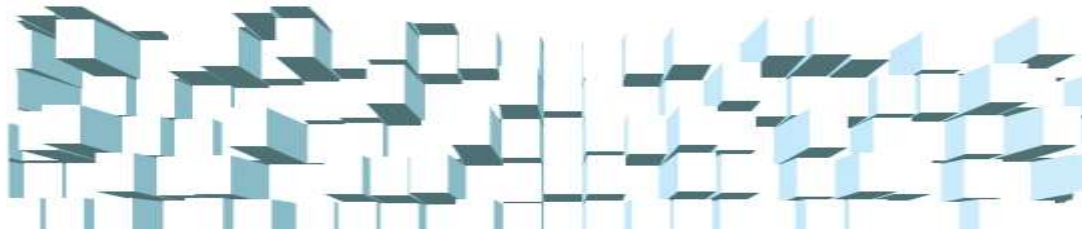# *Inspiring Research, Inspiring Scholarship*

The value and benefits of digitised resources for learning, teaching, research and enjoyment

Simon Tanner
King's Digital Consultancy Services
Centre for Computing in the Humanities
King's College London

Marilyn Deegan
Centre for Computing in the Humanities
King's College London

JISC

KDCS
DIGITAL CONSULTANCY

www.jisc-content.ac.uk

www.kdcs.kcl.ac.uk

Contents

Background & Acknowledgements

This report is the product of a JISC funded project to investigate the values, benefits and impacts of digitised resources. The first sections present the conclusions and results, while methodology, bibliography, lists of websites and other resources are detailed in the appendices.

The project website with all reports/ resources created is available here:
www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/digitisationbenefits.aspx
and linked from here: www.kdcs.kcl.ac.uk/innovation.html

A visually rich version of the information in this report has also been published. This would serve as a good starting place for those who need an attractive introduction to the values and benefits of digitised resources.
www.jisc.ac.uk/media/documents/programmes/digitisation/12pagefinaldocumentbenefitssynthesis.pdf

Project Leaders:

- Simon Tanner, King's Digital Consultancy Services, Centre for Computing in the Humanities, King's College London
  www.kdcs.kcl.ac.uk

- Pete Dalton, Evidence Base, Birmingham City University
  www.ebase.bcu.ac.uk

Additional Research:

- Marilyn Deegan, King's College London

- Angela Conyers, Evidence Base, Birmingham City University

- Lorna Hughes, CeRCH, King's College London

- Beth Delwiche, Evidence Base, Birmingham City University

- Nikki Griffin, Evidence Base, Birmingham City University

Acknowledgements

We have contacted, queried and quoted a large number of people in the course of this study, and we would like to acknowledge the following for their help: Fay Bound Alberti, Andrew Austin, Simon Bains, Toby Bainton, Tim Berners-Lee, Alan Bowman, Peter Bradwell, Lynne Brindley, Lucie Burgess, Carol Burrows, Nicholas Cook, Matt Chapman, Arianna Ciula, Robert Darnton, David Denison, Alastair Dunning, Jennifer Evans, Paul Flicek, Norman Gash, Andrew Green, Catherine Grout, Kevin Guthrie, Pen Hadow, Tim Hitchcock, Ellen Hogan, David Hunter, Amy Irwin, William Kilbride, Kimberly Kowal, Stuart Lee, Bill LeFurgy, Andrea Levy, Tom Lisney, Martin Mühleck, Will Noel, Richard Ovenden, Clare Page, Michael Popham, Andrew Prescott, Stewart Purvis, John Rink, Harold Short, Dagobert Soergel, Manuela Speiser, William Spencer, Kathryn Sutherland, Tilli Tansey, Sarah Thomas, David Turner, Paul Vetch, Nick Weaver, Michael Wesch, Dennis Wheeler, Astrid Wissenburg and Kate Zwaard.

Copyright and Re-Use

Guidance on How to Use this Document

Who is this document for?

This document draws evidence from a wide number of sources and seeks to provide a compelling account of the advantages of digitised content. The aim is to provide key information and strong exemplars for the following primary stakeholders:

- Memory institutions and cultural heritage organisations such as libraries, museums and archives.

- Holders and custodians of special collections.

- Managers, project managers and fundraisers who are seeking to justify further investment in digitised resources.

- Academics looking to establish digital projects and digital scholarship collaborations with collection owners.

- Publishing, media and business sectors which may be considering the best means to collaborate and align with collection owners, with academia or memory institutions.

There is a high level, shorter, visually rich version of this document aimed at strategic, political, policy making stakeholders. It is available here: www.jisc.ac.uk/media/documents/programmes/digitisation/12pagefinaldocumentbenefitssynthesis.pdf

What can you do with this document?

This report performs the task of synthesising information relating to the benefits of digitisation and helps to provide a compelling argument for future digitisation work. Thus, you will find in this document information on:

- Where the value and impact can be found in digitised resources,

- What modes of value and impact are achievable, and

- Who are the beneficiaries gaining from the impact and value?

Special attention is worth paying to the section upon *5 modes of value for digitised resources* in Creating Digital Britain. The basic value modes suggested here may act as a guide for future digitisation impact assessment. If these value models to society as a whole are satisfied then many other benefits identified in this report will also accrue.

This document therefore provides strong information to support:

- Fundraising and revenue development plans,

- Audience development,

- Designing evaluation and impact assessment,

- Project planning, and

- Planning educational activities to augment digitised resources.

Re-use, divide and repackage this document for your benefit. Please attribute the source/authorship according to the licence, but feel free to re-use.

A Vision for the Future

Imagine walking into one of Britain's great cathedrals. As you take in the architectural, cultural and religious ambience, your mobile device automatically engages with content on your behalf.

So, just when you ask for it, the local tour is available in your own language. But there is much more: images and information on the stained glass too high to view, videos of famous ceremonies, 3D walk-throughs showing how the cathedral may have looked in previous centuries, full text of historic and literary references, a list of people buried, baptized or married, choral works performed, oral histories of local residents, news reports through the centuries: this list of opportunities could and will grow even longer.

The opportunity to engage actively with British content that is educational, entertaining and deeply enlightening is here. Technology exists to drive forward a vision of intelligent environments that supply the right information to the right person at the right time. Paradoxically, what is missing is the depth of digitised content to make such technical developments more significant than mere playthings.

To achieve a Digital Britain that is educated and ready to exploit these new technologies, the treasure house of British content has to be digitised much more comprehensively.

For the intelligent Digital Britain we need beautiful information, authentic data, validated content and a critical mass that will drive economic impact, research innovation and social benefits.

What the Bodleian Library is doing now, in digitising large portions of our vast collections, is like the human genome project. Thousands of people can evaluate and use creatively the digital resources to discover new ideas and make innovations. Many hands make light work and those many hands will profoundly touch Britain's future capacity for learning, research and innovation.

Sarah Thomas, Bodleian Library, Oxford University

The next phases of activity for UK-wide digitisation must aim to both increase the wealth of content and to disperse this content to an even broader audience.

Much has been achieved, but there are opportunities for much more impact, benefit and a greater return if we continue to invest in the knowledge economy of Britain by digitising our wealth of information resources.

Digitised Resources:
15+ years of success, achievement and challenges

The purpose of education is life-enhancing: it contributes to the whole quality of life. This recognition of the purpose of higher education in development of our people, our society and our economy is central to our vision. In the next century, the economically successful nations will be those which become learning societies: where all are committed, through effective education and training, to lifelong learning.

Dearing Review of Higher Education, 1997

Britain is a treasure house of culture, innovation and knowledge. But many of these treasures have been locked away from the public gaze and available only to the most tenacious researcher. Over the last 15 years, JISC and others have been fostering UK digitisation strategy to bring these collections out of the dark. In so doing there have been tangible benefits to learning, research and teaching. These in turn have delivered economic and social benefits to the United Kingdom.

The JISC collections policy has been paradigm-changing in UK higher education. Expensively produced commercial and academic resources are now available at affordable prices to the whole community. JISC had the wisdom to realise very early in the digital era that we were stronger as a community in terms of bargaining power than we were as individual institutions, and so it evolved the model of upfront purchase or licensing of major resources, with institutions buying into the resources at levels commensurate with the size of the institution. This means that costly collections of early books like Early English Books Online (EEBO) and Eighteenth-Century Collections Online (ECCO), together offering some 50 million pages of works in English published between 1475 and 1800, can be made widely accessible to students and researchers in institutions large and small.

As well as purchasing digital resources, JISC has provided significant funding over the last fifteen years for the digitisation of a wide range of materials in many formats, held by libraries, museums, galleries and educational institutions, in collections large and small. This has built content and expertise throughout the UK higher education sector, and has brought many significant collections to a wider audience.

In particular, the large-scale digitisation programme that ran from 2004 to 2009 engaged organisations with world-class reputations and has enabled the digitisation of, among other vital resources:

- more than one million 18th century parliamentary publications;
- more than three million pages of British newspapers spanning three centuries from 1620;
- almost 45,000 archival sound recordings;
- half a million pages of minutes and memoranda produced by the British Cabinet between 1915 and 1978;
- 1.5 million items of printed ephemera ranging in date from 1508 to 1939;
- more than 3000 hours of newsfilm footage representing some 60,000 news stories and programme scripts from the ITN/Reuters archives.

The beginnings …

Much of this activity and success can be tracked back to JISC's inception. It has been highly influential in the production, purchase, delivery and preservation of digitised resources. Even before JISC existed, the UK higher education funding organisations established a number of vital initiatives for the promotion and production of digital resources through the Computer Board. The Computers in Teaching Initiative, set up in 1989, was revolutionary in establishing some 24 subject centres throughout the UK, some of which evolved into the Subject Centres of the Higher Education Academy, and which still promote the use of digital technologies and resources for teaching. Further initiatives by the funding organizations promoted the use of digital resources and the production of digital teaching materials, and the research councils, foundations and JISC itself have been providing funding for the production of large- and small-scale digitization projects and digital collections.

The UK Research Councils fund a range of research projects some of which may have digital components, and have supported significant amounts of digitisation activity. There have been other public programmes, many initiated

or promoted by JISC, which have specifically targeted digitisation developments. In 1994, following on from a report produced by the Joint Funding Councils' Libraries Review Group, chaired by Sir Brian Follett (the Follett Report), JISC established the Electronic Libraries Programme (eLib) with £15 million of funding. The first two phases of eLib funded some 60 projects in digitisation, electronic document delivery, access to networked resources, digital preservation, and on-demand publishing. It also carried out training and awareness programmes. The third phase sought to integrate some of the resources and findings of the first two phases into larger-scale hybrid libraries.

Another significant digitisation programme was the New Opportunities Fund's NOF-Digitise, which invested £50 million between 1999-2004 to create learning materials by educational, cultural and community organisations throughout the UK. Many millions of items of digital content were created and built into innovative learning resources across a whole range of disciplines in the arts and sciences and integrating surrogates of all possible analogue formats: illuminated manuscripts, archaeological sites, letters, personal papers, maps, art objects, buildings, etc. What was special about NOF-digitise was its cultural inclusiveness and diversity which promoted cross-fertilisation between academic institutions, libraries, commercial companies, faith groups, community groups, local authorities, media organisations, and other local groups.

JISC and others, through these exciting and ground-breaking programmes, have certainly helped to bring about the Dearing vision of creating 'learning societies' and with the next phases of activity of UK-wide digitisation we hope to both increase the wealth of content and disperse the content to an even broader audience. Much has been achieved, but there are opportunities for much more.

The Digitised Future for Higher Education

Opportunities, benefits and impacts from digitised resources

We need to create a sustainable national content collection of compelling rich and accessible digital content to foster excellence in research, learning and teaching.

To achieve this vision, the benefits and impact from digitised resources must support the following areas of digital opportunity.

Learning

Educational benefits are gained from a wide variety of activities introducing people to new digitised information and experiences. This might mean using digitised content to teach history at university or biology in a school classroom; an introduction to new activities such as creative writing or renovating a steam train; or visiting museum collections. Education benefits have to include all members of society, not just university students or schoolchildren: there is a hunger for learning and for resource discovery at all levels.

Now I enter the classroom and I think, most of the content that I have to deliver and a whole lot more, is floating around them right now. What I need to do is inspire them and give them the tools to harness that information and harness the skills of other people to do the things they want to get done. And that transforms the way you approach the classroom.

Dr Michael Wesch, Kansas State University

Research

Research benefits accrue when we invest in deepening our understanding of the world and build upon the intellectual legacy of previous generations. Digitised resources continue to transform the research process. The researcher can now ask questions that were previously not feasible; they can engage in a new process of discovery and focus their intellect on analysis rather than data collation.

Consumption

The most obvious benefit of digitised resources is the value people get from using them. The term consumption is intended to include both the "entertainment" value of engaging with digitised content and the personal value added from participating in a community of use. Increased consumption will also benefit economic sustainability.

Strengthening communities and regeneration

Digitised resources make it possible for communities to grow more cohesive as common interests and a common vision can be shared. Renaissance in the Regions has funded museum digitised resources and skills development that engages local communities. Some regeneration projects also include important skills development in the digital domain, although this is sometimes diffuse. For instance harnessing traditional crafts with Web developed marketing and services to attract employment and tourism to rural areas which have lost

previously established industries. Other programmes aim to use digitised resources to integrate people at risk of exclusion from society.

Building collaboration and the British university brand

Working together in collaboration maximises impact – whether for research, education or societal benefits. JISC fosters collaboration and best practice between universities nationally and internationally. They enable mutually beneficial links between universities, memory institutions, publishing and media to develop digital content.

The idea really is that Einstein's live everywhere, but you don't necessarily invite them to your meeting. They might be junior, ex-employees, associates or outside your organisation. But you need to engage them.

Matt Chapman, Imaginatik

Collaboration has a strong impact upon building Britain's brand recognition internationally, leading to new economic and innovation opportunities. Giving access to a high volume of digitised content will confer a high profile to the quality of the university's work.

Building on the legacy of success

The benefits and impact of digitised resources justify the investment in more digitisation of the rich collections to be found in Britain. The most significant technological challenges have diminished; and a new generation of users has emerged, newly poised to engage with content online. There has also never been a better time to ensure that these collections can become part of a critical mass of content provided by the major public sector cultural and educational institutions in the UK.   If we lose sight of the value of investing in content and the incredible possibilities that presents, then we may well look back from 2020 and regret that we did not grasp this opportunity.

Much has been achieved in the last fifteen years in building key collections and developing infrastructure and skills, in the HE sector and beyond, to support this development. The next phases of activity for UK-wide digitisation must aim to increase the wealth of content and disperse this content and its use to an even broader audience.

Learning, Teaching and Research Benefits

The New History from Within

The Old Bailey Online offers a fully searchable database of the largest body of texts detailing the lives of non-elite people ever published, containing 197,745 criminal trials held at London's central criminal court with over 120 billion words recorded.

Alongside other key projects, such as London Lives 1690 to 1800, this makes eighteenth and nineteenth century London the most digitised where and when in the history of world. The Old Bailey Online is being used by people in their millions.

Old Bailey Online reaches out to communities, such as family historians, who are keen to find a personal history, reflected in a national story, and in the process re-enforces the workings of a civil society. Digital resources both create a new audience, and re-configure our analysis to favour the individual.

Professor Tim Hitchcock, University of Hertfordshire

Digitised resources transform the research process

New areas of research are enabled.

Rich research content now widely accessible through innovative interfaces and friendly research tools.

The researcher can now ask questions that were previously not feasible.

Researchers can engage in a new process of discovery and focus their intellect on analysis rather than data collation.

Easier access to scholarly publications

A bedrock of scholarship is the ability to share, discuss and reference thoughts, ideas, and discoveries. Scholars require access to the accumulated knowledge of human endeavour to move research and discovery forward rather than in circles.

Improved access to scholarly content makes research and teaching easier, faster and more productive. Hundreds of millions of pages of historic journal content are now available, bringing untold thousands of hitherto hidden articles back into circulation. These enhance the ability of scholars to cross-search and cross-refer.

They are 'greener', they save valuable square metres of library storage space, and they are the format of choice for busy researchers.

Toby Bainton, Society of College, National and University Libraries

The ideas, thoughts, discoveries and scholarly discussion of many centuries

Over **6 million** pages of academic journals are available on **JSTOR**. In the current year they were accessed almost **600 million times**.

The **British Library's Electronic Theses Online Service** (EthOS) allows instant access to **250,000 plus** UK theses that have already been digitised, and will digitise on demand any other thesis produced in the UK.

Oxford University Press have created the **Oxford Journals Archive** to provide more than **3.4 million** article pages covering content from 1849-1995.

Welsh Journals Online digitised some **400,000** pages of Welsh academic content.

New areas of research enabled

Digitised resources enable entirely new areas of research and discovery to be opened up. New research methods can be applied to the digitised resources which were hitherto unthinkable. New collaborations across disciplines can also be fostered through joint engagement with digitised resources.

Almost the entire field of bioinformatics has grown up because of data sharing.

Dr Paul Flicek, Vertebrate Genomics at
European Bioinformatics Institute

The digital projects that have been carried out over the last twenty years by the research community have brought a new spirit of enterprise to the process of scholarship:

Allowing the rapid sharing of findings through online publication.

Dealing with multiple technologies, source types and formats.

Using and developing new methodologies.

Appealing to multiple audiences and uses.

Bringing collections out of the dark

Britain's wealth of information and artefacts underpin the nation's culture. Yet because of the sheer volume, value, fragility, complexity and dispersion of physical assets they can never fully be displayed, accessed or made widely available in that form.

Early English Books Online itself has transformed research into early English literature. It has democratised the research process by extending this facility to individuals and institutions without easy access to specialist libraries.

Dr Sarah Carpenter, University of Edinburgh

Early English Books Online

EEBO provides to scholars and students a digital collection of **22 million pages** of early printed text, representing 125,000 books published in England or in English between 1475 and 1700. This is the culmination of more than a century of effort in finding, cataloguing, microfilming, digitizing, rekeying and delivering what is in effect a great virtual library of early books.

It is one of the world's greatest digital collections, and its impact on research and teaching is profound. It allows many scholars and students around the world access to what has been in the past only accessible to the very few.

I would not be able to do my research without the use of EEBO. Moreover, I am looking at lots of medical recipes and need to assess quickly what the ingredients were thought to be useful for. The ability to search full texts to find these ingredients with ease and speed is crucial to my work. It saves me a lot of time not to have to read the whole document to find one herb.

Jennifer Evans, PhD Medical History student, Exeter University

A similar development to EEBO, Eighteenth Century Collections Online (ECCO) provides more than 30 million pages, representing 180,000 works including every significant English-language and foreign-language title printed in Great Britain during the eighteenth century, along with thousands of important works from the Americas. ECCO has revolutionized research and teaching in eighteenth-century studies:

ECCO is an amazingly rich resource: it puts a magnificent library of eighteenth-century printed material on the desktops of scholars and students. It vastly improves access; it allows the scholar to discover new seams of material; it gives students unprecedented access to masses of primary source material. And of course it supports new kinds of searching.

Joanna Innes, Somerville College, Oxford University, June 2009

What makes these resources even more accessible to scholars is the capacity to search across the metadata of both at the same time: the bibliographic records for ECCO have been loaded into EEBO, which gives EEBO users the possibility of locating additional texts relevant to their research.
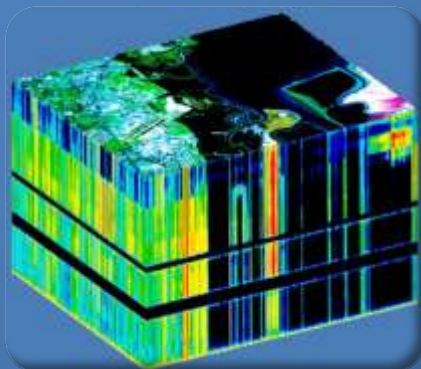
Shedding new light on mathematics

The Archimedes Palimpsest project has revealed to the world lost ideas by the ancient Greek mathematician and physicist Archimedes (287-212BC), whose discoveries underpin much of modern physics.

This work was quite literally brought out of the dark by digitisation. An international collaboration of scientists and textual scholars has produced a readable text that reveals Archimedes' ideas hidden for almost a millennium.

From beneath the pages of the prayer book a second book emerged—a virtual Archimedes

Will Noel, Curator of Manuscripts,
The Walters Art Museum

Digitisation brings these materials to a wider public than ever before: either free or at low-cost to the consumer and made accessible with a wealth of explanatory context produced by world-class experts.

Virtual reunification

Primary source material is vital to scholarly research but in some cases the source material may have been artificially separated and physically distributed over the whole planet. In the past scholars travelled to libraries around the world if they wanted to compare sources. This was costly, time consuming and inefficient. In addition to reunifying primary sources, digitised resources enable new tools to facilitate research once they can be brought together again.

Reunifying collections online

Jane Austen's Fiction Manuscripts Digital Edition presents all Austen's manuscripts to be viewed side-by side for the first time in 150 years.

The earliest Christian bible (the 1600 year-old **Codex Sinaiaticus**), whose pages reside in four different countries (the UK, Russia, Germany and Egypt) can now be viewed digitally via The British Library as a whole also for the first time in 150 years.

Chopin's First Editions Online unites all of the first impressions of Chopin's first editions in an unprecedented virtual collection, thereby providing direct access to musicians and musicologists to the most important primary source materials relevant to the composer's music.

Jane Austen's Fiction Manuscripts Digital Edition offers unprecedented opportunities for new scholarship, particularly in exploring the creative laboratory of her novels, so far an under examined area of Austen studies.

It also makes the manuscript sources freely available to the wider public.

Professor Kathryn Sutherland, University of Oxford

Teaching benefits

The increasing availability of digitised resources allows educational institutions to provide students with more varied, more accessible and richer teaching materials than ever before. This encourages a more exploratory, research-based approach to teaching and learning. Entirely new kinds of topics and courses can be studied, new modes of assessment are possible, and students are given a richer educational experience.

Not only an invaluable resource for studying Chopin's music, but potentially a means of studying music in general—perhaps with application beyond music, too.

Professor Nicholas Cook, University of Cambridge
on the Online Chopin Variorum Edition

Once available digitally, materials produced for one context can be used in many others: advanced research projects can be used by students in a wide range of contexts and backgrounds including schools and colleges, and life-long learners. For instance, Survivors of the Shoah Visual History Foundation identified that its content could have significant relevance to 42 academic subject areas.

Using real world data for teaching

The Economic and Social Data Service provides real-world economic data that is being used in learning and teaching. Students learn how economics data looks in its raw state and experience first-hand the complexities and difficulties of working with it.

Students develop a portfolio of realistic project work to demonstrate their skills and experience to prospective employers.

It's connected with getting your hands dirty and looking at the real world. Lots of the standard courses have got data that's already in some senses cleaned...whereas when you actually start to investigate the world you often find that things aren't straightforward.

Nick Weaver, University of Manchester

Availability of new kinds of materials

Digitisation takes primary sources beyond the book and the laboratory. Digitised sources bring into the classroom simulated practical experimentation in science as well as rare and fragile artefacts to support teaching.

The First World War Poetry Archive makes it easier to discuss the creative process in greater detail with students than was traditionally possible.

My teaching is enhanced because there is much more primary source material freely available, especially the full colour images of all the manuscript variants of a poem. This represents a significant benefit to students, teachers and researchers.

Dr Stuart Lee, University of Oxford

Time-based media

Time-based media can be difficult to access for teaching, though the tape recorder and later the video machine brought about the birth of media studies, a popular and vitally important area of study. Now, digitisation allows students and researchers to edit sources into multimedia publications and comment directly on them in ways that were never before possible.

Time-based media

LBC/Independent Radio News has created a colossal 2,965 hours of digitised radio recording covering the period 1973-1996 dealing with such vital public issues as the miner's strike, Margaret Thatcher's time as Prime Minister, the Falklands War and many other topics.

Its use in teaching has already been significant, even in schools it has allowed pupils the opportunity to carry out research on real primary sources.

Integrating many different kinds of resources

Students can now participate as genuine researchers and real contributors: online courses and reading lists can link directly to digitised resources—not only for library-type materials but digitised images for the study of image-rich subjects (art history, for example); 3-D models for chemistry or physics; simulations for teaching medicine; rich data sets for statistical modelling.

Students are no longer limited by geography, these resources do not even need to be in the student's own institution, they could be on the other side of the world.

Classroom activities built around communal engagement of defined collections raises the quality and amount of peer interactions centred around the subject matter being studied.

A 'contribution channel', whereby vetted or exemplary student annotation or analysis can be promoted into a curated collection, spurs students to work harder and more carefully on work possibly destined to be seen by other classes and/or the public.

Columbia University Digital Bridges Project

Bestowing Economic Benefits

When businesses like Google look at libraries, they do not merely see temples of learning. They see potential assets or what they call "content" ready to be mined. Built up over centuries at an enormous expenditure of money and labor, library collections can be digitized en masse at relatively little cost—millions of dollars, certainly, but little compared to the investment that went into them..

Professor Robert Darnton, Harvard University

Free access to medical research

2 million+ pages of medical journals are now available through the **Medical Journals Backfiles** project and the US National Library of Medicine service, PubMed.

Delivering free at the point of use access to almost 200 years of peer-reviewed medical research achieves economic impact. One title alone, the Biochemical Journal, attracts 300,000+ uses per month.

It's the immediate accessibility of a vast wealth of peer-reviewed resources that is most remarkable… [scholars] can access whole decades of invaluable resources on their desktops.

Professor Tilli Tansey, University College London

Widespread access to digitised resources enhances education and research at all levels of attainment. They contribute to the vibrant cultural and intellectual life of the UK, promoting education and enjoyment for all whilst bestowing a range of benefits to local and national economies.

Higher education generates more than £59 billion of economic output,

and provides more than 668,500 full time equivalent jobs throughout the UK economy per year.

Digitised content and JISC Collections negotiations save the sector ~£43 million/year.

JISC Advisory services save the sector around £12 for every £1 invested (equivalent to around £38m).

The production and use of digitised resources supports these economic impacts by delivering efficiency, innovation and enhanced skills, by underpinning competitiveness, and by developing a UK brand for Universities and HE worldwide.

The knowledge economy has thus become:

increasingly important as our international competitiveness rests more than ever on the development, dissemination and application of knowledge and ideas.

Sainsbury Review

Higher Education has a key role in transferring ideas, research results and skills between universities, other research organisations, business and the wider community, conferring a whole range of benefits: economic, social and political. In the modern world, the digital agenda and the digitised resources to support innovation are essential components for Higher Education investment.

The economic impact of the research base is important to the future prosperity and wellbeing of the country. The knowledge and expertise gained through our investment in people and innovation allows the UK to maintain a technological leading edge, build a strong economy and improve quality of life for its citizens

Excellence with Impact, Research Councils

Competitiveness – increasing value whilst accruing cost savings and efficiency gains

Bricks and mortar organisational practices can no longer sustain growth in Higher Education.

Daniel Greenstein, University of California

The economic profile of the acquire, store and access chain suggests that switching to digital has so many cost benefits that the cost of acquiring through digitisation is a solid investment, especially for text-based resources, film and video, or scientific datasets.

Learning, teaching and research are all enhanced by wider, easier and cheaper access to digitised resources. This is being achieved through the large-scale digitisation of materials held by educational and cultural establishments worldwide. One result of this is that costly, time consuming and inefficient travel to visit collections or collate data sets has been radically reduced. Digitisation allows multiple resources to be interrogated and compared instantly, making the research process more rapid and facilitating more in-depth study.

This digital resource is the only complete collection of the Chopin first editions, which otherwise are scattered across the globe... users have at their fingertips source materials which they otherwise would never have sight of, or only with considerable difficulty and concomitant expense.

Professor John Rink, Royal Holloway, University of London

Higher education has to foster increased global economic performance for the UK through the quality and depth of its research, teaching and scholarship. In order for our universities to remain competitive and for our researchers and teachers to get true advantage from digital content, concerted action needs to be taken to address gaps and channel communities within academia and beyond to build a sustainable national collection that is also accessible in a worldwide context.

Efficiency savings

Significant efficiency savings are being achieved through the use and re-use of data and by reducing the cost of collection and creation.

Re-use is a key economic benefit, with many research and learning uses becoming available to many audiences—many of these uses having not been foreseen by the original creators. For instance, researchers in psychology have used Early Child Care and Youth Development data sets to address a range of research questions not envisaged in the original study plan. There was so much new activity that this resulted in a special edition of the *Journal of Applied Developmental Psychology* being produced.

The benefits and impact of secondary analysis of digitised resources have been particularly apparent in the sciences.

Exchanging data and digitised content

The **Protein Data Bank** began in 1970 with the exchange of data using punched cards. From the 375 datasets distributed annually in the 1970s, daily file downloads now average over 200,000. In addition, data is applied in new research due to derivative databases.

Support from the complete digitised back runs of *Crystallography Journals Online* maximises re-use and cross-referencing, and reduces duplication of effort.

Dr Amy Irwin, research fellow at the MRC Institute of Hearing Research, has used the British Library's Archival Sound Recordings (ASR) during the course of her work to assess the impact on the human brain of sounds perceived as either pleasant or unpleasant:

Being able to download clips directly was a great time-saver – the variety of soundscapes available was also useful. Combined with the soundscapes I found from other sources, Archival Sound Recordings provided for all my needs.

Dr Amy Irwin, MRC Institute of Hearing Research

New kinds of collaboration

As a critical mass of digitised resources becomes available, along with the tools for manipulation, researchers can more easily interact with the resources and with each other. Scholarly endeavours that used to take decades can come to fruition much more quickly.

Doing more for less

The cost of creating digitised resources is continuously dropping, and investment in digitisation is delivering its benefits and impacts more quickly than previously was possible. As real economies of scale are realised, further benefits accrue through sharing both the direct and indirect costs, whilst international collaboration is fostered by the ability to share knowledge and resources.

An excellent example of the economic and intellectual leveraging of community engagement through sharing digitised resources is provided by crowdsourcing. Crowdsourcing is a distributed problem-solving and production model with the community or crowd submitting solutions. It is a very low cost means of engaging with a community, and delivers the benefits of increased skills, enhanced digital resources and improved institutional links with that community.

The Big Society in a digital environment

Over 3 years the **BBC** asked the public to contribute their memories and artefacts of the Second World War. 32,000 people registered and submitted 47,000 stories and 15,000 images.

FamilySearch Indexing is a volunteer project which aims to create searchable digital indexes for scanned images of historical documents—over 250 million historical records have been transcribed to date.

The Australian Newspapers Digitisation Program has registered 9,000 volunteers who enhance the text in their 8.4 million articles.

To date, 12 million lines of text have been corrected which equates to approximately **70 person years of effort** or, assuming an average wage, **£1.75million worth of effort**.

Optimising the research and teaching environment

Digitised resources and the increased sharing of data sets provide opportunities to create a more complete and transparent record of scholarly endeavour. The availability of digitised resources can

Aid citation analysis

Provide for easier assessment and peer review

Aid in policing the research and teaching environment

Provide online tools for the detection of fraud and plagiarism.

Digitised resources can also provide recognition for a wider range of research 'outputs' and contributions than is typical in current programmes based on a monograph and journal model. Art history, for instance, is under extreme economic pressure because the cost of print publication is so high with the need to use colour art images extensively. However, without publication, research dissemination is reduced.

Using online modes of publication allows the art historian to link directly to digitised resources, for instance to the JISC funded Birmingham Museums & Art Gallery Pre-Raphaelite Collection or to the Corpus of Medieval Stained Glass reducing the costs of research dissemination in terms of copyright fees and print publication

Skills

The growth of digitised resources generates new and improved skills in students, scholars and the wider public. The silver surfer generation has been fostered by the growth in family history resources available online.

Crowdsourcing has raised the skill levels of the wider public by aligning simple online tasks with exciting digital content. The Victoria and Albert Museum has crowdsourced Search the Collections asking the public to help manage the 140,000 images in the collection. This brings the users to the content and lifts their information and subject literacy skills.

KDCS
DIGITAL CONSULTANCY

Individuals are faced with diverse information choices in their studies, in the workplace, and in their lives.

Thousands of people per year are benefitting from digital literacy development, training and continued professional development

Engagement with digital collections helps improve standards of digital literacy by building the set of vocational skills that will equip students and researchers both in the university and the work place.

Authenticated, valid and reliable digitised resources from JISC are a great benefit to the wider community, as these are trusted sources.

Specific organisations, such as JISC Digital Media and Netskills plus a raft of consultancies, have become sustainable providing information, training and advice to the community. To be truly competitive institutions, university students and staff need to appreciate how to manage and deliver digital assets effectively. Such skills are a vital part of digital economy.

Just as importantly, research using digital resources does not now require a high level of computer expertise, opening up these benefits to an ever widening group of researchers.

New opportunities to create value through innovation and standards

JISC has been highly innovative in developing standards for digitisation and supporting licensing that overcomes some significant economic barriers to participation.

Digitised content, especially film and video, is available through more open licensing models because of the support JISC has provided. Economic benefits accrue to the wider educational community because of the negotiation engaged in by JISC.

Newsfilm Online is a ground-breaking example of a creative partnership between higher education and a leading commercial news archive. It is set to move the agenda forwards in the appreciation of the long-term educational and scholarly value of broadcast news.

Professor Stewart Purvis, City University. Former
Chief Executive and Editor in Chief at ITN

KDCS
DIGITAL CONSULTANCY

Open Access publishing models for digitised content are widening participation and increasing awareness of British research excellence. That JISC encourages digitised resources to be made available through Open Access models means that content is used by a wide audience of professional academics, students and amateur researchers. A competitive advantage is being achieved for UK Higher Education in attracting foreign students because of the amount of content able to be leveraged through these Open Access models.

Re-use 'industries' in particular areas of research are emerging through digitised resources. Particular successes have happened with geospatial, meteorological and oceanographic data for instance. Support and service 'industries' are also developing, focusing on providing value adding products and services that enable easier storage, discovery and access to digitised resources and datasets.

Connecting People and Communities

Connecting people and communities with digital content greatly improves life, work and leisure, and ensures that all are included in our digital future.

Access to over one hundred million digitised archival records from archives and libraries transforms local history research and builds expertise in genealogists and local historians. Octogenarians now regularly use complex resources with great facility—the silver surfer generation has been created.

Connecting communities with news

The news, local, national and international, is a vital resource. Now it is put into the hands of everyone, and reveals a wealth of information about our daily lives of the last three centuries.

Newspapers widen the scope of what historians can explore, bring colour and variety to historical events. The powerful search function available with digitised newspapers is a crucial advantage in exploring in detail and saves a lot of time.

Dr Peter Rushton, University of Sunderland

Connecting to news content

The British Library, funded by JISC, has digitised around 3 million pages of UK newspapers between 1620 and 1900. This is now available for public use.

Author **Kate Summerscale's** best-selling book *The Suspicions of Mr Whicher* draws heavily on contemporary newspaper reports of the famous 19th century murder trial. Kate found that the BL's digitised archive added new dimensions to her story.

The **LBC/IRN audio archive** delivers the most important commercial radio archive in the UK and provides a unique audio history of the period with over 80,000 individual audio files, from short news clips to longer documentaries and current affairs programmes.

NewsFilm Online delivers ~60,000 news stories with some 3,000 hours of footage from the ITN/Reuters archives.

The **British Cartoon Archive** is a unique archive of over 140,000 pieces of cartoon artwork.

Community cohesion

Communities (local and distributed) can cohere around digitised resources, sharing common interests and promoting a common vision. This is particularly important in areas of specialised or minority interests, where geographically-dispersed communities can be developed and sustained in a way that could never happen around physical resources.

Commenting about **Caribbean Histories Revealed**, an online exhibition from The National Archives, the award-winning novelist Andrea Levy, best known for *Small Island*, says

It is fascinating, and very gratifying, to see the historical records of the Caribbean becoming more accessible to ordinary people. The on-line exhibition makes a great starting point for anyone interested in researching this part of Britain's heritage.

Andrea Levy, novelist

More effective and usable collections can also be developed by harnessing input from outside of higher education. This can be achieved by getting communities to offer their knowledge, donate their objects for digitisation and share their histories. Photographic resources from the collections of the Shetland Isles Museum have been augmented with comments and tags from a community of newly skilled 'Tele-Crofters'.

Community engagement

The Great War Archive is a digital project building new communities around content with >6,500 contributions from the general public. The public can submit photographs of memorabilia and souvenirs from the First World War and enter their family's story. They can also trace relatives who served in the First World War.

Travelling around the country, the Archive held 'roadshows' to which people brought First World War memorabilia they had uncovered in their attics. This was digitised on the spot and added to the project's website.

Availability of digitised resources teaches new skills and provides stepping stones for our universities to engage with a broader range of audiences.

RunCoCo ('RunCoCo: how to Run a Community Collection online') an associated project to the Great War Archive seeks to link communities, collections and universities online. The project offers free training and open-source software to help small institutions in the education and public sectors. RunCoCo is also building a support network to exchange knowledge about 'community collections' to support institutional outreach agendas.

A sense of place and time: a deeper engagement with the place and area people live and their personal histories

Digitised resources can offer great support for personal participation in society. They provide information about family and ancestors, educational opportunities, medical and health information, entertainment, and a deeper engagement with the places and areas people live in through maps, historical photographs, trade catalogues, etc.

Census data and other digitised resources that can be quarried in depth for family history or provide a sense of place and time are hugely popular, and the UK Government has responded to the growing hunger for social information with a policy to set information free and open up government data sets. Substantial social and economic gains can be made through this strategy.

Memory institutions are also bringing their collections directly into communities to connect with those disadvantaged or isolated by circumstance from their personal memories or communities. Benefits include:

The disabled no longer need to travel to access difficult to reach repositories

The visually impaired can access the ever-expanding digital text available through text to speech conversion

Automated translation allows non-English speakers to understand digitised resources

Especially for older persons, bringing collections directly into their homes enables memories to be triggered and allows them to reconnect with their community and their past. It also opens up new opportunities for shared participation and inter-generational interaction. The social benefits of personal memories within a wider context has provided comfort to early stage Alzheimer's sufferers and enabled families to interact with the older generation's memories and social context.

With Harry Patch's death, any direct living connection to these [First World War soldiers'] records has finally been severed and marks the passing of this significant period in British military activity into history. Digitising these records makes them accessible to people around the world, many of whom had ancestors who served in the 'war to end all wars', and who will now be able to discover so much more about them.

William Spencer, Military Records Specialist at The National Archives

Community engagement through revealing content and allowing new content to be discovered

The ubiquity of affordable access to computing power and the increasing provision of ever more bandwidth means that communities outside of major organisations can interact with digitised resources as easily as those within. Community projects, in partnership with educational and cultural memory organisations, have helped deliver a wealth of formerly hidden material to a wide and diverse audience, both within and outside the UK.

Digitised resources allow me to discover the hidden lives of disabled people, who have not traditionally left records of their lives. I have found disability was discussed by many writers in the Eighteenth Century and that disabled men and women played an important role in the social life of the time.

Dr David Turner, Swansea University

Exploring the origins of diverse communities

Moving Here delivers a peerless public benefit that honours the origins of the diverse communities that make up modern Britain and gives them a voice.

Hosted by The National Archives (in partnership with some 30 other content holders), it delivers a substantial database of digitised material (more than 200,000 items) on Caribbean, Jamaican, Barbadian, Irish, Jewish, South Asian, Indian, Pakistani, Bangladeshi and Sri Lankan migrations to Britain over the last 200 years.

It also provides personal histories of migrations written by contributors from the migrant communities, and allows descendents of migrants to trace their roots and find out how their families first arrived in Britain. This project created schools resources at Key Stage 2 and 3 of the national curriculum and enabled communities to publish their experiences of migration online.

The wealth of information and artefacts that underpin a nation's culture can never be displayed, accessed or made widely available in analogue form because of the volume, value, fragility, complexity and dispersion of these assets.

Opening cultural collections otherwise hidden

Glasgow Museum's Collection is the city's biggest single fiscal asset valued at £1.4 billion. It contains around 1.2 million objects. On average only 2% of the collection is exhibited to the public at any one time. Glasgow Museums Resource Centre stores around 800,000 objects in 'open storage'. It provides free access to the collections and documentation associated with it.

Digital access is opening up further access to these collections through the Collections Navigator, a searchable database of 1,206 collections.

A major impact sought is to increase self-confidence in the populace – to feel less marginalised, less insignificant, less unheard. Increased feelings of self-worth through interaction with the Museums will spill over into every aspect of their lives.

Hidden collections exist in libraries, museums, galleries and private collections, sometimes well curated and catalogued and sometimes not. Digitisation is bringing these materials to a wider public than ever before: they are either free or low-cost and they are made accessible with a wealth of explanatory context produced generally by world-class experts.

Communities cohere around a digitised resource

The Digital Shikshapatri, funded by NOF-Digitise, brought together a number of Hindu faith groups with librarians and technical developers at Oxford University and King's College London to digitise the Shikshapatri manuscript, an object of religious veneration to Hindus of the Swaminarayan Faith.

This was the most visited manuscript in Oxford as Swaminarayans came to worship in its presence. The digital resource is used widely by scholars, but is also used by devotees for their daily worship.

Only 300 people could visit the physical manuscript per year because of conservation issues. Now it is accessed by more than **2,000 people** per day, of all ages and all educational backgrounds. Communities of Swaminarayans around the world now cohere around the digitised resource.

Oral history

Oral histories are an especially powerful means of connecting personal stories with digitised content to create a wider contextual framework. By interconnecting these histories we can better understand or engage with a subject than if they remain ungathered.

Spoken word collections fill a special place in the documentation of our cultural heritage, capturing aspects of the human experience that can be difficult to capture or convey as well in other formats. Dramatic improvements in the affordability of digital storage and the availability of adequate network bandwidth now make it practical to assemble enormous collections of digitized audio [and video].

Dagobert Soergel, Douglas Oard, et al

A Living Digital Archive

East London Lives documents the lives of East Londoners leading up to the 2012 Olympic Games. It records and reflects on the process of social change in East London arising from hosting the games, and maps the everyday effects that the Olympics have on local inhabitants as they happen.

The archive contains nearly 600 Greater London Authority published documents, transcripts of oral history interviews with Dr Mary Smith and local participants remembering the 1948 London Olympic Games or reflecting on sports history in the local area.

Employing oral interviews with school pupils and members of the public, as well as videos, photos and academic research and official documents linking these Olympics with the 1948 Games, the archive informs research on the indicators about well-being and health that were pledges made by the government.

The oral history resources of the United Kingdom are an enormous and untapped resource, as only a small proportion has been digitised. Layering oral histories with other digitised resources is an effective means of delivering benefit and impact by engaging communities in rich resources.

Lifelong learning and digital communities

The lifelong, voluntary and self-motivated pursuit of knowledge for personal and work gain relies considerably upon the availability of digitised resources. This not only enhances social inclusion, active citizenship and personal development, but also competitiveness and employability.

Without digitised resources, many subjects cannot be effectively engaged with and the availability of free to access digital content is addressing issues of digital literacy and the digital divide by democratizing access.

A key characteristic of life-long learners is that they wish to study outside of working hours and in their own homes rather than in libraries or institutions—digitised resources offer them this flexibility.

Digitised resources, especially in very specialist or relatively minority interests, provide the opportunity through the Web of developing a sense of belonging and common purpose. It is thus possible to build or sustain a community around an interest in the digitised content that could not easily be done in the physical world. For example, medieval studies is an area energised by the growing availability of digitised resources, which opens up the field to a wider community of lifelong learners and school usage. Resources such as the Digital Image Archive of Medieval Music (DIAMM) have been used in teaching even at primary school level.

As one amateur user of the Fine Rolls of Henry III stated:

What a treasure trove of information you have here, the simple details that give away the thoughts behind the monarch. I had no idea this was here... It is archives like this that reveal the rich history that this country has.

Ellen Hogan, Financial Controller, amateur
user of the Fine Rolls of Henry III

Regeneration

Some regeneration projects also include important skills development in the digital domain. Renaissance in the Regions has funded museum digitised resources and skills development that engage local communities. The impact is sometimes diffuse. For instance, harnessing traditional crafts with Web-developed marketing and digital services to attract employment and tourism to rural areas that have lost formerly established industries. Such impacts, even if diffuse, are very meaningful to these local communities.

If we harness people outside of Higher Education to assist with the digitising process we can also build more effective and usable collections. This is achieved by getting communities to offer their knowledge, offer their objects for digitisation and to share their histories. For instance, photographic resources from the collections of the Shetland Isles Museum have been augmented with comments and tags from the community of newly skilled "Tele-Crofters".

Creating Digital Britain

Without doubt the uses to which people in the future will put the fruits of big digitisation will be very different from today's uses. All the more reason why we should do our very best to plan today in a way that safeguards the interests of the researchers of tomorrow.

It is not difficult to imagine how groups of users might respond, given the opportunities and the tools, to the presence of huge quantities of text in digital form: by annotating, translating, citing, discussing, analysing, reusing and repackaging.

Andrew Green, Librarian National Library of Wales

5 modes of value for digitised resources

There are 5 basic value modes suggested here as a guide for future digitisation impact assessment[1]. If these value models to society as a whole are satisfied then many other benefits identified in this report will also accrue.

Option Value

- People value the possibility of enjoying the digitised resources and the resultant research outputs created through the endeavours of academics and HE now or sometime in the future.

Prestige Value

- People derive utility from knowing that a digitised resource, HE institution or its research, is cherished by persons living inside and outside their community.

Education Value

- People are aware that digitised resources contribute to their own or to other people's sense of culture, education, knowledge and heritage and therefore value it.

Existence Value

- People benefit from knowing that a digital resource exists but do not personally use it.

Bequest Value

- People derive satisfaction from the fact that their descendents and other members of the community will in the future be able to enjoy a digitised resource if they choose to.

Future modes of evaluation and impact assessment should include some focus upon these social factors. Digitisation projects and programmes need to

---

[1] Inspired by the work of Bruno S Frey and Werner W Pommerehne, Muses and M markets: Explorations in the Economics of the Arts, Blackwell, 1989.

34

engage with the core principle of impact assessment "how does this change people's lives?" to succeed in an ever more competitive funding environment. Engaging with the way digitised resources offer opportunity and choices that will foster changes is likely to prove increasingly important. Much of the evaluation to date has been qualitative in terms expressed in this report or quantitative in terms of volume of use. Different, more faceted evaluation questions will be needed to demonstrate changes in opportunity or lives and this is a ripe area for further research and development.

Asserting the value of the British brand

Building Blocks of Digital Britain

By building a critical mass of digitised content we are creating the building blocks for Digital Britain. A critical mass is both the volume of content and the infrastructure for delivery that generates a self sustaining and growing audience. Such engagement allows for the intellectual capital of our educational and cultural institutions to be shared more broadly in society, building links between different groups in society within and across geographic regions.

We also experience the "multiplier" effect with critical mass such that adding new and wider audiences does not add noticeably to base costs. So investment in Higher Education digitised resources can reach out to wider society in a cost effective way to deliver a deep social impact and benefit. Links with business and the commercial sector are also strengthened by investment in digital content in Higher Education, reaching new markets and stimulating new products and activities.

Developing the brand for UK Higher Education

Transformational digital content and resources support the broader government agenda to build Digital Britain and open up data for the twenty-first century. Our cultural and educational collections are our nation's prize jewels and should be at the heart of the agenda to expose government information to benefit the citizen.

UK research and universities are made more visible by digitised resources. Such digitisation widens international recognition for the quality of UK research. In turn this generates revenue by attracting overseas students and by fostering international research collaborations and funding. The establishment of transatlantic digitisation collaboration grants between JISC and the US National Endowment for Humanities is recognition that the USA, as the world's biggest research economy, makes a significant contribution to the leading edge performance of collaborating nations. UK-USA collaboration represent more than 30% of the UK's strongest research with impact factors up to four times higher for papers in biological and physical sciences.

We also need to consider our position in the digital world and ensure that we can maintain our competitive advantage and make best use of opportunities for cultural diplomacy. Collaboration will be a key feature of future digital economics as the projects become so large as to be unsustainable within an individual institutional context.

Digitised content stimulates the economy, underpins UK competitiveness and develops a British brand for universities and Higher Education worldwide.

Open Data Study: Opening Government Data

Both the US and UK found a three-tiered drive was at play when Government based data was opened up for wide access. The three groups of actors who were crucial to the projects' success were:

- ☐ Civil society, and in particular a small and motivated group of "civic hackers";

- ☐ An engaged and well-resourced "middle layer" of skilled government bureaucrats; and

- ☐ A top-level mandate, motivated by either an outside force (in the case of the UK) or a refreshed political administration hungry for change (in the US).

It has to start at the top, it has to start in the middle and it has to start at the bottom.

Tim Berners-Lee

Widespread access to digitised resources contributes to the vibrant cultural and intellectual life of the UK, promoting education and enjoyment for all whilst bestowing a range of benefits to local and national economies. There is also a social and economic benefit in helping to bridge the digital divide by providing digitised British content to the world.

Asserting the value of the British brand

The Nineteenth Century House of Commons Papers... cannot be matched as a historical source in any other country in the world.

Norman Gash, Times Literary Supplement

Digitised resources emphasise the quality and innovation of UK education, thus helping promote the economy, and also actively assert the value of our British brand.

Leading the scientific world on climate change

The availability of the historical record, increasingly in digitised form, is one element of the scientific dominance the United Kingdom holds in the scientific discourse on climate change.

The observations from the logbooks on wind force and weather are astonishingly good... What happens in the oceans controls what happens in the atmosphere – so we absolutely need to comprehend the oceans to understand future weather patterns

Dr Dennis Wheeler, University of Sunderland

Reconstructing past climate change

Hundreds of Royal Navy ships' logbooks have been digitised dating from the 1760s to 1923. The accurate weather information they contain is being used to reconstruct past climate change—hitherto untapped scientific data.

Digitising over 20,000 fragile photographs from 1845-1960, the Freeze Frame archive delivers to a worldwide audience some of the most important visual resources for research into British and international polar exploration. Personal journals and official expedition reports provide a narrative to the photographs.

The Freeze Frame archive is invaluable in charting changes in the Polar Regions. Making the material available to all will help with further research into scientific studies around global warming and climate change

Pen Hadow, Polar Explorer

Digitising Britain for our Digital Futures

Vision

A sustainable national content collection of compelling rich and accessible digitised resources for excellence in research, learning and teaching.

Spanning centuries, disciplines and sources, the pioneering JISC digitisation programme is unlocking a wealth of unique, hard-to-access material from the birth of writing to the present day, creating a critical mass of rich, permanent digital resources. Much has been achieved.

There are opportunities for more impact, benefit and a greater return on investment if we continue to invest in the knowledge economy of Britain by digitising our wealth of information resources.

The Way Forward

In order to realise this vision, what is needed is:

- Collaboration to achieve sustainable funding from a variety of different sources: public, private and commercial.

- Partnerships between content holders and consumers to build upon the JISC licensing and cost models to deliver more content that is currently within copyright.

- Investment in the digitisation of the rich collections to be found in the libraries, archives and museums in the higher education and associated sectors. We must:

    - Act together to fill gaps in content provision by engaging with national, regional, and cultural needs.

    - Create new online communities within and in particular beyond the walls of the university.

    - Raise standards of digital literacy.

    - Help institutions be more effective/save money.

- Excellence in research, teaching and learning sustained by developing innovative tools and interfaces to digitised resources

- Expansion of our national content collection by actively encouraging the creativity and enthusiasm surrounding user generated and annotated content.

- Development of sustainable and compelling public services based on open content in public libraries, museum and archives.

- Competitive advantage to UK Higher Education demonstrated through the continued evaluation and assessment of the use of digitised resources.

We are sitting on a goldmine of content which should be within a coherent UK national digital strategy. To support Digital Britain we need to deliver a critical mass of digital content. Access... ought to be the right of every citizen, every household, every child, every school and public library, universities and business. That's a vision worth delivering on.

Dame Lynne Brindley, The British Library

Project Description and Methodology

Objective

The project objective was to undertake:

a synthesis study to collate evidence relating to the development and use of digitised resources, articulating both the benefits of such resources and the broader outcomes arising from their creation.

As required by the JISC ITT, the research work:

🔸 Drew on evidence related to JISC digitisation projects, associated reports commissioned by JISC and other non-JISC projects and reports.

🔸 Outlined the outcomes from, and the benefits of, digitised resources

Measuring and interpreting the broad impact of digitised resources is a complex undertaking. There is a mass of extant evidence, but attempts to interpret such evidence often tended to rely on commonplace assumptions about the nature of digitisation, without fully appreciating the actual way in which end users interact with such digital content. Very little attempt has been made to provide a deeper analysis that draws evidence from a number of sources and provides a compelling account of the advantages of digitised content.   This report performs the task of synthesising information relating to the benefits of digitisation and helps to provide a compelling argument for future digitisation work.

Method and approach

Developing an information gathering framework

Based on an initial meeting with JISC and the contextual background of the team involved, a broad framework for criteria for inclusion in the synthesis was agreed. There were four principle areas for investigation:

🔸 Meeting and advancing research needs

🔸 Bringing collections out of the dark

🔸 Stimulating the economy, underpinning competitiveness and developing skills.

🔸 Reaching out and building communities.

These areas are extremely broad in scope, however, they proved sufficient to develop an initial framework for information gathering. JISC provided further information and guidance along the lines of their Transformational Content agenda.

During the actual gathering of information the project team was mindful to use these initial categories as a guide only and to go beyond these categories should interesting information arise during the course of data gathering which provides valuable evidence on the value and benefits of digitised resources. The synthesis did develop organically which resulted in rather different categorisations of the final outputs.

Evidence collection

Data was collected using the framework as a guide. Data was gathered which related to the outcomes from and benefits of JISC digitisation projects and related JISC activities. We also collected evidence more widely and went beyond JISC funded activities, as evaluation and impact work has already been focussed on some of the JISC Digitisation projects. This included data pertaining to activity in the UK through the Research Councils (AHRC and EPSRC's Digital Economy Programme) as well as from around the world (funded by the EU, Mellon Foundation, IMLS or NEH for example). For instance, the work of the ICT Methods Network[2] which engaged deeply with the use of advanced ICT methods in arts and humanities research is seen as having particular significance in mapping how user behaviour has been influenced by digitisation programmes.

Evidence was identified through literature and web searches, personal knowledge and organisational contacts. JISC staff also shared any suitable resources with the project team. Evidence collection identified and obtained relevant documents – web pages, published reports, policy statements, survey results, statistical measures and evaluations amongst others.

Statistical measures and evaluations were seen as of primary importance to provide a sense of the scale of use and the penetration of digitisation benefits into the community. However, in actuality these were mainly lacking in depth and longitudinal evidence. It is our assessment that many of the evaluations focussed upon measures of numeric achievement in terms of items digitised. Most evaluations were lacking detail on usage and impact.

Narrative accounts and case studies were thus also seen as important factors to personalise the statistics, evaluation and literature synthesis. These narratives add clarity to those benefits and provide a sense of the way digitisation actually creates and delivers changes in academic research and teaching practice.

As Paola Marchionni mentioned in her recent article[3] we sought to research and identify:

- key areas where user engagement has been particularly useful

- the successes and challenges of pro-actively involving users

- some practical tips on working with users in an effective way

The evidence synthesised in this report clearly demonstrates the outcomes and benefits for the critical HE user base and also the wider community. Some of the evidence collection used semi structured interviews with people who are involved in the research and teaching use of digital content created through digitisation.

The output of the evidence gathering was shared through a project web site and wiki hosted at King's College London. This ensured a central source of all

---

[2] http://www.methodsnetwork.ac.uk
[3] "Why Are Users So Useful?: User Engagement and the Experience of the JISC Digitisation Programme", Paola Marchionni, Ariadne Issue 61, 30-October-2009 http://www.ariadne.ac.uk/issue61/marchionni/

gathered primary and secondary data for the projects partners, JISC and later for the wider community.

It is worth stating clearly that the evidence presented by previous evaluations have either been limited to number-crunching visitor numbers without much segmentation and analysis, or the use of anecdotal or survey evidence to try to find out about value and benefits. We remain in a situation where the creative, cultural and academic sectors are not able to adequately demonstrate from a strong enough evidence base that they are changing lives or having a positive impact with regard to digitised content in the way that other sectors have found it possible to do for their services or products.

In short, we need better evidence of impact. How has the digital resource delivered a positive change in a defined group of people's lives? The kinds of changes to be measured are diverse, and are likely to be in the following areas: economic, social, educational, cultural, health, political, and environmental, etc. We see this as an important subject for further research.

Synthesis of evidence

The data collected was analysed and the key aspects of evidence drawn out. At this point the project team gave some consideration to weighting and evaluating the evidence i.e. how robust or generalisable was it? In light of the evidence collected the four initial framework themes were reviewed to assess whether or not the evidence collected fit neatly into that format or whether the categories should be revised at the analysis and presentation stages. At this stage, and throughout, the JISC Programme Manager and other relevant JISC Executive staff were fully involved in assessing the evidence and making decisions about the final format of the synthesis. The data was synthesised in order to make as strong a case as possible to demonstrate the benefits of digitisation and help provide a compelling argument for future digitisation work.

Two particular, modes of evidence analysis within a Strategic Creative Analysis (SCAN) provide strong, positive frameworks to enable this report to break out from the common perspectives of digitisation into fresh insights.

PESTLE

The PESTLE methodology was used as a means of considering the results of the information gathered in a strategic context. PESTLE relates to the Political, Economic, Social, Technological, Legal and Environmental. This provided a wider perspective to the outcomes and benefits of digitisation in categories more easily identifiable to the strategically oriented reader.

Important stakeholder perspectives have been underrepresented (or are narrowly represented) in the literature to date. We sought, within the context of this PESTLE analysis, to better synthesise definitions of stakeholders, to enumerate their current engagement with digitised resources and to map how they are affected and changed by their engagement with digitised resources.

Balanced Scorecard

The Balanced Scorecard is a well used method for analysis and measurement of the value of intangible assets across a set of faceted perspectives. It has gained popularity as a means of enumerating the benefits of digital preservation and digitisation. In particular, it is being used by museums such as the Getty to justify digitisation activity and by social media organisations to measure media impact on audiences. The following graphic shows the

perspectives to the outcomes and benefits of digitisation that we sought to show through the synthesis.

In the Balanced Scorecard the measures of success are faceted across several categories.

🔴 **Users, audience and stakeholders:** The main one is the worth of the digitisation to the users, audience and stakeholders and how that benefits them.

🔴 **Innovation and development:** This evaluates the value of the digitisation in terms of how it enables the users and providers to do new and innovative actions not possible previously. This might include new research and teaching methods, Web 2.0 type interactions, new modes of collection development and curation not easily possible before digitisation.

🔴 **Internal processes:** Evaluates how the Digitisation Strategy provides value to the way that the organisation operates. For instance, documentation and conservation will both find efficiencies and benefits that could not be accrued without digitisation, as will curation.

🔴 **Financial benefits and outcomes:** digitisation provides great benefits to the whole HE sector and delivers to the income stream of this sector in a number of financially measurable means. These can be evaluated and enumerated across a wide range of activity and the synthesis will seek to show these.

Against each of the criteria, defined firm evidence has been provided to demonstrate the value of digitisation. Some of the value may also be demonstrated in the opportunity cost of not digitising particular resources.

Scope

The study primarily considered impact in the context of the impact on Higher and Further Education. Despite this it was important to look more widely at

the impact of digitisation outside the HE and FE sectors. There were demonstrable lessons and examples of high end benefits that have been accrued through digitisation in other sectors which could be transferred or extrapolated to activity in the HE and FE sectors. Within the HE and FE sectors there are many stakeholders sub groups with an interest in the creation and use of digitised resources. This includes: universities, students, researchers, lecturers, librarians, collection curators, funding bodies such as JISC and the research councils, and government departments such as Business Innovation and Skills (BIS). While the focus will be on the stakeholders identified above, the project team was ever mindful to include additional groups that emerged as relevant during the course of the project as well as other known stakeholder groups such as public and private sector museums, non HE libraries and archives, lifelong learners, schools, local and family historians, other government departments and funding bodies.

Bibliography and Resources

Adams, E., *Towards Sustainability Indicators for Museums in Australia* (Master's Dissertation, University of Adelaide, 2010), www.collectionscouncil.com.au/Default.aspx?tabid=802

Altman, M., Transformative Effects of NDIIPP, the Case of the Henry A. Murray Archive, *Library Trends*, 57(3), (2009), 338-351.

Batt, C., *Digitisation, Curation and Two-Way Engagement: Final Report* (August 2009), www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/digicuration.aspx

Battisti, M., Digitization of Public Domain Works... and Then? *Documentaliste - Sciences de l'Information*, 46(3) (2009), 24-26. www.cairn.info/numero.php?ID_REVUE=DOCSI&ID_NUMPUBLIE=DOCSI_464&AJOUTB IBLIO=DOCSI_464_0028

Beagrie N., Beagrie, R. and Rowlands, L., Research Data Preservation and Access: The Views of Researchers, *Ariadne*, 60 (2009), www.ariadne.ac.uk/issue60/beagrie-et-al/

Beagrie, N., Chruszcz, J. and Lavoie, B., *Keeping Research Data Safe: a Cost Model and Guidance for UK Universities* (JISC, 2008), www.jisc.ac.uk/publications/reports/2008/keepingresearchdatasafe.aspx

Billon, M., Marco, R. and Lera-Lopez, F., Disparities in ICT Adoption: A Multidimensional Approach to Study the Cross-Country Digital Divide. *Telecommunications Policy*, 33(10-11), (2009), 596-610

Blythe, K., Access of Digitized Print Originals in U.S. and U.K. Higher Education Libraries Combined with Print Circulation Indicates Increased Usage of Traditional Forms of Reading Materials, *Evidence Based Library and Information Practice,* 4(1), (2009), 21-23, http://ejournals.library.ualberta.ca/index.php/EBLIP-website (pdf available under the Creative Commons Licence)

Bradwell, P., *The Edgeless University: Why Higher Education Must Embrace Technology* (Demos, 2009), www.demos.co.uk/publications/the-edgeless-university

Breeding, M., Maximizing the Impact of Digital Collections, *Computers in Libraries*, 29(4), (2009), 32-34.

British Library 2020 Vision, www.bl.uk/2020vision

Brown, K., Questions for the 21st-Century Learner, *Knowledge Quest*, 38(1), (2009), 24-29.

Bundy, A. (ed.,) Australian and New Zealand Information Literacy Framework: principles, standards and practice (2nd Ed., Adelaide: Australian and New Zealand Institute for Information Literacy 2004), www.library.unisa.edu.au/infoskills/infolit/infolit-2nd-edition.pdf

Burden, K. and Atkinson, S., *Enhancing Teaching and Learning with Digitised Resources in Higher* Education (University of Hull, 2009), www.hull.ac.uk/dial

Champion for Digital Inclusion: The Economic Case for Digital Inclusion
(PricewaterhouseCoopers LLP, October 2009),
http://raceonline2012.org/sites/default/files/resources/pwc_report.pdf

CIBER. *Information Behaviour of the Researcher of the Future* ('Google Generation'
project), (UCL, January 2008), www.ucl.ac.uk/infostudies/research/ciber/downloads/

Cilan, C.A., Bolat, B.A. and Coskun, E., Analyzing Digital Divide within and between
Member and Candidate Countries of European Union, *Government Information
Quarterly,* 26(1), (2009), 98-105.

Coelho, L., Making Digital Cultures: Access, Interactivity, and Authenticity. *Ariadne*, 59
(2009), Book review, www.ariadne.ac.uk/issue59/coelho-rvw/

Conservative Technology Manifesto (2010),
www.conservatives.com/News/News_stories/2010/03/Conservative_Technology_Manif
esto_launched.aspx

© *The Way ahead A Strategy for Copyright in the Digital Age* (Intellectual Property
Office, 2009), www.ipo.gov.uk/c-strategy-**digital**age.pdf

Creating a Digital Smithsonian: Digitization Strategic Plan Fiscal Years 2010-2015
(Smithsonian Institution, 2009),
www.si.edu/Content/Pdf/About/2010_SI_Digitization_Plan.pdf

*Cultural Capital: A Manifesto for the Future: Investing in Culture will build Britain's
Social and Economic Recovery,* (Arts Council England, April 2010),
www.artscouncil.org.uk/publication_archive/cultural-capital-manifesto-future

Davison, S., If We Build it, Will They Come? Strategies for Teaching and Research with
Digital Special Collections. *RBM: A Journal of Rare Books, Manuscripts, and Cultural
Heritage,* 10(1), (2009), 37-49,
http://rbm.acrl.org/content/10/1/37.full.pdf+html?sid=0be7d94b-02b9-4ce6-9a93-
99364056e834

Delivering Digital Inclusion (Annex**,** Public Sector Use of Information and
Communications) (2008),
www.communities.gov.uk/publications/communities/digitalinclusionannex

Deloitte, The Economic Impact of the BBC: 2008-9, A Report for the BBC (2010),
www.downloads.bbc.co.uk/aboutthebbc/reports/pdf/acc_economic_report.pdf

*Digitisation in the UK: the Case for a UK framework (*A report based on the
Loughborough University study on Digitised Content in the UK Research Libraries and
Archives Sector commissioned by JISC and the Consortium of Research Libraries
(CURL), JISC, November 2005),
www.jisc.ac.uk/publications/programmerelated/2005/pub_digi_uk.aspx

Digitisation of the Archive of the East Anglian Daily Times (EADT) Newspaper (HLF
case study, 2008), www.hlf.org.uk/ourproject/Pages/UnseenArchive.aspx

Dobreva, M., *Digitisation of Special Collections: mapping, assessment, prioritisation
(DiSCmap), Final Report* (2009),
www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/discmap.aspx#downloads

Dooley, J., Ten Commandments for Special Collections Librarians in the Digital Age, *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage*, 10(1), (2009), 51-59.

Dunn, R. and Menchaca, F., The Present is Another Country, *Journal of Library Administration,* 49(5), (2009), 469-479.

Dunn, S., Dealing with the Complexity Deluge: VREs in the Arts and Humanities, *Library Hi Tech*, 27(2), (2009). 205 – 216

Dyson, J., *Ingenious Britain: Making the UK the Leading High Tech Exporter in Europe* (March 2010), www.russellgroup.ac.uk/uploads/Dyson-report-Ingenious_Britain1.pdf

The Economic Impact of UK Higher Education Institutions (Universities UK, March 2006), www.universitiesuk.ac.uk/Publications/Pages/Publication-237.aspx

EU Culture Ministers Stress Importance of Culture for Economic Growth (31 March 2010), http://news.xinhuanet.com/english2010/world/2010-04/01/c_13233626.htm

Evaluation of the JISC Digitisation Programme Phase 1 and International Contextualisation (Evidence Base, 2007), www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/evalphase1.aspx

Excellence with Impact (Research Councils UK 2008) www.rcuk.ac.uk/documents/economicimpact/excellenceimpact.pdf

Fleming, P. and King, E., The British Library Newspaper Collections and Future Strategy, *Interlending and Document Supply*, 37(4), (2009), 223-228. Abstract at www.ingentaconnect.com/content/mcb/122/2009/00000037/00000004/art00009

Ford, K.M., Ambivalence towards Convergence: Digitalization and Media Change, *Journal of the American Society for Information Science and Technology,* 60(2), (2009), 427-428.

Formative Evaluation of the JISC Digitisation Programme Phase 2, Final Report (Glenaffric Ltd, October 2009), www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/evalphase2.aspx

Fox, H., *Beyond the Bottom Line: Evaluating Art Museums with the Balanced Scorecard* (Dissertation reprinted by the Getty Leadership Institute, Claremont Graduate University, 2006), www.cgu.edu/pdffiles/gli/fox.pdf

Frey, B.S. and Pommerehne, W.W., Muses and Markets : Explorations in the Economics of the Arts (Blackwell, 1989)

Fry, J., Lockyer, S., Oppenheim, C., Houghton, J. and Rasmussen, B., Identifying Benefits Arising from the Curation and Open Sharing of Research Data Produced by UK Higher Education and Research Institutes (JISC, 2009), http://ie-repository.jisc.ac.uk/279/

Green, A., Theatre of Memories, *Multimedia Information and Technology*, 35(2), (2009), 61-64

Green, A., Big Digitisation: Where Next? Paper delivered at the Digital Resources for the Humanities and Arts conference, Belfast, 8 September 2009

Grindley, N., Saving for the Future, *Research Information*, 40 (2009), 13-14, www.researchinformation.info/features/feature.php?feature_id=205

Guegen, G. and Hanlon, A.M., A Collaborative Workflow for the Digitization of Unique Materials, *The Journal of Academic Librarianship*, 35(5), (2009), 468-474.

Hacker, K.L., Mason, S.M. and Morgan, E.L., Digital Disempowerment in a Network Society, *International Journal of Electronic Government Research*, 5(2), (2009), 57-71.

Hammond, M. and Davies, C., *Understanding the Costs of Digitization: Detail Report* (Curtis+Cartwright Consulting Ltd, 2009), www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/breakingcosts.aspx

Handke, C., *The Economics of Copyright and Digitisation: A Report on the Literature and the Need for Further Research* (Strategic Advisory Board for Intellectual Property Policy (SABIP), 2010), http://digitisation.jiscinvolve.org/wp/2010/06/04/the-economics-of-copyright-and-digitisation/

Higher Education and Society: A Research Report (Centre for Higher Education Research and Information (CHERI), The Open University, March 2010), www.open.ac.uk/cheri/pages/CHERI-Reports-2010.shtml

Houghton, J. and Sheehan, P., *The Economic Impact of Enhanced Access to Research Findings* (CSES Working Paper 23, July 2006), www.cfses.com/documents/wp23.pdf

Hughes, L. (ed) , AHRC Methods Network Final Report (King's College London, 2008), www.methodsnetwork.ac.uk/publications/final-report.html

Hunter, D., Development of strategic performance information at the National Library of Scotland, *Performance Measurement and Metrics*, 10 (2), (2009), 142–150

Huwe, T.K., Exploiting Synergies: Among Digital Repositories, Special Collections, and Online Community, *Online*, 33(2), (2009), 14-19.

Increasing the Economic Impact of Research Councils (Research Councils UK, 2007), www.rcuk.ac.uk/Publications/policy/Pages/Increasingei.aspx

Kaufman, P.B. and Albon, M., *Funding Media, Strengthening Democracy: Grantmaking for the 21st Century* (March 2010), www.gfem.org/

Kelly, U., *Exploring the Evidence Base: an Overview of the Literature on the Economic Impact of Knowledge Transfer* (University of Strathclyde, 2008), http://ewds.strath.ac.uk/impact/PresentationsPublications/DiscussionPapers.aspx

Khoo, M., Buchanan, G. and Cunningham, S.J., CDL 2009 Workshop Report: Lightweight User-Friendly Evaluation Knowledge for Digital Librarians, *D-Lib Magazine*, 15(7-8), (2009), www.dlib.org/dlib/july09/khoo/07khoo.html

Lalitha, P., Importance of Digitization of Cultural and Heritage Materials, *SRELS Journal of Information Management*, 46(3), (2009), 249-266. Abstract at www.indianjournals.com/ijor.aspx?target=ijor:sjim&volume=46&issue=3&article=004

Lampert, G. and Vaughan, J., Success Factors and Strategic Planning: Rebuilding an Academic Library Digitization Program, *Information Technology and Libraries*, 28(3), (2009), 116-136.

Landon, G.V., Toward Digitizing All Forms of Documentation, *D-Lib Magazine*, 15(1-2), (2009), www.dlib.org/dlib/march09/landon/03landon.html

Lanz, D., Zarndt, F., Boddie, S., Powell, T. and Salgotra, V., The New Papers Past: An International Collaboration between New Zealand, India, Germany, and the United States. *OCLC Systems and Services: International Digital Library Perspectives,* 25(4), (2009), 287-294

Leading the World: the Economic Impact of UK Arts and Humanities Research, (Arts and Humanities Research Council, June 2009), www.ahrc.ac.uk/News/Latest/Pages/leadingtheworld.aspx

Lefurgy, W.G., NDIIPP Partner Perspectives on Economic Sustainability, *Library Trends*, 57(3), (2009), 413-426. Abstract at http://muse.jhu.edu/login?uri=/journals/library_trends/v057/57.3.lefurgy.pdf

Liew, C.L., Digital Library Research 1997-2007: Organisational and People Issues. *Journal of Documentation*, 65(2), (2009), 245-266

Lee, S.D. and Lindsay, K., If You Build it They Will Scan it: Oxford University's Exploration of Community Collections, *Educause Quarterly* 2 (2), (2009), www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolum/IfYouBuildItTheyWillScanOxford/174547

Lindsay, K., The Great War Archive: Putting Your Trust in the Community, an Alternative Approach to Digitisation (JISC Digital Content Conference, 2009), www.jisc.ac.uk/media/documents/events/2009/06/kate_lindsay_1e.pdf

Lindsay, K., Web Usability in Practice: a Case Study from the First World War Poetry Digital Archive (Society for Archivists: Web Usability for Archivists, 2009), www.slideshare.net/ktlindsay/web-usability-in-practice-a-case-study-from-the-first-world-war-poetry-digital-archive

Lindsay K. and Lee, S.D., Poetry in Context: The First World War Poetry Digital Archive, W*ordPlay*, 2 (October 2009), www.english.heacademy.ac.uk/explore/publications/magazine/wordplay2/lind_lee.htm

Locock, M., Putting Welsh Journals Online: The Challenges. *ALISS Quarterly*, 4(3), (2009), 32-34

Lynch, C. and Carleton, D.E., Lecture: Impact of Digital Scholarship on Research Libraries, *Journal of Library Administration*, 49(3), (2009), 227-244

Madsen, C.. The Importance of Marketing Digital Collections. *ALISS Quarterly* (Autumn 2009), http://christinemadsen.com/wpcontent/uploads/2009/09/ImportanceofMarketingDigitalCollections.pdf

Marchionni, P., Why Are Users So Useful?: User Engagement and the Experience of the JISC Digitisation Programme, *Ariadne,* 61 (October 2009), www.ariadne.ac.uk/issue61/marchionni/

Manzuch, Z., Monitoring Digitisation: Lessons from Previous Experiences, Journal of Documentation, 65(5), (2009), 768-796.

Maron, N.L. and Smith, K.K., 2009. Current Models of Digital Scholarly Communication: Results of an Investigation Conducted by Ithaka Strategic Services for the Association of Research Libraries. *JEP: The Journal of Electronic Publishing*, 12(1),. http://quod.lib.umich.edu/cgi/t/text/text-idx?c=jep;cc=jep;q1=3336451.0012.1%2A;rgn=main;view=text;idno=3336451.0012.105

Maron, N.L., Smith, K.K. and Loy, M., *Sustaining Digital Resources: An On-the-ground view of Projects Today* (Ithaka Case Studies in Sustainability, 2009), www.jisc.ac.uk/publications/programmerelated/2009/scaithakaprojectstoday.aspx

McAfee, A., The Weird and Wonderful Economics of Digitization, *Harvard Business Review* (29 March 2010), http://blogs.hbr.org/hbr/mcafee/2010/03/the-weird-and-wonderful-econom.html?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed:+harvardbusiness+(HBR.org)

McCarty, W., Digitising is Questioning, or Else, Long Room Hub Lecture Series, Trinity College Dublin, April 2008, http://staff.cch.kcl.ac.uk/~wmccarty/

Mcintyre, B., 2009. Information Online: Focusing on Connection, Collaboration, and Clients, *Information Today*, 26(3), 25-25

Meyer, E.T., Eccles, K., Thelwall, M. and Madsen, C., Usage and Impact Study of JISC-funded Phase 1 Digitisation Projects and the Toolkit for the Impact of Digitised Scholarly Resources (TIDSR), (Oxford Internet Institute, July 2009), http://microsites.oii.ox.ac.uk/tidsr/welcome

Meyer, E.T., Eccles, K. and Madsen, C., Digitisation as e-Research infrastructure: Access to Materials and Research Capabilities in the Humanities, *Proceedings of the 5th International Conference on e-Social Science* (Cologne, Germany, 24-26 June 2009), www.ncess.ac.uk/resources/content/papers/Meyer(2).pdf

Mezey, M., Digitisation: Impact, Not Historical Significance, Key to Funds, *Library and Information Update* (2009), 24

Michalko, J., Malpas, C. and Arcolio, A., *Research Libraries, Risk and Systemic Change* (OCLC Research, 2010), www.oclc.org/research/publications/library/2010/2010-03.pdf

Murphy, A., et al, *Freeze Frame: Digital Portals, Final Report* (November 2009), www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/metatataforportals.aspx#downloads

Musnik, S.Y., From Gallica to Gallica 2 and More: A Survey of the Digitisation Projects at the BnF, *Turk Kutuphaneciligi/Turkish Librarianship*, 23(2), (2009), 337-350.

National Library of New Zealand, *Digitisation Strategy 2010 – 2015* (June 2010), www.natlib.govt.nz/about-us/policies-strategy/national-library-digitisation-strategy

National Library of Scotland, *Corporate Plan 2009/10 - 2011/12* (2009), www.nls.uk/media/738466/2009-2012-corporate-plan.pdf

Nichols, S.G., Time to Change Our Thinking: Dismantling the Silo Model of Digital Scholarship, *Ariadne*, (58), (2009), www.ariadne.ac.uk/issue58/nichols/

Ooghe, B. and Moreels, D., Analysing Selection for Digitisation: Current Practices and Common Incentives, *D-Lib Magazine*, 15(9-10), (2009), www.dlib.org/dlib/september09/ooghe/09ooghe.html

Palmer, J., Archives 2.0: If We Build it, Will They Come? *Ariadne*, (60), (2009), www.ariadne.ac.uk/issue60/palmer/

Reisz, Matthew. 'Perverse' VAT policy will harm libraries and research, Chancellor told, *Times Higher Education (*19 July 2010)*,* www.timeshighereducation.co.uk/story.asp?sectioncode=26&storycode=412613&c=1

Review of User Requirements for Digitised Resources in Islamic Studies (University of Exeter, May 2008), www.jisc.ac.uk/whatwedo/programmes/digitisation/reports/islamicstudies.aspx

Ridge, M., O'Flaherty, D., Caldwell-Nichols, A., Bradley, R., Howell, C., *A framework for evaluating cultural policy investment* (London: Frontier Economics , 2007)

Rowlands, I., Nicholas, D., Williams, P., Huntington, P., Fieldhouse, M., Gunter, B., Withey, R., Jamali, H.R., Dobrowolski, T. and Tenopir, C., The Google Generation: the Information Behaviour of the Researcher of the Future.. *ASLIB Proceedings* 60(4), (2008). 290-310

Rowley, J., Making Digital Cultures: Access, Interactivity, and Authenticity, *Journal of Librarianship and Information Science*, 41(4), (2009), 248-249

Ryan, J., Stories and Numbers: A Framework for Measuring Engagement (Museum Computer Network conference, 2009), www.slideshare.net/jasonryan/mcn-measuring-engagement

Sharma, R.S., Samuel, E. and Ng, E., Beyond the Digital Divide: Policy Analysis for Knowledge Societies, *Journal of Knowledge Management*, 13(5), (2009).

Smith, A., *Access in the Future Tense* (Council on Library and Information Resources, Washington, D.C., April 2004), www.clir.org/pubs/reports/pub126/contents.html

Smith, K. K., *V&A Images: Image Licensing at a Cultural Heritage Institution* (Ithaka Case Studies in Sustainability, 2009), http://sca.jiscinvolve.org/files/2009/07/sca_bms_casestudy_vaimages.pdf

Somerville, M.M. and Brar, N., A User-Centered and Evidence-Based Approach for Digital Library Projects, *The Electronic Library*, 27(3), (2009), 409-425.

Soergel, D., Oard, D., Gustman, S., Fraser, L., Kim, J., Meyer, J., Proffen, E. and Sartori, T., *The Many Uses of Digitized Oral History Collections: Implications for Design* (Technical Report, College of Information Studies, University of Maryland, 2002), www.malach.umiacs.umd.edu/pubs/MALACHTechReportUses.pdf

Takle, M., *The Norwegian National Digital Library*, *Ariadne* (60), (2009), www.ariadne.ac.uk/issue60/takle/

Tanner, S., *Collaboration for our digital futures*, invitation paper presented to the Nobel Foundation Symposium, Stockholm, June 2009

Tanner, S., Deegan, M., Digital Futures: Strategies for the Information Age, 2002. Library Association Publishing

Tanner, S., *Digital Libraries and Culture, in Digital Libraries in Education, Science and Culture. Analytical survey*, UNESCO, 2006

Tanner, S., Deegan, M., Digital Preservation (edited volume), 2006. Facet Publishing

Tanner, S., Bearman G., *Digitising the Dead Sea Scrolls*, Proceedings of the IS&T Archiving Conference, 2009

Tanner, S., *Handbook on Cost Reduction in Digitisation*, European Programme Guidance Document, 2006

Tanner, S., *Technological Trends and Developments and their Future Influence on Digital National Libraries* (2010) as Appendix to the strategic forecast report Thriving and Surviving: National Library of Scotland in 2030

Tanner, S., *The economic future for digital libraries: a 2020 vision*, in Digital Library Economics. David Baker and Wendy Evans (eds.), Chandos, 2009

Transformation Through Technology: Illustrating JISC's impact across two decades (JISC, 2010), www.jisc.ac.uk/publications/generalpublications/2010/jiscimpact2010.aspx

Van der Hoeven, J., *First Insights into Digital Preservation of Research Output in Europe* (PARSE Insight, 2009), www.parse-insight.eu/downloads/PARSE-Insight_D3-5_InterimInsightReport_final.pdf

Van Stipriaan, R., Digitisation Helps Future Proof Dutch Literature, *Research Information*, (41), (2009), 13-14, www.researchinformation.info/features/feature.php?feature_id=212

Williams, R.V., Enhancing the Cultural Record: Recent Trends and Issues in the History of Information Science and Technology, *Libraries and the Cultural Record,* 44(3), (2009), 326-342. Abstract at http://muse.jhu.edu/login?uri=/journals/libraries_and_culture/v044/44.3.williams.html

Wilson, J.A.J., *Intute/JISC Digitisation Dissemination Project, Final Report* (July 2009), www.jisc.ac.uk/whatwedo/programmes/digitisation/intute.aspx

Wilson, T. and Maceviciute, E., What Do Practitioners Want to See Researched? *Library and Information Update*, (2009), 46-49

Zorich, D. M., A Survey of Digital Humanities Centers in the United States (Council on Library and Information Resources, Washington, D.C., 2008), www.clir.org/pubs/reports/pub143/pub143.pdf

Digitisation Projects and Resources Referenced

AHRC Methods Network, www.methnet.ac.uk

Andrew W. Mellon Foundation, www.mellon.org

The Archimedes Palimpsest Project, www.archimedespalimpsest.org/

Archival Sound Recordings, http://sounds.bl.uk/

Australian Newspapers Digitisation Program, www.nla.gov.au/ndp/

BBC Second World War, www.bbc.co.uk/ww2peopleswar/

Birmingham Museums & Art Gallery Pre-Raphaelite Online Resource, http://www.preraphaelites.org/

British Cartoon Archive, www.cartoons.ac.uk/

British Library Archival Sound Recordings, http://sounds.bl.uk/

British Library Electronic Theses Online Service (EthOS), http://ethos.bl.uk/

British Library Newspaper Digitisation, http://newspapers.bl.uk/blcs/

Caribbean Histories Revealed, www.nationalarchives.gov.uk/caribbeanhistory/

Chopin's First Editions Online, www.cfeo.org.uk/

The Codex Sinaiticus Digitisation Project, http://codexsinaiticus.org/en/

Columbia University Digital Bridges Project, http://ccnmtl.columbia.edu/digitalbridges/about/

Corpus Vitrearum Medii Aevi (CVMA), Corpus of Medieval Stained Glass in Great Britain, www.cvma.ac.uk

The Dearing Report (National Committee of Inquiry into Higher Education (the Dearing Committee) (1997), Higher Education in the Learning Society: Main Report, London: HMSO.) https://bei.leeds.ac.uk/Partners/NCIHE/

Digital Shikshapatri, http://www.shikshapatri.org.uk/

Early English Books Online, http://eebo.chadwyck.com/

East London Lives 2012 Digital Archive, www.uel.ac.uk/londoneast/research/EastLondonLives2012.htm

The Economic and Social Data Service, www.esds.ac.uk/

eLib: The Electronic Libraries Programme, www.ukoln.ac.uk/services/elib/

Excellence with Impact: UK Research Councils, www.innovationuk.org/news/innovation-uk-vol5-1/0042-excellence-with-impact.html

FamilySearch. www.familysearch.org

Fine Rolls of Henry III, www.finerollshenry3.org.uk

First World War Poetry Archive, www.oucs.ox.ac.uk/ww1lit/

First World War soldiers' records, The National Archives,
www.nationalarchives.gov.uk/pathways/firstworldwar/service_records/sr_soldiers.htm

The Follett Report (Joint Funding Council's Libraries Review Group: Report, 1993),
www.ukoln.ac.uk/services/papers/follett/report/

Freeze Frame, Historic Polar Images, 1845-1982 from the Scott Polar Research
Institute, www.freezeframe.ac.uk

Glasgow Museums Collection Navigator, http://collections.glasgowmuseums.com/

The Great War Archive, www.oucs.ox.ac.uk/ww1lit/gwa/

The Higher Education Academy, www.heacademy.ac.uk

Jane Austen Fiction Manuscripts Digital Edition, www.janeausten.ac.uk

JSTOR, www.jstor.org

LBC/Independent Radio News Digitisation Project, http://radio.bufvc.ac.uk/lbc/

Medical Journals Backfiles, http://library.wellcome.ac.uk/doc_WTD037630.html

Moving Here - 200 years of Migration to England, www.movinghere.org.uk

National Endowment for the Humanities, www.neh.gov

Newsfilm Online, www.nfo.ac.uk

Nineteenth Century House of Commons Papers,
www.proquest.co.uk/en-UK/catalogs/databases/detail/19thcenhocpp.shtml

NOF-digitise (New Opportunities Fund), www.nof-digitise.org/launch.htm

Old Bailey Online - The Proceedings of the Old Bailey, 1674-1913,
www.oldbaileyonline.org

Online Chopin Variorum Edition, www.ocve.org.uk

Open Data Study,
www.soros.org/initiatives/information/focus/communication/articles_publications/publi
cations/open-data-study-20100519

London Lives 1690 to 1800, www.londonlives.org

Oxford Journals Archive, www.oxfordjournals.org

The Protein Data Bank, www.pdb.org

Renaissance in the Regions, www.mla.gov.uk/what/programmes/renaissance

RunCoCo: How to run a community collection online,
http://projects.oucs.ox.ac.uk/runcoco/

Sainsbury Review: The Race to the Top A Review of Government's Science and
Innovation Policies, Lord Sainsbury of Turville, HM Treasury, October 2007
http://webarchive.nationalarchives.gov.uk/+/http://www.hm-
treasury.gov.uk/independent_reviews/sainsbury_review/sainsbury_index.cfm

Shetland Museum and Archives Photo Library, http://photos.shetland-museum.org.uk/

The UK Colonial Registers and Royal Navy Logbooks (CORRAL),
http://badc.nerc.ac.uk/data/corral/

The Virtual Workspace for the Study of Ancient Documents,
http://bvreh.humanities.ox.ac.uk/news/e-Science_Demonstrator.html

Wellcome Trust Medical Journals Backfiles,
http://library.wellcome.ac.uk/doc_WTD037630.html

Welsh Journals Online, http://welshjournals.llgc.org.uk/