

Project no. 269977

APARSEN

Alliance for Permanent Access to the Records of Science Network

Instrument: Network of Excellence

Thematic Priority: ICT 6-4.1 – Digital Libraries and Digital Preservation

D36.2 EXEMPLAR BUSINESS CASES

Document identifier:	APARSEN-REP_D36_2-01-1_0
Due Date:	2013-06-30
Submission Date:	2013-08-02
Work package:	WP36
Partners:	UPAT, INMARK, LIBER, DNB, BRITISH LIBRARY, ESA
WP Lead Partner:	UPAT
Document status	Released
URN	urn:nbn:de:101-20140516283

Abstract: This report focuses on the lessons learnt from exemplary business cases, of economically-sustainable digital preservation initiatives.

Delivery Type	Report
Author(s)	Ruben Riestra (RR) - INMARK, Xenia Beltran (XB) - INMARK, Panos Georgiou (PG) - UPAT, Giannis Tsakonas (GT) - UPAT, Kirnn Kaur (KK) - BL, Susan Reilly (SR) - LIBER, Karlheinz Schmitt (KS) – DNB
Approval	David Giarretta, Simon Lambert
Summary	The overall purpose of this report is to depict a set of business cases with digital preservation initiatives as well as recommendations for deploying economically-sustainable digital preservation policies.
Keyword List	Business cases, sustainable digital preservation
Availability	<input checked="" type="checkbox"/> Public

Document Status Sheet			
Issue	Date	Comment	Author
0.1	2012-11-15	Initial structure and methodology	RR, XB, PG, GT, KK, SR, KS
	2012-11-20– 2013/02/15	Desk Research and evaluation of potential exemplar cases	RR, XB, PG, GT, KK, SR, KS
0.2	2013-01-22– 2013-02-19	Guidelines for interviewing selected exemplar cases (generation, reviews, and approval). Assignment of fieldwork tasks.	RR, XB, PG, SR, GT
0.3	2013-02-25– 2013-07-24	Qualitative Fieldwork	RR, XB, PG, GT, KK, SR, KS
0.4	2013-06-21– 2013-07-25	Report Drafts	RR, XB, PG, GT, SR
1.0	2013-08-02	Report Released Version	RR, XB, PG, GT, SR

Project information

Project acronym:	APARSEN
Project full title:	Alliance for Permanent Access to the Records of Science Network
Proposal/Contract no.:	269977

Project coordinator: Simon Lambert/David Giaretta

Address:	STFC, Rutherford Appleton Laboratory Chilton, Didcot, Oxon OX11 0QX, UK
Phone:	+44 1235 446235
Fax:	+44 1235 446362
Mobile:	+44 (0) 7770326304
E-mail:	simon.lambert@stfc.ac.uk / david.giaretta@stfc.ac.uk

CONTENTS

GLOSSARY	5
EXECUTIVE SUMMARY	7
1. INTRODUCTION.....	9
1.1. THE APARSEN NETWORK OF EXCELLENCE	9
1.2. WORKPACKAGE 36: BUSINESS CASES	9
1.3. THE BLUE RIBBON TASK FORCE RECOMMENDATIONS	9
1.4. METHODOLOGY AND STRUCTURE OF THIS REPORT	11
2. SELECTED DP IMPLEMENTATION CASES	12
2.1. OVERVIEW	12
2.2. THE EXEMPLAR CASES IN A NUTSHELL.....	12
2.3. MAIN DRIVERS FOR DP IMPLEMENTATION	18
2.4. MAIN BENEFITS	21
2.5. THE IMPLEMENTATION PROCESS	24
2.6. DP SUSTAINABILITY AND FUNDING SCHEMES	29
3. IMPLEMENTATION OF THE BRTF RECOMMENDATIONS IN THE EU CONTEXT.....	33
3.1. THE NATIONAL AND INTERNATIONAL AGENCIES.....	33
3.2. THE FUNDERS AND SPONSORS OF DATA CREATION.....	37
3.3. STAKEHOLDER ORGANIZATIONS.....	39
4. ROADMAPPING SUSTAINABLE DIGITAL PRESERVATION	42
4.1. RATIONALE.....	42
4.2. THE CONTEXT FOR ECONOMICALLY SUSTAINABLE DP PRACTICES	42
4.3. APPROACH FOR MEETING DP SUSTAINABILITY REQUIREMENTS	44
4.4. GUIDELINES FOR ECONOMICALLY SUSTAINABLE DP IMPLEMENTATION	49
5. ANNEXES	52
5.1. ANNEX I: METHODOLOGY	52
5.2. ANNEX II: LINE OF DISCUSSION FOR IN-DEPTH INTERVIEWS.....	53
5.3. ANNEX III: SELECTED BIBLIOGRAPHY	56

GLOSSARY

Business case¹: A business case captures the reasoning as well as the quantifiable and unquantifiable characteristics of a proposed project. The logic of the business case is that, whenever resources such as money or effort are consumed, they should be in support of a specific business need. Business cases are created to help decision-makers ensure that:

- the proposed initiative will have value and relative priority compared to alternative initiatives
- the organization has the capability to deliver the benefits
- the organization's dedicated resources are working on the highest value opportunities
- projects with inter-dependencies are undertaken in the optimum sequence
- the performance of initiatives is monitored objectively based on the objectives and expected benefits laid out in the business case

Business model²: A business model describes the rationale of how an organization creates, delivers, and captures value (economic, social, cultural, or other forms of value). The process of business model construction is part of business strategy; business models are used by managers inside companies to explore possibilities for future development.

According to David Teece, whenever a business is established, "it either explicitly or implicitly employs a particular business model that describes the architecture of the value creation, delivery, and capture mechanisms employed by the business enterprise. The essence of a business model is that it defines the manner by which the business enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit: it thus reflects management's hypothesis about what customers want, how they want it, and how an enterprise can organize to best meet those needs, get paid for doing so, and make a profit"³.

Business Plan: A business plan is a formal statement of a set of business goals, the reasons they are believed attainable, and the plan for reaching those goals. It may also contain background information about the organization or team attempting to reach those goals⁴.

Set of documents prepared by a firm's management to summarize its operational and financial objectives for the near future (usually one to three years) and to show how they will be achieved. It serves as a blueprint to guide the firm's policies and strategies, and is continually modified as conditions change and new opportunities and/or threats emerge. When prepared for external audience (lenders, prospective investors) it details the past, present, and forecasted performance of the firm⁵.

Economic sustainability⁶: The use of various strategies for employing existing resources optimally so that that a responsible and beneficial balance can be achieved over the longer term. Within a business context, economic sustainability involves using the assorted assets of the company efficiently to allow it to continue functioning profitability over time⁷.

¹ http://en.wikipedia.org/wiki/Business_case

² http://en.wikipedia.org/wiki/Business_model

³ Teece, David J. Business Models, Business; Strategy and Innovation. Long Range Planning, vol 43; 2010-193. <http://www.bmcommunity.sitew.com/fs/Root/8jig8-businessmodelsbusinessstrategy.pdf>

⁴ Business Dictionary: http://en.wikipedia.org/wiki/Business_plan

⁵ <http://www.businessdictionary.com/definition/business-plan.html>

⁶ Read more: <http://www.businessdictionary.com/definition/economic-sustainability.html#ixzz2ZuZz4Vyt>

⁷ Business Dictionary: <http://www.businessdictionary.com/definition/economic-sustainability.html>

Digital Preservation policy: A digital preservation policy states and communicates the principles that guide an organisation's activities to secure the preservation of its digital information resources. Further policy documents, procedures, standards, and guidance will be developed in future to address specific aspects of the Strategy⁸.

A digital preservation policy should join digital preservation to the business outcomes of the organization. In particular it should⁹:

- Allocate responsibility and ownership of the policy to a senior role within the organization (i.e. a director or head of service).
- Direct what procedures should be followed and reference any internal guidance / other policies to be followed.
- Align the digital preservation policy with other relevant policies including record management, freedom of information and data protection, information security and the preservation policy for analogue records.
- Support the digital preservation strategy and over-arching system of governance.

⁸ <http://www.parliament.uk/documents/upload/digitalpreservationpolicy1.0.pdf>

⁹ <http://www.nationalarchives.gov.uk/information-management/projects-and-work/digital-preservation-policy.htm>

EXECUTIVE SUMMARY

This report provides a qualitative analysis of exemplar business cases for adopting DP policies within EU based memory institutions. The depicted cases represent the activities of leading pioneers and early adopters of DP practices and tools. Within this context, we have mapped the analysed initiatives to the recommendations on economically sustainable DP formulated by the BRTF UK-USA group of experts back in 2010.

Based on the lessons learnt from these cases, as well as the results from our previous report on business preparedness and from literature review, we have assembled a set of guidelines on how to approach the strategic and practical aspects of designing and deploying a sustainable DP policy within the organisation and activities of an institution in charge of digital collections to be preserved.

The exemplar cases represent the DP intermediate demand side; as most of the institutions currently assume responsibility for the entire DP process, receive digital content from third parties, have partnering strategies for deploying DP initiatives and providing preserved content to stakeholders. The selected institutions have developed expertise and services in DP, have shifted from tackling preservation at the creation end of the digital life-cycle to embedding preservation features increasingly earlier in the creation process (production context), as well as represent a variety of institutional approaches in terms of type and size. In addition all cases have a clear mission statement or mandate to store and preserve digital material to ensure sustainability, of public records, books or documents. With this in mind, the key element which all cases have in common, is that those responsible for DP claim that DP is at the heart of the organisation's strategy and key investment decisions.

Implementation of DP varies significantly from case to case in terms of financing methods (organizational budget, projects, revenue sources), methodological approach (policies vs. projects), scope (mandate vs. benefits/value driven), technological solutions (in-house vs. commercial solutions, autonomous vs. shared infrastructures) and relevant expertise (use of own staff vs. collaborations/sharing resources). All these approaches are present in the cases examined here, though the dominant one seems to be that of sharing resources, costs and expertise through collaborations and/or networks.

The organization's budget is the main funding source for DP in the cases reported here. Nevertheless a mixed funding model is applied in varying degree in most of the cases in a different degree per case, supplemented by external income sources like project funding, charges from providing services, grants etc.

Business models are applied only to a few cases but not always in a formal manner, whilst cost models, when used, are mainly either based on experience or focussed on specific parts of the DP process. Common obstacles for applying a cost model are the challenges in fitting the model to the organization's structure and operational logic as well as the high demand of effort and/or data to set it up.

The need for economies of scale is quite often mentioned but until now only a few cases have something concrete to report. However the need for collaboration as the only or as a very useful way to implement DP in a successful and sustainable way in the long term is reported almost in every case.

The guidelines for setting up sustainable DP practices as presented in chapter 4, are based upon the following: a) The **analysis of the current landscape for DP practices** based on bibliographic research as well as participation of team members in leading conferences and specialised workshops; b) The three conceptual "pillars" for the BRTF recommendations (The definition of DP economic sustainability, the Requirements for economically sustainable DP and the Critical Success Factors for economically sustainable DP), and c) The lessons learnt from the results of the **APARSEN survey on business preparedness** presented in D36.1 as well as from the **exemplary business cases** described and analysed in chapter 2 and 3 of this report.

According to the BRTF, the requirements for economically sustainable DP comprise of the following conditions, as **tangible measures of success** in the design and implementation of future DP policies: Recognition of the benefits of DP on the part of key decision-makers; existence of incentives for decision-makers to act in the public interest; Processes for selecting digital materials for long-term retention; Mechanisms to secure an on-going, efficient allocation of resources to DP activities and an appropriate organization and governance of DP activities. These requirements must be addressed in such a way that within a predefined period of time they are **collectively met as a whole**. The underlying assumption in the BRTF definition of DP economic sustainability, i.e. “**The set of business, social, technological, and policy mechanisms ...**” is that **DP is ultimately a managerial issue**. As such, DP practitioners are able to resort to the theory and extensive experience accrued in the last six decades in modern management science, bringing into DP management its models and other analytical tools. In this respect, strategic planning and management is the overarching approach to secure the long term competitive survival of activities and ultimately the organisations.

Proof of this understanding and consequent adoption of strategic planning and management practices in addressing DP initiatives, is already visible, in the BRTF documents, as well as in the DP policy formulation of leading early DP adopters such as the Library of Congress (USA), British Library, The National Archives (UK) and the KB (NL).

Adopting a **strategic planning and management approach to pursue the ultimate objective of securing future access to preserved digital assets, under sustainable conditions, is an imperative**; due to: the multiplicity of strategic **objectives** to be met simultaneously, the diversity of **players**, roles and tasks involved, the **long term** and continuous nature of DP business processes, the multiplicity of **scarce resources** to be managed as well as the **changing settings** (changing parameters and paradigms in the dynamic context of consolidations of the digitally based Information Society.)

Based on these premises, we highlight the crucial role of developing a **compelling value proposition for the intended DP practice**, as this strategic tool is the starting point to create a structured demand, for the concerned digital assets to be accessed in the future, as well as the backbone for the design and implementation of an economically sustainable DP policy for such assets.

1. INTRODUCTION

1.1. THE APARSEN NETWORK OF EXCELLENCE

APARSEN is a Network of Excellence that brings together a diverse set of practitioner organisations and researchers. APARSEN aims to bring coherence, cohesion and continuity to research addressing barriers to the long-term accessibility and usability of digital information and data. The ultimate result of the project is to set into motion a Virtual Centre of Digital Preservation Excellence.

1.2. WORKPACKAGE 36: BUSINESS CASES

The objective of this WP is to devise a methodology for implementing the recommendations of the Blue Ribbon Task Force (BRTF)¹⁰ on economically-sustainable Digital Preservation (DP).

Based on a survey methodology, desk research and interviews with experts and practitioners within organizations active in digital preservation, WP36 provides a diagnosis of the current preservation of digital records landscape and recommendations for deploying economically sustainable DP policies in two deliverables:

- D36.1 Business preparedness report¹¹, which gathers the outputs and analysis from the APARSEN online survey on business preparedness. This survey investigated the preparedness in accordance to the recommendations of the BRTF and the results were mapped to these recommendations to identify Implementation Gaps.
- D36.2 Exemplar business cases, presented here, which presents an analysis of exemplar cases and generation of a set of recommendations to research libraries for managing research data and implement DP policies in the long run and under sustainable conditions.

1.3. THE BLUE RIBBON TASK FORCE RECOMMENDATIONS

1.3.1. BRTF

The BRTF was an international and multidisciplinary group of experts - independent and representative of Governmental Agencies, Institutions and Academy, promoted by the USA based National Science Foundation (NSF) and the Andrew W. Mellon Foundation in partnership with the Library of Congress, the Joint Information Systems Committee of the United Kingdom, the Council on Library and Information Resources, and the National Archives and Records Administration.

The BRTF was created in 2007 aiming to perform a comprehensive analysis of current and previous efforts, implement models of sustainable digital information preservation, identify best practices, make specific recommendations and provide a research agenda to motivate future work. BRTF worked on a two-year programme. The first deliverable, released by the end of 2008, focused on the description of past and current economic models, identification of points of convergence/divergence and gaps, with the purpose of providing a thorough survey of the real problems. In early 2010 the BRTF published its final report, called "Sustainable Economics for a Digital Planet: Ensuring Long-Term Access to Digital Information." The report provides general principles and actions to support long-term economic sustainability; context-specific recommendations; and an agenda for priority actions and next steps, organized according to the type of decision maker best suited to carry that action forward.

¹⁰ <http://blueribbontaskforce.sdsc.edu/>

¹¹ APARSEN D36.1 Business Preparedness Report. http://www.alliancepermanentaccess.org/wp-content/uploads/downloads/2013/03/APARSEN-REP-D36_1-01-1_0.pdf. March 2013

1.3.2. The BRTF Recommendations

BRTF recommendations targeted four stakeholder groups, segmented according to their role in the DP value chain; which are:

- **National and International Agencies:** which comprise trusted international, national, and public institutions, libraries, archives, museums, research institutes, consortia and regulatory agencies which align DP benefits. These agencies can play a critical role in convening stakeholders and expert communities as well as in reforming governing principles such as national and international copyright legislation or addressing digital preservation needs.
- **Funders and Sponsors of Data Creation:** this group comprises private and public agencies and foundations which support in capacity building throughout the system, creation of mandates, promotion of DP skills and/or fund modelling and testing of DP initiatives.
- **Stakeholder Organizations:** this group comprises universities, research institutions, private companies, third-party archives, professional societies, trade organizations. Their role is to work with domain and preservation experts to ensure that personnel are fully equipped with the technical skills needed for selecting, curating, and preserving materials, as well as fund internal preservation and access activities as core infrastructure.
- **Individuals:** this group comprises principal investigators, data creators, individual authors, and scholars which create and distribute content through publicly accessible venues

The recommendations for each of these stakeholders groups are:

For National and International Agencies:

- R1. Create mechanisms for public-private partnerships to align or reconcile benefits that accrue to commercial and cultural entities.
- R2. Convene expert communities to address the selection and preservation needs of materials of particular interest to the public for which there is no stewardship.
- R3. Act expeditiously to reform national and international copyright legislation to address digital preservation needs.
- R4. Create financial incentives to encourage private entities to preserve digital materials on the public behalf.

For Funders and Sponsors of Data Creation:

- R1. Create preservation mandates when possible, ensuring that they adhere to community selection criteria, and specifying roles and responsibilities of individuals and organizations.
- R2. Invest in building capacity throughout the system.
- R3. Provide leadership in training and education for 21st century preservation, including domain expertise and core competencies in Science, Technology, Engineering, and Mathematics (STEM).
- R4. Fund the modelling and testing of domain-specific preservation strategies.

For Stakeholders Organizations:

- R1. Secure preservation of high-value institutional materials by making explicit roles and responsibilities across organizational boundaries.
- R2. Develop preservation strategies that assign responsibilities for achieving outcomes.
- R3. Leverage resources; create economies of scope and economies of scale by partnering with related organizations and industry professional associations.
- R4. Work with domain and preservation experts to ensure that personnel are fully equipped with the technical skills needed for selecting, curating, and preserving materials.
- R5. Fund internal preservation and access activities as core infrastructure.

For Individuals:

- R1. Provide nonexclusive rights to preserve content they create and to distribute this content through publicly accessible venues.
- R2. Partner with preservation experts early in the lifecycle of one's own digital data, to ensure that data are ready to hand off to an archive in forms that will be useful over the long term.
- R3. Actively participate in professional societies and relevant organizations in developing stewardship best practices and selection priorities.

1.4. METHODOLOGY AND STRUCTURE OF THIS REPORT

Results presented in this report have been produced by combining:

- Desk research
- Fieldwork tasks
- Comprehensive analysis, integrating qualitative results of fieldwork tasks with the quantitative findings from the APARSEN preparedness survey; (more details of the methodology are contained in Annex I)

The results are structured in 3 chapters:

- Chapter 2 provides a qualitative analysis and extrapolates best practices from exemplar cases of implementation of preservation business models. Lessons learned from the APARSEN preparedness survey¹² have been integrated into the analysis.
- Chapter 3 shows how the main initiatives of EU institutions (mainly libraries and archives) and agencies, based on information collected from exemplar cases, link to the BTRF recommendations on economically-sustainable DP.
- Chapter 4 provides the guidelines for managing data in the long run under economically sustainable conditions.

¹² APARSEN D36.1 Business Preparedness Report. http://www.alliancepermanentaccess.org/wp-content/uploads/downloads/2013/03/APARSEN-REP-D36_1-01-1_0.pdf. March 2013

2. SELECTED DP IMPLEMENTATION CASES

2.1. OVERVIEW

This chapter provides a qualitative analysis and best practices based on a collection of exemplar cases of implementation of preservation business models. Quantitative findings from the APARSEN preparedness survey have been integrated to support the analysis.

Exemplar cases have been collected from leading and/or pioneering DP initiatives either in LIBER member organisations or institutions/organisations with an interesting case that could be linked with the BRTF recommendations or used for illustrating the value proposition and roadmapping process. These initiatives were firstly collected during desk research and validated as well as extended with in-depth interviews with the DP managers at a later stage.

2.2. THE EXEMPLAR CASES IN A NUTSHELL

The exemplar cases represent the DP intermediate demand side as most of the institutions currently assume and have responsibility for the entire DP process, receive digital content from third parties, have partnering strategies for deploying DP initiatives and providing preserved content to individuals' stakeholders.

Selected cases also comprise, but are not limited to, early adopters of DP (with more than 5 years' experience with DP initiatives) that have developed expertise and services in DP, have shifted from tackling preservation at the creation end of the digital asset life-cycle to embedding preservation features increasingly earlier in the creation process (production context), and represent a variety of institutions approaches in terms of type and size. In addition all cases have a clear mission statement or mandate to store and preserve digital material to ensure sustainability. All cases have one issue in common, and that is, that those responsible for DP claim that DP is at the heart of the organisation's strategy and key investment decisions.

2.2.1. The National Archives (TNA)

TNA is the official archive of the UK government; it provides the interface between government and the public by providing access to records and ensuring that they are stored for the future. As a government department and an executive agency of the Ministry of Justice, they hold over 1,000 years of records. TNA is the guardian of these records and their role is to collect and secure the future of the record, both digital and physical, to preserve it for generations to come, and to make it accessible and available.

DP has now become a core element of the TNA organization's strategy and core to the organization's mission. This is endorsed by the fact that a strategic decision was taken a few years ago for investment in a new DP infrastructure.

The organization's strategic priorities are set out in their business plan for 2011-15, "For the Record. For Good." The plan includes annual updates on specific business priorities with details of where public money is spent. Strategic priorities for the period 2011-15 are: to redefine and collect the future record, transparently and seamlessly; innovate to ensure optimal physical and DP; widen funding base to generate more support in tough times; be agile and confident, trusted and efficient; and provide a record that is more open, inclusive and used than ever before. This shows that DP is set out as a key priority for the organisation.

TNA is considered a leader within the archive and cultural heritage sectors. They provide guidance related to the preservation and management of electronic records through their Digital Continuity Service.

TNA recognizes DP as a core mandate to store and preserve digital material, in this case the digital material created by the UK government, and to ensure sustainability of all public records. For born digital objects the value driven approach also applies due to the organisation's statutory role, including its role within the cultural heritage sector. This approach also applies to the third party service providers who assess the value of census records.

TNA has a sustainable strategy; given the organisation's corporate responsibility and funding restrictions it has been able to generate its own income. TNA partnerships, including technological and public-private partnership initiatives, nurture value decisions in order to sustain DP activities within the organisation. Risk assessments, commercial tools and services as well as training are provided for the public sector. Various collaboration schemes are active with other members of the DP community both nationally and internationally in areas including file formats, forensic computing and bit-preservation.

The TNA case presents a flagship case that recognizes DP as a core mandate to store and preserve digital material, in this case the digital material created by the UK government and to ensure sustainability of all public records. With this in mind DP is at heart of the organisation's strategy and key investment decisions. In addition given the organisation's corporate responsibility and funding restrictions, it has been able to generate its own income and make value decisions in order to sustain DP activities within the organisation.

Also TNA is a case that shows how an institution plays several roles and has a variety of initiatives that respond to the BTRF recommendations.

2.2.2. Archaeology Data Service (ADS)

"ADS supports research, learning and teaching with freely available, high quality and dependable digital resources. It does this by preserving digital data in the long term, and by promoting and disseminating a broad range of data in archaeology. The ADS promotes good practice in the use of digital data in archaeology, provides technical advice to the research community, and supports the deployment of digital technologies¹³." Archaeological research is by its very nature a destructive activity; the act of excavation results in an almost complete loss of the original resource. It has therefore always been deemed of the greatest importance to preserve the outputs of archaeological excavations.

ADS is mandated to act as the digital repository for archaeological research projects by funding bodies and the DP system is key to the institution's strategy. ADS has both a value driven approach with high quality standards and a cost driven approach with regard to its charging policies for depositors of digital material. ADS acquired the Data Seal of Approval (DSA) in 2010 and the International Standard, ISO 16363 on audit and certification of trustworthy digital repository is being considered in 2013/14.

The organisation's collection and preservation strategies allow for the re-use of data created by archaeologists; and increasingly ADS is acting as a digital repository for archaeological data for museum services and local authorities across England.

ADS shows a business-to-consumer (B2C) model, where consumers are a highly specialized professional collective target. A key function of the ADS is accessibility of data in order to serve the user community by providing a vast range of data types, free at point of use. As much of the data available was born digital, it has always been felt that delivery online was the best method of ensuring accessibility and reuse. ADS direct funding coming from the 'Arts and Humanities Research Council' (AHRC), may now include a different funding model considering the archiving costs upfront, based on individual grant applications.

¹³ <http://archaeologydataservice.ac.uk/about>

The ADS has a good relationship and a niche market for archaeological data so it can ensure sustainability through their collections policies and charging models; thus it will be really interesting to see how the new model works. The funding model and important links to funders is a key to the success to the ADS.

The ADS case represents a well formed business case that could be presented here as another digital presentation “flagship” case. The ADS is unique as it has both a value and cost driven approach. In terms of value – a Value and Impact study has provided improved prospects for the sustainability of ADS¹⁴. Results from the study showed to be important not to dwell exclusively on economic measures of value, but also to have clear messages and good graphical presentation of DP. The cost driven approach applies to its charging policy for depositors.

2.2.3. German National Library of Economics (ZBW)

The Network of the three National Subject Libraries runs their digital archive as a consortium. The consortiums comprises three libraries: the National Subject Libraries, the National Library of Science and Technology (TIB) and the National Library of Medicine (ZB MED), which decided to use Goportis¹⁵ network frame to join forces in order to implement a common DP environment.

ZBW decided to build a trustworthy digital archive as they have a mandate for the long-term-accessibility of their digital material and as a way to respond to the fast growth of their digital collections. Currently DP is a practice of their daily work. There is an institutional mandate to preserve the institutional collections for the long term and they are responsible for the Long Term Access of Digital Collections. ZBW follows a DP value driven approach with high quality standards.

The DP initiatives are mainly funded from the budget of the three libraries, permanently implemented in every year’s budget. Although, ZBW has not developed a cost model or a highly structured business case, ZBW nurtures not only a mix of internal and external IT developments (ExLibris Rosetta was selected to support DP developments), but also manages collaborative and cooperation arrangements among the National Subject libraries to share cost and effort (economies of scale) and manage the sustainability of DP.

The case of **ZBW** is a really interesting case of a collaborative DP initiative in action. This case shows how three German national subject libraries successfully joined to benefit from economies of scale. Also, this case shows how DP strategic objectives and the benefits, taking into account long-term preservation and sustainability issues, could be stated at partnership network level, fully utilising the experience and expertise of the partners, and bringing together complementary contributions and resources.

2.2.4. The German National Library (DNB)

DNB is seen as a very competent player in the field of DP, both nationally and internationally; with a wide range of successful completed DP projects with different partners.

In 2006 DNB was legally mandated to engage in large scale DP project. Since then DP activities were successively implemented in DNB workflows. The legal mandate helped to divert funds to the task. Before 2006, DNB collected online publications on a voluntary basis, but the approach was modular and remained rather isolated. To accommodate their preservation needs many experimental approaches were tested. These activities prepared DNB for the upcoming legislative mandate.

The decision to implement DP activities was a consequence of the amendment of the legal mandate in 2006. Additional funds were provided by the government, but there was also the need to redistribute funds within DNB to meet the challenge of developing new business processes. Besides extending the staffing level, it was also imperative to carry out wide-ranging IT-infrastructure adjustments to support

¹⁴ http://archaeologydataservice.ac.uk/attach/impact/ADSImpact_FocusGroup_Feedback.pdf

¹⁵ <http://www.goportis.de>

the fast growing masses of electronic publications. In addition, external and internal projects were carried out.

DNB follows a value driven approach and developed a cost model. In this regard benefits and risks of DP are well understood by the decision makers. Institutional budget secures a minimal level of funding for the legally mandated preservation activities, whilst additional project funding allows evaluation and development of new DP features.

The legal mandate differentiates DNB's business case from many others. In addition, DNB line of thinking is based on the fact that technological challenges in DP can only be tackled in collaboration with other institutions. DNB is therefore committed to cooperation. This includes the shared use of resources. DNB offers third parties the use of its DP infrastructure. A small fee helps to recover and distribute the costs of the cooperative network.

The DNB case shows an initiative that considers DP as an important component of data management, which integrates the DP workflows into the business routines of the library and the realignment of resources needed to scale up the processes. This case also shows how the legal mandate to collect and preserve online publications created some (positive) pressure to fully integrate the DP workflows into the business routines of the library and the realignment of resources needed to scale up the processes.

In times of decreasing budgets we see that DP and data management is gaining ground as one increasingly is convinced that investment in data management is making research more effective and efficient. Some cases of data fraud resulted in increased attention for data management. In addition the DNB is a clear case of public-private partnership for DP technological deployment.

2.2.5. The University of Bologna (UNIBO)

UNIBO includes a wide network of library and document structures and services to support teaching, research, professional and cultural activities of students, professors, technicians, graduates and scholars. UNIBO aims at providing to students and academic staff needed services that allow digital content sharing and guarantee integrity, secure storage, backing up and availability in the long term.

UNIBO's Digital Library includes DP in its mission statement. DP activities focus on collection of digital content produced by academic staff and students such as digital theses, course packages and research publications and data.

DP is being carried out both on an organizational and a technological level at the UNIBO; although UNIBO aims at securing long term DP, the DP policies are not mandatory for all typologies of documents and decision makers do not consider DP a strategic issue.

UNIBO was selected as a case of a hybrid library that mixes traditional print material such as books and magazines, with electronic based material. UNIBO is developing a digital library especially for multimedia dataset storage and maintenance, also the multimedia dataset applies a cost driven approach. Institutional repositories are funded on operating expenditure funds.

As a hybrid university library they see their challenge in the efficiency of their effort to achieve faster response to the customers, self-provisioning with high quality results and reduced operating costs. In addition UNIBO is challenged by its plan to archive electronic resources, as there are prominent legal issues related to it such as the intellectual property and authenticity of digital information.

In this regard, UNIBO is an exemplar case as its digital library is one of the most important initiatives in the field. UNIBO is an "early adopter" of the national legal deposit service for digital resources; and it is a partner of the Italian NBN initiative. Moreover, UNIBO is an example of creating and maintaining content according to standards that support preservation and long-term access, as a guiding principle.

2.2.6. Hochschulbibliothekszentrum (HBZ)

HBZ is the North Rhine-Westphalia Online Utility and Library Service Centre, which provides IT services to libraries in the German Federal State of North Rhine-Westphalia and a large part of

Rhineland-Palatinate. DP activities have been performed since 2002 as a by-product of other services, which includes the task to apply the legal deposit concept to the digital world enabled solutions with a strong focus on DP. As a public institution HBZ is largely financed by the German state of North Rhine-Westphalia. Its primary function is to provide the central catalogue for all academic libraries in the German state of North Rhine-Westphalia and a limited number of other services free of charge.

In HBZ, DP is key to strategic development of its services and follows a value driven approach. DP services are a part of the HBZ'S portfolio that grows in importance, within the context of providing a cost efficient service. Benefits of DP are recognized by key decision-makers. Although, HBZ does not have a specific cost model, or internal sources (different from main public budget) for DP activities, they reported that they are now well equipped to expand its DP activities.

HBZ is an exemplar case as HBZ has grown to be a key player for DP in servitude to public organizations, such as libraries based on strong planning and internal allocation of budgets, despite the lack of explicit funding for DP. In this regard HBZ is seen as an organisation that will be able to play an important role as a network partner in the future landscape of DP in Germany. As commented in the HBZ interview "Today's success in DP translates into future projects and tasks for HBZ."

2.2.7. Österreichische Nationalbibliothek (ONB) / National Library of Austria

ONB is the central academic library of the Republic of Austria. ONB deals increasingly with digitised material and digital publications. DP strategy of ONB is part of the ONB Vision 2025 "...equally important are our quickly growing digital holdings. For proper management and archiving we have set up a scalable digital long term preservation system." The Austrian media law obliges the ONB to preserve this material and to make it accessible and usable for the general public.

ONB runs a RAID storage system (NAS) and a repository by ExLibris but without preservation planning functionalities. ONB is currently working towards implementing an appropriate DP solution. ONB follows a value driven DP approach as laid out in the mission of the ONB as one of the most important cultural heritage organisations in Austria.

The ONB case shows DP as a key business process within the organisation. ONB has planned and developed in a systematic and gradual way over recent years. This process seems to be driven by the library's mission and the need for preserving a huge amount of digital material. ONB challenge is posed by the question of how to build efficient processes around the approach of making collections more and more digitally available.

2.2.8. Data Archiving & Networked Services (DANS)

DANS is a research data archive, whose mission it is to promote sustained access to research data. DANS is an initiative of the Netherlands Organisation of Scientific Research (NWO) and the Royal Netherlands Academy of Arts and Sciences (KNAW). The main drivers are to promote the curation of research data to enable re-use of data and to enable replication of research.

DP is an integral part of the "research data life cycle" and it is at the core of the mission of DANS. As reuse (secondary analysis) and research replication are the most important incentives for this, we rather speak of "data curation" and "data management". Different scenarios are possible: "Do it yourself deposit" by researchers / research groups; participation in research projects and provides services (data storage, data analysis, data visualisation, data citation, data documentation, etc.); consultancy with respect to data management, training and workshops and other outreach activities (also on policy level); as well as participation DP research e.g. by participating in APARSEN project.

DANS uses the national academic computing infrastructure SURF/SARA¹⁶. Specific services are based on top of this infrastructure.

¹⁶ <https://www.surfsara.nl/>

DANS believes that access to research data should be done in an easy and expedient way, securing high levels of effective reusability of digital information. DANS case shows the success in the implementation of the proper data management principles and techniques within DP management.

2.2.9. Koninklijke Bibliotheek (KB) – / The National Library of the Netherlands

The KB is responsible for legal deposit in the Netherlands. It aims to collect, catalogue and preserve all publications published in and related to the Netherlands. As the number of electronic publications is on the rise, the KB has embraced the important task of preserving and providing long-term access to electronic publications. For this purpose the KB runs e-Depot, which is a large digital archiving environment for long-term access to digital objects deposited today. It is the dedicated environment for the KB's electronic deposit collection, the Dutch web archive and digitised master images; which has been extended to publishers worldwide. The e-Depot is supported by R&D efforts geared towards maintaining the integrity of digital objects.

For the KB, its DP initiative is part of the organisation's mission and strategic plan, as its main mission is to select and keep digital material and preserve them for future use. There is a strategic plan in place and also additional strategic priorities include large scale digitisation and the international e-Depot. It was decided 2 years ago to develop e-Depot into a broader European "Portico like service."

The KB has strong procedures in place and uses set criteria for surveying the collection and required storage infrastructure, deciding how data is stored and the related costs. Knowing the criteria and costs makes it easier to calculate the cost of preservation; but not to calculate operational costs. The KB also performs value measurement. In relation to funding sources, DP activities are partially covered by the structural funding received by the library for its overall operations.

In this regard, they also suffer challenges from libraries with hybrid collections, still offsetting digital against print yet, and still cannot allocate money from physical to digital. The KB is a deposit library, that is what it is there to do and it will always do this.

KB believes that by integrating DP activities into existing functions and complementing this with engaging in continuous research, development and learning places the organisation in a positive place in relation to preparedness for sustainable digital preservation. The KB represents a case in which memory institutions have exceeded the learning curve and established themselves as a leader in DP projects. The knowledge and resources gained through engagement in R & D and collaborative project in turn supports their operational needs.

The KB case represents an interesting transition case from a hybrid to a digital library driven by sustainability reasons ("cannot do both in the long term"). Although this is something that all/most national libraries are experiencing, the KB is, however, a little ahead of the curve. In addition the KB's approach to international collaboration and service delivery differentiates this institution from the rest. This encompasses the international focus of e-Depot, the involvement in web archiving and membership of the International Internet Preservation Consortium (IIPC).

The KB case also illustrates the limits of current technological solutions in DP and the limitations to continuous technological development imposed by the small "market" size and financing capabilities. Finally this case contributes to this report with its interesting approach on storage tiers gauged to different user requirements and the collection properties.

2.2.10. National Library of Florence (BNCF)

BNCF is responsible to collect and preserve publications at regional level in Florence, from editorial products to PhD thesis. The DP project implemented by BNCF is called the "Digital Stacks" project. The name of the project recalls the stacks of the legal deposit libraries. As stated by a historical European project on digital preservation (NEDLIB- NETworked European Deposit Libraries): "For us, as memory organizations, this means we have to move from paper-based stacks to digital stacks". The main objective of the project (originally) was to set up a prototype of a long term digital preservation system for electronic documents published in Italy and made public via the digital

communication network, according to the legal deposit law. The Digital Stacks project was upgraded from a prototype to a full public service less than 1 year ago.

As a public body and given the role of the institution, BNCf follows a value driven approach. BNCf has implemented a cost model which is constantly under revision and monitoring. Moreover according to the cost driven set about and due to the public and private investments in the Digital Stacks project, the final cost of the DP service tends to be competitive.

The BNCf case shows a coordinated network of main initiatives and best practices available for high education, training and dissemination, based in the definition of an integrated set of rules and of a promising experience developed by regional repositories on digital preservation in Florence. In the future the BNCf's Digital Stacks initiative aims to be self-sustainable by extending the service of DP to other stakeholders like professionals associations, business organizations and private, cultural and research centres. In addition, BNCf case shows an initiative which currently is receiving political support, the number of objects collected is growing and there is a string demand of even new features and related services like NBN (National Bibliography Number associated to the objects deposited).

Looking at the exemplary cases we can see that there are commonalities among the among them in terms of management practice, technological approaches, and cross-boundaries and cross-fertilisation oriented cooperation efforts, which are presented in the next chapter sections.

2.3. MAIN DRIVERS FOR DP IMPLEMENTATION

As seen in the APARSEN survey¹⁷ on DP preparedness, the most significant drivers for DP were mentioned as

- Long term access & reusability of content
- Benefits for the organization
- Legal reasons/regulations

Studying carefully the cases represented in this report we see that generally the major driver for an organization to implement a systematic DP initiative is the fulfilment of a legal mandate, usually at national level. Of course access, reusability and benefits are also present here, but it is obvious that these are concerns in more specific cases, where other criteria is also applied: value for user, reputation, market penetration, need to comply to business change (from print to digital) etc.

What is really interesting and important is that almost all of the cases have reported that DP related activities have already been a part of their mission upon which strategic plans and priorities have been addressed.

TNA's major mission scope is to be «guardians of these records...», they «..collect and secure the future of the record, both digital and physical, to preserve it for generations to come, and to make it accessible and available...».

TNA has a detailed strategic plan in the centre of its business where digital (but also physical) preservation of the record is a key priority. Although as a governmental body its activities are mainly driven by the obligation to fulfil certain legal mandates and regulations, it is really interesting that to «provide a record that is more open, inclusive and used than ever before» is among TNA's 2011-2015 strategic priorities. This can be considered as a strong statement on re-usability issues and on DP value.

DP is currently a core element of the organization's strategy and core to the organization's mission. The overall digital strategy focusses on the core tasks of Collection, Preservation and Access. In compliance with this strategy and in order to support these tasks in conditions of heavily increased

¹⁷ http://aparsen.digitalpreservation.eu/pub/Main/ApanDeliverables/APARSEN-REP-D36_1-01-0_3.pdf

volumes of data a new DP infrastructure has been designed, the third generation of which will be set up and be fully operational in 2013/14.

Digital archiving, preservation as well as continuous access to the records are clearly stated in **ADS** mission and DP strategies. Focused on the re-usability of data created by archaeologists ADS key priority is to provide "...freely available, high quality and dependable digital resources" and advice to the research community in Archaeology by preserving for the long term.

ADS is acting as a «mandated» digital repository for archaeological data for collaborating organisations, namely museum services and local authorities across England.

Nevertheless the main driver for ADS archiving and preservation activities comes from the very nature of the archaeological research: excavation, as a destructive activity, results in an almost complete loss of the original resource and therefore preserve the outputs of archaeological excavations is of the greatest importance. With the advent of digital recording, "preservation by record" has moved to the digital media and it has become clear that compared to museums the preservation and reusability in digital format is easier and more economical in the long term.

Within this framework the «...key function of the organisation is accessibility of data in order to serve the user community by providing a vast range of data types free at point of use. As much of the data available was born digital it has always been felt that delivery online was the best method of ensuring accessibility and reuse...».

As the central archival library for Germany, **DNB** has a legal mandate to collect and preserve German language publications including online materials. This mandate is based on the German National Library Law and the Legal Deposit Regulation supplemented by the DNB Long-Term Preservation Policy¹⁸. As a result of this mandate and the fast growing numbers of electronic publications, DNB had to develop and operate a large scale DP plan through which eventually DP activities were successively implemented within DNB workflows.

DNB DP strategy seems to be restricted mainly by technical and administrative factors dealing with the library's capability to implement DP activities in an efficient way. Thus DNB is engaged in several national and international research activities and projects to promote progress in DP solutions and enhance its own capability by meeting technological challenges, shared use of resources/services etc.

ZBW, as a national library, has the mission to procure, index, archive and provide to the public, literature and subject specific information in economics and business studies, published or produced in Germany, as well as in other countries. These priorities are driven typically by a mandate for the long-term-accessibility of digital material but practically by the size of the collections and the need to provide high standard services to the users in the long term. These facts have led ZBW to claim that their DP activities follow a value driven approach.

Taking this into account, along with fast growth of the digital collections, the three libraries have recognised the responsibility of DP and, jointly with national and international partnerships have undertaken a pilot Digital Presentation project¹⁹ for building a trustworthy digital archive. This project strived for a joint technical implementation also looking for a cost-effective solution. The pilot finally resulted in a common DP system hosted centrally in Hannover at the TIB but co-operatively used by all members of the network.

UNIBO²⁰ includes DP in its mission statement. Related activities focus on content produced by academic staff and students (theses, course packages and research publications and data) as well as on the historical collections.

¹⁸ http://www.dnb.de/EN/Erwerbung/Pflichtablieferung/pflichtablieferung_node.html

¹⁹ <http://www.goportis.de/en/our-expertise/provision-of-scientific-content/digital-preservation/the-goportis-dp-project.html>

²⁰ <http://almadl.unibo.it/>

UNIBO's DP activities are driven mainly by the obligation to meet the national regulations on digitization and DP²¹. Additional reasons for implementing related activities include integrity and legal validity over time, long term availability and re-usability of the digital content.

ONB's mission states that "...a special challenge is presented by the gradual digitisation of the holdings". The DP strategy of ONB is part of the ONB Vision 2025²² "...equally important are our quickly growing digital holdings. For proper management and archiving we have set up a scalable digital long term preservation system". This has been translated as an explicit statement in the organisation's vision and strategic plan. ONB has identified intrinsic properties of their DP planning, based on scalable development and solidification to guarantee longevity. The Austrian Media Law obliges digital item creators to deposit their material to ONB. As a result, ONB deals increasingly with digitised material and digital publications. Consequently, ONB commits to accessibility and usability of the digital items.

DP supports **DANS'** strategic goals for reusability of the digital resources and the propelling of research through replication and it is a critical ingredient for the organisation's mission and strategic plan. For DANS the preservation activities are different parts of the cyclic lifetime of research data, as well as a prerequisite for data curation and data management.

DANS dedication to this approach is proven by its active involvement in research areas such as persistent identifiers to training sessions in the field of data management and acquisition of the Data Seal of Approval²³ that confirms DANS as a Trusted Digital repository on the findability and usability of data to license guidance.

While DP is not an explicit task of **HBZ**, it is an internal priority and it is seen as an important driver for the future development of HBZ services and the reinforcement of organization's position in the market.

In this direction, as a technological partner in the library sector, HBZ has been already engaged in a series of projects, tools and services (edoweb, DiPP, OPUS, DA NRW) with a strong DP aspect (digital libraries, publications in digital format, e-publishing, repositories and digital archiving).

KB as a pioneer in digital libraries field runs several DP related services, such as the national e-Depot service. This service is extended to an international e-Depot service on a voluntarily basis. The national activity is in cooperation with twelve international e-journal publishers.

DP is part of the mission statement of the KB Library («select and keep digital material and preserve for future uses»), in addition to other activities, such as digitization. There is a strategic plan in place with additional strategic priorities including large scale digitisation, and internationalization of the e-Depot service by developing a broader European 'portico like service'.

Through the current DP activities work flow KB has managed to merge printed and digital workflows and processes into a single one. It is clear that DP strategy serves perfectly the vision and needs of KB to become a full digital library in the near future with a more dominant role in the European landscape.

BNCF (National Library of Florence) is a public body and is entitled by national law to collect and preserve publications, from editorial products to PhD thesis produced by Research and Cultural heritage institutions. As expected the main body of this material is already in a digital format.

Apart from this legal mandate the main driver for the library to undertake DP initiatives is the need to convert to a full digital environment and so to enhance more effective procedures for content management and preservation.

²¹ http://www.rinascimento-digitale.it/conference2012/paper_ic_2012/guercio_paper.pdf

²² <http://www.onb.ac.at/about/21043.htm>

²³ https://assessment.datasealofapproval.org/assessment_47/seal/html/

BNCF works towards DP implementation participating in the Digital Stacks project²⁴ together with the National Library of Rome and the Marciana National Library of Venice.

The main objective is to set up a prototype of a long term DP system for electronic documents published in Italy and made public via the digital communication network, according to legal deposit law.

2.4. MAIN BENEFITS

When the discussion comes to DP various benefits are recognized by decision makers, staff and researchers, but not surprisingly, the interest usually is focused on costs. Although cost is a crucial factor of success and sustainability of DP activities and quite often savings or economies of scale are considered important benefits, especially from the funders point of view, a few can disagree that the major and most important benefits from DP cannot be restricted to cost only.

According to APARSEN D36.1: Business preparedness report main benefits perceived by research libraries active in DP, included

- a) Increased use of content as a result of better availability and fundability
- b) Improve organisation and staff reputation (visibility, citations, recognition of being at the forefront of DP, etc.)
- c) New research/business opportunities

Furthermore, referring to benefits for users as reason for which a user or an organization would like the digital content to be preserved, the reported arguments included:

- keep public heritage and realise historical value and related socio-economic benefits in culture, research and learning
- user needs/demands
- usefulness of digital content

In this report benefits related to the cost of DP have been referred to in the majority of the cases but benefits related to users and value and impact as well as organizations' reputation and position in a wider community are also a core element of the discussion.

In **TNA** it is generally perceived that as DP is core to the mission and strategy of the organisation; this proves how important DP is to the organisation's decision-makers, who obviously based this belief to the benefits of DP.

Nevertheless more concrete proof about the actual benefits from DP activities for the organization against business priorities can be found in the 2011-12 annual report²⁵:

- Given the organisation's corporate responsibility and funding restrictions it has been able to create new revenue sources and generate its own income and make value decisions in order to sustain DP activities within the organisation.
- Increased participation for communities and volunteers by:
 - developing and commencing implementation of a new user participation strategy for The National Archives, bringing in new volunteers, communities and partners;
 - sharing technologies and business processes with the whole archive sector
- Development of new collection strategy for government archives, as well as delivering new collections to the end users

²⁴ <http://www.rinascimento-digitale.it/projects-digitalstacks.phtml>

²⁵ <http://www.nationalarchives.gov.uk/documents/annualreport-11-12.pdf>

- Maintain high user satisfaction rates

The general statement (or feeling) that “the benefits of DP are recognised by funders” is also in the front line of **ADS** benefits. On the other hand ADS main benefit seems to come from the fulfilment of specific preservation requirements of the archaeological community (preservation by record) and the added value to the content that they offer as within this sector the principle of the value of heritage and that from derived information already exists.

This subject oriented “attitude” is resulting to benefits related to impact and economic value. As a matter of fact ADS’ approach follows both a cost and a value driven approach to its archiving and preservation activities. An attempt to provide a quantification picture of ‘value and impact’ is being carried out through IMPACT project²⁶, within which ADS aims to develop and refine a range of methods to measure the costs, benefits, economic impacts and value of the related activities in the organization.

Preliminary findings from a Value and Impact study carried out by Neil Beagrie (Charles Beagrie Ltd) and Prof John Houghton (CSES, Victoria University), indicate a benefit/cost ratio of net economic value to ADS for operational costs of £1 providing £3.50 in benefit. Over 30 years increase in returns on investment in data and related infrastructure arising from additional use facilitated by ADS perhaps £1 cost provides up to £8.30 return.

DNB plays a dominant and well defined by law role in DP in Germany. In this context DNB potential benefits are mainly related to administrative, operational and “procedural” issues on a wider national level. Again, in DNB the decision makers are aware of the benefits coming out of DP activities as the most evident benefit, from the organization perspective, is that the DNB is able to fulfil its legal mandate.

This major benefit according to DNB has multiple indirect benefits/positive effects for the DP activities and procedures of the organization such as

- development of staff skills and expertise in DP, valuable factors to ensure sustainable DP activities
- improvement of the organization and staff reputation in a national and international level
- improved quantitative and qualitative control and visibility of digital publications, which need to be archive
- establishment of an autonomous cost model for overiewing the accruing costs making the activities financially manageable.,

ZBW has already incorporated a solid DP system to the strategy of the institution as a result of the recognition of benefits of DP by the decision-makers. Implementing DP through a collaborative scheme (Goportis) and the use of a common information system, the organization considers economies of scale as a major benefit in various levels: shared costs, automated procedures, easier and faster implementation, risk management, planning etc.

Focus on in-house-expertise is also mentioned as an important benefit for the organization.

Evidently ZBW, along with its partners in Goportis network, has also benefited by the strengthening its role as a subject library in a wider perspective.

It is really interesting that although **UNIBO** has DP mentioned in its mission and it is considered as one of the first examples of a digital library in Italy, decision makers do not consider it as a strategic issue. A reason could be perhaps the fact that DP procedures are not mandatory to apply to all kinds of documents.

²⁶ <http://archaeologydataservice.ac.uk/research/impact>

Nevertheless UNIBO digital library hosts a considerable mass of digital content in different formats and they have already concluded that the main benefit from their DP activities is persistency and availability of digital contents over time. As a matter of fact they have established appropriate procedures of measuring primary related indicators such as authors using self-archiving facilities, usage of digital collections etc.

As a technology provider and a key player in the library community and market **HBZ** decision makers recognize the importance of incorporating DP activities in the organization activities. HBZ clearly believes that a proven record in this field will be translated to further future development of the organization's role and business as a network partner in the future landscape of DP in Germany.

Current benefits come from the active involvement of the organization in the development of four projects, tools and services:

- edoweb²⁷, a platform that enables the collection of digital publications, including websites, where DP is an explicit requirement.
- DiPP²⁸, an open access digital peer publishing platform for scientific journals run by HBZ in which considerations about DP strongly influence the design of the system
- OPUS²⁹, a document management system for grey literature, where again considerations about DP strongly influence the design of the system
- DA NRW³⁰ (Currently in development), a digital archive for cultural heritage institutions of North Rhine-Westphalia with a focus on DP

In regard to the awareness of the DP benefits, the **ONB** decision makers have understood well the merits of DP. ONB insists on the accessibility and the usability properties of digital content. Therewith ONB attracts an increasing number of online users over its portal. This can be further materialized in the firm belief that "Long-term according to our understanding really means for generations" and that the nature of this kind of business determines itself the need for long-term preservation.

As a bottom line, decision-makers recognition for DP is driven through ONB's mission.

DANS decision makers acknowledge the importance of DP. This is reflected in the DANS strategy for the period 2011-2015.³¹ According to the English text "DANS supports its services with research into sustained access to digital information. Central to sustained data storage is that the data should be traceable, accessible and usable at all times".

DANS' long time involvement in DP has as a result the high level expertise of the organization and the staff, thus helping to implement major strategic priorities such as becoming «a discipline independent data organization» and «an important building block in data provision in Europe».

Behind these priorities DANS, also look for benefits through collaboration in a national (NCCD³²) and international level (sister organizations) such as:

- succeed economies of scale sharing common infrastructures
- improved services: traceability of data both internationally and across disciplines, cohesion in data provision, access to data in foreign countries for Dutch researchers etc.

²⁷ <http://www.hbz-nrw.de/angebote/hosting/edoweb/> (in German)

²⁸ <http://www.hbz-nrw.de/recherche/dipp/> (in German)

²⁹ <http://www.hbz-nrw.de/angebote/hosting/opus/> (in German)

³⁰ <http://www.danrw.de>

³¹

http://www.dans.knaw.nl/sites/default/files/file/jaarverslagen%20en%20strategienota/Samenvatting%20strategienota_UK_D EE.pdf

³² Netherlands Coalition for Digital Preservation, <http://www.ncdd.nl>

The **KB** officers have acknowledged the need for proper digital content infrastructures as early as of 1990. The benefits of DP are also acknowledged, though not always in its full spectrum. For example it is easy to decide to collect e-books but it is not as such easy to realise the consequences on an operational level.

Starting early in DP helped KB and staff to make the transition from physical to digital easier as KB have decided that its future is digital³³. Strategic priorities have been defined with certain benefits expected and eventually came out of these:

- the only-digital choice increased the organizations and staff expertise in DP procedures and technologies
- mass increase of digitization efforts resulted to the development of new collections that reached a wider audience and user communities
- the huge needs and cost of infrastructure (storage solutions etc.) is considered to be balanced by the value for the users in the long term
- gained expertise is capitalized in national and international collaborations, projects and initiatives adding more value to the related activities/services

Finally in **BNFC** decision makers seem to recognize the benefits of the DP initiative the library is undertaking.

As Digital Stacks project produced concrete results and generated an operational system the Library became a key player in DP initiatives at a national level. The project enjoys the political support of the Ministry, something that contributes to the sustainability prospects of the project.

2.5. THE IMPLEMENTATION PROCESS

Implementation of DP varies significantly from case to case in terms of financing method (organizational budget, projects, revenue sources), methodological approach (policies vs. projects), scope (mandate vs. benefits/value driven), technological solutions (in-house vs. commercial solutions, autonomous vs. shared infrastructures), relevant expertise (use of own staff vs. collaborations/sharing resources).

All these approaches are present in the cases examined here though the dominant one seems to be that of sharing resources, costs and expertise through collaboration and/or networks.

TNA followed a step by step approach which after more than ten years of intensive development lead to the design and implementation of a 3rd generation DP infrastructure.

The DP department at TNA was set up in July 2001. Through a series of internal and collaborative projects the first digital archive system with the second generation system emerging in 2006-08. Today DP has become a core element of the organization's strategy and core to the organization's mission, a strategic decision was taken a few years ago for investment in a new DP infrastructure. As such DP activities are funded mainly from within the organisations core budget while about 25% of the budget comes from other sources: grants, licensing content from the collections etc.

The DP infrastructure includes the digital archive, an online presentation system and a suite of advance services and tools (PRONOM, DROID)³⁴ etc. The IT system is a mix of commercial (Safety Deposit Box, Tessella) and in-house solutions allowing the system to be fully integrated internally with own resources/experts.

³³ http://kb.nl/sites/default/files/docs/toekomst_kb_digitaal_web-en.pdf

³⁴ <http://www.nationalarchives.gov.uk/aboutapps/PRONOM/tools.htm>

The storage solution is supported by the large infrastructure of the external service provider. This removes the risk as the external provider takes care of the design of the system and provides component updates thus contributing to the sustainability of the technological solution.

TNA innovation in DP technologies was recognised in 2011 when they were awarded the Queen's Award for Enterprise and Innovation. The success was also recognised in receiving a public sector digital award for legislation.gov.uk. Further innovations include those in education, physical preservation of the collection in addition to saving energy.

DP activities in **ADS** are carried out following OAI methodology with a special focus on reusability of data created by archaeologists. This is achieved by providing all data online as delivery online is considered by the organization the best method of ensuring accessibility and reuse in the long term.

The DP system is currently fully operational. It consists of a variety of software tools and services providing services like secure back-ups, data refreshment and migration as needed and a fully documented system where records are maintained within a bespoke Collections Management System. The Collections Management System (CMS) developed as part of the ADS+ project is closely linked with other systems like ArchSearch and Fedora. File identification tools such as DROID and PRONOM are also built into the CMS.

Funding opportunities have allowed a major investment in upgrading storage capabilities. The system chosen allows the server to become part of the hosting organizations (Universities of York and Essex) storage cluster and also fits in with the UK Data Archive architecture.

The ADS works closely with a range of bodies in the UK: AHRC, NERC British Academy and the society of antiquaries, English Heritage and the Royal Commissions for the Ancient and Historic Monuments in both Wales and Scotland. Beyond these relationships ADS is increasingly acting as a digital repository for archaeological data for museum services and local authorities across England.

Furthermore ADS is actively involved in a number of national and international projects aiming to further research funding and expertise in the fields of data deposit and ingest automation (SWORD-ARM funded by JISC), value and impact, European infrastructures archaeologists (ARIADNE) and more.

ADS acquired the Data Seal of Approval (DSA) in 2010, which provides quality guidelines for repositories and assesses relationships with producers and consumers. Obtained through peer review the standard promotes good practice in data management and sharing.

ADS has also been accredited as a Data Archiving Centre (DAC) for the Marine Environmental Data and Information Network (MEDIN), becoming the first heritage organisation to be awarded this status. The international Standard, ISO 16363 on audit and certification of trustworthy digital repository is being considered in 2013/14.

An Access and Communications manager is appointed while publicity and dissemination of activities and results is materialized through newsletter, website and social media (twitter, facebook and blog posts) as well as conference papers, workshops and seminars.

Implementation of DP in **DNB** is a consequence of the amendment of the legal mandate in 2006. Funding was provided by the government, but also by re-allocation of internal budget. DP activities have value-driven approach

A "net-publication" workflow was generated and a wide-ranging IT-infrastructure had to be adjusted to support the fast growing masses of electronic publications.

DNB sought, and still seeks, for additional functional and expert knowledge in order to extend the existing DP activities in external and internal projects. In this way the evaluation and the development of new activities could be financed by projects while implementation of useful features is then financed by internal funds.

In terms of technological solutions DNB cooperates with IBM for underlying archive system (DIAS system) and Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen (GWDG) which is involved in the organizational model as a data centre and hosts the DIAS system.

Presentations at conferences and technical papers are widely used for the enhancement of the awareness of DNB's DP activities. Nestor, the German network of expertise in DP, is an active platform for these activities. Finally internal awareness and motivation is supported by training lessons and the development and presentation of relevant policies.

What is really interesting in the case of **ZBW** is the collaborative schema between the three German subject national libraries, Goportis, within which DP is performed under common infrastructure. The technological solution selected is the commercial ExLibris Rosetta. The system after a testing period it is fully operational and it is hosted centrally in Hannover at the TIB but co-operatively used.

This is considered as a cost-effective solution as all three libraries share the cost for the system and the central storage solution. It is also claimed to be a value driven DP approach due to network high quality standards. Network's staff feel pretty safe about the sustainability of the system in terms of operation, technologies applied and funding, based probably on the fact that funding comes from the core budgets of the Goportis participating organizations. Nevertheless although the implementation and operation of a DP system within a consortium offers great opportunities in the form of synergies shared, it also bears the great risk of 'varying realities': budgeting and staffing issues, possible implications of shared hardware, needs to support the preservation strategies of single institutions etc.

ZBW is an active member in Nestor project and the Open Planet Foundation and make use of conferences and meetings to communicate activities and expertise in the areas of DP cost, preservation policies and preservation planning with PDF documents.

DP in **UNIBO** is being implemented both on an organizational and a technological level. There have been efforts to develop institutional policies (mandate) to deposit digital publications and research products into the technological infrastructure of the digital library.

On a technological level the digital library has adopted mainly open source software looking for full interoperability across different systems (ePrints, Open Journal Systems – OJS) whilst they are experimenting with dataset curation by testing data migration procedures and the adoption of open formats. The development of a formal business case process is in progress especially for multimedia dataset storage and maintenance.

UNIBO tries to find solutions and expertise through national collaborations especially on national infrastructure such as Digital Stacks to secure long term DP and attribute digital persistent identifiers such as NBN to their content.

The **ONB** organizational structure is a layered one. In the forefront the Department of Digital Long Term Preservation collects digital assets, the Department for Research and Development is the middle layer, responsible for research monitoring, and the Department of Information Technology Services is the underlying layer that supports these units. In a more detailed fashion:

- The Department for Digital long-term Preservation deals in the first instance with digital long-term preservation of Austrian digital publications and websites and builds up the Web@rchive Austria.
- The Department for Research and Development participates in two European projects, SCAPE and APARSEN and deals with long-term preservation.
- The Department for Information Technology Services supports all endeavours within the ONB to implement DP technologies.

Through the Department for Research and Development ONB participates in several European projects in order to stay connected with the latest developments in the European DP landscape. ONB interacts also with other national bodies in the frame of the Association of Austria's Scientific Libraries.

According to the ONB storage is the most important cost and in response to that the organization shows a preference towards open formats, as much as standardised and interoperable (OAIS, RLG “trusted repositories”, Metadata, e.g. NISO z39.87, etc.). The search for the proper technological solution might turn out to be a very complex initiative. Through project liaison ONB gathers knowledge that internally sets stimulus to further improve its DP strategies and therefore prosper in the search for proper managerial approaches and technological solutions.

DANS considers cooperation as sine qua non, since it is attached to its operation model. It operates a wide range of national and international activities, either alone, or in collaboration with other organizations. There is a wide range of research areas that DANS covers, from persistent identifiers to training sessions in the field of data management and from approval sealing on the findability and usability of data to license guidance. According to a DANS officer “DP activities are by default implemented in cooperation with other parties. Cooperation is very important in order to involve all stakeholders in the activities.” In more detail:

- Management of Trusted Digital Repository (TDR) for deposit and retrieval of datasets. The interface of the TDR is the EASY system (<http://easy.dans.knaw.nl>)
- Implementing the “Front-office / back-office” model in the Netherlands. “Front-offices” are the university libraries that contact the research groups, while the “Back-offices” are the DANS services.
- Promoting, enhancing and implementing “Dataseal of Approval” to make data findable, citable, usable and durable (<http://www.datasealofapproval.org>)
- Participating in European Framework for audit and certification of digital repositories (<http://www.trusteddigitalrepository.eu/Site/Trusted%20Digital%20Repository.html>)
- Implementing and promoting data management plans (in cooperation with National Research Foundation NWO) making data management (including long term access) a point of interest in research projects (and assigning budget to it).
- Participating in Netherlands coalition for DP (see: <http://www.ncdd.nl>)
- Training and courses, e.g. in the field of data management data intelligence for Librarians (<http://dataintelligence.3tu.nl/en/home/>)
- Initiate and implement network in the field of sustainable archiving of research data: Research Data Netherlands (see e.g. : <http://www.datacite.org/node/83>)
- DP services: Persistent Identifier infrastructure (including resolver), data storage, supporting “preferred data formats”, data management (see EASY system above), research information system, see: <http://www.narcis.nl>), data citation services
- DANS has a research group for which DP is a research subject. See <http://www.dans.knaw.nl/content/e-researchgroep> (website in Dutch)
- Participating in projects to improve the research data infrastructure, such as CEDAR: <http://www.cedar-project.nl/> on open linked census data.
- Formulating, promoting and applying licenses to research data, promoting Open Access. The motto is “Open if possible, protected if necessary”.
- Participating in European research infrastructures, such as DARIAH, CLARIN, CESSDA, etc.
- Participating in European projects, such as APARSEN, Eudat, DASISH, Europeana Cloud, EHRI, CARARE, 4C, etc. See <http://www.dans.knaw.nl/content/projecten>.

DANS has a strong externalization plan through which it communicates its activities. This plan includes courses/workshops, publications and lectures, newsletters and journals, such as eDDATA, <http://www.edata.nl/>. The internal meetings can be considered as an informal dissemination instrument within the organisation itself.

HBZ started to be involved in DP back in 2002 with edoweb. The task to apply the legal deposit concept to the digital world enabled solutions with a strong focus on DP such as DiPP (started in

2004), where persistent identifiers were the main concern that sparked an interest in DP. Although HBZ is a public institutions and DP is not considered as an explicit activity of the organization, it uses DP integration cases to build up expertise and to develop services in that field for the library community and market.

HBZ employs various solutions and technologies for integrating DP to its tools and services with a tendency to implement open source solutions. Fedora is the backbone to DA NRW and will be employed for edoweb in the future. Web crawls for edoweb are made using httrack, with a likely change to heritrix in the future. OPUS makes use of LOCKSS. Commercial tools are employed as well. PDF/A- Migration both as a standalone service and in OPUS and edoweb use Callas PDF/A-Pilot, a commercial solution. HBZ follows the PLANETS approach of modular architecture, to make future software changes easier and engages in networks and projects dedicated to DP, such as Nestor.

At an organizational level DP activities in **KB** are implemented by two units in its organization: a) the Research and Innovation Department (research on operation needs, e-Depot), b) Cataloguing and Acquisitions Department which implements actual DP. These units initially followed the workflows of the printed material management procedures. However, as the hybrid library model of KB is changing towards an exclusive digital driven organisation, priorities and requirements related to DP need to be examined again from a different perspective.

KB uses e-Depot based on Digital Information Archiving System (DIAS). The system was developed with IBM back in 2003 based on OAIS standards. After almost ten years of successful operation KB is moving forward to a next generation system that it will be developed in-house as surveyed preservation systems were found inadequate for large scale and diverse material and they did not fit into the library's workflows. This ambitious effort incorporates the work of various experts (developers, IT architects, project manager, test coordinator, system analysts). The team soon realized how important it is to set the right user requirements and what it takes, in terms of effort and knowledge to build such a system.

In this process the cooperation model that had been followed in the case of e-Depot with IBM was rejected. The e-Depot case was a two ways collaborative project where KB contributed knowledge on DP and IBM expertise in workflow and storage systems. The strategic objective of this cooperation was to develop a system to be adopted by other users as well, so as to create a market for this and the technology provider and build a community to share experiences and create advantages for the library (ies). Unfortunately this didn't work out as such a market never emerged (the only other user of DIAS is DNB) and the provider lost interest and stopped developing the system. As a matter of fact this could be taken as a good argument why DP should not be considered only on a cost-driven basis.

KB DP activities are funded by the Netherlands Ministry of Culture. However development of the new e-Depot is seen as extension to these activities and it will be paid by project and structural funding (from ministry to conduct DP activities). Currently KB has a 500TB of data stored (about 300+ million files). An in-house data centre for primary storage and computing is used while off-site location is used for back-up.

Within this framework KB storage solution follows a Hierarchical Storage Management process with 4 storage tiers with different user requirements:

	Storage tier	Requirements
1	Gold	Very fast, very expensive Used: indexing, databases - SAN with HiPerf SAS disks
2	Silver	Fast, expensive Used: web hosting, processing - SAN with HiCap SAS disks
3	Steel	Slow (45 sec), sustainable Used: long-term archiving - Disk-based NAS with WORM
4	Bronze	Very slow (> 45 sec) Used: back-up & restore - LTO tape

While undertaking and implementing current DP activities, KB is strongly convinced that «...challenges posed by permanent access are quite daunting, both in a technical and in an organisational/financial sense and furthermore no single institution or even country is capable of solving the many inherent problems single handedly...»³⁵. In that sense KB is continuously sought for national and international cooperation through projects and initiatives³⁶.

Finally BNFC collects its digital assets in physical carriers, such as CD-ROMs. This increases the costs of cataloguing and physical media preservation.

BNFC uses the infrastructure of the Digital Stacks project which is based on open source software and tools. For data storage external data centres are used according to the requirements and guidelines of the project (data replication - different machines located in different sites)³⁷.

2.6. DP SUSTAINABILITY AND FUNDING SCHEMES

Adequate funding has been a major issue, usually a barrier, for DP within memory organizations. Although stakeholders and funders recognize the benefits for the organizations from preserving and re-using digital content in the long term, the business models usually follow a traditional cost accounting approach rather than a more value driven one.

The organization's budget is the main funding source for DP in the cases reported here. Nevertheless a mixed funding model is applied in most of the cases in a different degree per case, using also external income sources like project funding, charges from providing services, grants etc.

Business models are applied in only a few cases and not at all times in a formal way whilst cost models when used by few organizations are mainly either based on experience or focus on specific parts of the DP process. Common obstacles for applying a cost model are difficulties to fit in to the organization's structure and operational logic as well as high demands in effort and/or data to set them up.

Need for economies of scale are quite often mentioned but until now only a few cases have something concrete to report (Goportis network, Digital Stacks). However the need for collaboration is seen as the only or as a very useful way to implement DP in a successful and sustainable way in the long term is reported almost in every case.

TNA's DP activities are core to the strategy of the organisation and as such they are funded from within the organisations core budget. The main source of this budget is central government which for the 2013/14 period contributed about ¾ of the total organization budget. The rest of budget is covered mainly by earned income and secondary by external grants.

Earned income consists of non-exclusive licensing which allows images of documents in the collections to be reproduced by third parties. All earned income and external grants support the activities of DP. Overall, the DP budget is fixed.

The current economic climate had a significant impact on the organization as cuts of a total 25% of the budget have been applied over the last four years (2009-2013). This has resulted in a number of new solutions being applied, for example; web-based solutions such as WordPress, implementation of Agile project management and the use of social media.

TNA has no formal business case process specifically for DP activities as this is considered unnecessary since it is now core to the organisation's mission and strategic priorities. It is also considered that long term funding has been addressed with the recent investment in technologies

³⁵ Marcel Ras, The KB e-Depot: Building and Managing a Safe Place for e-Journals, *Liber Quarterly* 19 (1), April 2009, P44–53, <http://liber.library.uu.nl/index.php/lq/article/view/URN:NBN:NL:UI:10-1-113555>

³⁶ <http://kb.nl/en/research>

³⁷ <http://www.rinascimento-digitale.it/digitalstacks-results.phtml>

which provides security (sustainability) for the next 10 years. Within this sense the predominant approach is value driven upon specific selection criteria of the material to be preserved.

Among value judgements the organization consider value to the customer, the historical significance of the item, its intrinsic value, the public interest or popularity of the item as well as the risk of loss. This approach applies for digitized and born digital objects as well as to the third party service providers who assess the value of census records.

Cost elements tend to be considered at the end of the process in terms of prioritisation. As the technology has already been invested in, costs mainly consist of staff time, for example, effort in providing access. The value would then justify the cost which enables qualitative decisions to be made on investment where cash outlay is balanced against value.

TNA has developed internally a process based capacity model that will be extended to include human processes and other costs. Once the cost model has been finalised it can be used to make the case for future investment.

ADS funding comes from various sources that vary from year to year. Until recently (April 2013) it was receiving a core funding directly from the “Arts and Humanities Research Council” (AHRC) as its mandated repository. From now on AHRC core funding ceased in April 2013 and AHRC grant applicants should now include archiving costs within individual grant applications so that archiving costs are considered at the inception of the project (upfront) and not as an afterthought, which in is a new feature of the funding model allowing for sustainability (different and possibly better funding model).

Other funding sources include: JISC and the EC projects like SWORD-ARM, ARIDANE etc.³⁸, charging depositors of archives. Charges are based on management and administration, ingest, dissemination, storage and refreshment³⁹.

The cost driven approach applies to the charges for deposits where costs are assessed depending on the format and nature of the material. Charging policies apply to ensure cost recovery for the service offered.

Although there is not a proper cost model in place assessment and estimation of costs are determined through previous experience of the costs of the activities undertaken by the service (e.g. processing time) Storage charge and refreshment charge per MB are also considered, but as the size of deposits grow and storage costs drop this is often not strictly adhered to. On-going costs are accommodated through to the charging policy e.g. CAD migration once every 5 years.

The costs of deposit also cover on-going storage (server space) agreements with both the University of York and the UKDA. In addition each year a legacy fund is added to; this legacy fund is maintained in order to secure the archives smooth transition to a different home in the unlikely event that it is required.

ADS provides an exemplar case as the system is a sustainable one both for the creator of the data and for those who wish to re-use the data on the basis that it is a requirement of projects funding that the archaeological data produced by these projects is deposited with ADS.

DP in **DNB** is funded by the Institutional budget whilst project funding is also significant for R&D. Long term funding is secured as the organization has a legal mandate to preserve German language publications for the long term. DNB follows a value-driven approach as the underlying cost model is only a means to an end. Nevertheless DNB has developed a long time expertise in DP cost modelling through various national and international initiatives. A detailed cost model has been created and comparing the biggest cost drivers, the order is:

³⁸ <http://archaeologydataservice.ac.uk/research>

³⁹ <http://archaeologydataservice.ac.uk/advice/chargingPolicy>

1. Personnel costs
2. Costs for external Services (data centre)
3. Running of the archive system (DIAS-System)

In order to secure the current and future financing of all DP activities a mixed business model was developed. It was basically focused on establishing own DP capabilities, where their funding comes from the available public budget. To support this in a financially and professionally way all DP activities are offered as a service for third parties.

Since DP activities of DNB serve a legal requirement, the long term funding of a substantial share of the costs by the government seems very well secured and guaranteed. External funds nonetheless play an important role to supplement the running and further development of the DP activities. Third party funds are acquired for research projects. Institutions that use DNB's infrastructure are charged a fee for this service.

UNIBO's funding is provided by the central administration on operating expenditure funds. In the case of dataset curation the cost is covered directly by the researchers from their research funds.

The organization is developing a business process one especially for multimedia dataset storage and maintenance base on a cost driven approach.

There is not a formal cost model implemented. The main cost categories are technical staff and secure storage costs while key resources to DP implementation are metadata specialists, application & system administrators, security & database administrators. The major activities concern format assessment, data migration and data management system updating.

Finally there is no internal revenue source as there isn't also a concrete belief or answer regarding the sustainability of DP activities of the organization.

ZBW, as well as TIB and ZB MED, are funding Goportis activities from their institutional budget, in a permanent basis.. During the first three years of the project implementation, there is an extra funding from Schleswig-Holstein (Bundesland) for preservation activities (including preservation of printed material).

The network has adopted a value-driven approach based on the high quality standards applied in the procedures. The DP system is claimed to be sustainable by means of high quality standards followed, sufficient resources and well established processes.

As the network's pre-Pilot System is pretty new, no cost model has been designed as there's not enough historical data on detailed costs to validate any model. Nevertheless preliminary work towards that direction has already been undertaken on calculations and estimations about parts of the DP process like the development of Software necessary for the Ingest activities and personnel time for certain tasks.

There are also plans for providing DP services to third parties for additional income to support networks activities but currently institutional budgets cover the whole costs.

ONB has no formal business model for long term funding of DP. As an integral part of its mission DP is inherently funded by two sources: State funding and European projects. DP's highly attached nature to the mission of ONB leads to a value-driven approach to it, where value lies in the belief that the mission of ONB itself is a public well-doing service.

DANS is partly State and partly project-funded organization. Research activities are mainly funded by projects. Planning is based on a five year basis. The interviewee reckons that the data will be saved, regardless of the fate of DANS. The DANS Strategy 2011-2015 does contain information on funding models to be applied for a number of services. Major DP related services are considered as core services and are provided without any charges, while others are either paid services (storage for large volumes of data, backup services) or a cost-effective operating model is under development (PIs). In each case, it seems that DANS is seeking a proper balance between freely accessible and paid services.

It appears that this represents an informal model; value-driven for activities that are publicly open in contrast to cost-driven for activities that their results will be closed. The fees in paid services, though reasonable and affordable even in periods of economic shrinking, appear as an enforcement tool for the adoption and implementation of open policies. Sustainability of the DP services is guaranteed by the implementation of open standards and the constant updating of its strategic plan. The most important cost according to DANS officers is the cost of labour. Since there are a number of models that calculate for the DP costs, including labour costs, the DANS research team is examining its options through their participation in projects as APARSEN and 4C.

HBZ is a public institution and its main source of funding is the German state of North Rhine-Westphalia State. There is no specified budget for the organization's DP activities. Most of its services are free of charge to academic libraries and organizations in North Rhine-Westphalia. When these services are provided in non-academic libraries or organizations outside North Rhine-Westphalia, HBZ charges to cover the costs.

There is neither a formal business plan for sustainable DP, nor a cost model for the specific DP activities. Furthermore there is no formal statement or commitment on the sustainability of DP. It is just the belief that DP will be integral part of its mission in the future.

KB is mainly funded by the Government and more specific by the Ministry of Culture. The lump sum is provided to assist its mission to preserve the scientific and cultural production. Some newer activities, such as the new e-Depot service, will be project funded. Among its sources it will be financial contributions from using organizations, such as libraries. Yet, the international e-Depot service has not secured its funding.

A business case does exist and it is adjustable to the different requirements that the various formats have. However there is no cost model developed yet as it cannot link with organizational cost models. KB has surveyed a number of existing cost models concluding these models are seeing DP in isolation, outside of the organizational context.

There will be a cost-driven approach in KB DP activities in the future. One of the main concerns about costs is the costs of storage where KB has done a thorough work and specific needs & requirements have been addressed.

Although there is structural financing from ministry dedicated to DP, current funds are not sufficient to cover physical and DP. As long as the organization operates as a hybrid library current model cannot be considered as sustainable. This is actually the main reason why the organization has already addressed the strategic priority to go only digital. Value measurement is also being conducted on the different types of collections to determine level of storage space and technology.

The project of Digital Stacks, in which **BNFC** is implementing DP activities, is public funded. There are though references that there are also private funds. BNFC aims to open the service to a revenue model to fund its own costs but at the moment there is no business model in place.

BNCF adopts the value-driven approach and strongly believes that the main cost is the one of technology.

The core of the first version of the Digital Stacks platform was implemented by FRD. The system, on behalf of BNCF, is now operated by personnel of the library.

Sustainability is aimed through the extension of the service to other agencies, organizations and associations.

3. IMPLEMENTATION OF THE BTRF RECOMMENDATIONS IN THE EU CONTEXT

This section illustrates advances in preparedness for promoting and supporting economically-sustainable DP in Europe; although the research into case has not been exhaustive but selective, they represent the EU advances in preparedness. For this purpose we have linked exemplar cases of European organisations and EU agencies to each of the BTRF recommendations.

In this regard, through desk research also exemplary initiatives and EU agencies have been investigated and linked to the BTRF recommendations:

- The European Commission (EC): The Digital Agenda for Europe has set out the Commission's vision and ambitions for the information society, and defined the actions necessary to maximise the contribution of information and communication technologies to the wider Europe 2020 strategy for a smart, sustainable and inclusive economy. One of the key areas tackled by the Digital Agenda is the digitisation of our cultural heritage and the further online accessibility of cultural material and DP.
- JISC: JISC is a leading UK based institution undertaking research and development relating to the long-term preservation of digital materials. JISC has also worked collaboratively with national and international partners including the British Library, or the SURF Foundation (Netherlands). JISC is a founding member of the UK Web Archiving Consortium (UKWAC) and the Digital Preservation Coalition (DPC), and continues supporting and promoting the activities of both of these initiatives.

Description of the initiatives from selected EU exemplar cases, as well as from some European Agencies, as described in the tables have been described and related to the BTRF recommendations for the:

- National and international agencies
- Funders and sponsors of data creation
- The stakeholders organizations

3.1. THE NATIONAL AND INTERNATIONAL AGENCIES

Trusted international, national, and public institutions such as national libraries, national archives, large museums or research institutes create public-private partnerships or consortia across commercial and cultural organisations to align sponsored collaboration or cooperation initiatives policy and programmes that work towards the continuous improvement of DP. In addition regulatory agencies also are part of this stakeholder group, supporting the change of needed legislation or providing incentives for up-taking DP approaches.

For our investigation we have considered a public-private partnership, a partnership between a private-sector corporation and a public-sector body, through which the parties contribute different assets to a project and achieve complementary objectives; so it is a wider definition and not limited to a specific definition in law.

The following table presents a summary of organisation and/or agencies with initiatives that respond to the BTRF recommendations in each segment.

As National and International Agencies	TNA	DNB	DANS	KB	EC	JISC
R1. Create mechanisms for public-private partnerships	X	X	X	X		
R2. Convene expert communities to address the selection and preservation needs	X			X		
R3. Act expeditiously to reform national and international copyright legislation to address DP needs.					X	
R4. Create financial incentives to encourage private entities to preserve digital materials on the public behalf.					X	X

3.1.1. TNA

TNA has initiatives supporting the first two recommendations for this stakeholder group, as follows:

R1. Create mechanisms for public-private partnerships to align or reconcile benefits that accrue to commercial and cultural entities. These agencies can play a critical role in convening stakeholders, sponsoring cooperation and collaboration, and ensuring representation of all stakeholders.

The DP team carries out systematic research through projects and working groups in collaboration with other organisations both nationally and internationally as part of The National Archives' wider research agenda. The following initiatives represent how TNA through partnerships clearly state their strategic objectives and the benefits for the citizen to be achieved through, fully utilises the experience and expertise of the partners, and brings complementary contributions and maximises public access and takes into account long-term preservation and sustainability issues.

Currently TNA nurtures a mix of internal and external/private IT developments; TNA has partnered with Tessella to develop deep beneficial relationships over the long-term to lessen risk and develop an integrated DP approach based on in-house solutions and Safety Deposit Box from Tessella. A small, expert in-house team serves the needs of the organisation which are specific in relation to DP and archiving at scale with open and closed records. In terms of investment the off the shelf standardised storage solution is supported by the large infrastructure of the service provider. This removes the risk as the external provider takes care of the design of the system and provides component updates; thus ensuring sustainability of the technological solution.

Within the wider DP community, most visible are the applications developed by the organisation, namely, PRONOM and DROID.⁴⁰ DROID⁴⁰, an open source software tool, performs automated batch identification of file formats and can identify the precise format of all stored digital objects. It can link the identification to a central registry of technical information, the PRONOM technical registry. The National Archives wish to extend this suite of tools and broaden it to other formats. New and updated releases are regularly added to PRONOM, and DROID can be configured to automatically download these updates. DROID format coverage is increasing continuously through investment. Collaboration is sought with other members of the DP community both nationally and internationally in areas of research in DP, which includes file formats, forensic computing and bit-preservation.

In addition, TNA has performed a public-private partnership for the Find My Past Limited partnership for Outbound Passenger Lists. This partnership uses the Internet Associateship, to specify terms and conditions and made possible the digitation of the material, as the TNA received royalty payments calculated on individual transcript and image downloads. This partnership made possible free public access to Crown copyright archival materials at the TNA, and charged access to the lists available on the private partner Find My Past Limited's micro-site.

In 2012, the TNA in partnership with the Government Olympic Executive (GOE), the London 2012 organising committee, British Olympic Association and colleagues across government and the cultural and archives sectors delivered "The Olympic Record", which is a range of records on the modern Olympic and Paralympic Games and Cultural Olympiad, from 1896 to the present to reflect the sporting, social and cultural significance of London and the UK hosting the games and Cultural Olympiad. It has been made available online for the first time, providing access to this rich resource on sporting and cultural history⁴¹.

⁴⁰ <http://www.nationalarchives.gov.uk/information-management/our-services/dc-file-profiling-tool.html>

⁴¹ <http://www.nationalarchives.gov.uk/olympics/>

R2. Convene expert communities to address the selection and preservation needs of materials of particular interest to the public for which there is no stewardship (Web materials, digital orphans).

TNA works closely with several international bodies and the industry to bring together PRONOM and the Global Digital Format Registry Project, and support the requirements of a larger DP community, creating a Unified Digital Formats Registry (UDFR).

The National Archives is preserving this rich seam of information by archiving UK central government websites and adding them to the UK Government Web Archive, as websites provide a useful historical record of how our interactions with government are changing, and the context in which information is presented.

3.1.2. DNB

The DNB has initiatives support the first recommendations for this stakeholder group, illustrated as follows:

R1. Create mechanisms for public-private partnerships to align or reconcile benefits that accrue to commercial and cultural entities.

This case of public-private partnership of DNB, is an exemplary case of large-scale partnership involving public and private stakeholders to digitise, provide access to, and preserve massive amounts of digital materials ranging from documents (pdf, tiff, text) to complex objects such as videos. Also, the DNB is an exemplary case of a mechanism for developing a technological and organisational solution to ensure the long-term availability of electronic publications.

This partnership comprises The *German National Library* (DNB), the *Niedersächsische Staats- und Universitätsbibliothek Göttingen* (Göttingen State and University Library, SUB), *IBM Deutschland GmbH* (which has developed the underlying archive system -DIAS system) and the *Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen* (-GWDG-; which is active in the organizational model as a data centre and hosts the DIAS system and its main interest is focused on a simple commercial service B2B).

This partnership has allowed the development of new business processes (the so-called “net publication workflow”) that allowed for collection and processing of large volumes of digital publications and wide-ranging IT-infrastructure adjustments supported the fast growing masses of electronic publications.

This partnership started under the KOPAL project⁴². Massive amounts of digital materials ranging from documents (pdf, tiff, text) to complex objects such as videos were provided by DNB and SUB and deposited into the KOPAL system. Its technical operation is located at GWDG, with IBM providing customisation of the underlying commercial *DIAS-Core* software components and long-term support. DNB and SUB have implemented supplementary open-source software components on top of DIAS-Core, the *KOPAL Library for Retrieval and Ingest* (koLibRI).

3.1.3. DANS

DANS (NWO and the KNAW) as National and International Agencies have initiatives support the first recommendations for this stakeholder group, illustrated as follows:

R1. Create mechanisms for public-private partnerships to align or reconcile benefits that accrue to commercial and cultural entities.

DANS is a clear exemplary case of partnership that conveys stakeholders and collaboration. In DANS, DP activities are by default implemented in cooperation with other parties. Cooperation is very important in order to involve all stakeholders in the activities. Also, this cooperation approach reflects that DP activities are based on clear mission statements and most important on a national level partnership between the major players: big digital content providers & technology providers.

Main DP initiatives and activities are planned and implemented through partnerships and collaborations at a national level between big content providers (DANS, KB, universities etc.) and technology/related services providers (e.g. 3TU.Datacentrum), through the platform of Netherlands coalition for DP⁴³.

In the DANS strategy 2011-2015⁴⁴, major DP related services are considered as core services without any charges while others are either paid services (storage for large volumes of data, backup services) or a cost-effective operating model is under development (PIs)

⁴² <http://kopal.langzeitarchivierung.de/>

⁴³ <http://www.ncdd.nl>

⁴⁴ http://www.dans.knaw.nl/sites/default/files/file/jaarverslagen%20en%20strategienota/Samenvatting%20strategienota_UK_DEF.pdf

In addition the 3TU.Datacentrum is also a joint cooperation partnership of three technical university libraries: TU Delft Library, TU Eindhoven Information Expertise Centre and University of Twente Library & Archive. 3TU.Datacentrum currently accommodates approximately 5,300 data sets. It works in collaboration with national and international partners, including DataCite, DCC, NCDD, DANS, SURF.

3.1.4.

3.1.5. KB

The KB has initiatives support the first two recommendations for this stakeholder group, illustrated as follows:

R1. Create mechanisms for public-private partnerships to align or reconcile benefits that accrue to commercial and cultural entities.

The case of the KB is a clear case of an early adopter of DP and builds on an initial public-private partnership an innovative, sophisticated and integrated DP workflow.

The e-Depot system runs on the IBM (DIAS) system. The DIAS system based on OAIS standards. e-Depot now collects e-journals by voluntary deposit. It has agreements with 12 international e-journal publishers. A new in-house system for e-Depot is currently in development after surveying different preservation systems off the shelf; however none were usable for large scale and diverse material and they did not fit into library's workflows. The new system is an ambitious process.

When we worked with IBM their motivation was to establish a position for themselves in the DP market. IBM didn't know about DP but knew workflow and storage systems. They did not know the needs of a scientific or heritage institute. They learned this through working with KB and developed a system with us so that they could sell it on to others; but IBM lost interest when they couldn't sell to others and stopped developing the system.

With the new initiative, vendor lock in is avoid.

The KB has launched the Emulation Framework (EF), which is an ambitious process that offers an end-to-end, automated, emulation-based, DP strategy. The EF provides a convenient way to open old digital files and run the associated programs in their native computer environment. This allows the end user to experience the intended "look and feel" of the file or software program, independent from current state of the art computer systems. To achieve this, the EF combines existing emulation technology with a sophisticated workflow that automates steps of defining and configuring hardware and software dependencies. As a result, the end user doesn't need in-depth technical knowledge of the original computer system or software to be able to render the digital object.

During 2012, the KB developed a public-private partnership to accelerate the digitization process. The KB partnered with Google to digitize 160,000 books free from copyrights from the 18th and 19th century. Also, KB partnered with ProQuest to digitize early printed books (prior to 1700).

R2. Convene expert communities to address the selection and preservation needs of materials of particular interest to the public for which there is no stewardship (Web materials, digital orphans).

The KB addresses the selection and preservation needs web archiving and it is strongly focused on the long-term storage of archived websites. In 2007, the National Library of the Netherlands (the KB) started the web archiving project. Initially, the goal was to create a process and infrastructure for archiving a selection of Dutch websites and making them permanently accessible. This project has now been completed. Archiving the Dutch web now is part of the day to day activities at the KB. Archived web sites are stored in the KB e-Depot system. In the beginning of 2011, approximately 3000 sites were selected for harvesting aiming to have harvested about 10000 websites in 2013.

3.1.6. EC

EC has initiatives to support the third recommendation for this stakeholder group, illustrated as follows:

R3. Act expeditiously to reform national and international copyright legislation to address DP needs.

The EC has provided recommendations for legislation for the preservation of web content by mandated institutions using techniques for collecting material from the internet such as web harvesting. Access policy regarding the harvested material is also rather diverse, normally due to personal data and copyright protection concerns: many countries (e.g. Spain, France and the Czech Republic) report that access to harvested material is possible exclusively within library premises.

In addition the EC has provided recommendations for EU rules for orphan works (whose rights holders cannot be identified) need to be adopted as soon as possible. The Report defines eight fundamental conditions for any solution. In addition the EC submitted a Proposal for a Directive on certain permitted uses of orphan works In May 2011. The proposal is part of a broader IPR package proposed by the Commission.

The adoption of the proposal was preceded by a series of actions and consultations with stakeholders on the issue of orphan works.

In this regard the EC has co-funded projects such as ARROW ‘Accessible Registries of Rights Information and Orphan Works towards Europeana’ and its successor ARROW+, which brings together national libraries, publishers and collective management organisations with the aim of facilitating automated searches for rights and rights holders, rights clearance, and identification of orphan works at pan-European level.

The 2010 Communication “A Digital Agenda for Europe”²⁰ announced a Directive on orphan works to create a legal framework to facilitate the digitisation and dissemination of cultural works in Europe under its Key Action 1: “Simplify copyright clearance, management and cross-border licensing”.

R4. Act expeditiously to reform national and international copyright legislation to address DP needs.

The EC has provided recommendations for legislation for the preservation of web content by mandated institutions using techniques for collecting material from the internet such as web harvesting. Access policy regarding the harvested material is also rather diverse, normally due to personal data and copyright protection concerns: many countries (e.g. Spain, France and the Czech Republic) report that access to harvested material is possible exclusively within library premises.

3.1.7. JISC

The JISC has initiatives support the third recommendation for this stakeholder group, illustrated as follows:

R4. Act expeditiously to reform national and international copyright legislation to address DP needs.

JISC covers a range of legal issues, specifically on the intellectual property rights (IPR), which is a particularly relevant preservation issue. JISC performed “The international copyright law study” in 2008.

In addition, in Europe other figures such as alliances respond to the BTRF, for example the Open Content Alliance also respond to the R4 (Act expeditiously to reform national and international copyright legislation to address DP needs), as they highly influence open-standard digitisation projects for in copyright and out-of-copyright content, primarily books.

3.2. THE FUNDERS AND SPONSORS OF DATA CREATION

Private and Public agencies such as the European Commission, the JISC in UK, The Deutsche Forschungsgemeinschaft (German Research Foundation) or the National Archives (UK) are example of organisations in Europe that have undertaken, and currently promote, actions for economically-sustainable DP; which additionally can be associated to the BTRF recommendations for this stakeholder group. Among actions led by funders and sponsors of data creation for pursuing the creation of favourable conditions for DP we can find awareness raising, standardisation, capabilities build-up in skills, infrastructures, etc.

Notwithstanding, DP is being pushed forward DP practices, to be embedded at ***mission-critical and organisations` governance level, as preservation mandates***. Beyond, LIBER libraries (which represent the DP stakeholder organisations group) believe⁴⁵ that an organisational preservation mandate is a proper facilitator of DP; many of the stakeholders’ organisations are mainly publically funded organisations, a preservation mandate not only could ease adoption of a long term DP strategy but also generate collaboration among the different stakeholders.

3.2.1. TNA

The TNA has initiatives supporting all recommendations for this stakeholder group, illustrated as follows:

R1. Create preservation mandates when possible, ensuring that they adhere to community selection criteria, and specifying roles and responsibilities of individuals and organizations.

⁴⁵ APARSEN survey approaching the level of preparedness to ensure economically-sustainable digital preservation

As an emblematic institution, TNA role is to collect and secure the future of the record, both digital and physical, to preserve it for generations to come, and to make it accessible and available.

TNA supports the creation of DP mandates and guidance material to provide advice on specific topics related to the preservation and management of electronic records. They are written for anyone involved in the creation of electronic records which may need to be preserved over the long term, and those responsible for preservation⁴⁶.

Specifically, TNA has developed the “DP Policies: Guidance for archives⁴⁷”, which explains the key characteristics of a DP policy. The DP policy provides a mandate under which an archive can oversee these processes and manage DP. The guide discusses and provides guidance on why there is a need for a policy and how it supports DP. The intention is that organisations can use this guidance to improve the governance of DP through the development of a DP policy.

R2. Invest in building capacity throughout the system.

TNA works to build consensus and strengthen state stewardship capacity to set forth integrated approaches to seed stewardship capacity, develop sustainable funding models and support secure, sustainable, resilient and innovative services. TNA information to help archive services develop fundraising strategies, identify appropriate funding sources and explore a range of fundraising techniques⁴⁸.

R3. Provide leadership in training and education for 21st century preservation, including domain expertise and core competencies in STEM.

TNA works with other archives, government departments and places of deposit to advice on how to best handle documents and mitigate any risks to records collections. TNA provides training courses to Government departments and public records bodies, in records and information management, information assurance and the UK public records system; including training in how manage digital continuity in organizations, ensuring information remains usable over time and through change.

In addition, as developer the Archives for the 21st Century’s policies, TNA provide leadership and domain expertise for development training in this area.

R4. Fund the modelling and testing of domain-specific preservation strategies. This would entail developing domain-specific requirements for lifecycle management to create a timeline of predictable risks, strategies to meet them, and triggering mechanisms to address them.

TNA leads the Archives for the 21st Century, which is the government policy on archives that was published in November 2009. TNA develop strategies and influence policy and strategic relationships across government that aligns with Archives for the 21st Century priority areas (sustainability and funding, workforce, digital information, access and digitisation and partnership working and localism). The policy is rooted in evidence gathered from the archives, the culture sector, government and beyond. It is used to target our resource to develop policy and programmes that work towards the continuous improvement of the archive sector.

In addition TNA entails development of strategies for other domain specific areas, such as Business Archives (England and Wales) or Religious Archives.

3.2.2. JISC

JISC has initiatives supporting all recommendations for this stakeholder group, illustrated as follows:

R1. Create preservation mandates when possible, ensuring that they adhere to community selection criteria, and specifying roles and responsibilities of individuals and organizations.

JISC supports with the formulation of effective institutional or programme policy through relevant work in the Digital Preservation Policy Study (2008); which looks at different resources to suggest a framework for creating DP policies and recommends that preservation policy should be drawn up with reference to other institutional policy imperatives, e.g. research, teaching and learning, records management, staff development etc.

In this regard the study provides examples of the organisation’s mission statement, or mandate, and suggest to align the organisation’s own high level goals or mission statement with the role of digital content and preservation, and make it part of the core strengths of the organisation.

R2. Invest in building capacity throughout the system.

JISC invests in building capacity through an iteration of various JISC programs and partnership activities over the years, aiming to achieve among other objectives: a broader agreement on how to preserve a wide variety of digital objects, an increase in the support available for people wishing to preserve materials, an increase in institutional capacity to carry out (at least some) appropriate DP activities, the adoption of DP as an item on the strategic planning agendas of institutions and a more focused and effective funding of DP related work.

⁴⁶ <http://www.nationalarchives.gov.uk/information-management/projects-and-work/guidance.htm>

⁴⁷ <http://www.nationalarchives.gov.uk/documents/information-management/digital-preservation-policies-guidance-draft-v4.2.pdf>

⁴⁸ <http://www.nationalarchives.gov.uk/archives-sector/finding-funding.htm>

During last ten years the JISC has funded at least 58 projects five calls targeting different needs categories, which were from “Supporting Institutional Records Management” in 2003 to “Preservation Tools and Preservation of Complex Objects” in 2011.

JISC has worked in developing sustainable funding models supporting financial and strategic planning for preservation and information management. Relevant work comprises the work developed in the LIFE (2004 - 2010) and the Keeping Research Data Safe (2008 -2009) projects, as well as the support for the joined work developed in the Blue Ribbon Task Force for the Sustainability of Digital Preservation and Access (2007 - 2010).

R3. Provide leadership in training and education for 21st century preservation including domain expertise and core competencies in STEM.

JISC also provide leading training in preservation practices, including some work related with competences in Science, Technology, Engineering, and Mathematics (STEM) competencies. DP is widely viewed as an area where specialist knowledge is required.

JISC is committed to ensure that UK universities are able to call upon well-trained and knowledgeable practitioners, and JISC supports through projects the training for building capacity for this sector. In addition, JISC gathers examples of good practice, widely disseminated use-cases and agreed standards in to real-world examples of preservation practice, among other information, so it can be adopted by those teaching post-graduate curricula and professional training courses. Relevant work is comprised in training packages provided by the Digital Curation Centre and the Digital Preservation Coalition (both part of JISC).

R4. Fund the modelling and testing of domain-specific preservation strategies. This would entail developing domain-specific requirements for lifecycle management to create a timeline of predictable risks, strategies to meet them, and triggering mechanisms to address them.

JISC also leads domain specific preservation activities for domain specific strategies, for example in different business and religious archives.

3.2.3. EC

EC has initiatives supporting the 1st and 2nd recommendations for this stakeholder group, illustrated as follows:

R1. Create preservation mandates when possible, ensuring that they adhere to community selection criteria, and specifying roles and responsibilities of individuals and organizations.

The EC has provided a set of recommendations to establish national strategies for the long-term preservation of digital material, indicating the organisational approach, roles, responsibilities, resources, plans and objectives.

Additionally in the EC suggests, among other things, that in order to guarantee the long-term availability of digital collections, Europeana — in the medium term — could also play a role in their preservation. In addition, a system should be developed so that any cultural material that currently needs to be deposited in several countries is only deposited once.

R2. Invest in building capacity throughout the system.

The EC invests in building capacity through an iteration of various framework programs and partnership activities over the years. For example since the beginning of Framework Programme 7, more than EUR 60 million has been spent on 12 research projects to ensure future access to our digital information. During Framework Programme 6, seven projects had already paved the way. Two of them (PLANETS, PRESTOPRIME) have established organisations to provide advice and solutions within their communities:

(1) The Open Planets Foundation (OPF) provides its members with practical solutions and expertise in DP, building on the research and development outputs of the PLANETS project. The OPF’s mission is to ensure that its members around the world can meet their DP challenges with solutions that are widely adopted and actively practised by national heritage organisations and others.

(2) PrestoCentre is a membership-driven organisation that helps custodians and creators of audio-visual content to make the most of their digital archives through advocacy, information creation, knowledge leveraging, and practical workshops. PrestoCentre works with experts, advocates, businesses, public services, educational organisations and professional associations to enhance the audio-visual sector’s ability to provide long-term access to cultural heritage.

3.3. STAKEHOLDER ORGANIZATIONS

Within the context of APARSEN and investigation performed in D36.1, “Preparedness” has been defined as the fact of Libraries having incorporated DP practices for a) covering organisational long-term needs (i.e. access, innovation through content and data re-use), and b) having implemented

governance and financial approaches for ensuring that such DP practices are economically sustainable.

Stakeholders' organisations comprise universities, research institutions and private companies, among other, that provide explicit roles and responsibilities across organizational boundaries, develop preservation strategies that assign responsibilities for achieving outcomes and leverage resources; and create economies of scope and economies of scale by partnering with related organizations and industry professional associations.

LIBER members match with the stakeholders' organisations group profile. According to the preparedness survey performed to LIBER members in the APARSEN project, 70% of organisations have developed specific objectives pertaining DP, 59% have incorporated DP into their strategic plan and 55% have incorporated it into their mission and vision statements; of which 63%, 53% and 50% respectively have in place DP processes. This means that DP goals, strategy, scope, responsibility and accountability is formally understood, approved and documented within those organisations, describing the way the organisation will provide DP to its digitised and born digital collections.

Selected EU exemplar cases that respond the BTRF recommendations for this stakeholder groups are presented as follows.

3.3.1. ZBW

The ZBW has initiatives supporting the all recommendations for the stakeholder organisations group, illustrated as follows:

R1. Secure preservation of high-value institutional materials by making explicit roles and responsibilities across organizational boundaries.

The ZBW secures preservation of high value institutional materials. There is an institutional mandate to preserve the institutional collections for the long term and they are responsible for the Long Term Access of our Digital Collections. ZBW follows a DP value driven approach with high quality standards.

R2. Develop preservation strategies that assign responsibilities for achieving outcomes.

ZBW's preservation strategies, including responsibilities for achieving outcomes are defined under high quality standards. Their processes are developed in detail and can be adjusted to future needs easily. Therefore, the processes are sustainable and reusable.

R3. Leverage resources; create economies of scope and economies of scale by partnering with related organizations and industry professional associations.

ZBW is a Network of the three National Subject Libraries (TIB, ZB MED and ZBW) runs their digital archive as a consortium; and DP is approached via Goportis (common roof or consortium under which the three libraries - National Subject Libraries, the National Library of Science and Technology (TIB) and the National Library of Medicine (ZB MED)-implement DP).

ZWB network has successfully joined to benefit from economies of scale. In addition a partnership of this kind also provides significant opportunities for knowledge transfer, access to skills and expertise, and potential long-term cultural, scientific and economic benefits.

R4. Work with domain and preservation experts to ensure that personnel are fully equipped with the technical skills needed for selecting, curating, and preserving materials.

ZBW decided that build a trustworthy digital Archive as they have a mandate for the long-term-accessibility of their digital material and as a way to respond to the fast growth of their digital collections. ZBW works with domain and preservation experts.

R5. Fund internal preservation and access activities as core infrastructure.

In ZBW the DP initiatives are mainly funded from the Budget of the three libraries, permanently implemented in every year's budget. The ZWB funding is secured, the staff that is needed as well, therefore the workflows are secured also on the long run as are the documents.

3.3.2. DANS

The DANS has initiatives supporting the all recommendations for the stakeholder organisations group, illustrated as follows:

R1. Secure preservation of high-value institutional materials by making explicit roles and responsibilities across organizational boundaries.

Main mission of DANS is to provide sustainable access to research data and we are one of the few organisations in this field in the Netherlands. With other, related organisations (often active in other disciplines) we have close relationships and we work together. DP is integral part of “research data life cycle” and it is at the core of the mission of DANS. As reuse and research replication are the most important incentives for this, we rather speak of “data curation” and “data management”

R2. Develop preservation strategies that assign responsibilities for achieving outcomes.

DP is part of DAN’s strategic plans; the formal governance structure allows that responsibilities are correctly assigned. DP activities are based on clear mission statements.

R3. Leverage resources; create economies of scope and economies of scale by partnering with related organizations and industry professional associations.

DANS is an initiative of the Netherlands Organisation of Scientific Research (NWO) and the Royal Netherlands Academy of Arts and Sciences (KNAW). The main drivers to promote the curation of research data are to enable re-use of data and to enable replication of the research thus increase the research scale and leverage both, knowledgeable and economic resources.

In addition, the Main DP initiatives and activities are planned and implemented through partnerships and collaborations at a national level between big content providers (DANS, KB, universities etc.) and technology/related services providers (e.g. 3TU.Datacentrum), through the platform of Netherlands coalition for DP.

R3. Work with domain and preservation experts to ensure that personnel are fully equipped with the technical skills needed for selecting, curating, and preserving materials.

DANS uses the national academic computing infrastructure SURF/SARA . Specific services are based on top of this infrastructure. DANS has been working for the last 10 years with domain and preservation experts and its activities are based on a national level partnership between the major players: big digital content providers & technology providers..

5. Fund internal preservation and access activities as core infrastructure.

DANS funds the internal preservation and access of activities in recurrent 5 years plans. DANS internal sources of revenue come from umbrella organisations (NWO and KNAW). DP is also covered by projects. Also, DANS recently has started to use an “activity based costing model” to support funding strategies and sustainability.

4. ROADMAPING SUSTAINABLE DIGITAL PRESERVATION

4.1. RATIONALE

As mentioned in chapter 1, the objective of WP36 was to devise a methodology for implementing the recommendations of the Blue Ribbon Task Force (BRTF) on economically-sustainable DP. In this final chapter, we present a set of guidelines for managing research data in the long run, under economically sustainable conditions. The guidelines for setting up sustainable DP practices are based upon the following foundations:

1. The **analysis of the current landscape for DP practices** based on bibliographic research as well as participation of team members in leading conferences and specialised workshops.
2. The three conceptual “pillars” for the BRTF recommendations
 - a) **Definition of DP economic sustainability:** *“The set of business, social, technological, and policy mechanisms that encourage the gathering of important information assets into digital preservation systems, and support the indefinite persistence of digital preservation systems, enabling access to and use of the information assets into the long-term future”.*
 - b) **Requirements for economically sustainable DP:**
 - Recognition of the benefits of DP on the part of key decision-makers;
 - Incentives for decision-makers to act in the public interest;
 - A process for selecting digital materials for long-term retention;
 - Mechanisms to secure an on-going, efficient allocation of resources to DP activities;
 - Appropriate organization and governance of DP activities
 - c) **Critical Success Factors (CSF) for economically sustainable DP**
 - A compelling value proposition,
 - Clear incentives to act, and
 - Well –defined preservation roles and responsibilities.
3. The lessons learnt from the results of the **APARSEN survey on business preparedness** presented in D36.1 as well as from the **exemplar business cases** described and analysed in chapter 2 and 3 of this report.

4.2. THE CONTEXT FOR ECONOMICALLY SUSTAINABLE DP PRACTICES

4.2.1. The general landscape

A suitable way of describing the landscape for DP is through the wide array of Threats and Opportunities arising from the current political, economic, social and technological trends configuring the competitive context for deployment of sustainable DP practices:

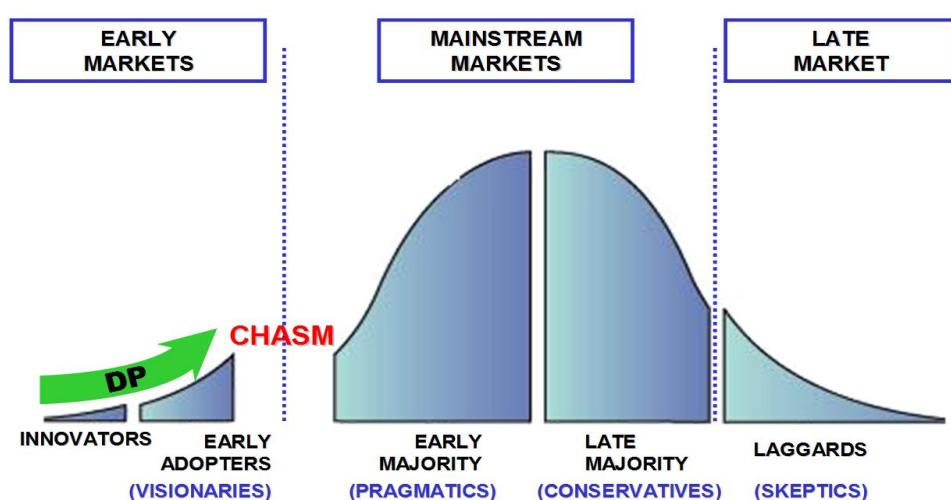
- **The consolidation of the Information Society:** Everything and Everyone will be digital in no time, and this seems to be a no-way-back journey. New patterns of knowledge acquisition, “digital native” population, Rising demand from industries/sectors/businesses of diverse nature such as: e-government, health systems or pharmaceuticals/ defence /nuclear.
- **Explosive growth of Digital content production.** Digital born content, Data deluge, prosumers digital production, social networks, etc.
- **The misconceptions around “digital lasts forever”:** such as the lack of recognition of an existing problem or the false security provided by the digitisation of analogic content.

- **Memory Institutions are becoming Digital organisations**, and assumed as such in their own mission statements (BL, KB, etc.).
- **The process of marketization of the public sector** is changing the rules for allocation of scarce resources. The Evidence-based policymaking practices demand measurability of results, impact assessments, ROI considerations, Requests for “More with Less” and consequent “innovation challenges”.
- **Compliance with institutional mandates are proving to be not enough anymore to keep the leading position as leading (not unique) providers of knowledge.** The monopolies in Public Sector Information supply are falling one after the other, and replaced by other sources such as general purpose search engines or specialised providers of information.
- **Being part of public sector is not a 100% guarantee for long term practices:** Increasing requirements for demonstrating Return on Investment (RO), increasing political demands for proper economic/employment/wealth creation. Austerity in Public expenditure, Cross sector/generalised Budget cuts/freezes/ “Fiscal Cliffs”, deaths/abrupt termination of entire lines of public sector driven activities and institutions.
- **Non-favourable regulatory frameworks.** By nature, DP is a long-term economic activity. Development of this kind of activities, require a favourable, robust and stable legal and institutional framework as basic conditions to survive. In the digital realm, this requirement is far from being a favourable factor for DP becoming a mainstream practice. Regulatory frameworks are constantly changing and will keep on changing: structural component for future DP management (e.g. what to preserve?)

4.2.2. Deployment of sustainable DP practices

The stage of development of DP as a practice aimed at solving societal challenges is still far from being properly consolidated, even in the most advanced economies of the world:

- DP deployment is still concentrated in the activities of a few pioneering institutions, to a great extent implemented through short term- tactical measures (projects, pilots,...), funded by fragile sources, and to a large extent still fragmented. In other words, the typical picture of an incipient –far from matureness activity. Out of more than half million Memory Institutions, just a minority of “**early adopters**” have implemented DP practices.
- In global terms, demand for both DP technological solutions and services have so far not generated enough traction to attract enough leading ICT industry players. Memory institutions have been forced to address the development of their own solutions



The APARSEN survey of LIBER libraries preparedness showed that there is still much work to be done to convince decision makers of the value of DP and to ensure that this practice is included in the mission and vision of organisations:

- Although accessibility came out as the strongest driver for investment in DP, there is no one value proposition on which proponents for investment DP can base their case.
- Currently, institutions are overly reliant on unsustainable funding sources, such as project funding, for their DP activities. Conversely, although institutions are open to the idea, there has been little activity in the area of the shared services to increase efficiency and generate potential revenue.
- Cost models are essential tools for helping to understand and calculate the cost of DP for institutions. The calculation of costs facilitates better planning for a sustainable future but current cost models are too complex and difficult to integrate with the existing financial systems of organisations.
- Storage is one of the main costs of DP and storage solutions should be determined by the nature of the collection and the level of access required.

Following discussion amongst DP stakeholders further specific issues have been uncovered/highlighted:

- Although some libraries have taken the decision to replace physical with digital in their collection strategy, this has not yet resulted in a reduction in the cost of physical storage.
- The cost of digital storage has not reduced as significantly as predicted. This is partly due to an explosion in the volume of the data that is now being created and collected. Changes in the types of digital formats collected have also necessitated investment in new infrastructures to cope with this variety of formats.
- It is important that DP is seen as integral to the core role of the institution and receives appropriate infrastructural funding. In many cases, libraries only receive one-off funding to develop their digital infrastructure.
- There is a need for both national legislation and institutional mandates for DP

This lack of matureness hampers a rapid attainment of the sustainability conditions identified by the BRTF. But the other side of the coin is that, precisely the need to find as soon as possible adequate solutions to fill these gaps, should act as a driver for including sustainability considerations in the formulation of the next generation of institutional DP policies.

In the path to becoming a mainstream practice to secure the memory of the Information Society, the economic sustainability of DP plays a critical role. In turn, as mentioned before, sustainability, and especially its DP cost component, depends to a large extent in the degree of matureness of DP as a mainstream practice. Only if the customer base for DP solutions and tools is properly enlarged, the entry barriers for competitive suppliers will be lowered and ultimately institutions implementing long term DP initiatives will benefit of competitive “unit” costs for their infrastructures and will be able to meet the critical success factors identified by BRTF as sustainability conditions.

4.3. APPROACH FOR MEETING DP SUSTAINABILITY REQUIREMENTS

The requirements for economically sustainable DP comprise, according to the BRTF, the following conditions, to be considered as **tangible measures of success** in the design and implementation of future DP policies:

- Recognition of the benefits of DP on the part of key decision-makers;
- Incentives for decision-makers to act in the public interest;
- A process for selecting digital materials for long-term retention;

- Mechanisms to secure an on-going, efficient allocation of resources⁴⁹ to DP activities;
- Appropriate organization and governance of DP activities

These requirements must be addressed in such a way that within a predefined period of time they are **collectively met as a whole**.

The underlying assumption in the BRTF definition of DP economic sustainability, i.e..... **“The set of business, social, technological, and policy mechanisms ...”** is that **DP is ultimately a managerial issue**. And as such, DP practitioners are able to resort to the theory and extensive experience accrued along the last 6 decades in modern Management science, bringing into DP management its models and other analytical tools. In this respect, strategic planning and management is the overarching approach to secure the long term competitive survival of activities and ultimately the organisations.

“Strategy is the art of planning a general course of action encompassing a long period of time to achieve a complicated goal, under conditions of uncertainty and scarcity of resources”

Factual proof of this understanding and consequent adoption of strategic planning and management practices in addressing DP initiatives, is already visible yet not until their last consequences, in the BRTF documents, as well as in the DP policy formulation of leading institutions such as the Library of Congress (USA), British Library and TNA (UK) or the KB (NL).

Adopting a **Strategic planning and management approach** such as the one presented in the following figure, **to pursue the ultimate objective of securing future access to preserved digital assets, under sustainability conditions, is an imperative** due to:

- The Multiplicity of strategic **Objectives** to be met simultaneously
- The diversity of **Players**, roles and tasks involved
- The **long term** (continuous) nature of DP business processes
- The multiplicity of **scarce resources** to be managed
- The **changing settings**, parameters and paradigms



⁴⁹ Resources comprise not only financial funding, but also the proper mix of trained staff, technical infrastructures, techno tools and the organisational support

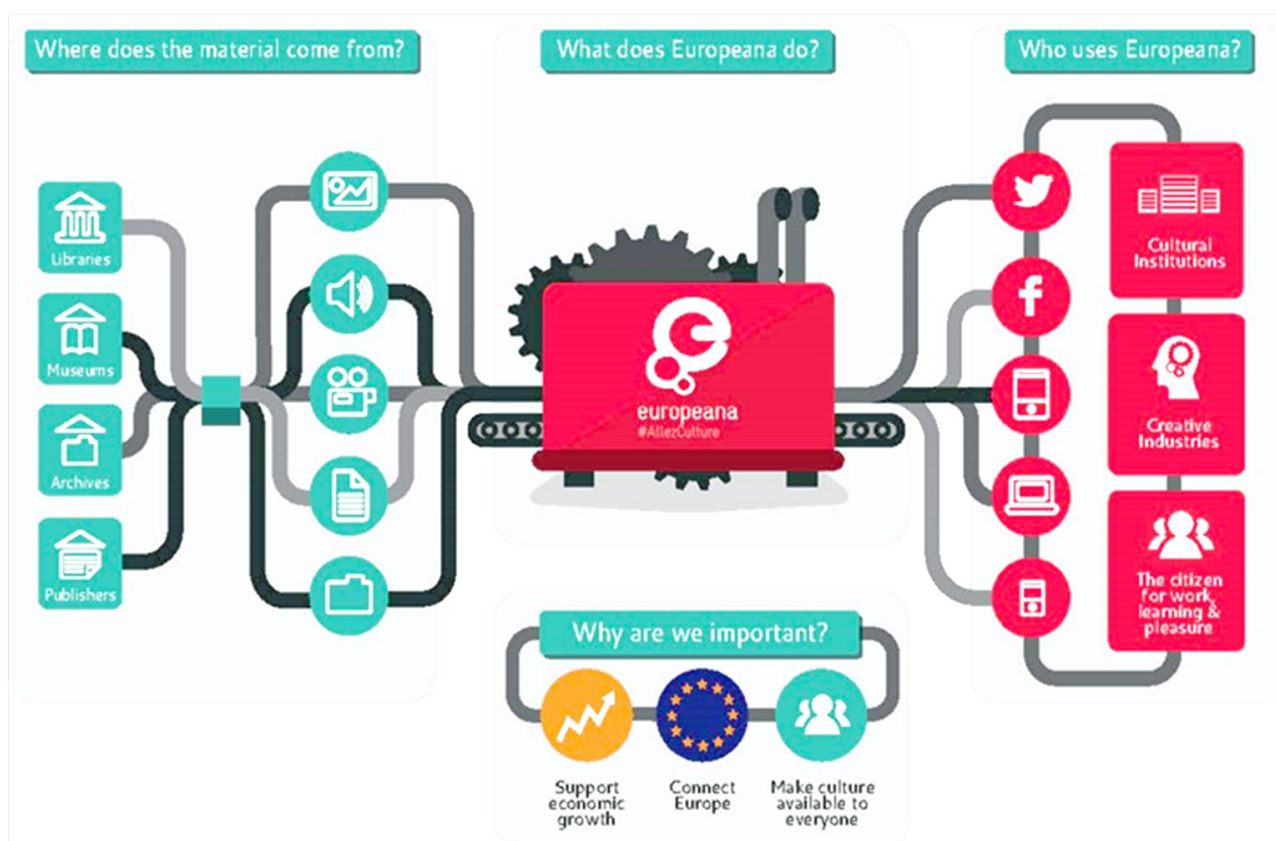
As defined by the BTRF, DP is an economic activity firmly rooted in:

- A compelling value proposition,
- Clear incentives to act, and
- Well –defined preservation roles and responsibilities.

In terms of management practice, these requisites are deemed as Critical Success Factors (CSF) for a strategic planning exercise aimed at securing long term objectives such as:

- Securing the leadership of a Memory Institution as provider of digital content in the long run
- Structuring the value chain of a certain flow of data-e.g. deriving from a specific field of experimental science, from the lab in the past to the lab in the future

The need of including this CSF in successful DP strategies is also seen in the rising concerns about properly depicting the value proposition of DP activities is reflected in a recent document by Europeana⁵⁰:



⁵⁰ Europeana - the case for funding, 2013

Furthermore, value proposition is in the centre of current discussions within the R&D communities (a key stakeholder for APARSEN):

....."improving the value proposition for research data is important. That way data will be seen as an asset, as the crown jewels of an institution. However to store these crown jewels the pricing does need to be easier and simpler for the users"

John Davidson, DCC. Conclusions from
**Knowledge Exchange workshop Price of keeping
knowledge: financial streams for digital
preservation, Amsterdam, 17 January 2013**

a) Developing a compelling value proposition

The Value Proposition is a fundamental tool in convincing decision makers, both friendly to DP but, more importantly, those sceptical or directly non-friendly. A compelling value proposition can help in getting DP into the priority list of wider funding agencies, but also inside Memory Institutions, helping answering questions such as *...if all our activities are mandate driven, how do we prioritize scarce resources?*

In modern management terms, the Value Proposition is the backbone of Business Models, as the latter can be seen as an expression on how a Value Proposition is instantiated. Last but not least, the formulation of the Value Proposition for DP practice helps in making the case for future usage of preserved assets, i.e. forecasting future demand. In this sense, the conclusion of the BRTF point to the idea that if there is no demand, in the long run there will be no reasons for having a supply.

A compelling Value Proposition briefly presents:

1. In which way our preserved assets become **relevant for our targeted demand segments**, in terms of:
 - a. Main and secondary **Benefits** for our targeted demand, and for other stakeholders. Displaying Benefits for users and providers (win-win scenarios);
 - b. the actual **short term and long term Impacts** derived from the **usage** of our services.
2. The **differential aspects of our preserved assets offering**. Answering the questions of Why our targeted customers should resort to us instead of other competitive offerings
3. The relevant metrics providing a **measurable image of the value of our services, incorporating socioeconomic results (cost savings, innovation, wealth creation, employment,.....)**.

An interesting example of impact's assessment was carried out by the British Library, to measure the Library's direct and indirect value to the UK economy. The Contingent Valuation methodology, a *technique supported by the Nobel Prize winning economists Kenneth Arrow and Robert Solow*, was used to produce a quantitative evaluation of the total benefit to the nation of publicly funded institutions. According to the results of the study ⁵¹, **each year the BL generates value around 4.4 times the level of its public funding and, if the British Library did not exist, the UK would lose £280m of economic value per annum.**

b) Generating clear incentives to act

⁵¹ Measuring our Value. British Library, 2004

Bearing in mind the lessons learnt, there are changes to be made in certain fundamental aspects of current practices of those institutions in charge of securing future access to preserved digital assets.

To ensure long term sustainability within an increasingly competitive environment, there are basic changes in the overall design and implementation of the drivers and incentives, which have to be built into the DP policy design and implementation:

- From a focus in the compliance of mandates towards the satisfaction of changing needs of users of preserved information assets
- From a situation of scarcely known users of our collections towards a well identified profile of our targeted consumers and their preferences, habits and critical needs and expectations
- From a Preserving approach (supply side/compliance of mandates) towards securing a user-friendly access and cost-effective usage of valuable information assets
- From a “monopolies” positioning and consequent behaviours towards becoming competitive services providers of a well-structured Demand, the ultimate reason of our DP efforts, according to BRTF.

These changes in the conditions to incentivize stronger practices for securing future access have already been (partially) recognized and promoted, at least nominally, by high political authorities. For example, the set of priority actions included in the conclusions of the Council of the European Union meeting⁵² on digitization and online accessibility of cultural material and DP.

Priority action in Digital Preservation

The following actions are among priority ones in DP:

- Promoting and reinforcing strategies for long-term DP, accompanied by implementation plans
- Exchanging information with each other on strategies and action plans for long-term DP
- Ensuring the necessary legal framework conditions for long-term DP in terms of multiple copying and migration of digital cultural material by public institutions for preservation purposes, in full respect of European Union and international legislation on intellectual property rights
- Making the necessary legal arrangements for the deposit of material created in digital format in order to guarantee its long term preservation
- Taking into account developments in other Member States, when establishing or updating policies and procedures for the deposit of material originally created in digital format, in order to prevent a wide variation in depositing arrangements.
- Ensuring that sufficient descriptive and technical metadata and permanent identifiers are produced as an integral part of digitising processes or when creating born-digital material

This suggested table of activities and objectives is an indicative roadmap for work to be done by Member States along years 2012 to 2015. The conclusions of this top political level group, also indicated the need for a”*Coordinated action at Union level to create synergies between national efforts and ensure that online accessibility of Europe’s cultural heritage reaches a critical mass*”. This is, in political terms, the same requirement about Mainstream maturity expressed in management terms in section 4.2.2.

c) Well-defined preservation roles and responsibilities

This requirement refers to the need of having a clear vision of the entire Value chain for digital assets and a common understanding of the entire workflow to secure future access among the stakeholders

⁵² Brussels, 10 and 11 May 2012

and players involved in a determined DP practice. Within this context, the role of the *Collection Curator at the core of Permanent Access to Digital Assets ecosystem is the Key* to secure:

- Closeness to future users of preserved assets, anticipating and satisfying demands for usage
- DP attractiveness among Data creators, by monitoring they are properly incentivised to share data/information/value with future users
- Coordination and interaction with funding agencies, sponsors and policy makers in general: Facilitate the creation and enforcement of the best possible context conditions (legal framework, adequate co-funding, etc.). In return, providing solutions for market failures, generating new opportunities based on preserved assets and, remain accountable.
- Awareness raising and knowledge dissemination (multiplier effect)
- Coordination in pushing Harmonisation of legal framework, critical mass, de-fragmentation, etc.

Complying with these conditions requires the establishment and continuous functioning of multidisciplinary teams, involving skills profiles which are not only technical, as there is plenty of human and organisational interaction inside and outside the concerned institution(s), through cooperation strategies, selling, convincing non-technical audiences, etc. Not necessarily all Memory Institutions staff is readily available so the need for external support is a must in many cases.

4.4. GUIDELINES FOR ECONOMICALLY SUSTAINABLE DP IMPLEMENTATION

4.4.1. DP Policy building blocks

Setting up the Value Proposition

As explained, the Value Proposition of a DP practice should be at the heart of the design and implementation if sustainability is a major goal to pursue.

There are 3 basic strategies that enable the implementation of the value proposition into the Vision, the Mission and the actual delivery of Value to the beneficiaries i.e. the users of preserved digital assets:

- **Segmentation** strategy enables the “**relevant for our targeted customers**” condition
 - **Positioning** deals with the creation of the **differencing factor**
 - **Strategic fit** secures the **measurability of the impacts**,
- a) **The Segmentation strategy** defines the structure of the potential demand we will be providing services to and in components of such demand we will focus our efforts (target segments).
- The Segmentation strategy is a reaction to the evaluation of the communities or even market segments/industries/sector who would/should become users of a certain type of preserved digital assets. This strategy is usually the first one to be addressed and decided in the design phase, as the systematic satisfaction of the needs and expectations of the users will become the cornerstone for design and implementing of the other components of the DP policy.
- b) **The Positioning strategy** defines how our organisation wants to be recognised/identified by players belonging to:
- Our targeted demand segments
 - Our competitors
 - Our Allies (suppliers, dissemination channels, funders, etc.)
 - Other key stakeholders, such as: Domain Institutions or concerned Government Ministers/Agencies/Departments.

Positioning is an internal decision made by the top management within the context of defining the policy. Its practical deployment is through a thorough and long term Communication policy which includes actions aimed inbound the organisation (internal marketing) as well as outbound, aimed towards the critical stakeholders segments (targeted audiences). All in all, focusing the efforts in creating, building up and consolidating a predefined Image (the widest, the first one, the most specialised, etc.)

- c) **The Strategic fit** is related to the adequate mix of resources to be deployed; especially in terms of products/services to be offered, under which terms/conditions, customer relation staff, infrastructure, etc. to fulfil the needs and expectations of our targeted demand in a competitive and economically sustainable way. This is by far the most extensive of the three strategies, in terms of multiplicity of factors included into its design, deployment and continuous operation in the long run.

The need to formalise and document the Strategy

Long Term Sustainability can be secured only if DP is fully integrated within the whole business process of the Institution, under the umbrella of a Business Plan. This brief but comprehensive strategy document provides evidence of commitment and a common ground for understanding and the starting point for building up trust, both internally and among third parties cooperating to deploy the strategy.

The operational versions of these documents, are instrumental in setting up adequate levels of expectation among the concerned parties and drive accountability with top management champions, sponsors/funding agencies and support providers (allies, suppliers,...).

Basic principles and behaviour patterns

- a) Robustness of the strategy, based upon:

- A conceptual and operational design customised to the organizational culture of the institution(s) willing to deploy/cooperate in sustainable DP practices
- A balance in taking into account stakeholders needs and expectations (searching for win-win situations)
- The simplicity of solutions and procedures implementing the policy
- Pragmatism (not reinventing the wheel, adopting already existing tools and components,...)
- Flexibility of scope and action to address the continuous changes in legislation, information usage patterns, and technological progress

- b) Co-operation as the fundamental style of management:

- Internal co-operation with: IT, Legal, Finances, Compliance, “Customer relationship” departments, backed by a “champion” from the top management of the Institution
- External co-operation: Other Memory Institutions, Suppliers. Examples of inter-institutional cooperation: Images for the Future (NL), Hathitrust, Metaarchive, JISC
- In practical terms a cross functional team should be set up to generate a strong team spirit and a multiplicity of “evangelisers” within the organisation, they will be the ambassadors and game-changer to get the entire institution to create a positive ground for developing long term sustainability, and not just of the DP practice.

- c) Proper flow of information, geared through a *Communication Plan for the DP policy formulation and deployment, documenting and tracking*:

- What to communicate to Whom: Communication axes and key (simple, clear, compelling) messages
- What they need to know about the incarnation of DP into the institution’s activities
- What they need to do to support the long term sustainability of this activity

- Why they should care, what is at stake
- When they need to do something, in terms of clear timelines
- How will communication occur: media, channels, timing, mapping of media with targeted, audiences, etc.
- How success of communication will be tracked and measured: success criteria, KPI, metrics, planning of measurements.
- Secure the feedback loop to keep the policy up-to -date
- Identify and track success metrics on top of performance metrics
- Establish KPI from different perspectives, feeding the creation the vision on how success can be better described
- Report and propose changes

4.4.2. Deployment in practical terms

Within the framework established in the previous sections, we present five condensed illustrative patterns of actions for libraries to take to ensure sustainable DP.

Advocate

DP must be viewed as an integral part of the core mission of libraries and funding for DP should primarily come from infrastructural funding. At national level libraries should advocate for digital legal deposit legislation, at institution level they should call for institutional mandates. Incentives, such as for transparency of research results, in the case of universities, should be clearly articulated.

Integrate

The integration of DP into library workflows is the most efficient long term solution to its implementation. This should be reflected in collections development policies (digital replacing physical) and also in the retraining of staff to adapt to the digital environment. Integration also means that cost models must also be developed in such a way that they can be integrated into the financial system of the organisation.

Share

Libraries need not reinvent the wheel when it comes to developing their own DP infrastructure. They should share best practice and experiences. They should also begin to gather and share 'stories' which have been used to make the case for investment in DP.

Innovate

Relatively speaking, DP as a discipline is still in its infancy. Engaging in international projects to develop best practice in DP not only helps develop the skills of staff engaged in DP, it is also a means of promoting libraries as leaders in the field. Investment in innovation can also lead to the development of add on tools and shared services as new sources of revenue.

Trust

Storage is clearly a major cost element in digital preservation. Not all institutions will require their own storage infrastructure. These institutions should consider collaborating with or establishing a national or shared infrastructure for storage. As trust is a major consideration in outsourcing such a service, institutions might start with utilising the service as a back-up and gradually moving towards a full storage solution once a relationship of trust and collaboration has been established.

5. ANNEXES

5.1. ANNEX I: METHODOLOGY

The methodology for WP36, specifically for D36.2 Exemplary Business comprises the following operational approach and techniques:

- **Desk Research** technique was used for gathering data and information required for feeding and supporting the analysis, synthesis, and modelling of findings and preliminary conclusions.

The general procedure for combining data and information into useful inputs for the study has been the following. As a first stage, we performed an in-depth analysis of the BRTF reports (interim and final) and drafted preliminary statements on the diverse issues under investigation based on the experience of expert partners in DP and the team's previous knowledge on DP as well as from literature review and information from conferences, workshops and events. These starting points were enhanced and illustrated with insights and real-world data derived from in-depth qualitative interviews with DP experts performed by senior team members. When suitable and feasible, quantitative evidence has been provided from the APARSEN survey for DP preparedness, as well as other surveys by industry associations involving their own membership.

Desk Research, i.e. the collection and review of a variety of literature sources such as theoretical works and scientific research papers, R&D roadmaps and prospective studies, market research reports and case studies, and statistics, directories and DP stakeholders websites. The review of these sources established the framework not only for linking collected information to the BRTF recommendations but also for the roadmapping process.

- **Fieldwork tasks** included attending several DP events, performing semi-structured in-depth interviews with exemplary stakeholders which either are leading DP practitioners, have a pioneer experience or a case to be shown, in order to show compliance and advances towards the BRTF recommendations.

Within this context the primary data gathering (i.e. from original sources) included the participation of senior team members in DP events, such as the MER Conference in Managing Electronic Records 2013 in Chicago, the 2013 LIBER conference in Munich, the DP Advanced Practitioners Course in Glasgow (July 16th 2013) and the DP Summer School organised by Universidad de Zaragoza (23 and 24 July 2013). These events allowed the team to gather insights directly from state-of-the-art presentations and debates among top level researchers, practitioners, and domain experts as well as to identify and contact key interviewees in a "friendly" environment, thus fostering discussion engagements and facilitating further contacts.

Qualitative face-to-face and/or telephone-based in-depth interviews were performed to support and extend information on selected exemplary cases, or to gather additional information for either roadmapping or linking initiatives to the BRTF recommendations. A set of guidelines were designed (included in Annex II) for getting needed information. The interviewees were DP managers from selected exemplary institutions/organisations identified during desk research.

In addition, results from the APARSEN survey on DP preparedness (APARSEN D36.1) were also integrated with D36.2 content, in order to enrich and provide real insights to the value proposition and roadmapping.

5.2. ANNEX II: LINE OF DISCUSSION FOR IN-DEPTH INTERVIEWS



WP36 Interview: Question outline

Objective: To provide a success story of how and why DP has been implemented looking at their previous and current situation including a review of funding for DP, based on innovative initiatives, such as generating revenues from services.

DP IN YOUR ORGANISATION

1. Could you please provide a short description of the DP activities (business case) in your organisation?
 - a. Please, comment if the DP initiative is part of the organisation's mission and strategic plan
2. What were the needs for implementing DP in your organisation? Describe any scenarios.
3. Describe **how** and why you implemented DP activities?

FUNDING DP IN YOUR ORGANISATION

4. How are DP activities funded within your organisation – what are the funding sources?
5. Do you have a formal business case process to ensure long term funding of DP activities?
6. Does your DP activity have a Cost driven or Value driven approach?
7. Have you implemented a cost model?
 - a. Please comment on the mechanisms to secure on-going, efficient allocation of resources to digital preservation activities. What are the most important costs inherent in our business model? Which key resources and activities are the most expensive?
8. Do you have any internal sources of revenue to support DP activities on an on-going basis?
9. In terms of technological solutions, can you tell us who have been your main technological (IBM, Hitachi, Amazon, ..?) and DP solution/integration (Supplier of preservation solution, integrators?) partners?
 - o Please comment on the main interests of your technological and integration partners to participate in the DP project
10. How do you ensure the **sustainability** of your DP activities?
11. Is there any characteristic(s) or activity that differentiates your business case from others?

BENEFITS OF DP

12. Do the organisation's decision-makers recognize the benefits of digital preservation?
13. What are the most important benefits your organisation has realised? How do you measure or quantify these benefits?

RAISING AWARENESS OF YOUR ACTIVITIES

14. How do you communicate or raise awareness of the DP initiatives? Both internally and externally.

YOUR SUCCESS STORY

15. Why do you think this case of DP is a success story?

Collection format

Type of Business case:	
Case Name	(Library/Organisation Name)
Short Description of the organisation (from P1 & 2)	Case, date of implementation, and info such as integration of DP in the mission and strategic plan
Scenario before (from P1 & 2)	Including needs and challenges; why DP and what needed to be preserved
The decision of implementing DP (from P3)	Explain how did you get to implement DP, how did you get DP to be funded? And how did you invest it? (Hardware, hired specialist for in-house development, subcontracted suppliers to develop the DP solution?), how did you prioritized actions.
Scenario after (from P3)	Selection of the DP solution and why, level of sophistication or complexity selected (why?)
Funding Activities in the organisation (P4, P7, P8)	Mechanisms to secure an on-going, efficient allocation of resources to digital preservation activities What are the most important costs inherent in our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?
Sustainability (P5, P6, P10 & P11)	<ul style="list-style-type: none"> • More Cost driven or Value driven approach • Recognition of the benefits of digital preservation on the part of key decision-makers • Is there any characteristic(s) or activity that differentiates your business case? • Do you have any internal source of revenue to support DP continuous activities?
Partners (which supported the DP development) Technology partnerships DP solution & Integrators (from P10)	Comment on motivation and key activities and roles
Benefits of DP (P12, P13)	E.g. <ul style="list-style-type: none"> • Faster response to the customers • Self-provisioning with high quality results • Reduced operating costs

Channels to communicate with end user (P14)	How do you communicate or raise awareness of the DP initiatives?
Why this is a success story? <i>(from the interviewee point of view)</i>	•
Why this is a success story? <i>(from your point of view, as interviewer, what was your perception?)</i>	•

5.3. ANNEX III: SELECTED BIBLIOGRAPHY

- Baron, J.R.. “Reflections on Information Governance: Three Lessons Learned From the Federal Sector”. MER Conference, Chicago, 2013.
- BRTF “Sustainable Economics for a Digital Planet: Ensuring Long-Term Access to Digital Information”. Blue Ribbon Task Force on Sustainable Digital Preservation and Access. Final Report, February 2010
- Beagrie, N., Eakin-Richards, L. and Vision, T. “Business Models and Cost Estimation: Dry ad Repository Case Study”. Austrian Computer Society (OCG), 2010.
- CGOC Summit 2013 Proceedings
- Guthrie, K., Griffiths, R. and Maron, N. “Sustainability and Revenue Models for Online Academic Resources” An Ithaka Report, May 2008.
- European Commission, Information Society and Media Directorate-General. “The Future of the Past – Shaping new visions for EU-research in digital preservation”. Luxembourg, May 2011. Cultural Heritage and Technology Enhanced Learning.
- European Commission. “Commission Recommendation on the digitisation and online accessibility of cultural material and digital preservation”. Brussels, 27.10.2011 C (2011) 7579 final. European Commission.
- Inmark Estudios y Estrategias, S.A. “DP Impact. Socio-Economic Drivers and Impact of Longer Term Digital Preservation”. Final Report, June 2009. European Commission.
- Knowledge Exchange, c/o Danish National Library Authority. “Report on Knowledge Exchange workshop. Price of keeping knowledge: financial streams for digital preservation” Amsterdam, 17 January 2013. Large member base and diverse sources of income.
- LERU Open Access Working Group. “The LERU Roadmap towards Open Access”. Advice Paper N°8, June 2011. League of European Research Universities.
- McGovern, N. Y. and Skinner, K. “Aligning National Approaches to Digital Preservation”. Educopia Institute Publications. Economic Alignment, 2012.
- Tanner, S. “Measuring the Impact of Digital Resources: The Balanced Value Impact Model” Department of Digital Humanities, King’s College London, October 2012.
- The National Archives. For the Record. For good. Our Business Plan for 2011-2015
- Strodl, S., Petrov, P. and Rauber, A. “Research on Digital Preservation within projects co-funded by the European Union in the ICT Programme”. Vienna University of Technology, Austria, May 2011.