Ain't No Mountain High Enough:

Developing a New Skills Framework for Digital Preservation

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**Abstract – A skilled workforce is essential to successful digital preservation. But how do we define what “skilled” means? Attempts to define knowledge and competencies for digital preservation have, so far, largely focused on the issue from the point of view of educators. This paper describes work carried out by the Digital Preservation Coalition to create a new skills framework that can be deployed for a range of purposes, including facilitating recruitment, structuring professional development, auditing skills, and reviewing curricula.**

**Keywords – skills, training, staffing, education, professional development**

**Conference Topics – Community; Resilience**

# Introduction

In her iPres 2019 paper “People Get Ready: Building sustainability into digital preservation workforce development”, Sharon McMeekin stated that “A skilled workforce is essential to digital preservation and should be […] a key part of strategies for development” [1]. She identified the failure to clearly define “digital preservation practitioner” as a distinct profession as a key barrier to developing successful pathways for workforce development in the field.

The paper finished with a call to improve and expand on the current digital preservation workforce development resources. This included support for recruitment, training aimed at new and more advanced audiences, increased collaboration and sharing of knowledge and resources, and the creation of a digital preservation skills framework that reflected current good practice.

This paper provides an overview of a project undertaken by the Workforce Development team of the Digital Preservation Coalition (DPC) to develop a skills framework as described in the 2019 paper. It will start by offering context for the activity through a brief overview of the community’s previous efforts to define digital preservation competencies and curricula. The paper will go on to describe the methodology used to research and design the new skills framework, which brought together the insights of previous work and good practice guidance from key models such as the NDSA Levels of Digital Preservation[[1]](#footnote-1) and the DPC’s Rapid Assessment Model (DPC RAM)[[2]](#footnote-2). It will then detail the skills framework that has been developed, before setting out future work that will produce a skills audit toolkit and a suite of resources to support recruitment for digital preservation roles.

# Digital Preservation Requires Skilled Staff

In their seminal 2003 essay “The Five Organizational Stages of Digital Preservation”, Anne Kenney and Nancy McGovern were among the first to highlight the dangers of considering digital preservation as simply a technological problem [2]. They championed a balanced approach that gives equal consideration to issues relating to both organizational context and resourcing, with skilled personnel and defined responsibilities being a key component. In the years since, there has been much discussion about, and several attempts to define, the skills, knowledge, and competencies required to facilitate digital preservation activities and fulfil this need for skilled personnel.

The breadth of skills required has been a constant issue discussed by those developing resources in this area. For example, Fulton, Botticelli, and Bradley (2011) identify the importance of understanding digital preservation to be a “distinctly interdisciplinary undertaking” when developing the curriculum for their Digital Information Management (DigIn) graduate certificate program [3]. They also discuss the importance of information professionals acquiring “a common foundation of technological literacy” to allow them to effectively undertake digital preservation activities and to collaborate with colleagues, particularly those who specialize in relevant areas of information technology.

Likewise, the “Matrix of Digital Curation Knowledge and Competencies” developed by Cal Lee and colleagues in 2009 to help with “identifying and organizing the material to be covered in a digital curation curriculum” shows that digital preservation requires a complex array of skills from different disciplines [4]. The Matrix includes a diverse list of skills and knowledge from areas including administration, advocacy and communication, information management, legal considerations, and a broad range of technological activities. The Matrix is comprehensive in its coverage, but it is also focused on what should be included in a digital preservation curriculum which makes it difficult to parse if trying to identify the skills needed by a digital preservation practitioner.

Aiming to bridge the gap between course curricula and professional training and development needs, the 2013 Digital Curator Vocational Education Europe Project (DigCurV) developed a framework with three “lenses” onto the competencies required at different stages of a digital preservation career. Indeed, Molloy, Gow, and Konstantelos share that the project “aimed to address two types of vocational training: for those aiming to enter the profession (including Master’s-level qualifications), and for existing staff (such as in-house skills training or CPD provided by professional organisations)” [5]. The DigCurV framework also explicitly recognizes the complexities of the skills required for digital preservation noting that for “successful professional performance, staff must demonstrate domain-specific and technical competencies, generic professional and project skills, and personal qualities in a blend appropriate to their particular professional context”. The framework was described as an aspirational model and that they did not “expect an individual […] to possess every skill, ability or piece of knowledge enumerated in the Framework”.

The competency framework developed by the DigCurV project has been a popular touchstone for those interested in education and training for digital preservation since its publication in 2014, but even at that time, its authors suggested further work that should be undertaken. This included defining “a set of core knowledge and skill elements” from across the “Practitioner”, “Manager”, and “Executive” lenses defined within the framework. The framework also represents a snapshot of digital preservation practice at the time of its development and is now a step or two behind current good practice, suggesting updates or a new framework would be desirable.

In another attempt to define the skills for digital preservation, Blumenthal et al.’ s 2016 paper “What Makes a Digital Steward: A Competency Profile Based on the National Digital Stewardship Residencies”, aimed to provide “a profile of the skills, responsibilities, and knowledge areas that define competency in digital stewardship” [6]. The authors list seven categories of competence they derived from an analysis of the project proposals of the National Digital Stewardship Residences and a survey of participants. The seven categories are as follows:

1. Technical Skills
2. Professional Output Responsibilities
3. Communication Skills
4. Research Responsibilities
5. Project Management Responsibilities
6. Knowledge of Standards and Best Practice
7. Personality Requirements

In addition to defining these categories, they also captured data on the importance of different skills within respondent’s organizational contexts. Responses showed that skills relating to communications, project management, research, and knowledge of standards and best practice were more important across the cohort than technical skills. As with previous work on digital preservation skills, the emphasis is on the need for professionals with interdisciplinary competencies. Additionally, they found that “being an effective steward of digital material requires more extensive and specialized training than can be acquired through traditional means”.

The need for a clear definition of the skills required for digital preservation to facilitate professional development was further confirmed by the survey results detailed in the “Staffing for Effective Digital Preservation 2017” report from the NDSA. Watkins et al. share that 68% of organizations who responded to the survey source some or all of the staff to work on digital preservation from their existing staff complement, retraining them to work in the area [7]. Without knowing what skills are required, how can these staff be successfully trained to carry out their new responsibilities effectively? Their survey results also upheld previous descriptions of digital preservation practitioners as multi-faceted professionals who are required to have a wide-ranging skillset. Knowledge of standards and best practices for digital preservation was amongst the most important identified by survey respondents, but the other high-ranking skills were all of a more generic nature. These included communications, collaboration, project management, and collaboration skills.

Finally, in their 2020 article “What’s Wrong with Digital Stewardship”, Blumenthal et al. list ideas shared by the practitioners they interviewed for better orientating digital stewardship towards its ultimate goal [8]. These included the need to “reorganize existing staff, change existing job descriptions, redistribute responsibility for digital stewardship, and implementing more effective decision- and policy-making protocols”. These ideas closely mirror requests the DPC has received from its members to help support their workforce development. Members have indicated the need for a resource that would support recruitment, develop job descriptions, and structure ongoing professional development for staff.

Members have also indicated a need for a resource that would align with other DPC tools such as the Rapid Assessment Model, would reflect current good practice, and would offer an optimal balance of detail so that it would be widely applicable but still offer enough detail to be useable, and would be flexible enough to be used for a number of different purposes. With these goals in mind, we (the DPC Workforce Development team) began the development of a new skills framework for digital preservation.

# Methodology

We employed a team-based approach and iterative, agile methodology, gathering and analyzing qualitative data from previous work on digital competencies and drawing from the experiences and expertise of those working in digital preservation. There were three main phases of research and development: (1) in-depth assessments of existing literature and resources with identification of key skills, knowledge or competency areas relating to digital preservation, (2) a series of concept mapping exercises for framework design and development, and (3) an iterative feedback and review process with other DPC colleagues for refining and aligning the framework with other DPC tools.

We began with a short but intensive phase of qualitative research and data collection, gathering relevant articles and resources on digital competencies and curricula to compile a shared reading list. We then each conducted in-depth reviews of those readings. This assessment took place from July to August 2021 and involved separate readings and analysis; we each identified, collected, and assessed direct or indirect references to digital preservation skills. Following these individual reviews, we held a face-to-face meeting in August to compare our findings and compile a preliminary list of common skills, knowledge, and competencies relevant to digital preservation based on the discussion.

Our next phase of research focused on developing and designing the framework itself, conducting a series of concept mapping (or mind mapping) exercises for further analysis and structuring of the framework. The first mapping exercise took place in August during the face-to-face meeting. The aforementioned list of skills, knowledge and competencies written onto post-it notes, then arranged and rearranged into groups. Our first version of the framework, drafted from this exercise, resulted in 37 distinct skills/knowledge elements arranged into seven overarching skill areas. These elements and areas were entered into a spreadsheet to record them and to allow us to input more detail by adding corresponding example statements and example activities to clarify their meaning and practical applications. Following the completion of these additions, a second mapping exercise was conducted in September, resulting in a more expanded scope, and structuring and 74 skill/knowledge elements under six skill areas.

The use of concept mapping exercises at various points throughout the research proved useful for the early stages of framework design; not only did they help identify interrelationships of skills required for digital preservation, and skill areas and elements where overlaps occur, they also provided a way to structure and present early drafts of the framework in a meaningful way to facilitate feedback and refining of findings. From November to January, drafts of the framework were shared with DPC colleagues for iterative review and refinement based on their feedback. A revised version was created and shared with colleagues in December. In light of the feedback a final mapping exercise was completed, and revisions made. The final draft version that was created, now with 27 skill/knowledge elements under five skill areas, is presented in this paper for additional feedback from iPres attendees and the broader digital preservation community.

# A New Skills Framework

The new framework aims to be a reference point for anyone interested in understanding the skills required to undertake digital preservation activities. This might be an individual wishing to benchmark their own skills as part of planning their professional development, or an advertisement for a post they would like to apply for. It could be an educator looking to evaluate the curriculum of a digital preservation course they teach. The framework may also be used by an organization revising job descriptions for staff, recruiting new employees, or auditing current skills across a team or department.

The framework presents information on the skills required for digital preservation in a hierarchical structure, from generic to granular, and aims to offer as much flexibility as possible for users. The information is organized into the following:

* Five high-level skill areas that offer an overview of and quick reference to the breadth of knowledge and competencies required to undertake digital preservation work.
* Twenty-seven skill elements, organized in groups under the skill areas, which break down the knowledge and competencies into more clearly defined units.
* An example descriptive statement for each skill element to show how it might be defined in a job description or advertisement.
* Between three and seven example activities for each skill element to show how that element might be deployed in practice.

The five skill areas and twenty-seven elements included in the framework are shown in Table One. As with previous endeavors to define the skills required for digital preservation, the five skill areas represent a broad range of interdisciplinary skills, with only one of the five areas specifically referencing digital preservation knowledge and competencies. The other five skills areas cover issues relating to ensuring sustainable organizational infrastructures, communications, technological skills, and proactive management of legal and social considerations.

TABLE I

DPC Skills Framework

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| --- | --- | --- | --- |
| **Skill Area** | **#** | **Skill/Knowledge** | **Example Statement** |
| Governance, Resourcing, and Management | 1 | Policy Development | Can develop robust policy with reference to organizational goals, values, and existing policy |
| 2 | Risk Management | Can apply risk management techniques for decision making, planning, and management |
| 3 | Resource Management | Can effectively manage available resources |
| 4 | Staff Management | Can recruit, manage, motivate, and support competent staff |
| 5 | Strategy and Planning | Can competently develop and implement strategy using suitable project planning and management techniques |
| 6 | Analysis and Decision-Making | Can think critically, analyze data, make difficult decisions, and solve complex problems |
| Communications and Advocacy | 7 | Effective Communication | Can communicate effectively, both verbally and in written formats |
| 8 | Collaboration and Teamwork | Can collaborate with colleagues internal and external to the organization, including functioning well as part of a team |
| 9 | Stakeholder Analysis and Engagement | Can successfully manage stakeholder engagement, including identification, mapping, and planning |
| 10 | User Analysis and Engagement | Can undertake an analysis of users and their needs through a variety of techniques |
| 11 | Advocacy | Can employ a range of advocacy techniques to raise awareness of digital preservation and highlight its importance |
| 12 | Training | Can develop and present training and development opportunities using appropriate delivery methodologies |
| 13 | Producing Documentation | Can produce documentation required to manage effective digital preservation |
| Information Technology | 14 | General IT Literacy | Can understand and work with a range of key information formats and systems |
| 15 | System Procurement | Can identify the requirements for a new system or service and utilize these to select and procure a solution |
| 16 | Storage Infrastructures | Can understand the elements required for robust storage infrastructures and processes required to manage them |
| 17 | Information Security | Can understand and input to the implementation of information security protocols and processes |
| 18 | Workflow Development and Implementation | Can design, document, and use workflows to manage the preservation of digital information |
| Legal and Social Responsibilities | 19 | Legal and Regularity Compliance | Can manage the organization's legal and regulatory compliance in relation to digital preservation |
| 20 | Environmental Impact | Can understand the environmental impact of digital preservation and incorporate this into decision-making, planning, and practice |
| 21 | Inclusion and Diversity | Can ensure inclusion and diversity good practice is embedded in all digital preservation activities |
| 22 | Ethics | Can understand and apply ethical approaches to digital preservation |
| Digital Preservation Domain Specific | 23 | Metadata Standards and Implementation | Can identify and implement relevant metadata standards for managing and providing access to digital content |
| 24 | Information Management Principles | Can understand and apply core information management principles |
| 25 | Approaches to Preservation | Can understand, select, and implement suitable preservation approaches |
| 26 | DP Standards and Models | Can understand, select, and implement relevant digital preservation standards and models |
| 27 | Managing Access | Can plan and input to the implementation of discovery and access services |

Echoing the structure and use of maturity models, five levels of experience have also been defined, against which an individual might rate their competency with regards to a particular skill element. These have been loosely aligned with the five levels of maturity defined in DPC RAM (Minimal Awareness, Awareness, Basic, Managed, and Optimized). The five levels of experience are as follows:

1. Novice - Limited awareness of the skill element.
2. Beginner - A basic understanding of skill element. May have received some training, but little or no practical experience.
3. Intermediate - A sound understanding of skill element and some experience of its practical application
4. Advanced - A thorough understanding of the skill element and significant experience of its practical application.
5. Expert - An in-depth understanding of the skill element and leader in the development of approaches to its practical application.

As mentioned above, the framework has been structured as described to allow for flexibility in how it is used. In particular, that flexibility means that the framework might be deployed to understand and assess the skills needed in any context from an individual role through to all of the staff involved in an organization’s digital preservation activities. With this in mind it is important to note two pieces of guidance with regards to using the framework.

The first piece of guidance is that it is not intended that any individual member of staff should be competent in all of the skills included in the framework. Digital preservation is a collaborative undertaking and as such responsibilities for different areas of work, and the corresponding skills required to effectively fulfil those responsibilities, should be spread across a number of roles. When assessing skills for a particular role, this should be done in reference specifically to the skill elements that align with the related job description and/or the responsibilities and activities carried out by the individual in the role. Other skill elements are likely only to be considered as part of reformulating job descriptions or to facilitate the professional development of those looking to expand their current skill set.

The second piece of guidance relates to the level of experience required for each skill element. It is unlikely that there will be a requirement to reach expert level for all skill levels, either for an individual or across a group of staff. The appropriate level of skill to facilitate the organization’s digital preservation activities should be identified and used as the benchmark against which to measure skills. For example, few practitioners will be required to become experts in the development of metadata standards and implementation. An intermediate or advanced level of knowledge of how metadata standards are deployed within their own organizational context is likely to be more than sufficient. Indeed, there as benefits to be gained from aligning the skill levels required within an organization with the results of a maturity modelling exercise. Planned future work on the skills framework will facilitate this and is discussed later in the paper.

It is also important to note that, as with maturity models such as DPC RAM, the information in the framework aims to be illustrative and not exhaustive. An early attempt in the development process to make the framework as thorough as possible resulted in a resource that was frankly too detailed and likely unusable in its complexity. Therefore, while it is hoped that the framework is relevant across the digital preservation community, some customization may be required for individual contexts.

Due to the complexity and interrelationships of skills required for digital preservation, there are also some skill areas and elements where overlaps occur. We spent a significant amount of the development time attempting to successfully tease out the individual skill elements and decide under which skill area they should sit, so that the framework would be clear and usable. For example, there are clear links between the skills within the Information Technology area and the Digital Preservation Domain Specific Area. With this in mind, users of the framework may need to make their own judgements as to which skill(s) relate to a particular activity they undertake if it might be related to more than one skill area.

It is expected that the skills framework will continue to develop over time, as good practice within digital preservation continues to develop. Technological solutions will change and may require the development of new skills, and new areas of specialization may evolve. The DPC is committed to the continued management and development of the skills framework to ensure it remains relevant and usable for the digital preservation community, and in the next section we will discuss some of the complementary resources that will be developed.

# What’s Next?

The DPC is committed to the continued support and development of the skills framework as part of its increasing suite of tools and resources for digital preservation continuous improvement. In the near term that represents a next phase of the development project to create a crosswalk between the skills framework and DPC RAM, and an accompanying skills audit toolkit.

This work will identify key skill elements for each of the eleven sections of RAM and link the level of experience required with the maturity levels for each section as defined in the model. The data captured during this process will then be used to develop a skills audit toolkit which will allow users to input their current RAM maturity levels, and the levels they aspire to in their next phase of development, and toolkit will generate worksheets detailing the relevant skill areas and experience levels that can be used to audit skills within the organization. It is hoped that we will be in the late stages of the pilot phase of the toolkit development by the iPres 2022 conference to allow more information to be shared at that time.

A more focused version of the skills audit toolkit will also be produced to allow individuals to assess their own skill levels as part of managing their continuing professional development. It is hoped that this will also eventually be supported by signposting to suitable training opportunities for elements of the skills framework. It is planned that this will be facilitated by the addition of training course information to the COPTR registry[[3]](#footnote-3), and this has been discussed with those who directly support the continued development of the resource.

Next on the list of future developments are resources to support recruitment for digital preservation posts. Anecdotal evidence suggests that many find the current digital preservation labor market difficult to navigate and role descriptions included in advertisements to be intimidating, whilst employers often struggle to assemble a viable pool of candidates. Also folding in learning from the results of the forthcoming 2022 iteration of our labor market analysis work, we will create exemplar job descriptions, role profiles, and guidance on recruitment for digital preservation roles. The hope is this will ease the process for those recruiting new employees but will also remove some of the uncertainty for those applying for a new position.

Finally, we hope to engage with those offering training and education opportunities to encourage the use of the skills framework to aid in the development and review of their courses and curricula. We will also be using the skills framework inhouse for this purpose, reviewing current DPC training modules and resources and planning for the development of new content in line with gaps identified against the framework. This will be of particular use was we build on our existing online training offering, the Novice to Know-How learning pathway[[4]](#footnote-4).

# Conclusion

The purpose of this project by the Workforce Development team at the Digital Preservation Coalition was to develop a new digital preservation skills framework as described in Sharon McMeekin’s 2019 iPres paper on sustainability and digital preservation workforce development. While there is a great deal of previous work on digital preservation competencies and curricula, a new, more defined skills framework for digital preservation practitioners is necessary to ensure successful pathways for those in the field. With this in mind, the project aimed to develop a skills framework that balances detail with flexibility--providing enough detail to be applicable by digital preservation practitioners across different organizational contexts while also having enough flexibility to be used for a number of distinct purposes such as recruitment, training, or benchmarking models.

This was not an easy feat, given the scale of the task and high/lofty aims, but we employed a team-based approach with qualitative research methods to build on the paths laid by previous efforts and drew from the expertise of DPC colleagues to develop and design our framework. Throughout the research and design process, we found that the use of concept mapping exercises was useful for designing and refining the framework in a meaningful way and that feedback from colleagues who bring different perspectives is invaluable. To continue this collaborative approach to development, we present the final draft of the skills framework here in this paper to facilitate feedback from the iPres and broader digital preservation community before undertaking our next steps: producing a skills audit toolkit and a suite of resources to support recruitment for digital preservation roles. To borrow a lyric, we hope that there “ain’t no mountain high enough” to keep us from this momentous task…

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