

Investing in Curation

A Shared Path to Sustainability
(Draft)

Introduction

How can organisations working in a variety of different domains more cost-effectively look after and account for the digital assets in their care? This concise Roadmap sets out to address that question by outlining the steps that should be taken over the next five years in order to maximise the efficiency of digital curation and to ensure sustainability.

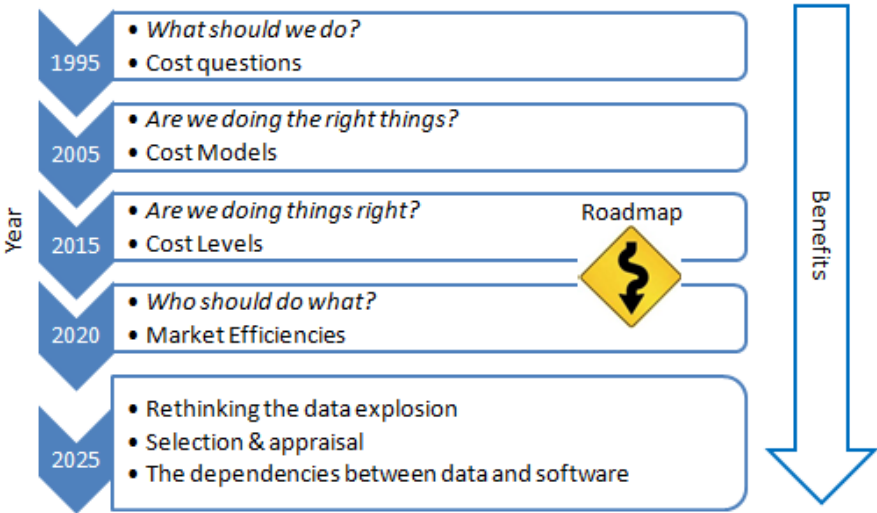
Digital curation involves managing, preserving and adding value to digital assets over their entire lifecycle. The active management of digital assets maximises their reuse potential, mitigates the risk of obsolescence and reduces the likelihood that their long-term value will diminish. However, this requires effort so there are costs associated with this activity. As the range of organisations responsible for managing and providing access to digital assets over time continues to increase, the cost of digital curation has become a significant concern for a wider range of stakeholders.

Establishing how much investment an organisation should make in its curation activities is a difficult question. If a shared path can be agreed that allows the costs and benefits of digital curation to be collectively assessed, shared and understood, a wider range of stakeholders will be able to make more efficient investments throughout the lifecycle of the

digital assets in their care. With a shared vision, it will be easier to assign roles and responsibilities to maximise the return on the investment of digital curation and to clarify questions about the supply and demand of curation services. This will foster a healthier and more effective marketplace for services and solutions and will provide a more robust foundation for tackling future grand challenges.

Situating the Roadmap

The six messages in the roadmap have been carefully considered to effect a step change in attitudes over the next five years. It starts with a focus on the costs of digital curation—but the end point and the goal is to bring about a change in the way that *all* organisations think about and sustainably manage their digital assets.



Who is responsible for this Roadmap?

The Roadmap has been developed by the 4C Project (Collaboration to Clarify the Costs of Curation)—<http://4cproject.eu>
 4C is an ERA-NET project co-funded by the 7th Framework Programme of the European Commission.

The 4C participants are:

- Jisc
- The Royal Library—National Library of Denmark
- INESC-ID—Institute for System and Computer Engineering
- Danish National Archives
- German National Library
- University of Glasgow
- University of Essex
- KEEP SOLUTIONS
- Digital Preservation Coalition
- SBA Research
- The University of Edinburgh
- Data Archiving and Networked Services
- National Library of Estonia

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The Vision

In five years time (2020) it will be easier to design or procure more cost effective and efficient digital curation services because the costs, benefits and the business cases for doing so will be more widely understood across the curation lifecycle and by all relevant stakeholders. Cost modelling will be part of the planning and management activities of all digital repositories.

Who should be interested?

Curation Practitioners

Those with direct responsibility for managing digital assets and appropriate knowledge about digital curation processes and techniques.

For example: digital curators, digital preservation officers, digital archivists, records managers and digital repository/data/collections managers with enough technical expertise to assume responsibility for the long-term management of assets.

Curation Researchers

Those with the remit and the expertise (or the appropriate guidance) to tackle emerging digital curation challenges and to define new methods and processes for the long-term management of digital assets.

For example: university research teams, research teams in larger memory institution, funded research consortia, research arms of commercial entities (e.g. Microsoft, Google, IBM).

Data Users (and re-users)

Those with an interest in using and re-using the curated data. Also known as the ‘designated community’ when it comes to determining why and for whose benefit investment is being considered to curate the digital assets.

For example: data scientists, researchers, cultural heritage professionals, authors, analysts, media and broadcast organisations, and any data-consuming business.

Managers (and financial officers)

Those within organisations or groups that have little or no digital curation expertise themselves but are required to integrate, coordinate, facilitate or manage digital curation activity as an integral part of the business function of the organisation.

For example: heads of library and information systems, IT managers, finance managers, administrators,

Member Organisations

Those who represent the interests of subscribing member organisations and the wider community to promote and support best practice and policy-making in the domain of digital curation or in related areas.

For example: Alliance for Permanent Access, Archives & Records Association (UK), Digital Preservation Coalition, International Council on Archives, International Federation of Library Associations, LIBER, Nestor, Netherlands Coalition for Digital Preservation, Open Planets Foundation.

Policy Makers (Resource Providers / Data Owners)

Those with responsibility for dictating the type and quality of digital curation activity that is required; those responsible for making the resources available to support that activity (funding); and those responsible for establishing the framework of ownership around data.

For example: research councils, funding agencies, government departments, charitable bodies, senior information risk owners, publishers, and any senior management within data dependent corporations.

Solution Providers

Those with incentives (commercially or community-driven) to develop and disseminate products that will support digital curation activity at either the infrastructure (services) or systems (solutions) level.

For example: Archivematica, Arkivum, CERN, DuraSpace, Ex Libris, LOCKSS, OCLC, Portico, Tessella.

*Identify the value of
digital assets and
make choices*

I: Identify the value of digital assets and make choices

What the message means and who should act

Not all digital objects are digital assets. Only those which store value and will realise future benefit can be described as assets. Those which won't are liabilities. Trying to distinguish these is difficult but it is no harder than the many other business decisions that organisations are faced with on a regular basis. And although it might seem cheaper to preserve everything than to spend time doing this selection, such an approach is unlikely to be sustainable or result in assets that are findable, understandable and reusable.

“One in five of the UK's largest companies now measure the value of corporate data on their balance sheets. Businesses realise that finding better ways of analysing data is the key to unlocking [their] profitability”

Alwin Magimay,
KPMG UK Head of Digital and Analytics

This was true in the early days of digital curation, but given the global upward curve of data creation, appraisal and selection of valuable assets is of increasing relevance. Even for organisations that have explicit—limiting—policies on the types or quality of the assets that they manage, budgeting for the curation of rapidly increasing volumes is a challenge.

The resources available to ensure long-term availability of data are unlikely to grow at the same rate as data volumes. Secondly, despite the long-standing tradition of human appraisal of assets (i.e. deciding what to retain), for many organisations data has grown to such an extent that it is no longer feasible for this to be done by a person. Appraisal has to be (at least) semi-automated to be scalable and “value” is an essential concept that will need to be algorithmically defined.

Designing how human appraisal knowledge and skills can be combined with machine-based appraisal to result in semi-automated decision making process is a major topic for research.

However, some key aspects can be identified:

- Value is an indirect economic determinant on the cost of curating an asset. The perception of value will affect the methods chosen and how much investment is required. That perception is best established by the designated community for whom the asset is being curated.
- Content owners should have clear policies regarding the scope of their collections, the type of assets sought, the preferred file formats. They must also identify the designated community using the assets and monitor usage intentions over time. From this, decisions can be made

about which properties or attributes of the asset should be prioritised for preservation.

- Establishing, formalising and codifying value criteria for assets requires active effort and should be a costed component of curation. This should be done in conjunction with an understanding that certain types of assets can be re-generated or re-captured relatively easily, thereby avoiding curation costs
- Establishing ‘value’ is a challenging exercise. The myriad contexts in which organisations operate and the differing perceptions of stakeholders about the current and potential use cases for digital assets makes the concept difficult to quantify and difficult to compare. A mixed approach, however, in which automated appraisal leads to selection advice for the human expert would mean an important reduction of workload during appraisal and selection.



I: Identify the value of digital assets and make choices

Benefits and positive outcomes

- Focusing on the value of digital assets and their likely return on investment will foster a deeper sense of tactical and strategic alignment at all levels within an organisation.
- Questions will usefully arise about whether existing data and digital collections are being used, have potential users, are being adequately exposed or are sufficiently discoverable.
- The effort to automate the identification of value could be combined with improving the overall efficiency of curation systems (see message 2).
- Similarly, the information that must be explicit for automated appraisal will also be valuable when digital repositories seek to validate their procedures.
- Co-operation and collaboration between organisations will become more commonplace as organisations work together to effect 'handoffs' of data and agree long-term archiving arrangements.
- An investment now into research relating to automated selection and appraisal techniques will lay the groundwork for increasingly sophisticated and critical work beyond 2020 when global data volumes dwarf current levels.
- The articulation of demand for automated selection and appraisal products will drive solution provider activity and provoke action within the marketplace to supply that demand.

Actions

Who	What	When				
		2015	2016	2017	2018	2019
Curation Practitioners	Lobby management into proper resourcing of selection and appraisal practice and focus on cost-effective digital curation activity	●	●			
Curation Researchers	Conduct research into automatic appraisal and selection techniques based on codified value criteria	●	●	●		
Data Users	Content experts to work with technologists to establish value criteria and represent 'designated communities'	●	●			
Managers	Incorporate the concept of 'value' into strategic and tactical decision-making		●	●	●	
Member Organisations	Help establish relationships between organisations to facilitate the transfer or 'handoff' of digital assets	●	●	●	●	●
Policy Makers	Establish requirements for digital asset value assessment as part of data management and curation planning			●	●	●
Solution Providers	Build on existing tools (e.g. file format registries) to provide automated selection & appraisal tools		●	●	●	

*Demand and choose
more efficient
systems*

2: Demand and choose more efficient systems

What the message means and who should act

The concept of supply and demand is a fundamental economic principle and should underpin decisions about service design, business modelling and sustainability. In a fully functional marketplace, a clearly articulated demand will be met by a competitive range of solutions, at least one of which should be able to meet or even surpass the specification and do so at an affordable price.

Digital curation remains an immature market for systems and some data managers report difficulties in identifying and selecting solutions appropriate to their

organisational requirements. The question arises, is this a supply-side or a demand-side problem? If the supply is not adequately responding to demand, one practical response is to look closely at how that demand is being articulated and whether there are ways it can be simplified, amplified or just expressed more clearly.

A common understanding and clear specifications are prerequisites for a competitive market

Investment decisions should be based on well understood requirements which in turn will allow solution providers to supply new or enhanced products. Requirements for curation services should be specified according to a range of widely accepted standards or established best practices which would help to encourage competitive tendering processes. Standardisation would strengthen the digital curation market and increase vendors' responsiveness to curation needs.

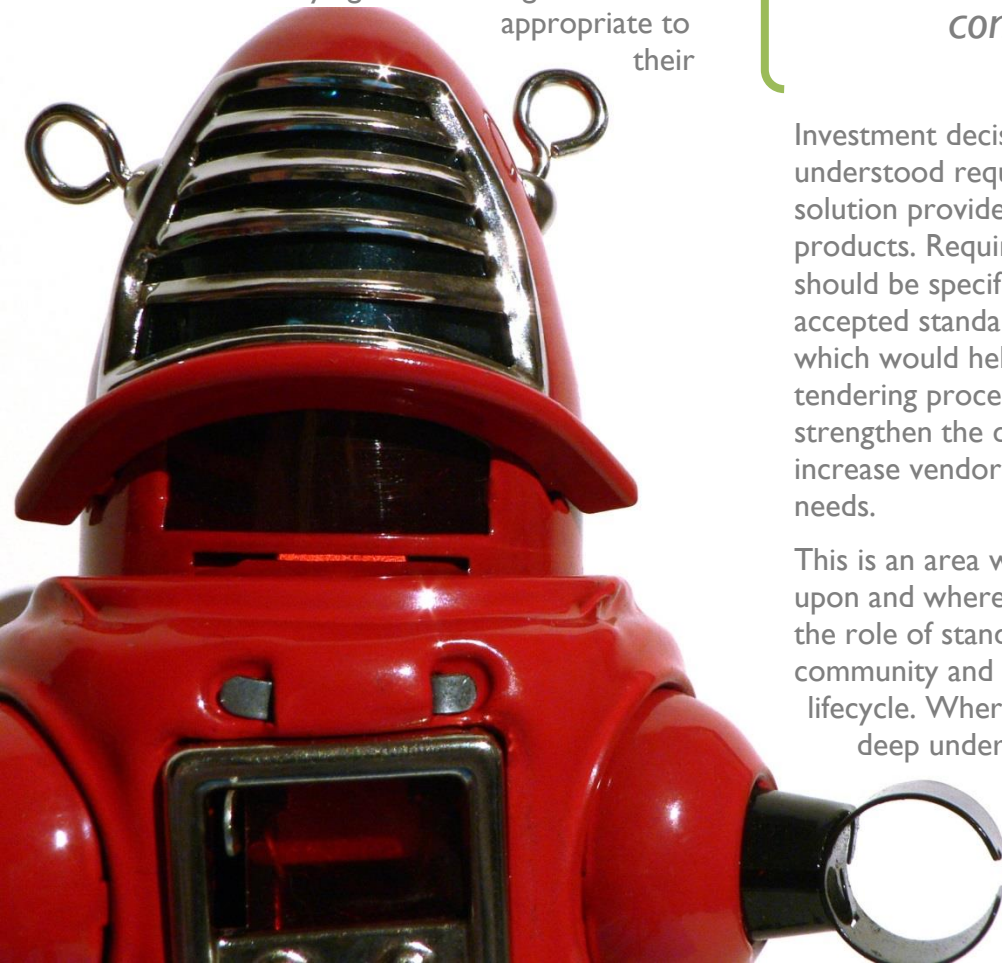
This is an area where existing practice can be built upon and where a more uniform understanding of the role of standards is needed across the community and at all stages of the digital asset lifecycle. Where organisations already have a deep understanding of developing and implementing standards (and of procuring and implementing digital curation solutions) this

expertise should be sought, synthesised and disseminated for the benefit of other types of stakeholders.

Information about existing well-established methods and concepts should be made as accessible as possible and might include plain-language guidance or simple implementation tools that address such topics as: risk management (ISO 31000), information security (ISO 27001), records management (ISO 15489), digital preservation (ISO 14721), or digital repository trustworthiness (ISO 16363).

A common understanding and clear specifications are prerequisites for a competitive market and this can also be fostered by adopting good practice approaches as well as adherence to formal standards. Third party formal certification of services and systems may helpfully increase the comparability of products but well designed and widely endorsed self-assessment tools, or peer-reviewing will also help to improve knowledge across a variety of domains and allow a broader range of stakeholders to better understand the types of systems they should be seeking to procure and implement.

More knowledgeable customers demanding better specified and standardised functionality will mean that products can mature more quickly. It is this transaction that will over time create a virtuous circle of supply and demand and result in more effective and efficient systems.



2: Demand and choose more efficient systems

Benefits and positive outcomes

- Digital curation requires a significant investment of time in order to acquire expertise. The spread and adoption of standardised practices helps to lower the barriers to entry for new practitioners.
- Standardisation supports easier institutional decision making and will add efficiencies to operational environments.
- Standardisation may not be possible or applicable for institutions with unusual or unique digital holdings, but may still provide practical reference points for customisations and extensions.
- For institutions where curation is not their core business best effort approaches are often sufficient to address their needs. Being clear about where local practice deviates from standard practice and documenting the reasons in policies will be helpful in maintaining an effective operating environment and to align understanding (within the organisation) of current capability and the organisational mission.

Actions

Who	What	When				
		2015	2016	2017	2018	2019
Curation Practitioners	Establish a common understanding of curation. Share experiences and empirical evidence about tools & methods to provide institutions with baseline curation requirements	●	●			
Curation Researchers	Undertake research work to minimise subjectivity and clarify & standardise definitions of benefits. Develop tools that facilitate the implementation of standards	●	●			
Data Users	Demand better and more standardised interfaces to data and metadata making data more usable and thus demonstrating its value	●	●			
Managers	Setup agreements between organisations to share infrastructure for more efficient utilisation of available resources	●	●	●		
Member Organisations	Evangelise for the standardisation of practice across domains and produce advice & guidance that will help organisations to act upon this message. Work with solution providers & customers to translate and improve system specifications	●	●	●		
Policy Makers	Promote good practice and training so that integrated and standardised digital curation tools and services have a higher profile			●	●	●
Solution Providers	Work with customers and the community to develop, explain and simplify standard practices. Meet customers half-way in specifying solutions and by making pricing models and implementation options clear & understandable	●	●	●		

*Develop scalable
services and
infrastructure*

3: Develop scalable services and infrastructure

What the message means and who should act

While some organisations will need to be able to provide intensive curation services, others may only need to provide basic functions. To help organisations develop sustainable business models that fit their particular needs they need to understand what drives their investment and where it will have the most impact.

This will require decisions around appropriate infrastructure—not only in terms of hardware and software—but also in terms of the skills and resources that can be employed within the organisation. Optimising the impact of investments may be achieved through:

- Information and knowledge exchange, including cost data, to enable the identification of opportunities for improved efficiencies

- Sharing infrastructure, resources and effort among complementary institutions

It may also require a high level of commitment to collaboration and a realisation that retaining effective local control might mean letting go of some tasks and commissioning external parties to do things more efficiently on a contractual basis. This feeds into a wider issue around maturing strategy and practice right across the digital curation domain.

The switch to collaboration, sharing information and sharing resources to manage budgets for digital curation may be easily justified in financial terms. Nevertheless a programme of “education” and “culture change” is required to encourage this approach.

It may be possible to do this from the “top-down” and from the “bottom up”:

- Mature national and international support networks, with endorsements from national sector leaders and funders, mentoring less mature or less well equipped organisations, facilitating lessons learned and identifying opportunities for further sharing and collaboration.
 - Local or sectoral organisations actively seeking peers and establish platforms for information exchange and the sharing of resources.

It is realistic and prudent to assume that curation budgets are unlikely to be raised in line with the

enormous growth in volumes of content, so investment needs to be strategically targeted to the right places to create economies of scale and scope. Where organisations have sufficient resources, capability and need to design their own infrastructure, additional budget must be found for ensuring that evaluation, advocacy and sustainability planning are built into the ongoing cost of maintaining the infrastructure.

“Collaborating & sharing infrastructure, resources & effort is a valuable approach for local institutions who want to improve their digital curation practices on limited budgets.”

Matt Greenhall,
Programmes Manager at The National Archives

Whether organisations are reliant on local or external curation infrastructures, they should all be aiming to work smarter every year and should be able to demonstrate the impact of their investments year on year.

This will remain the case all the way up the infrastructure stack towards national and international provision of infrastructure. The measures of effectiveness may change radically depending on the context but the need to demonstrate the efficiency and effectiveness of investment remains constant.



3: Develop scalable services and infrastructure

Benefits and positive outcomes

- Collaborating this way opens a forum for mentoring, knowledge exchange, application of standards and continuous development; reducing the “gap” between organisations seen as more “mature” in the field of digital preservation and those who are relatively new to the practice.
- An assessment of local capability versus outsourcing shines a light on skills gaps within the organisation and should highlight training and staff development opportunities.
- Organisations will be able to identify opportunities for the introduction of cost efficiencies by comparing their own activities with those of similar organisations.
- Shared infrastructure, resources and effort will also enable the realisation of further cost reductions by improving efficiency of the workflows necessary to undertake digital curation.

Actions

Who	What	When				
		2015	2016	2017	2018	2019
Curation Practitioners	Make realistic assessments of institutional capability to provide scalable services & infrastructure and compare this with the cost effectiveness & suitability of external service provision		●	●		
Curation Researchers	Optimise workflows and design procedures that will handle large volumes and complex digital objects	●	●	●		
Data Users	Demand delivery of assets and access to resources that suit the needs of users rather than fit within the constraints of current services and infrastructure	●	●	●	●	●
Managers	Setup agreements between organisations to share infrastructure for more efficient utilisation of available resources. Support practitioners to make realistic assessments of local capability	●	●	●		
Member Organisations	Identify and share lessons learnt relating to the economic benefits of using shared infrastructures and the value of planning for scalability over time. Provide a neutral environment to build trust for the negotiation of sharing agreements.	●	●			
Policy Makers	Provide domain-wide shared infrastructures to exploit economies of scale	●	●	●		
Solution Providers	Pay close attention to the need to build scalability into services. Offer solutions that are vigorously tested and provide transparent, benchmarked performance in response to more sophisticated specifications	●	●	●	●	

*Design digital
curation as a
sustainable service*

4: Design digital curation as a sustainable service

What the message means and who should act

In most cases, the ongoing management of digital assets will be an accumulative challenge as new data is added to existing managed information environments. Even where strict retention schedules dictate that obsolete data is deleted in a timely fashion, the trend of information growth will be upward.

Also, effective digital curation requires active management throughout the whole lifecycle of a digital object. 'Active' implies effort. Even where automation can be achieved, the processes need to be designed, monitored and maintained.

Therefore, it will always be

necessary to find resources to fund curation, and the level of resources required will need to be regularly reviewed.

Whilst the likelihood in most organisations is that the amount of digital assets that need curating will steadily (or even dramatically) increase over time, it must also be understood that solutions and processes can be employed more effectively and

Curation should be undertaken with a stated purpose in mind

efficiently over time to keep pace with or even overtake resourcing requirements.

But this can only be achieved with a purposeful focus on planning for increased scale (see message 3) and by anticipating - on a regular basis - the need to enhance and mature the current curation environment.

This drive towards maturity is often characterised in practice by a shift from ad hoc or reactive activities towards a situation where curation is planned into the organisational culture and becomes a service-type activity.

As well as implying a planned and continuous provision of capacity and capability, the transactional nature of the work illustrates the supply-side and a demand-side of service provision and consumption.

Curation should be undertaken with a stated purpose. Even in cases where there is no formal

requirement for a business model to be declared, understanding who requires it to happen is fundamental to arguing the case for resources to support it.

The designation of curation as a service further embeds the activity into the normal business function of an organisation. As part of the infrastructure of an organisation, a curation service becomes as necessary and unremarkable as the human resources section or the estates department and relies on similar levels of mature alignment of practice across organisations and across sectors. It also implies that the mechanisms and systems used to curate digital assets should be interoperable, joined up and easily scalable.

Where the provision of a curation service within the organisation is not viable or practical, services must be easily procurable from outside the organisation. This requires structural services offering competitively priced and appropriate digital curation capability to be available.



4: Design digital curation as a sustainable service

Benefits and positive outcomes

- By considering curation activity in terms of service provision, organisations will be able to specify more clearly the costs of digital curation and better establish their incentives and the methods they should use to manage their digital assets over time.
- Rather than digital curation happening within the organisation as an ad-hoc activity or an accidental adjunct to other tasks, it will become a strategic business function, underpinned by appropriate cost/benefit analyses.
- The result of those analyses will provide a clearer view and a better understanding of the value of digital assets and will help to refine the mission and objectives of an organisation
- Designing digital curation as a service should help to make activity more comparable across all sectors and should help to align and standardise practice.
- This in turn should promote the market for the provision of solutions and services and should lead to a wider range of competitively priced offerings from a broader range of suppliers.

Actions

Who	What	When				
		2015	2016	2017	2018	2019
Curation Practitioners	Work with digital curation service consumers (users) to model the current costs and benefits of digital curation activity	●	●			
Curation Researchers	Continue research into sustainable business models and examine how to standardise divergent current practices	●	●			
Data Users	Methodically and empirically assert the value of digital assets and work with practitioners and managers to undertake cost/benefit analyses		●	●	●	
Managers	Seek proof that digital curation activity within the organisation is: optimally & sustainably resourced; works within a defined supply & demand framework; is providing an efficient & effective service		●	●		
Member Organisations	Provide practitioner advocacy material to promote activities within organisations. Help solution providers to publicise & promote their offerings to enhance the marketplace for services & solutions	●	●	●	●	●
Policy Makers	Provide domain-wide shared infrastructures to exploit economies of scale. Design funding constraints to ensure that sustainable digital curation is underpinned by proven cost-effectiveness	●	●	●		
Solution Providers	Participate in setting standards and focus on long-term interoperability of design in software & infrastructure. Focus on openness & collaboration and building a sustainable & inclusive market place	●	●	●	●	

*Make funding
dependent on
costing digital assets
across the whole
lifecycle*

5: Make funding dependent on costing digital assets across the whole lifecycle

What the message means and who should act

Digital curation activity requires a flow of resources and whether that means salaries, skills acquisition, building infrastructure or systems procurement, a resource provider must make a commitment to provide sufficient resources for that activity to proceed.

Many sectors call these resource providers 'funders' and the most straightforward implication of this message would be to recommend that funds are not awarded to initiatives (e.g. research projects, development projects) that aren't able to give a plausible estimate of how much it will cost to sustain and make available the data they will be funded to create.

For this message to have broad applicability the term 'funder' needs to be widely defined as does the timescale for funding. Some digital assets may need to be preserved in perpetuity but others will have a much more predictable and shorter life-span.



The overall message should, therefore, be understood as being very context sensitive and particularly aimed at situations where a demonstrably efficient use of funding is an important principle and a critical component of any case that is made for sustaining assets into the future.

Digital curation activity requires a flow of resources to support it

All stakeholders involved at any point in the curation lifecycle will need to understand their fiscal responsibilities for managing and curating the asset until such time that the asset is transferred to another steward in the lifecycle chain.

Using the management of research data as an example:

- Universities and researchers need to be able to estimate the cost of curating research data during the active phase of the research project and be able to request all or some of these costs to be covered in new grant applications.
- Data centres need to be able to assess the costs associated with the long-term retention of data beyond the life of the project along with requirements relating to access and functionality (e.g., restricted access, specific software required to render, analyse and/or manipulate the data).

- Re-users of data may need to understand if there are any costs associated with access and reuse of in new data intensive activities.



In all domains organisations have to operate within funding constraints and the general principle of anticipating costs as much as possible in advance tends to appeal to budget holders and resource providers everywhere. What will also be necessary is for those resource providers to have a way of assessing whether the requested costs are reasonable and for it to be clear that the benchmarks and costing practices being used by those seeking funds are legitimate.

5: Make funding dependent on costing digital assets across the whole lifecycle

Benefits and positive outcomes

- With more clarity on the costs associated with each stage of the curation lifecycle, transfers of assets from one managed environment to another are likely to be handled more smoothly.
- The ability to make realistic estimates of future liabilities will integrate digital asset management more firmly into the ordinary planning activities of organisations.
- This in turn will raise awareness of the value and importance of digital assets and may prompt an increased desire to exploit that value creatively.
- Resource Providers will be better placed to identify areas where centralised support may realise greater curation efficiencies, potentially leading to more shared infrastructure becoming available.
- A focus on lifecycle costs may incentivise organisations and resource providers to avoid re-creating data that already exists, or to create data in such a way that the prospects for its sustainability and reusability are optimised from the outset.
- This, in turn, may positively affect the quality of data created allowing re-users to have greater confidence in the data they use and, subsequently, produce more useful results.

Actions

Who	What	When				
		2015	2016	2017	2018	2019
Curation Practitioners	Collaborate with peer organisations and engage with tools to establish the cost and benefits of digital curation. Be prepared to clarify whole lifecycle costs for managing digital assets	●	●	●	●	
Curation Researchers	Further develop resources that will simplify cost modelling & comparison for digital curation. Engage in additional pathfinder research to refine methods & decrease costs	●	●			
Data Users	Work with practitioners, researchers & policy makers to establish a better understanding of the variable asset value across the digital lifecycle & the impact of digital curation on that value		●	●	●	●
Managers	Establish clarity within organisations about roles & responsibilities for costing curation & resource it appropriately. Provide additional training for finance & accounting staff to understand digital asset management budgeting issues	●				
Member Organisations	Help establish relationships between organisations to facilitate the transfer or 'handoff' of digital assets. Promote tools & methods for whole lifecycle costing and disseminate good practice	●	●	●	●	●
Policy Makers	Identify where the maintenance of digital assets is a priority & design clauses in support agreements that require an estimation of the whole lifecycle costs of sustaining the assets for as long as they may be needed			●	●	●
Solution Providers	Work with practitioners and researchers to build accounting and budgeting modules into curation systems		●	●		

*Be collaborative and
transparent to drive
down costs*

6: Be collaborative and transparent to drive down costs

What the message means and who should act

Drivers for managing and curating digital assets vary greatly between stakeholders, but essentially each is looking to realise a return on their investment—either through mitigation of risk or through derived benefits. Comparing operational costs and effort with peers is essential for identifying where efficiencies and savings can be made and to improve an organisation’s ability to make informed investment decisions. The only way organisations can compare costs is if they—and others—are prepared to be transparent about their costs.

“The Curation Costs Exchange (CCEx) will help funders realise the benefit of their investments. By being transparent about their costs and plugging them into this platform, projects can demonstrate that the taxpayer is getting value for money.”

Ron Dekker, the Netherlands Organisation for Scientific Research (NWO)

Whilst transparency of cost data is urgently needed, it must in some cases be anonymised, and properly contextualised. This might include information about: the environment in which the costs were incurred; the assumptions of quality and trustworthiness of curation that have been

made; the complexity of the objects being managed; the scale of working; and a host of other issues that will allow proper interpretation of the overall value of the investments that have been made.

Up until now, there have been no mechanisms to help stakeholders find out what their peers are spending, to share their own cost data and to provide contextual information to better identify risks and benefits. The Curation Costs Exchange (CCEx) has been developed to address this problem.

The critical issue for the CCEx – and for the whole concept of being transparent about costs – is that collaboration is key and requires trust between the parties sharing their information.

Institutions where digital curation is a significant part of their core business, e.g. national memory institutions or large content-rich organisations, may not only already have some experience of trying to cost curation but may also have a publicly funded mandate to be transparent and accountable. Where this is the case, those types of organisations may be able to take a lead and start sharing existing data (anonymised if necessary).

In return, those organisations can expect information that will immediately help them to optimise their investments. In addition policy makers should promote and support a culture of sharing cost data, then it should be possible to

build a critical mass of data relatively quickly that would be of benefit to all.

If those who provide digital curation services can be contextually descriptive about their products and transparent about their pricing structures, this will enhance possible comparisons, drive competitiveness and lead the market to maturity.

If a whole range of organisations creating and managing digital assets can share emerging cost data and contextual information, this will help everyone to identify points in the curation lifecycle where efficiencies and savings can be realised.



6: Be collaborative and transparent to drive down costs

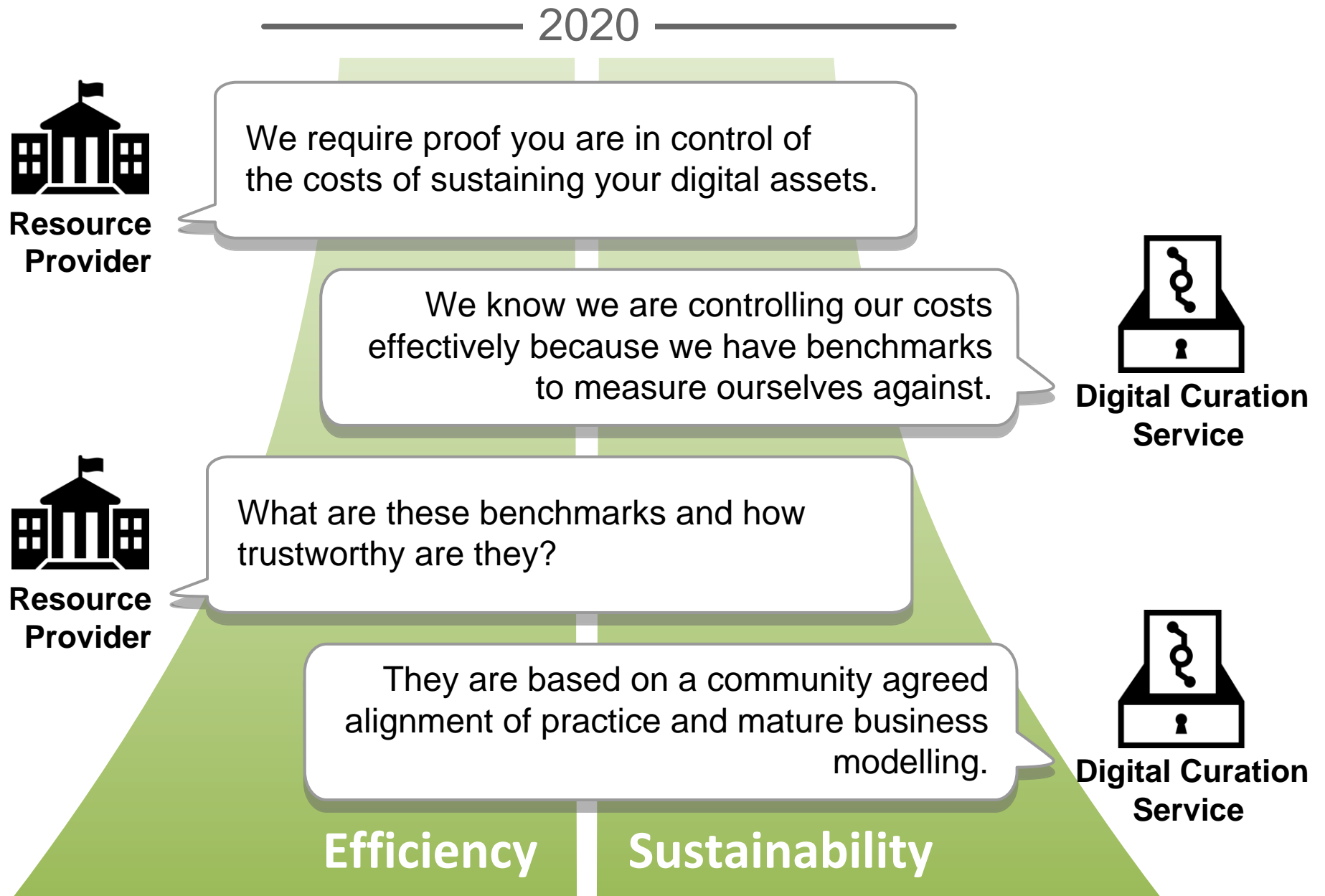
Benefits and positive outcomes

- Being transparent about costs is a short-cut for organisations and content holders to obtain reciprocal information from their peers.
- The analysis of this information should afford opportunities to optimise curation strategies and practices, identify efficiencies, create networks, and enhance communication with peers, designated communities and other stakeholders.
- Better business cases, scenario planning and calculation of different scenarios will be easier to perform for all parties that are involved with and active in digital curation.
- Better informed investments in digital curation will create value and trust.
- A demonstrable increase in organisational transparency could have important positive reputational implications and could be used as an instrument for changing public perceptions.
- Having accurate and comprehensive data on which to base decisions will benefit all types of organisation and should universally provide advantage. Businesses and other types of organisations where there are sensitivities around openly revealing the economic basis of their activities can still contribute with carefully contextualised and anonymised data.

Actions

Who	What	When				
		2015	2016	2017	2018	2019
Curation Practitioners	Devote resources to clarifying the costs & benefits of curation and then share the findings with the wider community. Ask for reciprocal information from others	●	●	●		
Curation Researchers	Examine, evaluate, assess and report on the impact of being collaborative and transparent about costs and benefits information		●	●		
Data Users	Understand the role and purpose of the 'designated community' for curation and ensure that managers & policy makers include users in consultation and steering groups for digital curation initiatives	●	●			
Managers	Ensure that curation activity within organisations is aligned with organisational objectives and that curation practitioners are correctly identifying & emphasising curation benefits when they are outlining curation costs	●	●			
Member Organisations	Synthesise & disseminate the data on costs & benefits and adopt a neutral & universal approach to help all organisations drive down the costs of curation. Foster a culture of trust among members	●	●	●	●	●
Policy Makers	Foster a culture of collaboration to understand the costs and benefits of digital curation	●	●	●		
Solution Providers	Come up with good descriptions of the benefits frameworks and the curation objectives that systems & solutions support to complement clear pricing & costs information	●	●			

The shape of things to come?



How can the 4C Project Help?

The outputs of the 4C Project are designed to help stakeholders manage and control the costs of digital curation and to assess those costs against critically related concepts such as benefits, value, risk and sustainability.

The main outputs of the project are:

The Curation Costs Exchange

A trustworthy and sustainable community resource for depositing and accessing curation costs data and related information. Its purpose is to make the sharing and comparison of data as easy as possible.

<http://curationexchange.org>

A Cost Concept Model and Gateway Specification

A framework that allows current and future cost models to be compared and benchmarked against a comprehensive set of cost concepts. The model and the associated gateway specification are designed to support future cost modelling activities

<http://4cproject.eu/d3-2-ccm>

An Evaluation of Costs Models and a Needs & Gap Analysis

An analysis of existing research related to the economics of digital curation and how well current cost and benefit models meet stakeholders' needs for calculating and comparing financial information.

<http://4cproject.eu/d3-1>

A Summary of Current Cost Models

A summary and description of 10 openly available cost models

<http://4cproject.eu/summary-of-cost-models>

An Economic Sustainability Reference Model

A strategic tool to facilitate discussion and to support planning of successful sustainability strategies for digital curation.

<http://4cproject.eu/ms9-draft-esrm>

A Report on the Indirect Economic Determinants of Digital Curation

A description of the indirect factors and concepts that organisations need to be aware of when clarifying the costs of curation.

<http://4cproject.eu/d4-1-ied>

A Report on Quality & Trustworthiness as an Indirect Economic Determinant

A case study report on the overhead, cost, intellectual input and the eventual benefits that may accrue of undergoing audit and certification procedures to become a 'trusted digital repository' or similar.

<http://4cproject.eu/d4-3-quality-and-trustworthiness>

A report on Risk as an Indirect Economic Determinant

A report on the role of risk and risk assessment in relation to digital curation and its impact on costs.

(Work in progress).

From Costs to Business Models for Digital Curation

An examination of potential business models, an analysis of the types of services needed, the ways that these can be provided, and options for fee structures.

(Work in progress).

Baseline Study of Stakeholders & Stakeholder Initiatives

A review of relevant work on the economics of digital curation and the results of a stakeholder survey on current practice and stakeholder needs.

<http://4cproject.eu/d2-1-stakeholders>



So what do you think?

This version of the Roadmap (August 2014) is being published as a draft because we want your feedback. The messages are based on extensive research and engagement with the community but they are *opinions*.

We want to know what you think.

What have we got right?

What have we got wrong?

What have we missed out?

We have an online survey so when you've read the draft and thought a bit please go on-line and let rip!
<http://4cproject.eu/rmfeedback>

*Don't hold back.
Tell us what you **really** think!*

We want the final roadmap to speak to all stakeholders and we want it to be useful, practical and for people to act on the messages it contains. For that we need it to contain targets and goals that people can get behind. We know that not all of the messages will be applicable to all stakeholders, but we do want there to be at least something in the Roadmap for everyone. If you think that your community will see no benefit then tell us (and just as importantly tell us why).

Digital curation is important and this roadmap represents an opportunity to raise awareness of that fact across the board.

The questions

Before you leap away to answer the questions we thought we'd give you an opportunity to see them here.

Firstly, we'd like to know if you share the overall vision we outlined up front. Or do you not share it? Either way we'd like to know why.

Then for each of the 6 messages we'd like you to consider:

- Is the message meaningful to you?
- If the message applies to you, are you prepared to act on it?
- Do you agree with the message?
- Is this message aimed at the right audiences?

As with the vision, we'd also like to know why.

Pass it on

Please do. If you know of someone who you think might be interested then please do send them a copy. Alternatively you can point them at the web-site— <http://4cproject.eu/d5-1-draft-roadmap>—where they can download their own copy.

From all of us here at the 4C Project, thanks for participating.

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