project seeks to identify these areas which are at risk for destruction or looting, and document as much information about the site as possible, pre-emptively.[102]

SDRF score: 96

This project has a sustainability score which falls under 'strong foundation'. EAMENA uses the Arches project open-source platform for the repository build.[103] Through this platform, the user can see the sustainable file formats, descriptive metadata, and supplementary information regarding user support for the digital outputs.

The EAMENA project received full points across the Content and Technology Dimensions. The project has also secured funding and staff support for the continuation of data management, Criteria which have been difficult to identify

[98] The full criteria questionnaire for this documentation project can be found in Appendix VI (l).
[99] Link to site component: https://eamena.org/home
[100] Database access is available for the public, as well as a dedicated research portal that requires registration.
[101] Link to site component: https://eamena.org/arcadia-fund
[102] Link to site component: https://eamena.org/home
[103] Link to Arches database: https://database.eamena.org/en/

in the other examples.[104] This contributes greatly due to the weighting of the Preservation Dimension. The SDRF score classifies the project as having a 'Strong foundation' for long term digital sustainability. The areas for improvement relate to IPR and the public communication of obligations by the project to maintain the digital outputs for the long term.[105] There are no mitigating actions needed for effective preservation of outputs at this time.

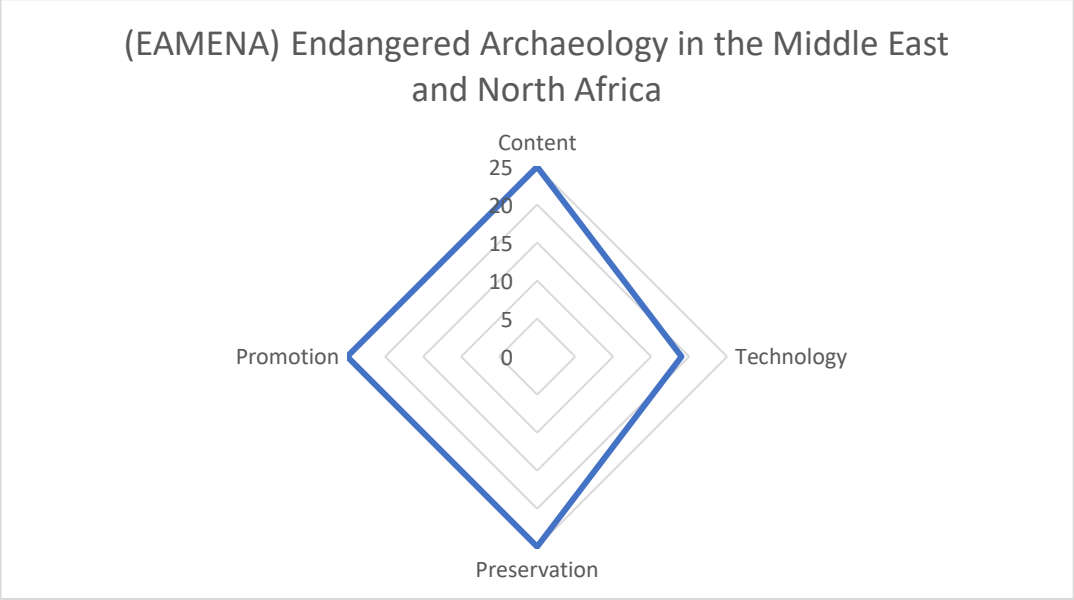


Figure 5.23: Radar visualisation for SDRF Dimensions, (EAMENA) Endangered Archaeology in the Middle East and North Africa

[104] Press release regarding funding: https://www.britishcouncil.org/arts/culture-development/cultural-protection-fund/international-partnership-projects
[105] This information was not discoverable.

Figure 5.24 (EAMENA) Endangered Archaeology in the Middle East and North Africa, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	NA	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	0	2	0	0	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 23														Sustainability score for Content:	23	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes			Yes			Yes		Yes				NA		Yes			
	2			2			2		2				0		2			
	Max possible points: 12														Sustainability score for Preservation:	10	83	21
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE..		96

5.3.13 Syrian Heritage Initiative (Syrian Heritage Archive)[106]

The Syrian Heritage Initiative represents the virtual platform of the Syrian Heritage Initiatives based at the Museum for Islamic Art/ Staatliche Museen zu Berlin and acts as a network for projects based there. The initiative brings together six projects related to Syrian material and immaterial cultural heritage, and archival efforts focused on documenting this material and making it more publicly accessible in a participatory platform. These methods have included workshops which aim to record oral history es and anecdotes to weave more diverse narratives of Syrian heritage.[107]

Around 120,000 datasets have been digitised so far. Focusing in particular on the Syrian Heritage Archive, since its inception in 2013, the archive has ingested 270,000 items, primarily photographs, which have been geo-referenced, adding 4000 new locations on to their virtual map of Syria.[108] More than 115,000 digitised items are available to registered users, though registration is not compulsory to view collections – but these users have access to a smaller dataset if they do not register.

SDRF score: 94

This project has a suitability score which falls under 'strong foundation'. The documentation project, from as early as the planning stage, undertook all the measures needed to develop a sustainable project. This included maintaining multiple content types[109] and communicating with transparency each Criterion for project Relevance, Authority, and Best Practice.

The project provides a strong example of communicating robust metadata to the users. A simple metadata view is available to the user via the archive database, but the user can expand to see more advanced level of metadata, including:

- File size
- Original filename

[106] The full criteria questionnaire for this documentation project can be found in Appendix VI (m).
[107] Link to website component: https://syrian-heritage.org/interactive-heritage-map-of-syria/#Workshops
[108] These elements are linked in the database: syrianheritage.gbv.de
[109] (Documents, images)[109]

- Original filename basename
- Original filepath
- Date uploaded
- ID
- Aspect ratio
- Color depth
- Color space
- DPI
- Checksum
- Format
- Height (in pixels)
- Max dimension (in pixels)
- Orientation
- Width (in pixels)

From a digital sustainability standpoint, the Syrian Heritage Archive sets a commendable example for communicating the project methodology and explaining technical specifications, and the transparency for the integrated metadata could be a good example for a technical appendix.

The Syrian Heritage Archive received full points across 2 of 4 dimensions, losing points in Content for not having a discoverable avenue for support for community members requiring assistance with the digital content. Further, like most projects, information related to the IPR Criteria regarding the legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term was not overtly discoverable to the public and adjusted the weighting to 0.

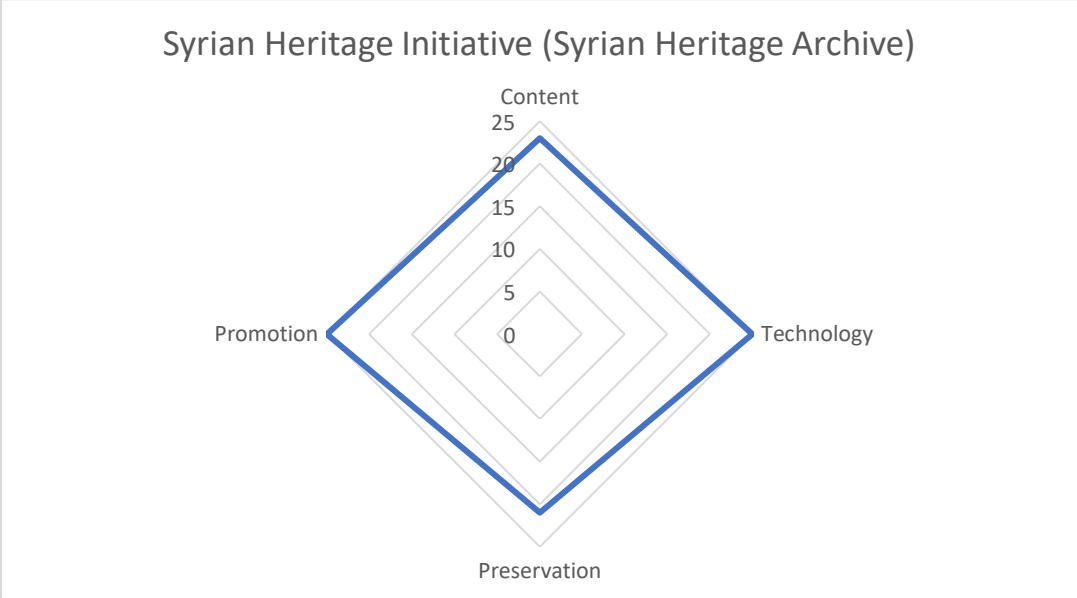


Figure 5.25: Radar visualisation for SDRF Dimensions, Syrian Heritage Initiative (Syrian Heritage Archive)

Figure 5.26 Syrian Heritage Initiative (Syrian Heritage Archive), SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Not available	Project website		
	1	2	2	0	0	0	2	2	2	2	2	2	2	2	0	2		
	Max possible points: 25														Sustainability score for Content:	23	92	23
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes			Yes			Yes		Yes				NA		Yes			
	2			2			2		2				0		2			
	Max possible points: 12														Sustainability score for Preservation:	10	83	21
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE..		94

5.3.14 The International Collection of Digitized Hebrew Manuscripts[110]

The International Collection of Digitized Hebrew Manuscripts project was developed with the express interest in filling a gap in digital preservation related to Hebrew Manuscripts, with the objective of providing open access to all manuscripts via an online portal. An estimated 90% of Hebrew Manuscripts are maintained in as the original manuscripts or on microfilm. This presents imminent threats to the long-term life of the materials with both physical interventions for preservation and obsolescence risk for microfilm. The physical preservation needed for both manuscripts and microfilm needs robust archival infrastructures. The project sought to expand options for preservation, presentation and access to the digital content and developed several concrete project goals, including:

- Developing an efficient search engine, enabling manuscript searches according to their physical attributes, content, historical and artistic context amongst other types of metadata.
- Developing a manuscript viewer to present the entire layout of the manuscript and single pages, enabling manipulation of high-resolution images, and supplying links to the catalogue record and to other related items or texts,
- Integrating text- and image-related tools chosen by the user to create a personal working space, and
- Enabling shared research amongst user groups.[111]

The digitisation project presently preserves 558 collections, 94.8k Manuscripts, 1.20 million images, and comprises 85% of extant Hebrew Manuscripts.

SDRF score: 92

This project has a suitability score which falls under ‘Strong foundation’.

The project received full points across the Content Dimension, scoring highly for the Relevance, Ongoing Support, and Authority Criteria.

[110] The full criteria questionnaire for this documentation project can be found in Appendix VI (n).
[111] Link to site component:
https://web.nli.org.il/sites/nlis/en/manuscript/Pages/manuscripts_about.aspx

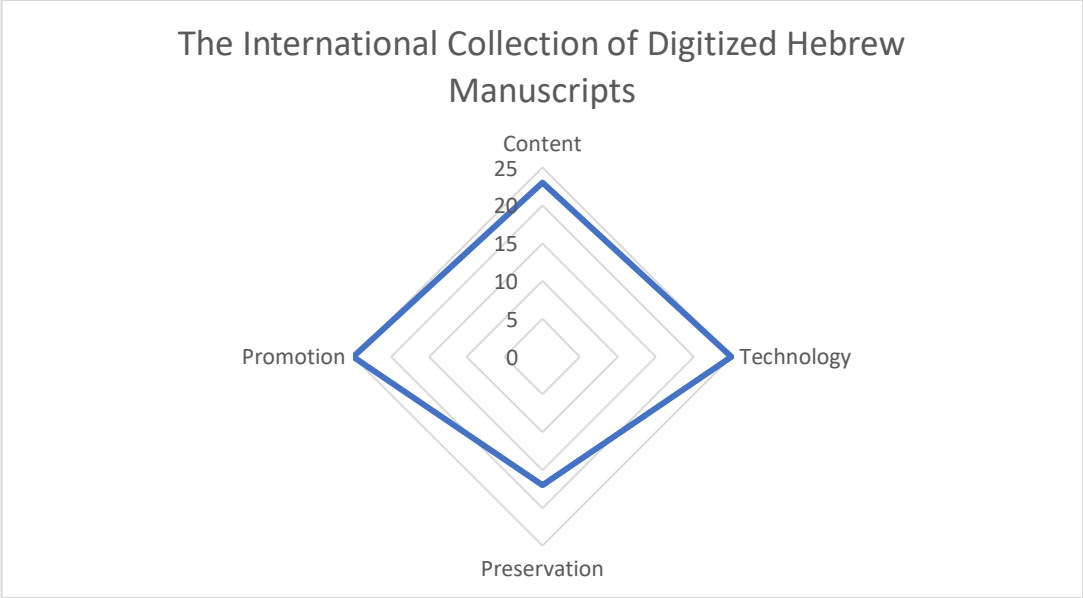


Figure 5.27: Radar visualisation for SDRF Dimensions, The International Collection of Digitized Hebrew Manuscripts

The Digitized Hebrew Manuscripts project does not need any mitigating factors to ensure for the long-term sustainability of the digital content. There is a strong foundation across the Four Dimensions with points lost only in terms of transparency of operation to the user groups. Further regarding transparency, across the Authority Criteria, the project adds an extra level of user support by outlining possible bugs that may arise from the use of the content. This model can help to ensure the continued use and reuse of the material by mitigating possible areas for confusion for stakeholders.

Figure 5.28 The International Collection of Digitized Hebrew Manuscripts, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	2	2	0	0	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 25															Sustainability score for Content: 25	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4															Sustainability score for Technology: 4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured				Ongoing financial support (staff) secured		Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes				Yes		Yes		NA				NA		Yes			
	2				2		2		0				0		2			
	Max possible points: 12															Sustainability score for Preservation: 8	67	17
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6															Sustainability score for Promotion: 6	100	25
																TOTAL WEIGHTED SCORE...		92

5.3.15 The Schøyen Collection[112]

The Schøyen Collection, MSS 1-5527, comprises about 20,450 manuscript items, including 2,380 volumes and scrolls. Altogether 6,870 of the manuscript items are from the ancient period, 3,500 BC–500 AD. Some 3,860 items are from the medieval period 500–1500. The remaining manuscripts are from the late Renaissance up to the present. There are manuscripts from 135 different countries and territories in 120 languages and 185 scripts.[113]

SDRF score: 96

This project has a sustainability score which falls under 'Strong foundation for sustainability.' This score requires more in-depth discussion, however, as context about the project operations suggest that the high score may be erroneous. For the purposes of this analysis, the SDRF framework has been followed exactly to the point, rewarding points based on the exact working of each criteria question.

The Schøyen Collection is successful to varying degrees regarding transparency about aspects of the project. In terms of copyright, licensing and use, the project presents the most robust example of terms and conditions for use amongst the examples.[114] However, it loses points for the first IPR criteria related to legal or contractual obligation to keep the digital materials for the long term. The project may have done this, but that information is not communicated to the public.

Regarding ownership of the digital materials, this highlights a drawback of the SDRF framework. The Schøyen Collection may erroneously receive point for Authority Criteria which may not be warranted due to reports of incorrect and incomplete information situated within the webpages for the project, highlighting shortfalls within the SDRF framework for assessment. The Schøyen Collection has multiple accusations of dubious provenance for certain

[112] The full criteria questionnaire for this documentation project can be found in Appendix VI (o).
[113] Link to site component: https://www.schoyencollection.com/about-schoyen-collection/scope-size
[114] Link to site component: https://www.schoyencollection.com/website-terms-conditions

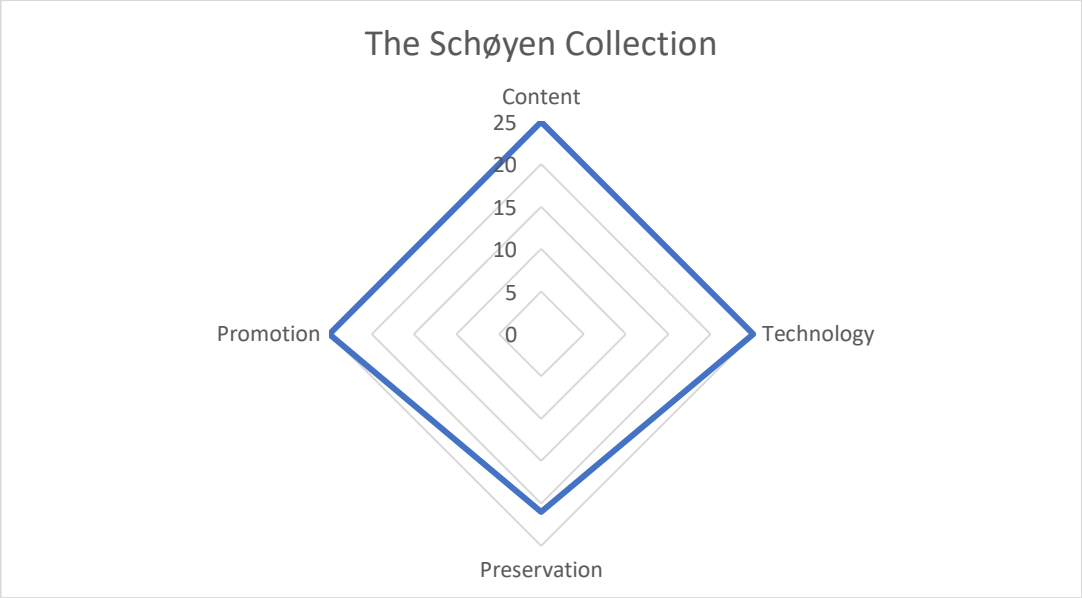
collections, particularly materials originating from Iraq.[115] While the Schøyen Collection dedicated space to outline the provenance of the collections within the website portal,[116] further research outwith the remit of the SDRF questionnaire would indicate these issues. This type of discrepancy brings into focus general issues with the SDRF framework, the remit of the questionnaire, and what level of fact-checking could be required if the framework were to be used in a more formal standardised capacity. For the purposes of the Authority Criterion, this discrepancy in the ownership criteria leads to doubt on the validity of many other criteria within this Dimension. To investigate this discrepancy, two SDRF evaluations have been undertaken to see how loss of points within the Authority Criteria affect the global score of the project.

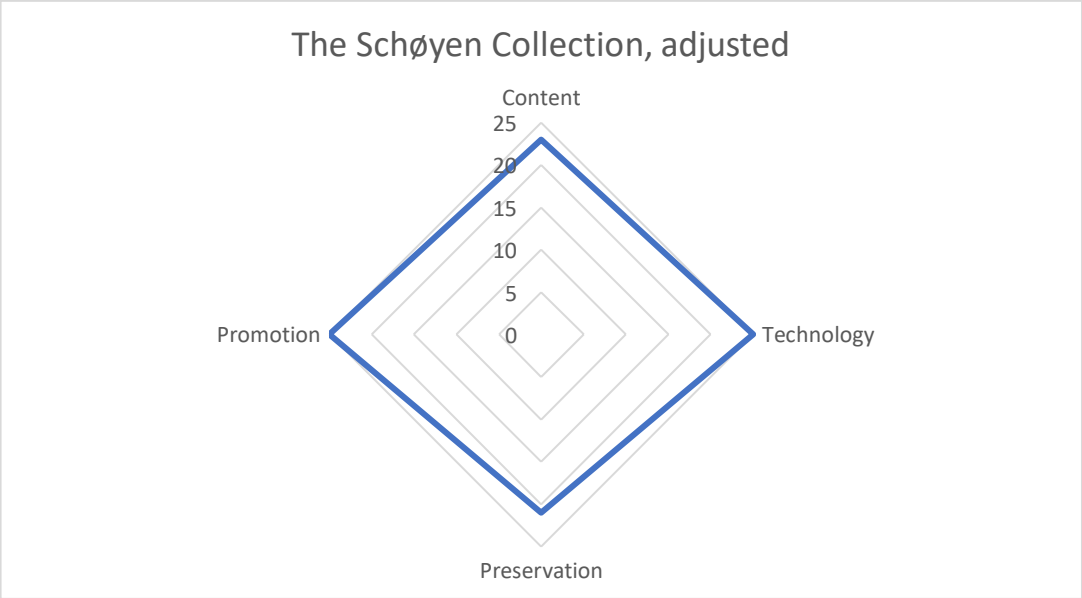
For Best Practice Criteria, the Collection provides metadata for simple and advanced searches of the digital images. A spot check of images seems to indicate that the file formats are sustainable. This information was not publicly communicated to the users but using developer tools on the webpages showed those images were stored as JPEG – which falls under sustainable for the SDRF framework. The images are of a low image resolution; this may not be an issue presently but with the presence of "bit rot", or data degradation,[117] over time this can greatly inhibit the usability of the images in the future. This would require mitigating action to ensure long term sustainability. It is difficult within the remit of this SDRF framework to know how the files are stored within the related archive or digital repository if this information is not communicated to the public. It is possible that the file formats are only hosted in lower resolution on the website, while using files with lossless compression algorithms, like .TIFF internally, but this is not discoverable for this case.

[115] Link to report: https://www.regjeringen.no/contentassets/634cb3589cfb4678bfc1f9da2e55aeed/schoyen-coll_seizure_expert-assessment.pdf pg. 4-5
[116] Statement of provenance: https://www.schoyencollection.com/about-schoyen-collection/statement-on-provenance/history-of-ownership
[117] Full definition outlined in "Just keep the bits: and introduction to bit level preservation" by the DPC: https://www.dpconline.org/docs/miscellaneous/events/2016-events/1662-bit-preservation-gettingstarted/file

Within the technology dimension, the Best Practice Criteria: “Is the project's digital content harvested and archived by a digital repository or archive (e.g., the Internet Archive)?” highlights a shortfall in the language of the SDRF framework. This passive wording of the criteria would reward full points in instance in cases of passive documentation, for example, when web crawlers submit a snapshot of the website to the Internet archive, rather than conscious and proactive recording of the project outputs. There is no differentiation within the wording of the framework criteria. For the context of the Schøyen Collection, this wording has had an overwhelming positive effect upon the score. There are several snapshots of the project website on the Internet Archive, fulfilling this criterion. However, similarly to the discrepancies with the Authority Criteria, there are contested accounts surrounding the Schøyen Collection’s website, with information missing or having been removed. This discrepancy with regards to the Schøyen Collection has been highlighted in a report undertaken by the Embassy of Iraq and the Norwegian Ministry of Culture.[118] With this context, it presents an interesting dilemma for a researcher, with no clear indication of what level of independent fact checking should accompany the completion of the framework. For the remit of this project, I have based the score exactly on the wording found in the framework. It therefore receives and overall score which falls under the “Strong foundation” category. If the project were to instead, lose points for this Best Practice criteria to account for the discrepancy in presented information, the outcome is very different, receiving an overall score of 77 – firmly situated within the “mitigation action needed” category.

[118] “Martin Schøyen removed and changed provenience and provenance statements concerning objects listed in these platforms. The entries have been reconstructed partially in a bachelor thesis by Daniel Harrouz (supervised by Professor Justnes, University of Agder) and searches through *Wayback*.” Report with assessment and recommendations concerning objects impounded at Martin Schøyen’s residence August 24, 2021, https://www.regjeringen.no/contentassets/634cb3589cfb4678bfc1f9da2e55aeed/schoyen-coll_seizure_expert-assessment.pdf





Figures 5.29a-b: Radar visualisations for SDRF Dimensions, The Schøyen Collection

The difference between the results was largely negligible, with the base SDRF score as 96 and the adjusted at 94. Due to the weighting of the SDRF framework, lack of clarification for a single, or even a few, Authority Criteria would not have any knock-on effects upon the global score. This can further be seen the radar visualisation in Figures 5.29 a-b.

Figure 5.30a The Schøyen Collection, SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	2	2	0	0	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 25														Sustainability score for Content:	25	100	25
TECHNOLOGY	Open web tech used				SEO rating*		Green rating*				Digital content archived							25%
	Entirely				NA		NA				Entirely							
	2				0		0				2							
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured		Ongoing financial support (staff) secured		Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined					25%
	Yes		Yes		Yes		Yes				NA		Yes					
	2		2		2		2				0		2					
	Max possible points: 12														Sustainability score for Preservation:	10	83	21
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)		Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media							25%
	NA				Yes		Yes				Yes							
	0				2		2				2							
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE...		96

Figure 5.30b The Schøyen Collection, SDRF weighted score (adjusted)

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Not available	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	2	2	0	0	0	2	2	2	2	2	0	2	2	2	2		
	Max possible points: 25														Sustainability score for Content:	23	92	23
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes			Yes			Yes		Yes				NA		Yes			
	2			2			2		2				0		2			
	Max possible points: 12														Sustainability score for Preservation:	10	83	21
PROMOTION	Digital content promoted at events			Digital content promoted via public media (TV, radio, newspapers etc.)					Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA			Yes					Yes				Yes					
	0			2					2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE...		94

5.3.16 Virtual Magic Bowl Archive (VMBA)[119]

The Virtual Magic Bowl Archive project brings together 650 texts from the privately held Schøyen Collection related to material that was previously difficult to access or unavailable to the public.

SDRF score: 92

This project has a sustainability score which falls under 'Strong foundation'; not losing any points for sustainability across the four Dimensions.

In terms of long-term sustainability, The Virtual Magic Bowl Archive provides an apt model across the four Dimensions. The project clearly communicates information about the project and the methodology for the selection of the cultural heritage that is documented, further it outlines gaps in accessibility that it fills as well as its value to the user groups and stakeholders. The project also allows for public access to the materials. In the same vein, the clear communication of copyright makes it easier to continue the digital content lifecycle model.

The project has its difficulties in making the metadata as transparent and discoverable as possible. For the Best Practice Criterion relating to descriptive metadata, the project has provided very generic levels of metadata. Within the VMBA archive, this metadata functions as it should to navigate the site based on general themes, however the metadata is not particularly robust. Following the terms of the SDRF, this still metadata policy meets the requirements for the Best Practice criterion,

The digital outputs have been documented and preserved in a way that is much less likely to need mitigating factors to ensure their long-term health. The parent collection partnership with the Schøyen Collection allows for collaboration and coordination to integrate the data and ingest catalogues and metadata; having multiple partners actively maintaining the outputs decreases the likelihood of data loss. There is full transparency to the user groups for the

[119] The full criteria questionnaire for this documentation project can be found in Appendix VI (p).

use and reuse of the materials. This project, by association with the Schøyen Collection may have similar issues for the Authority and Best Practice criteria which suggest misinformation. These issues will be discussed further in Chapter 6.

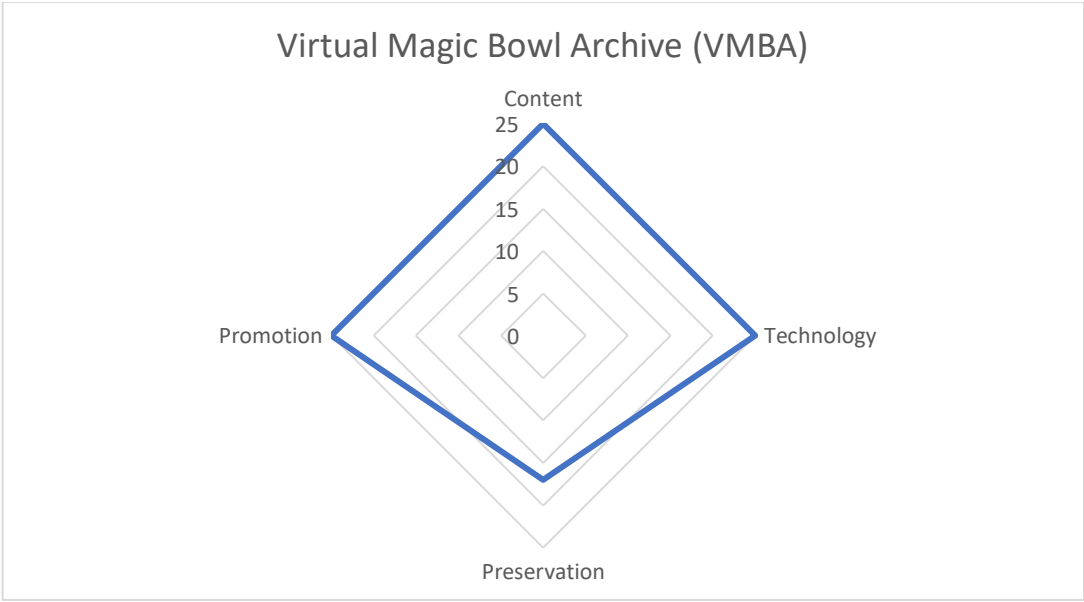


Figure 5.31: Radar visualisation for SDRF Dimensions, Virtual Magic Bowl Archive (VMBA)

Figure 5.32 Virtual Magic Bowl Archive (VMBA), SDRF weighted score

DIMENSION	CRITERIA																Score/100	Weighted score
CONTENT	Project Status	Types: Documents	Types: Images	Types: Audio & Video	Types: 3D	Types: Web	Relevance: Objectives	Relevance: Context	Relevance: Audience	Relevance: Value	Authority: Organisation details	Authority: Ownership	Authority: Partners	Authority: Funding details	Authority: Ongoing support	Content accessible?		25%
	Active	Maintained (active/archived)	Maintained (active/archived)	NA	NA	NA	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Available (online/physical)	Project website		
	1	2	2	0	0	0	2	2	2	2	2	2	2	2	2	2		
	Max possible points: 25														Sustainability score for Content:	25	100	25
TECHNOLOGY	Open web tech used				SEO rating*				Green rating*				Digital content archived					25%
	Entirely				NA				NA				Entirely					
	2				0				0				2					
	Max possible points: 4														Sustainability score for Technology:	4	100	25
PRESERVATION	Ongoing financial support (maintenance) secured			Ongoing financial support (staff) secured			Metadata for digital content produced		Sustainainable file formats used				Legal, contractual and/or financial reasons for preservation defined		Terms and conditions (incl. copyright and licensing) for use defined			25%
	Yes			Yes			Yes		NA				NA		Yes			
	2			2			2		0				0		2			
	Max possible points: 12														Sustainability score for Preservation:	8	67	17
PROMOTION	Digital content promoted at events				Digital content promoted via public media (TV, radio, newspapers etc.)				Digital content featured in academic press (journals, conference papers)				Digital content promoted via social media					25%
	NA				Yes				Yes				Yes					
	0				2				2				2					
	Max possible points: 6														Sustainability score for Promotion:	6	100	25
																TOTAL WEIGHTED SCORE..		92

5.7 Conclusion

This chapter examined and analysed digitisation projects that produced digital outputs as a method of preservation for cultural heritage in conflict. Each case study was evaluated using a set of adapted criteria that were developed to assess the long-term sustainability of the digital outputs produced by the projects. The answers collected from the questionnaire were used to assess areas within the four Dimensions where examples performed well, and where there were shortfalls. These successes and shortfalls were compiled within a weighted SDRF spreadsheet which gave a numerical value, a score for digital sustainability of the outputs which were created as deliverables for the projects.

These scores will be further broken down and analysed in the following chapter and will identify key successes and shortfalls across the 16 examples. Further, the chapter will re-assess the digital content lifecycle model in for responsive digitisation based on the findings from the case study analysis, evaluating mitigating actions for single points of failure.

These findings clearly show strong correlations with successes and shortfalls from the sample of examples. The analysis identified areas which performed successfully within the four Dimensions and translated this to a numerical value. These values are used to assess an overall score for digital sustainability. These scores are discussed in depth in the following chapter.

Chapter 6—Findings

6.1 Introduction

This chapter summarises the major findings that arose from the case study analysis, application of the SDRF framework criteria, and policy gap analysis; it compiles findings and statistics related to the case study analysis and SDRF sustainability framework template. Through a discussion of these findings, I will identify the features of successful examples informed by the case study analysis.

6.2 Findings from the SDRF framework analysis

An observational analysis of the digital outputs for each of the cases studies was undertaken. This included reviewing all the publicly accessible digital documentation produced by the projects, as well as any associated websites, databases and datasets that were produced. From this data analysis, insights into global project successes and shortfalls can be gleaned and single points of failure can be identified.

According to the findings from the SDRF sustainability questionnaire, there were a few areas where nearly every case study received full points. In the Content Dimension, nearly all projects received full points for the Authority Criteria.

	Neither available to the community nor documented by the project	Not publicly available to the community, but the project has recorded it	Publicly available to the community
Authority—details of the organisation responsible for content development	-	-	16
Authority—Information about the ownership of the digital content	-	1	15
Authority—Information about external stakeholders and partners that have been involved in its development and maintenance	-	-	16
Authority—Details of the source/body that has funded content development	-	1	15

Where projects missed in this Dimension was 'Authority—Information about support for community members requiring assistance with the digital content' and this was one of the lowest scoring Criteria.

In the Technology Dimension, for the Criterion Implementation and Development, 15 projects used entirely open technologies and file formats.

	No, only proprietary technologies used	Partly, a combination of open and proprietary technologies used	Entirely, only open technologies used	Information not discoverable
Implementation and development—Does the project use open technologies for web-based digital outputs?	-	0	15	1

In the Preservation Dimension, the examples performed positively in Best Practice Criteria:

	No	No information available or the project hasn't considered this	Partly/partly defined	Entirely/ fully defined
Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?	-	-	-	16
Best practice—Does the project use sustainable file formats for storing digital outputs?	-	6	-	10
Best practice—Is the project's digital content harvested and archived by a digital repository or archive?	1	-	-	15

Similarly, the examples responded well to the second IPR Criteria:

	No	No information available or the project hasn't considered this	Partly/partly defined	Entirely/ fully defined
IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?	-	3	1	12

Where did most projects miss the mark?

There were three Criteria that many projects missed points on that due to weighting, had a detrimental effect upon the overall scores; all of these are situated in the Preservation Dimension:

	No	No information available or the project hasn't considered this	Partly/partly defined	Entirely/ fully defined
Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?	1	4	2	9
Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?	1	5	2	8
IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?	-	12	1	3

Around 30% of the examples either did not have secured funding in place to ensure that there would be continued financial and staffing support to maintain digital outputs, or there was no information publicly available about such funding.

Why is the promotion Dimension less important when thinking about preservation in conflict?

For the purposes of this project, for the overall data analysis the Criteria in the Promotion Dimension have not been explicitly discussed, though the projects responded positively in the questionnaire:

	No	No information available or the project hasn't considered this	Yes
Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows	-	1	15
Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters	-	2	14
Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content	1	1	14

When operating within conflict or when working with cultural heritage materials that are in immediate need of digital intervention the hierarchy of mitigating actions is wholly dependent upon the number of resources available to the

project. Promotion and visibility of the digital outputs outside of the stakeholder groups is important for the continued lifecycle of the materials on an extended scale. However, from the standpoint of more responsive digitisation initiatives, or less well funded initiatives, these promotional activities might represent a timescale that would not indeed ever be feasible. For this reason, the Promotion Dimension in the scope of this project is not given the same level of prominence in this analysis.

Why is the Technical Dimension, specifically the SEO Criteria, not included when thinking about preservation in conflict?

As seen in the SDRF frameworks, there are two Criteria that were taken out of the weighted calculation for the Technical Dimension: SEO rating and Green rating. The Search Engine Optimisation refers to actions take to improve discoverability of a website from search engines, with the aim of increasing overall visitor number. These were omitted for one reason: while gathering data on the examples, staffing requirements for the projects did not always allocate adequate resources for a dedicated IT specialist, and while improving SEO rating is not a technically rigorous endeavour, significantly more effort goes into documentation rather than the final presentation of the site. Discoverability of the final front-facing site is an important secondary goal, after the documentation, and initial preservation efforts for both the physical and digital materials.

6.2.1 Relevance

The Relevance Criteria were overwhelmingly successful across the examples. Public communication of project objectives and the project history had a 100% success rate. The audience for which the content was developed was identified 100% of the time and 100% of overall examples communicated the value for the digital outputs for the intended community. Across the questions in the Relevance Criterion, there were no instances where the information was not discoverable via public web presence. This is overwhelmingly positive.

It is important to communicate the value of digital outputs to the communities and target audience because this can contribute to use of the resources and

increase public awareness of the digital outputs. In conjunction with stakeholder consultation, keeping the user groups informed on the project operation can ultimately affect the success of the project in the long term. Communication, inclusion, and awareness of the digital output further feeds into the digital content lifecycle.

6.2.2 Authority

Like the Relevance Criterion, the examples had overall positive responses for Authority. There were however indicators that posed issues for projects.

Each of the 16 examples provided further information about the organisation or entity responsible for the development of the digital content. Similarly, 100% of cases reported information about stakeholders that were involved in the development and maintenance of the digital content, as well as details of the funding source. Information about the ownership of the created digital content was slightly less successful with 93% of cases making the information publicly available. This information was undiscoverable in only one case.

The first breakdown in quality is the availability of information regarding support for community members need assistance with the digital content. This is classified generally, but can indicate things such as accessibility, site navigation, a FAQ page, information for contacting relevant staff with enquiries, or linking to an affiliate web resource (often the linked institutional database or repository). The information was undiscoverable in five projects, and publicly available for eleven projects.

It is important for these details to be available to the public because it contributes to enhancing access to, and usability of, digital content. Like a breakdown in communication about copyright and licensing, inhibitors to accessing the materials or engaging with in a non-superficial manner can interfere with the digital content lifecycle for use and reuse.

6.2.3 Quality

The sample of examples performed well within the Quality Criteria. Most projects developed dedicated websites where the digital outputs were readily available or linked to a related in institutional digital repository or digital archive. Several projects have access to both, thus the overlap in the numbers; ten indicated websites and twelve indicated repositories/archives. The extensiveness of the material available depended upon the quality of the created website and its capacity for user engagement. Several examples used the open-source software Arches[120] to develop the webpages, (EAMENA, IOMHER) and these projects were able to present a richer dataset than other developed websites via an interactive map built into the user interface. On the other end of the spectrum, CADiP did not have public access the digital outputs but has plans to make the digital content available in the future.

6.2.4 Implementation and development

The Implementation and Development Criterion is based on the use of open-source technologies. With 15 projects indicated that only open-source technologies were used in the development. In one case, this information was not discoverable via public means

This aspect of the Technology Dimension was the most difficult to investigate. Information regarding the development of the websites or the associated databases/linked repositories was not a highlight of any of the examples, so specific information was often buried deep within the sitemap. Once the types of software (i.e., Arches, Open Heritage 3D[121], IIIF[122]) and related metadata standards had been identified, targeted research was taken to further identify if close source software or proprietary formats[123] were utilised. Generally, this information was difficult to identify unless the project website had resources available about the technical specifications about the development, like the International Dunhuang Project (IDP).[124] The IDP technical resources are

[120] Link to site: https://www.archesproject.org
[121] Link to site: https://openheritage3d.org
[122] Link to site: https://iiif.io
[123] Link to site: https://www.archesproject.org
[124] Link to technical specifications: http://idp.bl.uk/pages/technical_infra.a4d

incredibly rich and represent a strong example for presenting technical information to the public, as well as other digitisation projects, which could use the information available in the project planning stage to have a more efficient start-up.

Using proprietary software, that is, non-free or closed-source software,[125] loses points on the SDRF framework. Proprietary software poses several difficulties. The commercial status of some proprietary software carries additional fiscal responsibility that can make it difficult to maintain digital content in the long term. Moreover, some proprietary software stores data in file formats which can be incompatible with other types of software and/or may be subject to patents. This, again, is an aggravating factor to long-term sustainability of databases and repositories, as well as the content within them.

Not all digitisation and documentation projects will have a mandate for open access. This presents a problem because this could lead to the materials never becoming publicly available or encountering severe delays in the publication of the materials if the project timeline becomes protracted or must change due to complications.

One option for setting up a data management system is to seek out freely available open-source data management platforms for the heritage field. However, there are many factors to consider before undertaking platform customisation through open-source software. If there is underdevelopment of the platform for data management this can be detrimental to the long-term sustainability of the digital outputs. Platforms such as these can support aspects such as data sustainability, data sharing, integration of vocabularies for metadata entry and validate data entry and complex searching, and data collection tools.

To use an open-source platform, the digitisation project will need to plan to build, develop, test, and make the site live, train users how to navigate the site,

[125] Closed-source software does not give the public access to the source code; it cannot be modified. This is the opposite of Open-source software. Example of this type of software includes Microsoft Windows, adobe Photoshop, UNIX

and configure it work in accordance with the project intentions. To do this effectively, there must be a sufficient allocation of budget and adequately trained staff. For some complex tasks this will require staff who understand both the complexity of the project data as well as the open-source software. This can be a particular shortfall for projects focused on the digitisation of cultural heritage, whereby those working on the project may not have a particular background in these types of digital humanities-based tasks. This is further exacerbated in periods of conflict and disaster when it may simply be impossible to integrate additional skilled staff to work on the technical side.

With open-source software there can be a learning curve and it does not represent a fully contained solution. There is a certain amount of research needed to develop the necessary skills to customise these sites or the allocation of resources to re-appropriate existing staff within an institution.

6.2.5 Ongoing Support

With a slight majority, 10 projects indicated that they have either full or partial funding to sustain the project after the end of the dedicated project phase, with 8 indicating full funding, and 2 indicating partial funding. The further 5 projects of the projects did not have information publicly available about the funding status. One project had reached the end of their funding period and did not have provisions for a further financial support for that iteration of research.

Staff support, being closely tied to the financial aspects of the project report, reflected the same numbers as financial support indicating a close tie between ongoing financial support and the ability to maintain project staffing levels.

Costs and Budgeting

Digitisation is a costly endeavour, requiring staff time and training, the technologies available to digitally document the materials, and costs for subsequent storage of the digital outputs. The process of creating digital information comprises only one aspect of the entire project but can represent a

large percentage of infrastructure and operating costs.[126] Also to be considered is the selection, conservation, movement, application of metadata, indexing, negotiations of rights, preparation, delivery, use, and preservation. When considering digitisation projects, institutions can explore several funding options: secure internal funding to commission the work, secure grant-funding for commissions, or enter a public or private sector partnership.

6.2.6 Best Practice

The Best Practice Criteria includes metadata and discoverability of the descriptive information, the sustainability of the file formats used for the digital outputs, and how the digital content is archived within repositories. Most projects had defined the metadata and descriptive information: 16 projects have indicated fully defined metadata, with no projects failing to communicate this information to the public.

The projects further reported positively for maintaining sustainable file formats, with 10 using entirely sustainable formats. The other 6 projects didn't have information available on the file structure. This criterion represented the largest gap in public communication. Information about the file formats was not always available to the public on the database, or website, rather presenting only digital content and available metadata with more limited file specs.

Almost unanimously, 15 projects indicated that the digital outputs are harvested by a digital archive or a digital repository. One project indicated the outputs were not harvested and archived with an external party.

This data communicates that the examples as a whole do follow best practice when developing the digital content, with 62.5% of cases having fully defined all 3 Best Practice Criteria. In cases where information is not known or discoverable to the public, this does not necessarily mean that the digital outputs are not being maintained sustainably. However, with less transparency in this area there

[126] There have been studies on the itemised costs associated with digitisation as well as calculating purchasing power based on the components of costs. An example of this type of study can be seen in: Hardisty A, Livermore L, Walton S, Woodburn M, Hardy H (2020) Costbook of the digitisation infrastructure of DiSSCo. Research Ideas and Outcomes 6: e58915. https://doi.org/10.3897/rio.6.e58915

could be lapses in quality, and if non-sustainable practices are being utilised the need for mitigating action for the preservation of the digital outputs has a higher likelihood for being overlooked. Stakeholder and community involvement and access to this material can hold projects accountable for the long-term health of the digital materials.

Storage of complex outputs

There are certain limitations associated with the storage of digitally reconstructed cultural heritage items, and it becomes more complicated as the digital outputs advances in complexity. For example, 3D models are massive in size, containing millions of polygons and hundreds of megabytes of information, depending on the level of detail and DPI.[127] This means that the user-interface used to present the information can be slowed dramatically if adequate storage space is lacking — requiring long wait times to load the 3D display.

Credibility of the reconstruction

There are a few further considerations regarding the documentation of cultural heritage and its presentation for stakeholder and community groups, especially if the cultural heritage that has been documented no longer exists in an analogue form, that is having been displaced, lost, or destroyed:

1. Is the digital documentation that is produced sufficient to represent the complexity of the intellectual content that is represented in the original material?
2. Are the digital methods and tools sufficient to capture, analyse and present the original cultural objects in a way that identifies with the public and stakeholders?

The London Charter recognises that the credibility of a digital reconstruction needs to be established and further conveying this knowledge to the user is imperative. Another aspect they highlight is transparency with the user about the process of digitisation and the series of creative decisions made, called paradata. Scientific data that has been collected from images and artefacts have

[127] "Dots per inch": a measure of the resolution of a printed document or digital scan.

the possibility to be interpreted in different manners which may lead to different reconstructions. This means that the verisimilitude of computer-based images should be questioned and actively monitored for intellectual integrity.

In the process of interpretation and validity, the initial step is to consult specialists from many fields to ensure a scientifically acceptable reconstruction, using the expertise of archaeologists, historians, building historians, art historians, engineers, architects, and 3D designers. An issue that can arise from the collaborative work is that experts may have differing professional opinions about the reconstruction about the item or building; an issue prefaced in the literature review. After this, an institution must decide how they will utilise these different datasets: will they display all options, providing alternatives, or will they pick one interpretation? If there is missing data, if the items or space has been destroyed, how will the project piece together the information they do have? Should a project show the differences between what is a "certain" dataset and what is a "doubtful" dataset if there is missing material? Each of these questions must be answered as they correlate with the item or building itself.

6.2.7 Intellectual Property Rights

Communication of Intellectual Property Rights and copyright to the users and stakeholder groups represented the lowest preforming Criteria from the questionnaire. There was missing information from 12 (75%) projects about the legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term, with 3 (19%) having fully defined this, and 1 (6%) partly defining it. The examples however did more successfully provide user communities with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content, with 12 (75%) entirely defining this, 1 partially defining, 3 projects had no information available.

Rights issues

Depending upon the type of digitisation methods that are being undertaken in the project, there are difficulties in identifying what copyright and intellectual property rights should be assessed at the outset of the project, or post conflict, if minimal project planning can be undertaken during active conflict or ongoing disaster.

Digitisation initiatives that focus on surveys of geographical areas can be especially difficult to navigate. These surveys aim to systematically inventory and document endangered cultural heritage materials. These projects can encounter cultural heritage materials which may require more robust definitions of copyright, depending upon agreements with the stakeholder groups. Because the projects don't know what they will encounter before the survey is undertaken, it can be more difficult to plan for considerations of IPR and copyright before the digital documentation takes place. Projects which undertake satellite and spectral imagery, such as the EAMENA project, may also encounter difficulties relating to time managing rights issues, including GDPR and privacy issues.

There can be difficulties in negotiating copyright with stakeholder communities, as well. These communities may want to reuse the data that is created for a commercial venture so another level of copyright would need to be navigated. It is possible that grant funders may requires that projects which apply for funds must consider copyright, and rights issues that may arise during the duration of the project. This pre-emptive planning for IPR and copyright can help to avoid delays in making the digital outputs publicly available after the digital documentation of the heritage materials.

6.2.8 Promotion

The examples performed well within the Promotion Dimension, with 14 (87%) examples indicating "yes" for the 3 promotion criteria. Projects performed successfully in the Public Media criteria (newspapers articles; television programmes; radio shows) with 15 projects being discoverable in this context. Further, 14 projects had been documented in academic publications, such as journals and conference papers/posters. Most examples (14, 87%) maintained a dedicated social media presence, where information about the project was communicated, as well as promotion of the digital content.

Consequences of increased digital exposure to sites

Possible consequences of over-exposure of a site must also be considered. While knowledge of a security issue may provide for increased policing of the area and

facilitate new measures of preservation, information too readily available may increase the risk of looting by signalling that sites that are in distress. This could take on the form of illicit trafficking or even simply the public knowledge of the locations of items leading to augmented subsistence looting.[128] Nicita and Rizzolli (2010) suggest that efforts to implement precautions against looting may prove to incentivise the action rather than deter it:

> "Indeed, it is not granted that more precaution discourages thieves from committing the crime. In fact, even if, on the one hand, investments in precautions increase the efforts that thieves have to put into stealing, on the other hand, they actually act as a signal of overwhelming rewards for thieves from theft: the more elaborate precautions are, the higher is the expected reward".

Measures to provide for adequate policing of cultural heritage sites or source countries after the successful implementation of digitisation projects is an aspect of preservation to be considered when working with cultural heritage in conflict.

Strong foundation for sustainability, Table 6.1	
Project	Score
University of Oxford, EAMENA	96
The Schøyen Collection	96
The Mogao (Dunhuang) Caves and the (IDP) The International Dunhuang Project	94
CyArk	94
#New Palmyra	94
Syrian Heritage Initiative (Syrian Heritage Archive)	94
The International Collection of Digitized Hebrew Manuscripts	92
Virtual Magic Bowl Archive (VMBA)	92
Global Digital Heritage (GDH)	91
Manx National Heritage, Isle of Man Historic Environment (IOMHER)	90

[128] Illicit excavation of archaeological sites for saleable cultural objects due to extreme poverty (Hollowell 2006; Matsuda 1998, 2005)

Table 6.1 shows the projects which sored within the range of “Strong foundation” and Table 6.2 shows the projects which scored within the range of “Fair foundation.”

Fair foundation for sustainability, Table 6.2	
Project name	Score
MicroPasts	88
Cypriot digitisation, CADiP	87
Iraq Mosul Museum, Project Mosul/Rekrei	87
The Scottish Ten and (HES) Historic Environment Scotland	85
Cymru1900Wales	82
Million Image Database/ Institute for Digital Archaeology (IDA)	80

6.3 Re-evaluating the Digital Content Lifecycle model

This research introduced the term ‘*responsive digitisation*’ to refer to the idea that, when operating in the context of conflict, actions undertaken for digital documentation will be done in an ad hoc manner. Within this context for expedited action due to limited timeframes and resources, regarding digitisation and digital outputs there are certain dimensions within the digital content lifecycle where inherent shortfalls inhibit the continuation of the cycle.

All dimensions have the possibility of failure within the context of ‘threat’, though there are dimensions which are at a greater risk of being missed. Selection, Managing, Preservation, Discovery, and Use/reuse are at a greater risk of being overlooked due to the necessity for more targeted staffing resources, more thorough stakeholder and user group consultation, or financial resources for continued preservation actions.

The graphic below demonstrates the shortfalls which may be present when undertaking responsive digitisation, or more generally working with cultural heritage in conflict.

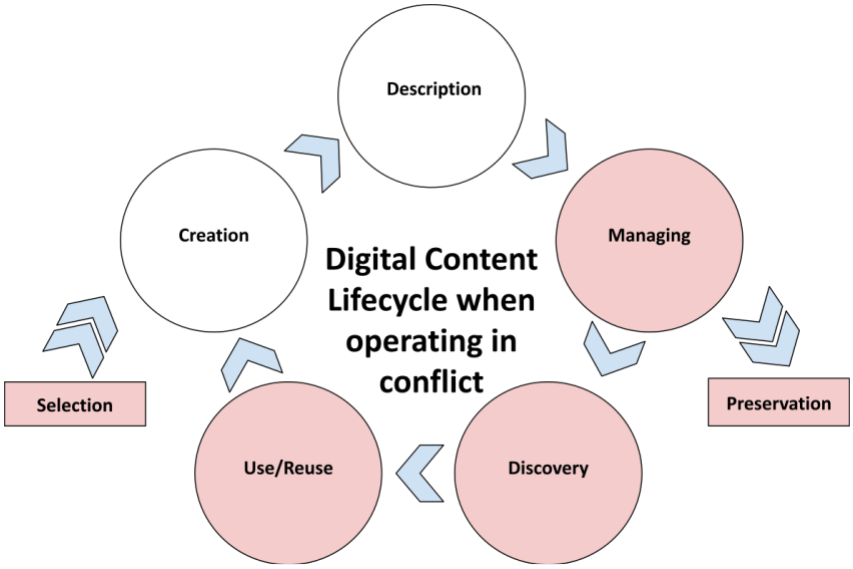


Figure 6.1: Digital content lifecycle when operating in conflict.

6.3.1 Selection

The example analysis suggests that projects clearly communicate information about the different kinds of materials to be digitised to the stakeholders. This falls under the Content Dimension, predominately including the Authority Criteria where projects scored higher for sustainability if they clearly communicated procedures, context, and specifics about operation with user and stakeholder groups.

Stakeholders familiar with the cultural heritage materials can provide insight for selection, indicating the digital outputs with the greatest intrinsic value for the groups. Further, the case study analysis demonstrates the importance of clear communication of the technical aspects of the projects and how this works within a strict timeline for undertaking documentation.

What is sufficient in practice

Based on the critical analysis of the 16 examples, key successes that arose can be compiled into recommendations:

To maintain a good foundation for digitisation and data management, practitioners should outline the content selection, and identifying the parameters for selection. These parameters will vary by project, funded status, and type of threat that is sought to be addressed but by having a better understanding of the entire dataset that will be produced, initial actions for better preservation, including initial mitigating actions to avoid single points of failure.

Practitioners should also seek to identify from the outset what types of data will be recorded (i.e., images, audio-visual materials), what kinds of metadata will be recorded, and further what standards will be used (i.e., Dublin Core Metadata), as well as what types of documentation will be needed to adequately maintain digital outputs. These actions can prove difficult when operating under threat due to the possibility of fast time scales and limited funding or staffing, so a flexible yet strong foundation is needed. The Dublin Core Metadata Element Set (DCMES) can provide a starting point for this strong foundation.

The DCMES provides an interoperable and internationally recognised metadata standard that can be built upon to make a richer dataset. The Dublin Core Metadata Element Set consists of 15 elements which outline basic descriptive, administrative, and technical elements for a digital resource. These 15 core elements align well with the SDRF criteria, and each element is optional and may be repeated, allowing some flexibility based on the context of the data collection (DCMI Usage Board, 2020).

There are further properties, vocabulary and syntax coding schemes, and classes associated with the DCMES. This allows for the use of the Metadata scheme to be flexible, with the capacity to be built upon.

Identifying this important information at the outset of selection of cultural heritage to be digitally documented allows for the creation of a stronger foundation for the digital outputs to be correctly and robustly described which will further facilitate discoverability and use of the object farther down the digital lifecycle.

6.3.2 Managing

The finding from the case study analysis indicate that projects should clearly and explicitly outline all technical requirements that will be needed to undertake the digitisation of the cultural heritage materials. This can be done via a technical appendix which can help staff from overlooking certain aspect related to the digital infrastructure. The IDP provides a great example for how to communicate the technical aspects related to the design of the project infrastructure. This could further be used as a technical appendix template for projects creating similar digital outputs. For funded projects, this tool could be developed as part of the application for funding; to highlight that research on the technological, funding, and staff requirements has been undertaken. At the development stage of each project, this appendix can provide an assessment of main points.

Further to implementing pre-emptive risk strategies, initiatives can build upon smaller pilot projects that can give the staff an opportunity to troubleshoot any issues related to the practical digitisation or any other related technical issues. These pilot projects can also help to pre-emptively identify any potential single points of failure that could arise during the lifetime of the project, and mitigating action can be integrated in the planning phase. Research on relevant guidelines for undertaking digitisation and project management can also be undertaken. If projects can explicitly mention required digital skills when hiring new staff, then grantees can more successfully ensure the projects are capable of recruiting to those skill levels.

Projects should develop an ethos that they have a community-facing responsibility for the next generation of digitisation projects, and that knowledge and customisations should be planned to be shared, documented, and made available with engagement in mind. The examples responded positively to the Authority Criteria in this regard – projects indicated almost unanimous communication about how the project was developed, who was involved, and how the material can be accessed. By having a better understanding of what is required from a technical standpoint, decisions can be made to ensure the

success of the lifecycle of the digital outputs while being directly related to the staffing and financial resources available to the project.

What is sufficient in practice

Based on the critical analysis of the 16 examples, key successes that arose can be compiled into recommendations:

Practitioners should understand what infrastructural support is available to manage the digital outputs. This will include information about what types of hardware, software, storage, backup, and provisions and affordances that are available to the project. Operating under threat, or under aggravating conditions can severely limit the access to these elements, however an accurate record of what is available to the practitioners can help navigate acquisition of further resources based on identified need, as well as facilitate selection and creation of the digital outputs.

Practitioners should also note what infrastructural support will be provided by the funder, or funding body (if funding is available). Further, identifying if any training needs for practitioners will be facilitated by the funder, or if the project must facilitate or develop this training.

An identified limitation in the SDRF framework was a lack of a quality assurance process for the collated information. Although the SDRF was originally developed as a self-assessment tool to be undertaken by practitioners, outside independent research can receive very similar conclusions though the criteria questionnaire as most projects with digital outputs have a public-facing element (i.e., public reports, a digital repository, publicly communicated information for stakeholders). This information communicated to the public can be erroneous, however especially if a project is not currently active or has reached the end of its funding period. Practitioners should, from the planning phase, communicate with regularity with stakeholder groups to ensure that contextual information about the cultural heritage being digitally documented is as accurate as possible.

6.3.3 Preservation

This dimension relates the digital landscape, to the digital content lifecycle and the long-term life of the digital outputs. This includes technical specifications, such as ensuring copies of the raw digital outputs are properly hosted, maintained, and stored in more than one location. This is addressed via the SDRF spreadsheet within the Preservation Dimension. To continually improve upon the infrastructure to preserve the digital outputs, projects can engage with national and international organisations such as the Digital Preservation Coalition and Software Sustainability Institute to continue to follow the most up to date preservation guidelines. By branching out to outside organisations, projects can explore data-sharing and operability with related initiatives.

By having a greater understanding of the digital output infrastructure that will be created, practitioners can better develop a responsive methodology for preserving the digitised cultural heritage materials. Projects should develop an ethos that they have a community-facing responsibility for the next generation of digitisation projects, and that knowledge and customisations should be planned to be shared, documented, and made available with engagement in mind. The case studies responded positively to the Authority Criteria in this regard – projects indicated almost unanimous communication about how the project was developed, who was involved, and how the material can be accessed.

The examples highlight the need for communication to stakeholder and user groups how the digital outputs will be preserved in the long-term and further how they will be made publicly available, even after the funding period has ended. By considering these factors from the outset, during the project planning stage, this can help avoid catastrophic loss of data. The identified single points of failure related to this were situated within the Ongoing Support Criteria and the Implementation and Development criteria. The two were interrelated in the case of Cymru1914Wales, where the online platform has an expired SSL certificate. The Cymru1914.org website is currently unavailable due to technical difficulties, and the National Library of Wales no longer has the necessary resources to redevelop and maintain the website. This highlights the difficulties

with loss of funding, un-secured streams of future funding streams, or lack of project funding, and continued public access to digital outputs. Further to this, projects can maintain a detailed inventory of all digital outputs which at the end of the funding period, could disseminate an inventory of the outputs which can be tracked and monitored in the future so any losses can be monitored.

Practitioners should also think about the digital landscape, and how the long-term life of the digitised content can be emphasised amongst existing methodologies and frameworks and reassess if a more flexible structure is needed. This can take the form of building foundational knowledge around technical specifications and standards, such as ensuring copies of the raw digital outputs are properly hosted, maintained, and stored in more than one location. This is addressed via the SDRF spreadsheet for within the "Preservation" Dimension. To continually improve upon the infrastructure to preserve the digital outputs, projects can engage with national and international organisations such as the Digital Preservation Coalition, Digital Curation Centre, or Software Sustainability Institute to continue to follow the most up to date preservation guidelines. By branching out to outside organisations, projects can explore data-sharing and operability with related initiatives.

What is sufficient in practice

Based on the critical analysis of the 16 examples, key successes that arose can be compiled into recommendations:

For practitioners to undertake sufficient digital preservation and understanding of staffing requirements related to the digital infrastructure, digital capture and documentation, and other technical aspects should be a priority.

A management plan for the technical aspects of the project should be developed and implemented at the earliest possible stage. This can help to identify possible points of failure as well as plan for flexibility and scalability in the scope of the digital documentation. Practitioners may be working to very strict timelines when operating under threat, where these management plans can be

used to better facilitate the data creation and integrate it to the digital infrastructure where it will be stored.

6.3.4 Discovery and Use/reuse

Considerations for copyright, legal requirements, and intellectual property rights can be clearly defined by project during the project planning phase. These aspects all affect the use and reuse of the digital outputs. The findings from the case study analysis indicate that these were difficult criteria to meet. This increases the likelihood for this becoming an inhibitor to use, and in the longer term, digital sustainability. The key solution here is to take advantage of the strong link between sustainability and use: a project which is used by stakeholder, the public, researchers, and by others has the opportunity for sustainability in the long term from potential routes once funding ends or the project finishes; this continues the digital content lifecycle.

Projects can maintain a detailed inventory of all digital outputs which at the end of the funding period, could disseminate an inventory of the outputs which can be tracked and monitored in the future so any losses can be monitored. Further, digitisation projects can undertake the development of a technical appendix. For funded project, this could be developed as part of the application for funding; to highlight that research on the technological, funding, and staff requirements has been undertaken. At the development stage of each project, this appendix can provide an assessment of main points of project planning and can follow the dimensions of the digital content lifecycle.

What is sufficient in practice

Based on the critical analysis of the 16 examples, key successes that arose can be compiled into recommendations:

Use and Reuse of digital outputs are very closely tied to the overall accessibility of the resources and the clear communication to stakeholder groups about what is available to use, and how the outputs can be used.

To help facilitate the digital content lifecycle in the final stage, practitioners should clearly communicate the copyright and rights management issues which apply to the digital outputs. Further, the project should define copyright for the digital outputs that is context specific based on more nuanced aspects of copyright and IPR such as non-legal definitions as they relate to patrimony or varying concepts of ownership.

Practitioners should identify any the factors that might limit data access as well as identify any perceived legal restrictions that may apply to the active dissemination of the digital outputs amongst users and stakeholder groups. Further to this, stakeholder groups may define restrictions to the digital outputs, so clear community engagement should be implemented stage as possible. If it is not possible in the initial stages, i.e., in instances of responsive digitisation, retroactive community and stakeholder consultation should be sought.

Other facets of use and reuse relate to the storage and access to the digital outputs and practitioners should identify:

- How the digital outputs be accessible to users, communities, and stakeholder groups
- How the outputs will be available, i.e., through an accessible repository, database, or bespoke webpage
- How access to the digital outputs will be ensured, and if there are perceived barriers, how will they be addressed and mitigated in the long term.
- Further to this, how practitioners will ensure access to the digital outputs after the end of a funding period

6.3.5 Conclusions on re-evaluation

Based on the SDRF evaluations of the 16 examples which identified successful long-term digital sustainability based on the digital content lifecycle continuation, as well as instances of aggravating factors that inhibit the cycle, a relevant technical appendix of key information to know based on the re-evaluation might look like this Table 6.3. This can flexible and scale to a higher complexity based on context of collection, whether responsive in nature, or

longer funded timescales. However, these criteria represent a baseline for a strong foundation to build from.

Actions to undertake to maintain digital content lifecycle dimensions in context of threat, Table 6.3	
Digital Content Lifecycle Dimension	**Workflow and variables to identify**
Selection	- Outline the content selection and identify the parameters for selection - Identify the types of data that will be recorded - Identify the metadata that should be recorded - Identify the methods of digital documentation that will be used to produce the digital outputs
Managing	- Identify how the technical aspects of the project will be managed - Identify the timeline for undertaking the creation of the digital outputs - Identify the structure of the proposed digital management process - Identify what skills will be required for digital documentation, storage, and accessibility
Preservation	- Identify the strategies for digital preservation - Undertake a technical appendix exercise to map the infrastructure

Discovery	- Define copyright and IPR rights as they will apply to the digital outputs (with stakeholder consultation) - Identify any perceived rights management issues which may apply to the digital outputs - Identify factors which might limit access to the digital outputs (i.e., need for vetted access, stakeholder parameters for access, etc.) - Identify via stakeholder engagement any ethical or legal restrictions for access to the digital outputs
Use/Reuse	- Identify how the digital outputs will be made available to users, communities, and stakeholder groups - Identify how the digital outputs will be made available, i.e., via a bespoke website, database, digital repository, social media, etc. - Identify how the digital outputs will be made accessible during the funding period - Identify how the digital outputs will be made accessible after the end of a funding period

Long-term sustainability is a complex process and cannot be diminished to a simple tick-box exercise. When operating in conflict, this process is more susceptible to aggravating factors and single points of failure. While each digital documentation project will have its own nuances and context, a robust yet flexible workflow can be used to ensure a strong foundation for digital preservation and management.

6.4 Limitations of the SDRF Framework

An issue arising from using the SDRF framework is how to reconcile the use of the SDRF framework considering occasions where the publicly available information created by a digitisation project may not be accurate, due to oversight, error, or deliberate deception.

For certain criteria within the Dimensions, the framework relies on publicly available information that is communicated to the public via a developed web presence. Within the Sustainability of Digital Resources Framework (SDRF) Report (2019), the criteria which are assessed via "Direct Observation" are: Currency, Relevance, Authority, Ongoing Support (with the digital resources), Implementation and Development, Best Practice, IPR. While the SDRF was originally developed as a self-assessment tool to be undertaken by staff familiar with the project, in practice, outside independent research can use the framework to receive very similar conclusions. This information communicated to the public by the project can be erroneous, however; there can be inaccuracies and gaps, especially if a project is no longer active. The accuracy of the SDRF framework assessment hinges on the honesty, transparency, and accuracy of the information reported online. The Schøyen Collection case study highlighted this limitation in the framework, possibly receiving points within the Authority Criteria which may not be deserved. The Schøyen Collection has had multiple accusations of dubious provenance for certain collections, particularly materials originating from Iraq, which directly contradicts the information regarding provenance that is available on the project webpages.[129] This

[129] Link to report: https://www.regjeringen.no/contentassets/634cb3589cfb4678bfc1f9da2e55aeed/schoyen-coll_seizure_expert-assessment.pdf

dedicated space to outline the provenance of the collections within the website portal would be sufficient to complete the SDRF questionnaire within the remit of the framework, but more targeted research would highlight these discrepancies.

The SDRF also highlighted discrepancies in its definition of copyright and IPR, highlighting only particularly legalistic definitions of these terms, and does allow any scaling to mitigate more nuanced arguments against aspects like digital colonialism and data sovereignty. CyArk and Million Image Database/ Institute for Digital Archaeology (IDA) both have received stark critiques about the manner in which they make the digital outputs available to community groups and stakeholders. CyArk retains all copyright and licencing of the digital outputs produced, rather than a more mutually beneficial agreement for stakeholder groups within the country of origin (Sydell, 2018).

The SDRF questionnaire investigates if copyright and IPR parameters are communicated to the community and does not engage with questions of whether the most ethical copyright agreement has been implemented. Future iterations of the SDRF frameworks should include new criteria reweight the Preservation Dimension to further nuance this limitation.

As a third-party undertaking the SDRF assessment, using the public information provided, there is a level of fact-checking and oversight that should be expected to ensure the fair scoring of the project. Further investigation surrounding how the framework can adapt, or how a researcher should adapt with data collection when there are known issues of authenticity and accuracy can be a valuable exercise.

The original iteration of the SDRF framework also includes interviews as data collection but is not required to undertake the SDRF criteria questionnaire. This type of data collection can act as a form of validation with the resource creator where Direct Observation can be collated with responses from interviews. This can add a level of accuracy to the framework data collection.

Passive language which is found within the framework criteria does not incentivise independent research and fact checking of the presented project information. This highlights an interesting dialogue surrounding the role of the external researcher – whereby "Direct Observation" may only present a partial story and a more robust nuancing of aspects of each criterion should be explored. This passive language can have further knock-on effects when assessing digital outputs relating to cultural heritage in conflict. The SDRF is reliant on publicly available information being accurate, complete, non-self-serving, and legally sound, and organisations being honest and transparent.

There are discrepancies in the weighting of the Criteria within the Dimensions; with varying numbers of criteria while each Dimension is weighted at 25%. This is not inherently a shortfall but could be further refined. The Technology and Preservation Dimensions could benefit from more nuanced ranges of Criteria to better reflect data that would be collected during a technical appendix exercise and could more aptly pinpoint where points of failure lie. A repercussion of this reweighting of the 25% if more criteria are added would be a diminished value of the Criteria for "On-going financial support", which according to the assessment of the 16 examples, can prove to be a single point of failure. Future iterations of this type of assessment framework may consider adding in a new Dimension related to funding, or allocation of resources, and reweight each Dimension to 20%.

Highlighting caveats and shortfalls of evaluating digital outputs within this framework can lay the foundation for the next stronger iteration of this type of assessment framework.

6.5 Conclusion

This chapter summarises the major findings that arose from the case study analysis, application of the SDRF framework criteria, and policy gap analysis; compiling findings and statistics related to the case study analysis and SDRF sustainability framework template. Further, the chapter identified the features of successful examples informed by the case study analysis. The digital content lifecycle model within the context of conflict was also re-assed using the case

study findings to propose mitigating factors for the single points of failure. These points of failure are found in the selection, managing, preservation and use/re-use dimensions. The findings from the case study analysis and SDRF frameworks has demonstrated that there are clear strong correlations for successes in long-term digital sustainability, as well as strong correlations for shortfalls for long-term sustainability.

The case study analysis and policy gap analysis identified key themes where gaps can be situated for responsive digitisation activities:

1. Project management of technical aspects (Selection)
2. Data development methods (Creation)
3. Infrastructural support (Managing)
4. Access (Use/Reuse)
5. Data preservation and sustainability (Preserving)
6. Copyright and intellectual property issues (Preserving, Reuse)

To compartmentalise the gaps, they have been situated along the digital content lifecycle dimensions. In doing so, susceptibilities to single points of action can be identified in context to where sustainability would fail for the life of the digital output. These common issues are present in public access to the digital outputs, terms of use and reuse, use of open-source software, and allocation of funding. In the next chapter I will bring these findings back to the research question and subobjectives.

Chapter 7—Conclusions

The main goal of the research was to evaluate methods for undertaking digital documentation and preservation of cultural heritage in conflict, and how these digital outputs can be sustainable in the long-term. Further, this work explored how these methods are affected by prevailing policy documents and guidelines within the field of cultural heritage, conflict, and digitisation. To investigate these streams further, the following research question was posed: to what extent does digitisation provide a tactical value for the preservation of cultural heritage in conflict from a digital sustainability standpoint?

Through the investigation of examples and a field-wide policy gap analysis, this research examined the efficacy of the current frameworks for digitisation and identifying gaps in practice. Bringing together these data streams allowed for the analysis of the fields of cultural heritage and digitisation more widely, but also nuance the direct effect conflict has upon these areas. This was done with the aim of determining if a scalable and workable framework for the role of digitisation in cultural heritage preservation within the context of conflict to address some of these difficulties is possible.

This analysis clearly showed that operating within the context of conflict makes the process of developing any kind of standardised frameworks complicated, possibly complicated beyond practicality and applicability. As shown in Chapters 5 and 6, any framework of this sort would need to be flexible and scalable. Determining what is “good digitisation” in such a framework would not depend on weighted criteria that are impossible in conflict situations. Focus would be on contextualised responses and post conflict mitigation.

The result of this analysis was the development of the concept of ‘responsive digitisation’. This new term, defined as *ad hoc actions undertaken for digital documentation and preservation in the context of conflict*, emerged from the structured case study analysis within the context of existing policy presented in the preceding chapters. In times where responsive digitisation is appropriate, documentation will be undertaken within the parameters of staffing and

financial resources, as well as the available timescale that is feasible for the situation. Minimal pre-emptive work for preservation is assumed, due to the unpredictable timeframe of conflict. This means that mitigating action for preservation and digital documentation must be undertaken to ensure the safety of the materials in imminent danger. While the documentation may not be complete at the outset of mitigating actions, a strong foundation can be made more complete in a post-conflict environment, or when further resources are made available to the project undertaking the digitisation.

Responsive digitisation, then, depends less on prior preparation and preservation efforts (a hallmark of both previous considerations of conflict preservation within the literature and within policy), and more on doing the best that is possible within the unpredictable and shifting realities of conflict, coupled with post-conflict revision of approaches and techniques. It is a realistic and immensely practical philosophy of digitisation that does not focus on condemning a lack of prior preparation or criticising the shortfalls in digitising decisions made in conflict situations. Rather responsive digitisation rests on the collaborative development of sector-wide techniques and approaches which can be drawn upon during times of conflict and adapted impromptu due to the context of the situation.

The case study analysis in Chapter 5 used the SDRF framework to make generalisations about common shortfalls and strong correlations between types of digitisation projects and points of failure. Use of such tools can provide a quicker initial assessment of the health of digitised cultural heritage materials, as well as inform the initial project planning stages before emergency actions are taken. Such tools and frameworks are useful and important.

Yet, as noted above, operating within the context of conflict makes the process of developing standardised digitisation frameworks more complicated, and flexibility and scalability are key. This research has shown that while the initial assessment of the efficacy of conflict digitisation can be assessed by existing tools such as the SDRF, this cannot be done without modifications. A challenge particularly highlighted is passive language used within the SDRF framework

which leaves room for less robust investigation of certain aspect of project operations and can reward projects for fulfilling criteria in a dubious manner. Frameworks in the future should include more proactive language to ensure oversight and direct involvement in accurate recording of digital outputs. There are inherent risks associated with documentation of culture heritage in conflict, and passive language magnifies these risks, making it easier for inaccuracies to be assessed rather than facts.

Chapter 5 showed how the SDRF can be adapted to evaluate conflict digitisation project. Going forward, this tool can and should be further adapted to fit within the parameters needed to evaluate digitisation projects within other geographic locations and experiencing other types of conflict. This doesn't represent an abandonment of the evaluation tools we already have, but an introduction of a degree of flexibility and scalability that will allow meaningful application to conflict digitisation projects, without negating the obvious comparative benefits of having a single framework.

This research produced a wealth of information that can be used and considered in evaluating digitisation during and post conflict. These are primarily discussed in chapters 5 and 6. Considering the bigger picture, and the broader implications of this research on the further development of effective conflict digitisation projects, the following three recommendations sum up what future practice should look like.

Recommendation I: Re-evaluation of Existing Frameworks

Responsive digitisation requires a re-evaluation of the digital content lifecycle and our existing evaluative and regulatory frameworks for designating what "good preservation" looks like. This was a goal of this research project. Chapter 6 provides a re-evaluation of the digital content lifecycle, but a complete overhaul of regulatory and evaluative frameworks is a vital next step that must be taken to ensure that digitisation in conflict happens in a sustainable way.

Recommendation II: Policy Must Take Digitisation into Account

This reconsideration of the digital content lifecycle, as well as the analytical component of this thesis did reveal some clear features that policy and practice documents should consider or include going forward if they are to be relevant in the ad hoc atmosphere of conflict digitisation. Future policy cannot and should not neglect digitisation as both a tool in our collective toolkit related to heritage preservation, though this is an idea that brings with it its own set of issues (IP, access, control, ethics, best practice) that cannot be ignored or covered by generalities. Policy makers must consider digitisation when they draft policy, particularly when that policy relates to heritage in conflict. Further elaboration of existing multilateral treaties (e.g., any new protocols to the Hague Convention) must consider digitisation, and indeed, the realities of ad hoc digitisation.

Recommendation III: A Research-based Foundation for Practical Action

Before digitisation can be incorporated effectively into emerging policy, those in academia and practitioners must further develop our understanding and evaluation of conflict digitisation. Future academic research on the topic should be focused on clarifying common shortfalls in long-term digital sustainability, operating within the context of conflict, and responsive digitisation in a way that supports the adaption of existing frameworks and informs digitisation policy.

In summary, responsive digitisation represents a new way of considering digitisation in conflict situations. Mitigating actions for preservation and digital documentation must be undertaken to ensure the safety of the materials in imminent danger – though the practicalities of this require flexibility. While the documentation may not be complete at the outset of mitigating actions, a strong foundation can be built upon in a post-conflict environment. Addressing gaps that inhibit the conflict digitisation can aid in facilitating better protected, sustainable digitised cultural heritage in the long term.

Appendix I — Data Management Plan for project

Data Collection

1. What data will you collect or create?

Data collection will take the form of approximately 10 recorded interviews of no more than 1 hour's duration with cultural heritage professionals commenting on the remit of their professional capacity in conflict. The interviews will take the form of semi-structured interviews. According to Bernard (1988), semi-structured interviews are best implemented when a singular instance of correspondence is available, and as difficulties in contact hours was predicted at the project inception, the questions were left open for the possibility of tangential, yet thematic, discussion of issues. Access to the heritage professionals to be interviewed was anticipated to be difficult due to distance, time-schedules, and possible risks in undertaking the interview; an individual was not expected to be available for any successive interviews. The interviews are thematic to the identified policy gap analysis chapter, and this will be conveyed explicitly within the final analysis write up (Kvale, 1996, 88). Although all groups will be asked the same questions initially, secondary follow up questions to clarify individualised institutional procedures as outlined by the professionals will be (potentially) different for all parties.

From these recorded interviews, the principal researcher (Sarah Gambell) will further transcribe the dialog and then code the data using a programme such as NVivo. Recording at a rate of 320 kbps rate with an assumed 2.40MB accumulated per minute of audio would equate to 115.2 MB of audio. With 10 interviews this would equate to 1152 MB or 1.15 GB of raw data. The files will be stored as .MP3 format. This is due to the preference of the principal researcher, and the chosen recording device defaults to producing .MP3 files. These interchangeable or open formats ensures the long-term usability of data for the duration of the project. The transcribed data for each 1-hour interview, at an assumed 8000 words per interview saved to the University of Glasgow local disk as a .PDF constitutes 145KB. For the 10 interviews, this would be roughly 1450 KB or 1.45 MB. This amount will easily fit within storage requirements for the University of Glasgow institutional OneDrive for Business account with an allotment of 1TB. The scale of the data will not pose challenges when sharing or transferring data between sites, though there is no planned sharing of this data outside the principal researcher and her academic advisors. There is no existing data, to our knowledge, of semi-structured interviews of professionals in this context and geographical location to call upon for further analysis.

2. How will the data be collected or created?

I will be using an Olympus LS-5 PCM Digital Audio Recorder to record interviews over Skype or telephone then I will transfer this information from the digital recorder on to an SD card that is fitted into a USB drive transfer directly to the University of Glasgow based OneDrive for Business account at the first opportunity. Transcripts will then be created using Microsoft Word processor for analysis and coding using NVivo qualitative data analysis software.

To keep the research process confidential any recording made of the interview, either by audio tape or by written notes or transcription, was to be made accessible only to the principal researcher and these will not be stored with any personally identifying information.

Documentation and Metadata

1. What documentation and metadata will accompany the data?

Due to the confidential nature of the interviews, outside of the processing and analysis of the information in the write up stage of the project, there will not be secondary users of this particular dataset.

Files will be given arbitrary file names in a numerical organisation in order to ensure the confidentiality of the interviewee. This numbering system will only be known by the principal researcher. Example naming conventions may be: "month_day-year_countryidentifyer_001; month_day-year_countryidentifyer_002; etc."

The consistency and quality of data collection will be controlled and documented though explicit notes kept by the principal researcher to cross-check with each new interview transcription entry and standardised data capture. Peer review of the data is not possible due to the confidential nature of the materials being recorded. Data entry validation will be a secondary effect as the process of coding will, as an output, facilitate a metadata repository. Files will be recorded and organised in accordance with Historic Environment Scotland standards in accordance with requirements to submit an archive or digital collection to CANMORE, the National Record of the Historic Environment.

Ethics and Legal Compliance

1. How will you manage any ethical issues?

When completing the College of Arts Ethics Checklist for the Ethics Committee for Non-Clinical Research Involving Human Subjects, three potential areas of risk were raised which will need to be mitigated: 1). the research involves human participants; 2). the research may involve data that is not in the public domain, i.e., data still in copyright; and 3). the study may involve discussion of sensitive topics due to the geopolitical turmoil in the countries of the examples. The ethical approach to the research project needed to work based on confidentiality to address the three identified areas of potential risk in the ethics checklist. By making the process of data collection and the storage of this data confidential, potential risks may be pre-emptively mitigated.

As outlined by Schinke and Gilchrist, (1993, 83), informed consent procedures were undertaken to adequately inform the research participants the purpose and use of their provided data. Parameters for the content of this informed consent for was taken from Pickard's work, "Research Methods in Information" (2013). All participants in the interview process will be provided with a "Participant Information Sheet" that explicitly defines the purpose of the project, gives context on the research project as a whole, defines the process of the interview, how the data collected will remain confidential throughout the project, defines how the data collected will be stored and subsequently destroyed at the end of the project or at the request of the participant, how the research will be used in future publications and includes contacts should the participants require further information on the project.

Included in the Participant Information Sheet are the assumptions:
All names and other material likely to identify individuals will be anonymised.
The material will be treated as confidential and maintained in password protected drives.
The data collected during the interview process will be stored on cloud-based storage on University of Glasgow based computers. The data will be produced (transcriptions) stored only on local machines managed under guidelines outlined by the University of Glasgow data management officer.

The material containing personal information, such as my name and contact details, will be destroyed after completion of this doctoral research (2020).

The participant, through the form, will have knowledge of the title of the research, the name of the principal investigator, and their rights as participants in a research study.

2. How will you manage copyright and Intellectual Property Rights (IPR) issues?
Any "grey literature", that is, any reports, working papers or government documents given or discussed with the principal researcher as a result of the interview process will be assumed to have gone through an extensive vetting process by the interviewee, therefore they should not fall outside of copyright and if any material is used in the writing up of the research, express permission will be sought for the use of these documents before publication. The principal researcher and the University of Glasgow will own the copyright and IPR of the completed doctoral thesis which includes this analysed data.

Storage and Backup

1. How will the data be stored and backed up during the research?
Data will be created and stored on the local drive of University of Glasgow, which is password protected and encrypted. There is sufficient storage space, no additional services will need to be sought. The data will at no point be stored on the personal computer of the principal researcher. The data will automatically be backed up by the University IT team, and past versions of the data will be available should any loss of data incur in the event of an incident.

2. How will you manage access and security?
The data will be encrypted, and password protected on the local disks to minimise the risk of a breach in security. The principal researcher will be the only one with access to the data; there are no collaborators on this project.

Selection and Preservation

1. Which data are of long-term value and should be retained, shared, and/or preserved?
The recorded interviews and the analysed transcriptions will be destroyed at the end of the doctoral project (2020). This is outlined in the participant information sheet as well as the informed consent form given to each interviewee before they participate in the interview process.

2. What is the long-term preservation plan for the dataset?

There is no long-term preservation plan for the dataset as it is planned to be destroyed upon completion of the project in 2020. The anonymised transcripts will be added into the appendix of the written up doctoral project.

Data Sharing

1. How will you share the data?

The data is for use of the principal researcher only.

2. Are any restrictions on data sharing required?

Not applicable.

Responsibilities and Resources

1. Who will be responsible for data management?

The principal research is responsible for implementing the data management plan and for the facilitation of each activity outlined within it. The DMP will further be reviewed by her academic advisors. All data capture, metadata production, data quality, storage and backup, data archiving & data sharing will be managed by the principal researcher (Sarah Gambell) and will take responsibility for ensuring relevant policies will be respected.

2. What resources will you require to deliver your plan?

Guidance for each step will be given by relevant academic advisors; no formal additional training is needed.

Appendix II — College of Arts Research Ethics Checklist

This checklist is used to identify whether a full application for ethics approval needs to be submitted. Before completing this form, please refer to the College of Arts Ethics policy and procedures (http://www.gla.ac.uk/colleges/arts/research/ethics).
The principal investigator (PI) or supervisor (where the PI is a student) is responsible for exercising appropriate professional judgment in this review. This checklist must be completed before potential participants are approached to take part in any research.

Please answer each question by ticking the appropriate box:	YES	NO
Does the research involve human participants?	☒	☐
Does the research involve data not in the public domain? (i.e., data still in copyright)	☒	☐
Does the study involve people in a dependent relationship, minors, or vulnerable people who may be unable to give informed consent? (e.g., your own students, children, people with special needs) I*f your research involves minors or vulnerable subjects, please elaborate as fully as possible on the reasons why this is needed and the ways in which you intend to fully protect the interests of such subjects. If the research involves unsupervised contact with vulnerable groups, you may need to join the Protection of Vulnerable Groups Scheme*.	☐	☒
Will the study require the co-operation of a gatekeeper for access to participants? (e.g., teacher, local authority)	☐	☒
Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places)	☐	☒
Will the study involve discussion of sensitive topics? (e.g., sexuality, drug use)	☒	☐
Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life?	☐	☒
Are there issues of safety for the investigators or subjects? (see also "Ethical Issues in Interviews" on http://www.gla.ac.uk/colleges/arts/research/ethics/)	☐	☒
Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	☐	☒
Are there issues of confidentiality? (see also "Ethical Issues in Interviews" on http://www.gla.ac.uk/colleges/arts/research/ethics/)	☐	☒
Are there issues of security? (e.g., data storage security)	☐	☒
Are there issues of balance? (e.g., cultural, social or gender-based characteristics of the research subjects affecting the design of the project or its conduct)	☐	☒

If you have answered NO to all of the questions above, you need take no further action before starting your research.

If you have answered YES to any of the questions above, you need to submit an application to the College of Arts Research Ethics Committee before you begin the research. Please complete Part B) of this form and address any ethical issues of your research project in section 12 of the application form. Append your research proposal and any other supporting

documents such as questionnaires, consent form, information letter for participants etc. and submit your application through the online Research Ethics System (log in via the University's Business Systems page: https://frontdoor.spa.gla.ac.uk/login/).

APPLICATION FORM FOR ETHICAL APPROVAL

1. Name(s) of person(s) submitting research proposal:
Sarah Gambell

2. Position
Undergraduate Student ☐/ Postgraduate Student ☒/ Staff ☐

3. Subject/ Centre/ School:
Information Studies

4. Contact Address:

5. Email (please use your GU email address):
s.gambell.1@research.gla.ac.uk

6. *For Students only*	
Course name	PhD Candidate Information Studies
Supervisor's name	Dr Lorna Hughes; Dr Donna Yates; Dr Paul Gooding
Supervisor's email address	lorna.hughes@glasgow.ac.uk; donna.yates@glasgow.ac.uk; paul.gooding@glasgow.ac.uk
Supervisor's contact address	Information Studies, 11 University Gardens Glasgow G12 8QH

7. *For Supervisors of Student Applications*
Please note that by submitting this application the supervisor confirms that:

- The student has read the College's Ethics Policy and Procedures.
- The topic merits further research.
- The student has the relevant skills to begin research.
- If interviewing, the student has produced an appropriate information sheet for participants.
- The procedures for recruitment and obtaining informed consent are appropriate.

8. Project title:
The tactical value of digitisation for the preservation and conservation of cultural heritage in conflict

9. Proposed project end date:
2020

10. *Have all investigators read, understood and accepted the College Ethical Policy, a statement of which is available on the College website at*
http://www.gla.ac.uk/colleges/arts/research/ethics YES☒/NO☐

11. Independent contact name (in case of complaints or questions from participants). *This could be your head of department, line manager, dissertation supervisor, etc.:*
Dr Lorna Hughes; lorna.hughes@glasgow.ac.uk

12. Ethical Issues
What in your opinion are the ethical considerations involved in this proposal? You should consult the ethical policy statements of the AHRC and other funding and professional bodies (these can be found on www.gla.ac.uk/colleges/arts/research/ethics).

Please address in detail all ethical issues that you have identified in the checklist above, as well as any further potential ethical issues of your research. Please explain how you will deal with these issues.

Per the above code of ethics checklist, this project identifies three possible ethical difficulties, those being: 1). The research involves human participants; 2). the research may involve data that is not in the public domain, i.e., data still in copyright; and 3). the study may involve discussion of sensitive topics due to the geopolitical turmoil in the countries of the examples.

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1). The research will involve human participants who will receive an informed consent form and a participant information sheet which will outline the aims, objectives, uses of collected data and any concerns that could arise during the data collection process. Having received this information, the participants will have an opportunity to ask the lead researcher (Sarah Gambell) any further questions/clarifications.

2). The data collected during the interview process will be stored on cloud-based storage on University of Glasgow based computers. The data will be produced (transcriptions) and stored only on local machines managed under guidelines outlined by the University of Glasgow data management officer.

A topic that needs to be discussed further is 'grey literature', that is, any reports, working papers or government documents. These may be given to the lead researcher (Sarah Gambell) as a result of the interview process. These will be vetted by the interviewee, so they will not be outside of copyright, and if any material is used in the writing up of the research, express permission will be sought for the use of these documents before publication.

3). The interview participants will be commenting within their professional capacity to comment on the conflict discussed. As heritage professionals working in zone of geopolitical conflict, discussing methods of preservation in the paradigm of conflict is their profession, and commenting on this topic is on the remit of their professional capacity.

If an interviewee wants to see the transcripts after the interview, they will have the ability to request this from the lead researcher (Sarah Gambell). There will also be self-redaction taking place when completing the transcript of the interview. The research is not focused on sensitive topics, rather it explores non-sensitive topics on preservation, and if there is a digression into these topics during the interview, the conversation will be immediately steered away from this.

13. If applying for funding for this research, please give name of funding body:
N/A

14. Have you submitted, or are you intending to submit this application to another College in the University?
Yes☐/ No☒ If yes, please specify:

End of Project Report
The Committee requires that a brief report be provided within one month of the completion of the research, giving details of any ethical issues which have arisen (a copy of the report to the funder, or a paragraph or two will usually be sufficient). This is a condition of approval and in line with the committee's need to monitor research.
In addition, any unforeseen events which might affect the ethical conduct of the research, or which might provide grounds for discontinuing the study, must be reported immediately in writing to the Ethics Committee. The Committee will examine the circumstances and advise you of its decision, which may include referral of the matter to the central University Ethics Committee or a requirement that the research be terminated.

Please note that it is the responsibility of the researcher to follow the College of Arts Ethics policy and procedures and any relevant academic or professional guidelines in the conduct of the study. This includes providing appropriate information sheets and consent forms and ensuring confidentiality in the storage and use of data. Any significant change in the question, design or conduct over the course of the research should be notified to the College Ethics Officer and may require a new application for ethics approval.

Date of submission of form:

Signature of person making the proposal: Sarah Gambell
(please type name)

Signature of supervisor (for student applications only): Lorna Hughes
(please type name)

Thank you for filling in this form. You should receive confirmation of ethical approval within four weeks of submitting it.

Appendix III — Ethical Approval

12 March 2019

Dear Sarah,

Ethics Application 100180096: Ethical Approval

With many apologies for the considerable delay in getting back to you (largely because one of the reviewers was very slow and then I was off ill), I am pleased to report that ethical approval is granted for your research. This is subject to the use of the revised consent form included below.

You should note the following actions, which are required as part of the process of research monitoring:

- It is your responsibility to inform, as appropriate, your supervisor, advisor or funding body of the outcome of your Ethics application. You should also indicate successful receipt of ethical clearance on all consent and interview information forms as well as on the acknowledgements page of your dissertation project (suggested wording: 'ethical clearance for this project has been granted by the College of Arts Research Ethics committee [date of approval letter]').
- We advise that you need to make it clear to participants that there will be no impact if they choose either not to participate in the interviews or to allow use of the resulting materials. Without this reassurance, you are potentially in a coercive position towards them where they may feel that they have no choice about participation.
- An end of project report is required by the Ethics Committee. A brief report should be provided within one month of the completion of the research, giving details of participant numbers, participant withdrawals and any ethical issues which have arisen. (A paragraph or two will usually be sufficient — this could also be a copy of your reflective appendix, as it would be good practice to incorporate some comment on your handling of the ethical issues associated with the project there.) This is a condition of approval and in line with the committee's need to monitor the conduct of research.

In addition, please note that any unforeseen events (particularly personal data breaches) which might affect the ethical conduct of the research — or which might provide grounds for discontinuing the study — must be reported immediately in writing to the Ethics Committee. The Committee will examine the circumstances and advise you of its decision, which may include referral of the matter to the central University Ethics Committee or a requirement that the research be terminated.

Information on the College of Arts Ethics policy and procedures is available for consultation at http://www.gla.ac.uk/colleges/arts/research/ethics.

Yours sincerely,
Dr James R. Simpson
Ethics Officer, College of Art

Appendix IV — Criteria for initial case study selection

Policy Documents selected for in-depth analysis, Table 4.1

Documents for gap analysis	When was it established?	Is it still in effect?	Ratification by states	Scope of implementation
1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict	14 May 1954; Ratified 7 Aug 1956	Supplement in 1999	131 parties; 109 states Parties to the First Protocol. The Second Protocol has 77 states Parties	Defining Cultural Heritage and respect for its effective safeguarding
1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	UNESCO meeting in Paris 12 Oct - 14 Nov 1970; effective 24 April 1972	Updated in 1995 UNIDROIT (still int'l standard)	136 countries have signed the treaty	Partners: European Union; INTERPOL; UNIDROIT; UNODC; WCO; ICOM
1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage	1972; entry into force 17 December 1975	Y	198	World Heritage List
UNESCO Charter on the Preservation of Digital Heritage	15 October 2003	Y	Integrate principles within the UN	195 UNESCO member states
The London Charter	2006	Y (updated in Seville Principles)	Provides guidelines, not a ratifiable document	Standardisation of digitisation practice; paradata
ICOMOS ENAME Charter	16th Gen Assembly, Quebec, 4 October 2008	Y	9,500 individual members in 144 countries, 110 national committees and 28 international scientific committees	Areas of authenticity, sustainability, and inclusiveness; training

Seville Principles	2011	Y	Basis in London Charter; not ratifiable	Standardisation of digitisation practice; paradata

Evidence of impact, Table 4.2

Documents for gap analysis:	Evidence of impact/where do we see its effect
1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict	First international treaty that focuses exclusively on the protection of cultural property in armed conflict; established The Committee for the Protection of Cultural Property in the Event of Armed Conflict; Sanctions and individual criminal responsibility
1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property	Three main pillars: preventive measures, restitution provisions, and international cooperation; party can seek recovery and assistance for recovery of stolen or illegally imported material
1972 Paris Convention Concerning the Protection of the World Cultural and Natural Heritage	Proposed World Heritage List
UNESCO Charter on the Preservation of Digital Heritage	Public access to digital heritage; emphasis on preserving born digital collections; develop improved preservation strategies; establishing common standards; legal and institutional frameworks for protection of digital heritage
The London Charter	Defines principles for the use of computer-based visualisation methods in relation to intellectual integrity, reliability, documentation, sustainability, and access
ICOMOS ENAME Charter	Define basic principles of interpretation and preservation as essential components of heritage conservation efforts; establish 7 principles
Seville Principles	Theoretical framework for undertaking computer-based digitisation; cooperation and interdisciplinarity; transparency of documentation and processes; training programmes for specialists

Policy Documents which informed analysis, Table 4.3

Documents for gap analysis	When was it established?	Is it date current?	Ratification by states	Where the rules have been implemented	Evidence of impact/where do we see its effect
Text of the Convention for the Safeguarding of the Intangible Cultural Heritage	17 Oct 2003; Paris	Y	150 states	Difference between tangible and intangible heritage	Renewed dialogue among communities; intolerance, to grave threats of deterioration, disappearance, and destruction of the intangible cultural heritage, in particular owing to a lack of resources for safeguarding such heritage
AHDS Guides to Good Practice for CAD (2002)	1998-2002	Updated	N/A	Potential user communities are largely unaware of the digital resources available. Making basic information about archaeological archives available can help	Legal frameworks requiring public access to archaeological records exist in both the UK (e.g., PPS5) and US (e.g., 36CFR79); provide information on the best way to create, manage, and document digital material produced during the course of an archaeological project; improves functionality of GIS, CAD and VR.
UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects	Rome 1995	Y	self-executing; 28 parties	Illicit trafficking; inheritance transfer of ownership	Strengthen the main weaknesses of the 1970 UNESCO; fight the illicit trafficking of cultural property by modifying the buyer's behaviour, obliging him/her to check the legitimacy of their purchase; due diligence and burden of proof; time restriction on repatriation
UNESCO's Intergovernmental Council Guidelines for the Use of the "Standard Form Concerning Requests for Return or Restitution" of 1986	Jan 1986	Yes	Those pursuant to The Intergovernmental Committee for Promoting the Return of Cultural Property to its Countries of Origin or its	Established to promote bilateral negotiations between states' parties	Presents a flexible but comprehensive framework

			Restitution in Case of Illicit Appropriation		

Case study collection evaluation: programmes for digital repositories								
Programmes	**Dates**	**Room for growth, i.e., gov't backing; funding; international**	**Long term sustainability plan**	**Tech developed outside conflict zone (i.e., in west, implemented in east)**	**International consortium**	**How was it founded and where**	**Is it a strategic lead**	**Liaisons with partners in situ (partnership agreement)**
ATHAR Programme; (Conservation of Cultural Heritage in the Arab Region)	4 November – 13 December 2012	Gov't funding	N/A	N	Y (ICCROM; ALESCO; UCL Qatar; gov't of Qatar; The Government of Sharjah, UAE; National Council of Tourism and Antiquities, UAE	Regional Conservation centre founded by ICCROM	Patronage of H.H. Dr Sheikh Sultan bin Mohammed Al Qasimi	Y
V&A Culture in Crisis programme	Active since 2015	V&A Culture in Crisis Charity; Collaboration with the British Museum	Y	N/A	The V&A partnered with the Institute for the Preservation of Cultural Heritage at Yale University and operated under the patronage of UNESCO	Founded in UK; response to conflict	As a promoter of public awareness; yes	Identifies stakeholders at the local group level

Emergency Safeguarding of the Syrian Cultural Heritage Project	3/1/2014; initial run of 3 years	Collaboration with ICOMOS and CyArk	Funded	Y (with project Anqa, CyArk 3D reconstructions)	Y	UNESCO Project Management Unit is based in Beirut for global proximity	Y; highly involved with UNESCO	Safeguard Syrian heritage through direct technical assistance w stakeholders; related training with Project Anqa
SHIRIN (Syrian heritage in danger: and international research initiative and network)	10 June 2014	Swiss Society for Ancient Near Eastern Societies	Y	N/A	Y; brings together research teams working in Syria before 2011	request by 9th international congress of archaeology during a workshop	Y (within Syria)	Syrian heritage professionals
(DGAM), The Directorate General of Syrian Antiquities in Damascus	1946; Ministry of Culture	Gov't funding	Y	N/A	N; in country gov't agency	Founded by Ministry of Culture	Y	Y
(SMRS) Sights and Monuments Record for Syria	19 Nov 2015	19 Nov 2015	General Inventory of Artefacts in the Museums of Syria	Y	DGAMS: UNESCO: ICOMOS: German Archaeological Institute in Berlin. Survey: Fertile Crescent Project; PaleoSyr; GIAMS	Advocated in UK	N/A	Y
Pergamonmuseum, ILLICID; Verfahren zur Erhellung des Dunkelfeldes als Grundlage für Kriminalitätsbekämpfung und-prävention am	02/2015 – 10/2018	EU Prize for Cultural Heritage/ Europa Nostra Award; funding €1.2M	Y	N/A	Y (via UNESCO)	Germany; investigates the illegal trade in cultural artefacts	The project results will become a strategic action and further	Baghdad

Beispiel antiker Kulturgüter							training concept for security authorities developed	
STACHEM; particularly in Cyprus; Cypriot mosaics	2009	backed by the Department of Antiquities	Co-financed by the Norwegian Financial Mechanism; goal to make database publicly accessible	N	Cypriot + Norwegian Funding	Cyprus as a response to past looting and conflict; 1974 occupation	Y (within Cyprus)	Y
Italian Carabinieri; Comando Carabinieri per la Tutela del Patrimonio Culturale	3 May 1969; Digital since 1992	Y	Y	Y (based in Italy)	works internationally with organisations including UNESCO, UNIDROIT, ICOMOS, ICOM, and INTERPOL.	Italy; predates the UNESCO Convention of 1970	Y	Y (works with Iraq; provides training)
INTERPOL; Stolen Works of Art database; PSYCHE	18 October 2011	Y	Initial time frame of 24 months, became 33 months	Y (based in Europe)	with Italian Carabinieri	Founded by INTERPOL, to integrate with Leonardo and Stolen WOA	Y	enable each member country to insert, modify and delete information on stolen artwork and associated events directly in the works of art database; and standardise it

Example collection evaluation						
Project/process	**Launch date**	**Funding: (None; private; research fund; gov't; crowdsourced)**	**Online platform/site**	**Accessible to the public**	**Wider scope for integration**	**Catalyst for formation a result of conflict**
Iraq Mosul Museum, Project Mosul	8 March 2015	crowdsourced	Y	Y	Y (Nepal)	Y (Natural Disaster and war/conflict; destruction on Mosul Museum objects)
Statues at Hatra	2015	Private; not-for-profit arts organization	Y	Y	Y (Technology and dissemination)	Y
RecoVR Mosul; Gates of Nimrud	2015	Private (Economist, Rekrei) Non-Profit	Y	Y	(Works with Rekrei, who works internationally)	Y
Bamiyan Buddhas	2003	Gov't; non gov't (UNESCO)	N (no longer active)	N	Y (Early work in photogrammetry)	Y
CyArk	2003	Non-profit; private	Y	Y	Y	Y (Bamiyan Buddhas)
#NewPalmyra	2005	crowdsourced; private	Y	Y	Y	Y
Million Image Database/Institute for Digital Archaeology	c. 2015	Funding from University / grant from British Council	Y	Y	Y	Y

CADiP; Cyprus Archaeological Digitisation Programme	2009	Gov't (Cultural Protection Fund)	Y	Y (forthcoming)	Y	Y
Mosaics digitisation; 1974 looting by Turkey		Gov't funded			Y	Y
(EAMENA), Endangered Archaeology in the Middle East and North Africa	2015	research fund	Y	Y	Y	Y
Dunhuang Caves; digital and public access to collections	1994	research fund; govt; private	Y	Y	Y	Y
Scottish Ten; Historic Environment Scotland	2009	research fund; lottery fund	Y	Y	Y	N
Djoser Complex in Saqqara					Y	
MicroPasts	2014	AHRC funded	Y	Y	Y	Y
Glasgow School of Art (GSA)		research fund	Y	Y	Y	
Cymru1900Wales	2013	crowdsourcing	Y	Y	N	N (addressing gap in access)
Durham University	2006	Research fund (Council for British Research in the Levant; British Academy; Global Heritage Fund; AHRC)	Y (with work on EMENA)	Y	Y (foundation on which to study damage to the identified sites)	Y

Appendix V — SDRF Criterion Questionnaire

Currency—Current status of project
Completed:
Active: 0
Total: 100%

Documents (e.g. text, spreadsheets, PowerPoint presentations)
Neither maintained in secure storage, nor publicly available:
Publicly available (e.g., on website) but not maintained in secure storage:
Maintained in secure storage:
Total 100.0%

Images and Photographs (including graphics and logos)
Neither maintained in secure storage, nor publicly available:
Publicly available (e.g., on website) but not maintained in secure storage:
Maintained in secure storage:
Total 100.0%

Audio and video materials
Neither maintained in secure storage, nor publicly available:
Publicly available (e.g., on website) but not maintained in secure storage:
Maintained in secure storage:
Total 100.0%

3D objects and models
Neither maintained in secure storage, nor publicly available:
Publicly available (e.g., on website) but not maintained in secure storage:
Maintained in secure storage:
Total 100.0%

Website/web pages
Neither maintained in secure storage, nor publicly available:
Publicly available (e.g., on website) but not maintained in secure storage:
Maintained in secure storage:
Total 100.0%

Relevance—Project objectives (the objectives which the digital content has been developed to address)
Neither available to the community nor documented by the project:
Not publicly available to the community, but the project has recorded it:
Publicly available to the community:
Total 100.0%

Relevance—Project history/context (the context within which the digital content has been created) (the context within which the digital content has been created)
Neither available to the community nor documented by the project:
Not publicly available to the community, but the project has recorded it:
Publicly available to the community:
Total 100.0%

Relevance—the audience for which the digital content has been developed
Neither available to the community nor documented by the project:
Publicly available to the community:

Total 100.0%

Relevance—The value that the digital content aims to provide to the community

Neither available to the community nor documented by the project or publicly available to the community, but the project has recorded it:
Publicly available to the community:
Total 100.0%

Authority—details of the organisation responsible for content development

Neither available to the community nor documented by the project:
Not publicly available to the community, but the project has recorded it:
Publicly available to the community:
Total 100.0%

Authority—Information about the ownership of the digital content

Neither available to the community nor documented by the project:
Not publicly available to the community, but the project has recorded it:
Publicly available to the community:
Total 100.0%

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Neither available to the community nor documented by the project:
Not publicly available to the community, but the project has recorded it:
Publicly available to the community:
Total 100.0%

Authority—Details of the source/body that has funded content development

Neither available to the community nor documented by the project:
Not publicly available to the community, but the project has recorded it:
Publicly available to the community:
Total 100.0%

Authority—Information about support for community members requiring assistance with the digital content

Neither available to the community nor documented by the project:
Publicly available to the community:
Total 100.0%

Quality—Is the digital content produced by the project accessible to the community?

No, and there are no plans to make the digital content available to the community:
No, but the project is planning to make digital content available to the community in future:
Yes, at a physical location:
Yes, through a dedicated project website:
Yes, via a digital repository or digital archive:
Total 100.0%

Implementation and development—Does the project use open technologies for web-based digital outputs?

No, only proprietary technologies used:
Partly, a combination of open and proprietary technologies used:
Entirely, only open technologies used:
Total 100.0%

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
No:
No information available or the project hasn't considered this:
Partly, some financial support:
Entirely, full financial support:
Total 100.0%

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
No:
No information available or the project hasn't considered this:
Partly, some staff support:
Entirely, full staff support:
Total 100.0%

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
No:
No information available or the project hasn't considered this:
Partly, metadata provided for some digital outputs:
Entirely, metadata provided for all digital outputs:
Total 100.0%

Best practice—Does the project use sustainable file formats for storing digital outputs?
No
No information available or the project hasn't considered this:
Partly, some digital outputs stored in sustainable file formats:
Entirely, all digital outputs stored in sustainable file formats:
Total 100.0%

Best practice—Is the project's digital content harvested and archived by a digital repository or archive (e.g. the Internet Archive)?
No:
Partly, only some digital content archived:
Entirely:
Total 100.0%

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No:
No information available or the project hasn't considered this:
Partly defined:
Fully defined:
Total 100.0%

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
No:
No information available or the project hasn't considered this:
Partly defined:
Fully defined:
Total 100.0%

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
No:
No information available or the project hasn't considered this:
Yes:
Total 100.0%

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
No:
No information available or the project hasn't considered this:
Yes:
Total 100.0%

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
No:
No information available or the project hasn't considered this:
Yes:
Total 100.0%

Appendix VI — Case Study SDRF data

(a) (IDP) The International Dunhuang Project

Currency—Current status of project
Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)
Maintained in secure storage

Images and Photographs
Maintained in secure storage

Audio and video materials
Maintained in secure storage

3D objects and models
Maintained in secure storage

Website/web pages
N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)
Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)
Publicly available to the community

Relevance—the audience for which the digital content has been developed
Publicly available to the community

Relevance—The value that the digital content aims to provide to the community
Publicly available to the community

Authority—details of the organisation responsible for content development
Publicly available to the community

Authority—Information about the ownership of the digital content
Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance
Publicly available to the community

Authority—Details of the source/body that has funded content development
Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content
Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Partly, some financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Partly, some financial support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
Partly defined

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Entirely defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content

Yes

(b) The Scottish Ten and (HES) Historic Environment Scotland

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

N/A

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

Maintained in secure storage

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Not publicly available to the community, but the project has recorded it

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Not publicly available to the community, but the project has recorded it

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
No information available or the project hasn't considered this

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
No information available or the project hasn't considered this

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
No information available or the project hasn't considered this

(c) MicroPasts

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

Maintained in secure storage

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
No information available

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
No information available

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
No information available or the project hasn't considered this

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(d) Cymru1900Wales

Currency—Current status of project

Completed

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

Maintained in secure storage

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
No, and there are no plans to make the digital content available to the community

Implementation and development—Does the project use open technologies for web-based digital outputs?
Yes, entirely

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
No

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
No

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(e) Cyprus Archaeological Digitization Programme (CADiP)

Currency—Current status of project

Completed

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Neither available to the community nor documented by the project

Quality—Is the digital content produced by the project accessible to the community?
No, but the project is planning to make digital content available to the community in future

Implementation and development—Does the project use open technologies for web-based digital outputs?
Yes, entirely

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
No information available or the project hasn't considered this

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
Fully defined

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
No information available or the project hasn't considered this

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
No

(f) Manx National Heritage, Isle of Man Historical Environment

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

N/A

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
No information available or the project hasn't considered this

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
N/A

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
Fully defined

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
No information available or the project hasn't considered this

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(g) Global Digital Heritage

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

N/A

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

Maintained in secure storage

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

N/A

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
No information available or the project hasn't considered this

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Partly defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(h) University of Oxford, EAMENA

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

N/A

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(i) CyArk

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

N/A

Images and Photographs

N/A

Audio and video materials

N/A

3D objects and models

Maintained in secure storage

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(j) Iraq Mosul Museum, Project Mosul – Rekrei; crowdsourced

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

N/A

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

Maintained in secure storage

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Not publicly available to the community, but the project has recorded it

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
No information available or the project hasn't considered this

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
No information available or the project hasn't considered this

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(k) #New Palmyra

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

N/A

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

Maintained in secure storage

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?

Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Partly, some financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Partly, some staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
N/A

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
Fully defined

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Partly defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(l) Million Image Database/ Institute for Digital Archaeology (IDA)

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

Maintained in secure storage

3D objects and models

Maintained in secure storage

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

N/A

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
No information available

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
No information available or the project hasn't considered this

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
No information available or the project hasn't considered this

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
No information available or the project hasn't considered this

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Partly defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
No information available or the project hasn't considered this

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(m) Syrian Heritage Archive

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

N/A

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(n) The International Collection of Digitized Hebrew Manuscripts

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

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Authority—Information about the ownership of the digital content

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Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
No information available or the project hasn't considered this

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(o) The Schøyen Collection

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
Entirely, all digital outputs stored in sustainable file formats

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in academic publications, such as journals and conference papers/posters
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

(p) Virtual Magic Bowl Archive (VMBA)

Currency—Current status of project

Active

Documents (e.g. text, spreadsheets, PowerPoint presentations)

Maintained in secure storage

Images and Photographs

Maintained in secure storage

Audio and video materials

N/A

3D objects and models

N/A

Website/web pages

N/A

Relevance—Project objectives (the objectives which the digital content has been developed to address)

Publicly available to the community

Relevance—Project history/context (the context within which the digital content has been created)

Publicly available to the community

Relevance—the audience for which the digital content has been developed

Publicly available to the community

Relevance—The value that the digital content aims to provide to the community

Publicly available to the community

Authority—details of the organisation responsible for content development

Publicly available to the community

Authority—Information about the ownership of the digital content

Publicly available to the community

Authority—Information about external stakeholders and partners that have been involved in its development and maintenance

Publicly available to the community

Authority—Details of the source/body that has funded content development

Publicly available to the community

Authority—Information about support for community members requiring assistance with the digital content

Publicly available to the community

Quality—Is the digital content produced by the project accessible to the community?
Yes, through a dedicated project website
Yes, via a digital repository or digital archive

Implementation and development—Does the project use open technologies for web-based digital outputs?
Entirely, only open technologies used

Ongoing support—Has the project identified/secured financial support for the ongoing maintenance of digital content post end-of-project?
Entirely, full financial support

Ongoing support—Has the project identified/secured staff resources for ongoing support with digital content?
Entirely, full staff support

Best practice—Does the project provide metadata or other descriptive information for its digital outputs, so that the user community can understand, interpret, and discover the content?
Entirely, metadata provided for all digital outputs

Best practice—Does the project use sustainable file formats for storing digital outputs?
No information available or the project hasn't considered this

Best practice—Is the project's digital content harvested and archived by a digital repository or archive?
Entirely

IPR—Has the project defined legal, legislative, contractual and/or financial reasons for keeping digital outputs for the long-term?
No information available or the project hasn't considered this

IPR—Does the project provide its user community with the terms and conditions (including copyright and licensing) that apply to access and use of the digital content?
Fully defined

Public media—the project and its digital content have been published in public media, such as newspapers articles; television programmes; radio shows
Yes

Academic press—the project and its digital content have been documented in
Yes

Social media—the project has a dedicated presence on social media, through which it promotes its activities and digital content
Yes

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