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1. Summary

A number of current drivers for Research Data Management (RDM) are identified, prompted by amongst others, RCUK, UK Data Archive, EU, the Data Seal of Approval, and a range of research funders.

Particular reference is made to the specific and immediate requirements or nine “clear expectations” of the Engineering and Physical Sciences Research Council (EPSRC). It expects that where it funds research, institutions will fully comply with these expectations by May 2015. More immediately these institutions should have developed a research data “roadmap” by 1 May 2012.

Although not prescriptive in its definition of a data roadmap and not expecting formal submission, the EPSRC has confirmed that it expects a road-mapping process to produce a plan on the basis of four questions:

1. What do we do now?
2. What must be done to address current gaps?
3. When will it be done?
4. What resources will be committed?

The University’s current position and plans are described in relation to its IT Strategy 2011-16, in particular pointing to the desire to meet needs of, and develop services for researchers.

At its meeting of 4 April 2012 the Research Computing Management Group (RCMG) agreed asserted that whilst it acknowledged and intended to respond positively to the EPSRC requirements, it also needed to identify and generic issues and address broader demands, for example from other research funders, and to support the long-term development of research data management.

The RCMG agreed that IT Services Academic Liaison should continue its work to create a data roadmap by 1 May 2012.

In addition broader decisions have been taken by RCMG concerning:

- the need to progress with development of an institutional RDM policy,
- collaboration between researchers, IT Services, the Library and the Research Support Office,
- establishment of a RDM Working Group, and
- the need for quick development of researcher relevant communications, documentation and guidance, as part of a RDM support service, emphasising appropriate adaptation and use of existing materials.

An initial Research Data Roadmap has been written, for iterative development and as a basis for consultation and broader input.

2. Purpose of this Document

In the context of the existing broad demand for attention on, and improvement, to research data management, the purpose of this document is to,

- a) Raise awareness of the EPSRC specific expectations within the RCMG and more widely,
- b) Discuss what is required to comply,
- c) Provide evidence of a RDM “roadmap” to compliance.
- d) Place this requirement within the context of general RDM development
- e) Confirm the general direction of RDM work with the University.

This document does not attempt to define the precise nature of all processes, services and resources which it is envisaged will provide compliance with expectations of RCUK, all funders and EPSRC in particular. These will develop as aspects of research data management (RDM) are introduced and improved within the University and as the IT Strategy is implemented (University of Leicester IT Strategy 2011-2016, R01.7).

It is expected that later reports to the Research Computing Management Group will provide progress updates and further detail.

3. Background & Introduction – Research Data Management

An impetus for appropriate research data management (RDM) is provided by Research Councils UK (RCUK) in their “Common Principles on Data Policy” (RCUK, <http://www.rcuk.ac.uk/research/Pages/DataPolicy.aspx>):

Making research data available to users is a core part of the Research Councils’ remit and is undertaken in a variety of ways. We are committed to transparency and to a coherent approach across the research base.

Principles

- *Publicly funded research data are a public good, produced in the public interest, which should be made openly available with as few restrictions as possible in a timely and responsible manner that does not harm intellectual property.*
- *Institutional and project specific data management policies and plans should be in accordance with relevant standards and community best practice. Data with acknowledged long-term value should be preserved and remain accessible and usable for future research.*
- *To enable research data to be discoverable and effectively re-used by others, sufficient metadata should be recorded and made openly available to enable other researchers to understand the research and re-use potential of the data. Published results should always include information on how to access the supporting data.*
- *RCUK recognises that there are legal, ethical and commercial constraints on release of research data. To ensure that the research process is not damaged by inappropriate release of data, research organisation policies and practices should ensure that these are considered at all stages in the research process.*
- *To ensure that research teams get appropriate recognition for the effort involved in collecting and analysing data, those who undertake Research Council funded work may be entitled to a limited period of privileged use of the data they have collected to enable them to publish the results of their research. The length of this period varies by research discipline*

and, where appropriate, is discussed further in the published policies of individual Research Councils.

- *In order to recognise the intellectual contributions of researchers who generate, preserve and share key research datasets, all users of research data should acknowledge the sources of their data and abide by the terms and conditions under which they are accessed.*
- *It is appropriate to use public funds to support the management and sharing of publicly-funded research data. To maximise the research benefit which can be gained from limited budgets, the mechanisms for these activities should be both efficient and cost-effective in the use of public funds.*

These principles provide *overarching framework* for individual Research Council data policies.

Good data management is described by the UK Data Archive as:

... fundamental for high quality research data and research excellence. Data management covers all aspects of handling, organising, documenting and enhancing research data, and enabling their sustainability and sharing. Many research funders require data management and sharing plans at the start of research projects.

UK Data Archive (<http://www.data-archive.ac.uk/create-manage/planning-for-sharing>)

In May 2007 EU INSPIRE Directive established an infrastructure for spatial information in Europe (with metadata regulations in December 2008 and regulations on data and service sharing in March 2010), in 2008 the Data Seal of Approval (DSA) guidelines were initially drafted giving quality guidelines for digital research data as a basis for granting a “Data Seal of Approval” to trusted digital repositories (<http://datasealofapproval.org/>).

A range of research funders (AHRC, BBSRC, CRUK, EPSRC, ESRC, MRC, NERC, STFC and the Wellcome Trust) have policies and policy stipulations which concern aspects of research data management including published output, datasets (and access to and maintenance of electronic resources), storage and access time limits, data planning, access, data sharing and re-use, long-term curation and monitoring of compliance (See Appendix 1 for a summary of these policies and stipulations).

In terms of a specific challenge for institutions, in April 2011 the Engineering and Physical Sciences Research Council (EPSRC) wrote to university Vice Chancellors explaining their Policy Framework on Research Data. This framework set out EPSRC’s principles and expectations concerning how the *institutions* (not just the researchers) they fund will ensure that research data generated as a result of their support is appropriately managed and shared. (from Pryor, G., “The Essential Data Roadmap”, DCC, <http://www.dcc.ac.uk/news/essential-data-roadmap>).

Specifically the EPSRC has the following “*clear expectations*” of organisations in receipt of EPSRC research funding:

1. **Research organisations will promote internal awareness of these principles and expectations** and ensure that their researchers and research students have a general awareness of the regulatory environment and of the available exemptions which may be used, should the need arise, to justify

the withholding of research data.

2. Published research papers should include a short statement describing ***how and on what terms any supporting research data may be accessed***.
3. Each research organisation will have specific ***policies and associated processes*** to maintain effective ***internal awareness of their publicly-funded research data holdings*** and of requests by third parties to access such data; all of their ***researchers or research students*** funded by EPSRC will be required to ***comply with research organisation policies*** in this area or, in exceptional circumstances, to provide justification of why this is not possible.
4. Publicly-funded ***research data that is not generated in digital format will be stored in a manner to facilitate it being shared*** in the event of a valid request for access to the data being received (this expectation could be satisfied by implementing a policy to convert and store such data in digital format in a timely manner).
5. Research organisations will ensure that ***appropriately structured metadata*** describing the research data they hold is ***published*** (normally within 12 months of the data being generated) and ***made freely accessible on the internet***; in each case the metadata must be sufficient to allow others to understand what research data exists, why, when and how it was generated, and how to access it. Where the research data referred to in the metadata is a digital object it is expected that the metadata will include use of a robust digital object identifier (For example as available through the DataCite organisation - <http://datacite.org>).
6. ***Where access to the data is restricted*** the published metadata should also give the reason and summarise the conditions which must be satisfied for access to be granted. For example 'commercially confidential' data, in which a business organisation has a legitimate interest, might be made available to others subject to a suitable legally enforceable non-disclosure agreement.
7. ***Research organisations will ensure that EPSRC-funded research data is securely preserved for a minimum of 10-years from the date that any researcher 'privileged access' period expires or, if others have accessed the data, from last date on which access to the data was requested by a third party***; all reasonable steps will be taken to ensure that publicly-funded data is not held in any jurisdiction where the available legal safeguards provide lower levels of protection than are available in the UK.
8. ***Research organisations will ensure that effective data curation is provided throughout the full data lifecycle***, with 'data curation' and 'data lifecycle' being as defined by the Digital Curation Centre [see Appendix B., C.]. The full range of ***responsibilities associated with data curation over the data lifecycle will be clearly allocated within the research organisation***, and where research data is subject to restricted access the research organisation will implement and manage appropriate security controls; research organisations will particularly ensure that the ***quality assurance of their data curation processes is a specifically assigned responsibility***.

9. **Research organisations will ensure adequate resources are provided to support the curation of publicly-funded research data**; these resources will be allocated from within their **existing public funding streams**, whether received from Research Councils as direct or indirect support for specific projects or from higher education Funding Councils as block grants.

EPSRC Policy Framework on Research Data - Expectations

<http://www.epsrc.ac.uk/about/standards/researchdata/Pages/expectations.aspx>

(Author's emphasis within the above).

The EPSRC has attached specific deadlines to these requirements. They state that by:

- a) 1 May 2012 each funded institution should have a clear roadmap in place to align their policies and processes with the EPSRC expectations, and that by
- b) 1 May 2015, each institution should be fully compliant with these.

(EPSRC Policy Framework on Research Data – Impact, Timescales & Support,

<http://www.epsrc.ac.uk/about/standards/researchdata/Pages/impact.aspx>)

4. What is a “Data Roadmap”?

Since making its requirements known clarification has been sought from the EPSRC regarding what a “data roadmap” comprises.

In its Policy Framework EPSRC makes it clear that it does not intend to prescribe how an institution meets its expectations, and it *“encourages research organisations to develop specific approaches which, while aligned with EPSRC’s expectations, are appropriate to their own structures and cultures”* (EPSRC Policy Framework on Research Data, <http://www.epsrc.ac.uk/about/standards/researchdata/Pages/default.aspx>). A reminder sent to Vice Chancellors in February 2012, also stated that the EPSRC does not require roadmaps to be formally submitted but that they may be requested on a case by case basis.

With a lack of prescription however, there has been some confusion about the preferred or most acceptable shape of a roadmap.

Attending a Digital Curation Centre (DCC) Road-show (Loughborough, 7-8th February 2012) and JISC MRD (Managing Research Data) Workshop (Leeds 12-13th March 2012), Ben Ryan of EPSRC was able to provide clarification when he:

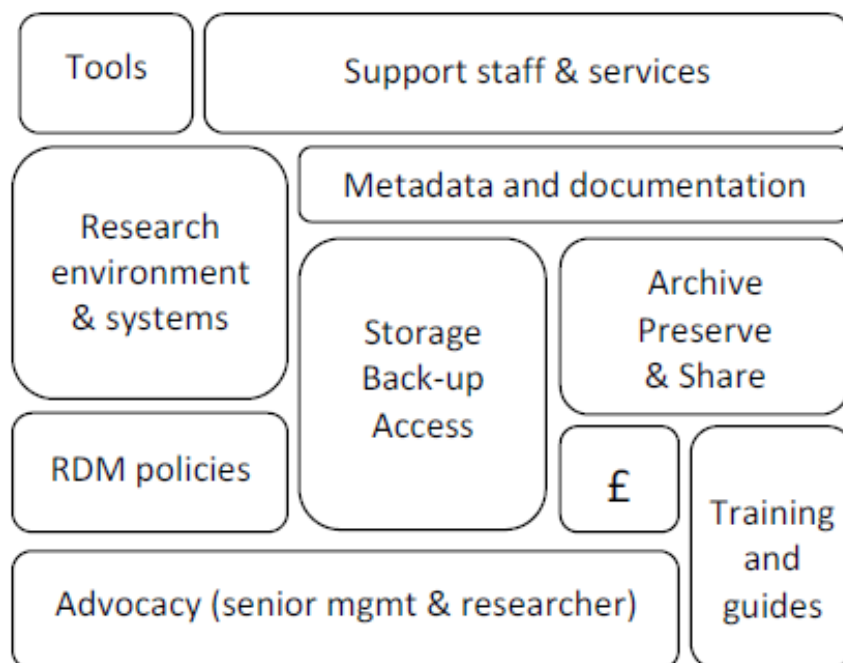
*“... stressed the importance of the road mapping process needed to **produce a plan**. Institutions should review their current capabilities to identify what changes are needed to ensure compliance, and then devise a realistic plan to implement these within the 3-year timeframe”.*

Jones, S., “Developing a Roadmap for RDM”, DCC, <http://www.dcc.ac.uk/news/developing-roadmap-rdm>

5. What is needed to meet Roadmap requirements

Institutions may interpret the requirements in a variety of ways, and relate compliance to various aspects of on-going RDM development and other funder requirements. It is clear from the DCC/JISC events that institutions vary significantly in terms of approaches taken, resources attached and progress made. What is required however is a roadmap or plan for research data policy and services, or a “*fully functioning RDM Support Service*” (DCC) (See Fig. 1.)

Fig. 1. Components of a Research Data Management Service



Digital Curation Centre

The University requires a project plan, based on a description of what it has in place currently (current infrastructure and support) and what gaps in provision must be addressed before the nine expectations are met. For each expectation it is important to answer four questions:

1. What do we do now and what do we have in place?
2. What must we do to meet any identified gaps?
3. When will we do it?
4. What resources will we commit?

At its simplest the roadmap may consist of a table stating what exists now and what will be in place at the end of three years. This will demonstrate commitment to undertake actions by May 2015, not to have the requisite policy and infrastructure wholly in place by May 2012.

(from Pryor, G., “The Essential Data Roadmap”, DCC, <http://www.dcc.ac.uk/news/essential-data-roadmap>)

The DCC confirm that EPSRC is asking institutions to self-certify and will undertake dipstick monitoring to test compliance. The reminder sent to Vice Chancellors on 10th February confirms that the EPSRC “*will not require roadmaps to be formally submitted [but] may ask to see individual roadmaps on a case by case*”

basis." (Jones, S., "Developing a Roadmap for RDM", DCC, <http://www.dcc.ac.uk/news/developing-roadmap-rdm>).

In addition however the EPSRC have confirmed that if, after the 2015 deadline, an institution is found to be deliberately obstructing the proper sharing of research data, or otherwise seriously failing to comply with its expectations, this will initiate a process that could ultimately lead to it being declared ineligible for EPSRC support.

From initial consideration the DCC have identified some particular challenges:

- RDM practice is often ad hoc – it is difficult for an institution to have a comprehensive view of research data holdings that can be made available online, within 12 months, or to be certain that researchers aren't using cloud services that store data outside the UK. (See clauses iii, v & vii).
- Access requests tend to be handled by individuals, and researchers' willingness to share data can be based on feeling in control so maintaining an accurate central record to determine retention schedules may be difficult to administer. (See clauses iii & vii).
- Implementing an institution wide process to digitise and share such materials on request may be challenging to scope and deliver. (See clauses iv).
- Funding RDM activity from within existing streams requires an effective case to be put to senior management. (See clause ix).

The underlying challenge is that the EPSRC policy necessitates a change from ad hoc approaches to a more structured process.

(from, Jones, S. "Navigating the Potholes - Where do HEIs have most work to do?", DCC, <http://www.dcc.ac.uk/node/9480>)

6. The University's Current Position and Direction

For some time the University, including through its IT Services Research Liaison role, has been offering practical RDM support and advice to researchers. Alongside this work there has been horizon scanning, participation in national RDM developments, and collaboration with bodies such as JISC, the UK Data Archive and the Research Information Network (RIN).

The University's IT Strategy 2011-2016 (R01.7) details current and planned services, processes, infrastructure and resources in relation to the needs of research and researchers:

Basic IT needs will have to be met 'free at the point of use' and covered by institutional overheads. This direction of travel is reinforced by new guidance from Research Councils UK on capital funding through research grants which encourages greater utilisation of assets and use of shared facilities.

The University will invest in its centrally provided IT services so as to prepare for a reduction in total aggregated institutional spending on IT by 2013/14 from 6.6% to 6% of institutional revenue. It will do so by:

a. Upgrading core services to place them on a sustainable footing, and b. Broadening the scope of services so as to meet a wider spectrum of IT and data management needs; particularly those of researchers. (p4).

6.1 Support & Advice

The University offers specific ‘research data management’ advisory and training services. Research teams/researchers have advice and guidance from the earliest stages of the project life cycle so they can manage their data effectively and meet the demands of funding bodies for secure storage, dissemination and curation of data outputs. These demands are becoming increasingly onerous. Methods of data collection, analysis and dissemination are also key elements of the University’s Research Ethics Code of Practice for research involving human subjects. The University has pioneered the role of ‘IT Research Liaison Manager’.

When requirements and budgets are clearer, IT Services will expand the team of ‘Research Liaison’ managers so that all research staff will have help with research data management. They will act as the advocate for the client area and provide a bridge to the IT service to ensure that services are well aligned to need at every level.

6.2. Policy & Research Data Management Planning

Having established the Research Liaison Manager role and a Research Computing Management Group (RCMG) the University is now in a better place to develop RDM infrastructure and support. This includes forming an institutional RDM Policy (based on substantial experience). In addition the University has conducted a Sensitive Research Data Survey (all researchers included) and collaborated with the DCC in examining their on-line Data Management Planning (DMP) tool. It is hoped to adapt this to specific University requirements and to generalise and routinise its use by researchers planning research, whether through a funding body or not.

6.3 Curation & Preservation

Research produces electronic data which has to be preserved, disseminated and cited after funding for the project has ended. RCUK and the funding councils are obliging institutions to find ways to support this long-term preservation.

Enabling the curation and preservation of digital information assets IT Services will work with the Library to locate and review the range of digital information assets that have been produced as part of research projects. Many of these could be valuable resources for others and help build the University’s impact ratings by encouraging others to cite them. They need to be preserved, made accessible for the long term and referenced in the Leicester Research Archive repository.

6.4 Data Storage

We are exposed to significant risk that research data is lost or exposed so researchers (including PGR students) must be provided with high capacity data storage which is backed up.

In 2012 a new “Scalable Storage System” will be implemented to include a specific Research Data Storage service with initial capacity of hundreds of Terabytes (TB). Researchers will have access to storage on a “free at the point of use” basis, which will be secure and backed up, and reachable from any platform and from anywhere that has an internet connection. The University will have confidence that intellectual property assets are safe. (p12)

6.5 Computing

The way we do research has changed. All disciplines now need access to computing power, data storage and analysis capability beyond the capacity of a personal computer.

In 2011/12 IT Services will Implement a new, shared national High Performance Computing service for particle physicists and astronomers funded by external grant and Upgrade our existing ALICE High Performance Computing service (subject to funding).

6.6 Services & Systems

IT Services offer server and database hosting services for research teams 'on demand'.

Where possible, research software applications will be run in the most common open source environment. The preferred stack for hosting research software is "LAMP", which is Linux (operating system), Apache HTTP Server, MySQL (database software) and Perl/PHP/Python (programming language).

Providing an Integrated Research Management System, we will support the management of the whole research life cycle from grant application, through to publication of research outputs and the gathering of REF submission data with an integrated set of systems. These will be easy to use, easy to search and minimise the data collection overhead for researchers. This includes implementation of the Integrated Research Information System (IRIS), and Grant Costing System (LUCRE).

Through JISC funding IT Services is currently developing a shared service for Bioinformatics researchers funded by external grant (BRISKit).

We have a constant stream of requests from research teams who need to set up convenient ways to collaborate, communicate and share information with each other and partners in other institutions and industry. With little in place to help them (apart from an FTP service), many make their own arrangements using 'free' internet based systems e.g. Dropbox. There is a risk that University intellectual property may leak or that information becomes very difficult to find.

Enabling research teams to set up 'team sites' on the Web in which they can store, organise, edit, search for and publish information researchers will be able to set up their team spaces. It will be easy for them to request IT accounts for their collaborators. The University will know where its data is and have contractual protection (IT Strategy 2011-2016, p12).

IT Services are also developing a Wiki service and later, when requirements and budgets are clearer, IT Services will implement data discovery and analysis software

6.7 IT Infrastructure

With exposure to significant risk that research data is lost or exposed researchers (including PGR students) must be provided with resources including laptops which automatically encrypt any sensitive data that they may need to carry with them.

Later, when requirements and budgets are clearer, IT Services will implement a new desktop/laptop service for researchers based on LINUX/Mac OS.

6.8 Research IT Service Scope

We recognise that the IT related needs of PGR students are in most respects more similar to those of researchers than those of students on taught programmes. For example, they generate and handle sensitive

research data, they produce publications, they use High Performance Computing and other kinds of computing intensive research infrastructure. This means that all those services provided for researchers will be designed to meet the needs of PGR students also. (IT Strategy 2011-2016, p9)

The current position of the University in relation to the EPSRC requirements is shown below as Table 1. (as yet incomplete)

7. Conclusions and Recommendations

Alongside prompting from RCUK and research funders in general, the EPSRC requirements are likely to act at this University, as elsewhere, to focus minds and consider the appropriate RDM direction of travel, priorities, timescales and resources required.

The University's IT Strategy does much to detail what has been done so far, acknowledge current shortcomings, and confirm what is already planned with regard to IT support for researchers. Much of this will directly or indirectly lead to compliance with several of the EPSRC requirements.

Given the recent specificity of demands the RCMG has a role to focus on improvement, promoting collaboration between researchers, research students, IT Services and other stakeholders (Library, Research Support Office etc.) within RDM development, including development of an institutional policy and putting in place the required elements of an integrated "RDM Service".

The relatively recently created Research Liaison role provides a means to do much of the "leg work" in moving from strategic decision-making to implementation and change but the scale and scope of potential this change is significant and may require additional investment.

At its meeting of 4 April 2012 the RCMG focussed on RDM development and direction in general, and the appropriate response to the EPSRC requirements specifically. It was agreed that appropriate efforts should be made to meet the EPSRC requirements, whilst emphasising that this should be part of, and not detrimental to general RDM development. It recognised the need to, a) address all funder's requirements, and b) analyse where requirements are general, vary or may not be consistent across funders, or may present specific challenges to particular colleges/departments/research groups/researchers.

It was agreed that this document would be refined and established by 1 May 2012 as the initial University of Leicester Research Data Roadmap, thus satisfying EPSRC requirements, and subject to iterative development and broader consultation.

Further conclusions included:

- Broader RDM development includes the establishment of an institutional RDM policy.
- The need to progress this work on the basis of involvement of, and collaboration between, relevant stakeholders including researchers, IT Services, the Library, and the Research Support Office, through the direction of this group.
- The need for a researcher perspective rather than a procedural or administrative emphasis, making it clear to researchers what the relevance of RDM is and what it means to them.
- Work should progress to generate an integrated research support service (See Fig. 1 above) including training, communication and documentation, and a web presence.

- Rather than re-invent the wheel, there should be an emphasis on identifying existing resources and where appropriate adapting and re-using these e.g. UK Data Archive materials.
- Communication/documentation/training should focus on both generic information and also identify what is specific in relation to individual funders, colleges/departments/disciplines.
- There should not be over-reliance on textual communication and support materials – images and diagrams should be used for simplicity and immediate impact, particularly through web based materials.

Recommendations approved by the RCMG (4 April 2012):

1. Completion of the University of Leicester Research Data Roadmap document (with appropriate subsequent iteration), before 1 May 2012.
2. Establishment of a RDM Wiki as a communications device.
3. The need for agreement on a definition of research data.
4. Progress within RDM to include both research management and communication.
5. RDM development to include creation of an institutional RDM Policy.
6. The need for collaboration between researchers, IT Services Research Liaison, the Library and Research Support Office, and specifically the establishment of a Working Group, via the Chair of the RCMG, to direct work, initially on the development of an institutional RDM Policy, and then more widely.
7. Progress should be directed through, and reported back to the RCMG, with the key deadline of the commencement of the 2012-2013 academic year for establishment of support services and materials.

The following section shows the current University position in relation to the Research Data Roadmap.

8. University EPSRC Research Data Roadmap

EPSRC Requirement	Current Status	Gaps	Action to be Taken	Schedule	Resources Committed
1 a) Promote internal awareness of these principles and expectations.	As yet not general awareness.	<ol style="list-style-type: none"> 1. Institutional ownership of the issue. 2. Comms. throughout the institution. 	<ol style="list-style-type: none"> 1. RCMG to lead & decide appropriate methods 2. Working Group to be set up via Pro Vice Chancellor of Research. 3. Establish RDM Wiki. 	<ol style="list-style-type: none"> 1. First RCMG Report 4.4.2012 and agreement of direction. 2. Information generated to be available at start of 2012-13 academic year. 	<ol style="list-style-type: none"> 1. Agreement to involve researchers, IT Research Liaison, Library and Research Support Office.
1 b) Ensure researchers and research students have a general awareness of the regulatory environment.	Ad hoc approach to training and awareness.	<ol style="list-style-type: none"> 1. Aspects of institutional support and communication. 2. Inclusion as part of researcher training. 	<ol style="list-style-type: none"> 1. RDM Training 2. Use of UK Data Archive documents including "Managing & Sharing Data" and "Planning for Sharing". 3. Website development. 4. Departmental Communication with researchers. 5. Potential input and direction through JISC Transformation funding. 	<ol style="list-style-type: none"> 1. Information generated via Working Group to be available at start of 2012-13 academic year. 2. If successful JISC transformations project July 2012 – June 2013. 	<ol style="list-style-type: none"> 1. Agreement to involve researchers, IT Research Liaison, Library and Research Support Office. 2. JISC funding would support Research Liaison input and development of specialist knowledge.
1 c) Ensure researchers and research students have an awareness of available exemptions which may be used, should the need arise, to justify the withholding of research data.	Not currently implemented institution-wide.	<ol style="list-style-type: none"> 1. Comms. throughout the institution. 	<ol style="list-style-type: none"> 1. RDM Training. 2. Website development. 3. Role of Research Liaison support. 	<ol style="list-style-type: none"> 1. Information generated via Working Group to be available at start of 2012-13 academic year. 	<ol style="list-style-type: none"> 1. Agreement to involve researchers, IT Research Liaison, Library and Research Support Office. 2. JISC funding would support Research Liaison input and development of specialist knowledge.

EPSRC Requirement	Current Status	Gaps	Action to be Taken	Schedule	Resources Committed
2. Published research papers should include a short statement describing how and on what terms any supporting research data may be accessed.	Not currently implemented institution-wide.	1. Institution-wide data storage facilities 2. Awareness of requirements	1. Research File Storage system (RFS) to be implemented. 2. RDM Training and Comms., including web content to raise awareness.	1. Storage technology in place January 2012. Service for new users July 2012. 2. Working Group and Transformations input during 2012-13.	1. Investment in place by 2012. Plans to be developed for on-going expansion. 2. JISC funding would support Research Liaison input and development of specialist knowledge.
3 a) Specific policies and associated processes to maintain effective internal awareness of their publicly-funded research data holdings.	Not currently implemented institution-wide.	1. No RDM institutional policy. 2. Institution-wide data storage facilities.	1. RDM institutional policy. 2. RFS system to be implemented.	1. Institutional policy 2012. 2. Technology in place January 2012. Service for new users July 2012.	1. RDM Working Group. 2. Investment in place by 2012 for RFS. Plans to be developed for on-going expansion.
3 b) All of their researchers or research students funded by EPSRC will be required to comply with research organisation policies in this area or, in exceptional circumstances, to provide justification of why this is not possible.	Not currently implemented institution-wide.	1. No RDM institutional policy	1. RDM institutional policy. 2. Compliance monitoring process.	1. Institutional policy 2012.	1. RDM Working Group.
3 c) Internal awareness of requests by third parties to access such data.	Not currently implemented institution-wide.	1. Institution-wide awareness. 2. Access request process.	1. Clear processes to manage requests and give access to relevant information	To be agreed.	1. To be agreed.
4 a) Research data that is not generated in digital format will be stored in a manner to facilitate it being shared.	Current knowledge at Departmental / College level.	1. Institution-wide awareness.	1. Review of non-digital data and cataloguing and digitising potential via RCMG or delegated body.	To be agreed.	1. To be agreed.
4 b) This expectation could be satisfied by implementing a policy to convert and store such data in digital format in a timely manner.	Current knowledge at Departmental / College level.	1. Institution-wide awareness. 2. Policy.	1. Consideration of conversion opportunities. 2. Consideration of Policy.	To be agreed.	1. To be agreed.

EPSRC Requirement	Current Status	Gaps	Action to be Taken	Schedule	Resources Committed
5 a) Appropriately structured metadata describing the research data they hold is published.	Agreed metadata standards yet to be agreed for institution.	1. Agreed metadata standards for institution.	1. Research Liaison to advise on progress of metadata standards work through JISC, DCC etc. 2. Progress to be reported to/discussed at RCMG to advise on appropriate standards as and when agreed. 2. Communication of agreed standards. 3. Inclusion within researcher training.	To be agreed.	1. To be agreed.
5 b) Appropriately structured metadata describing the research data they hold is made freely accessible on the internet.	Agreed metadata standards yet to be agreed for institution.	1. Agreed metadata standards for institution.	1. Following from actions at 5a, develop means to publish.	Link to 5a.	Link to 5a.
5 c) Metadata must be sufficient to allow others to understand what research data exists, why, when and how it was generated, and how to access it.	Agreed metadata standards yet to be agreed for institution.	1. Agreed metadata standards for institution.	1. Following from actions at 5a agreed standards to be implemented	Link to 5a.	Link to 5a.
5 d) Where the research data referred to in the metadata is a digital object it is expected that the metadata will include use of a robust digital object identifier.	Agreed metadata standards yet to be agreed for institution.	1. Agreed metadata standards for institution.	1. Following from actions at 5a, implementation of ODI	Link to 5a.	Link to 5a.
6 a) Where access to the data is restricted the published metadata should also give the reason.	Agreed metadata standards yet to be agreed for institution.	1. Agreed metadata standards for institution.	1. Agreed standards to be implemented	Link to 5a.	Link to 5a.
6 b) Where access to the data is restricted summarise the conditions which must be satisfied for access to be granted.	RDM Policy and guidance to be developed.	1. Current RDM Policy and guidance.	1. Policy & guidance to include this issue.	Consider as part of policy and guidance development.	To be agreed.

EPSRC Requirement	Current Status	Gaps	Action to be Taken	Schedule	Resources Committed
7 a) EPSRC-funded research data is securely preserved for a minimum of 10-years from the date that any researcher ‘privileged access’ period expires or, if others have accessed the data, from last date on which access to the data was requested by a third party.	No consistent approach or assurance of compliance.	<ol style="list-style-type: none"> 1. Lack of generally available Research Data Storage system. 2. Long-term storage solution. 3. Disposal policy and procedure. 	<ol style="list-style-type: none"> 1. Research File Storage system to be implemented with “free at the point of use” principle. 2. Issue to be considered by the RCMG. 3. Enabling the curation and preservation of digital information assets IT Services will work with the Library to locate and review the range of digital information assets that have been produced as part of research projects. 4. Continued consideration of archival service. 	<ol style="list-style-type: none"> 1. Research File Storage technology in place January 2012. Service for new users July 2012. 2. Long-term storage issues subject to current discussion, and agreement. 	<ol style="list-style-type: none"> 1. Investment in place by 2012. Plans to be developed for on-going expansion.
7 b) All reasonable steps will be taken to ensure that publicly-funded data is not held in any jurisdiction where the available legal safeguards provide lower levels of protection than are available in the UK.	RDM Policy and guidance to be developed.	Current RDM Policy and guidance.	<ol style="list-style-type: none"> 1. Policy & guidance to include this issue. 	Consider as part of policy and guidance development.	To be agreed.
8 a) Effective data curation is provided throughout the full data lifecycle.	Research teams/researchers have advice and guidance from the earliest stages of the project life cycle so they can manage their data effectively and meet the demands of funding bodies for secure storage, dissemination and curation of data outputs.	<ol style="list-style-type: none"> 1. RDM policy and processes. 2. Complete RDM support infrastructure. 3. Support and training materials. 	<ol style="list-style-type: none"> 1. Develop RDM policy and processes 2. Research Liaison support structures and role – see 1. above. 	<ol style="list-style-type: none"> 1. Information generated via Working Group to be available at start of 2012-13 academic year. 2. If successful JISC transformations project July 2012 – June 2013. 	<ol style="list-style-type: none"> 1. Agreement to involve researchers, IT Research Liaison, Library and Research Support Office. 2. JISC funding would support Research Liaison input and development of specialist knowledge.

EPSRC Requirement	Current Status	Gaps	Action to be Taken	Schedule	Resources Committed
8 b) The full range of responsibilities associated with data curation over the data lifecycle will be clearly allocated within the research organisation.	<ol style="list-style-type: none"> 1. RDM Policy and guidance yet to be developed. 2. RCMG to co-ordinate development and ensure collaboration. 	<ol style="list-style-type: none"> 1. RDM policy and processes. 2. Technology infrastructure to support the whole lifecycle. 	<ol style="list-style-type: none"> 1. Develop RDM policy and processes. 2. Research Liaison to support structures and role. 3. Training and support to define and amplify responsibilities across the whole lifecycle. 4. Further consideration of archival IT services to support long-term data curation. 	<ol style="list-style-type: none"> 1. Information generated via Working Group to be available at start of 2012-13 academic year. 2. If successful JISC transformations project July 2012 – June 1013. 3. Other aspects yet to be confirmed. 	<ol style="list-style-type: none"> 1. Agreement to involve researchers, IT Research Liaison, Library and Research Support Office. 2. JISC funding would support Research Liaison input and development of specialist knowledge. 3. Archival IT services yet to be resourced.
8 c) Where research data is subject to restricted access the research organisation will implement and manage appropriate security controls.	No generally available research file storage system.	Research file storage system.	<ol style="list-style-type: none"> 1. Research File Storage to be available by July 2012 2. Implement technical security measures and rules 	Research File Storage to be available by July 2012	The RFS system is funded and being implemented currently. Funding for growth to be identified.
8 d) Research organisations will particularly ensure that the quality assurance of their data curation processes is a specifically assigned responsibility.	<ol style="list-style-type: none"> 1. RDM Policy and guidance yet to be developed. 2. RCMG to co-ordinate development and ensure collaboration. 	<ol style="list-style-type: none"> 1. RDM policy and processes. 2. Technology infrastructure to support the whole lifecycle. 	<ol style="list-style-type: none"> 1. Develop RDM policy and processes. 2. Training and support to define and amplify responsibilities across the whole lifecycle. 3. Define data curation quality assurance. 4. Define responsibility. 5. Include in training materials. 	<ol style="list-style-type: none"> 1. Information generated via Working Group to be available at start of 2012-13 academic year. 2. If successful JISC trans. project July 2012 – June 1013. 3. Other aspects yet to be confirmed. 	<ol style="list-style-type: none"> 1. Agreement to involve researchers, IT Research Liaison, Library and Research Support Office. 2. JISC funding would support Research Liaison input and development of specialist knowledge. 3. Archival IT services yet to be resourced.

EPSRC Requirement	Current Status	Gaps	Action to be Taken	Schedule	Resources Committed
9 a) Adequate resources are provided to support the curation of publicly-funded research data.	The University offers specific 'research data management' advisory and training services. Research teams/researchers have advice and guidance from the earliest stages of the project life cycle so they can manage their data effectively and meet the demands of funding bodies for secure storage, dissemination and curation of data outputs.	Technology infrastructure to support the whole lifecycle.	The work of the RCMG and development of RDM support service will highlight resources required to support curation.	RCMG 4.4.2012 considered RDM development and the RDM Roadmap. This group to pick up this role.	Centrally, IT Services provide HPC, LAMP stack, Departmental data storage, Research File Storage, and Research Liaison Support.
9 b) These resources will be allocated from within their existing public funding streams, whether received from Research Councils as direct or indirect support for specific projects or from higher education Funding Councils as block grants.	Technical infrastructure being developed as part of University IT Strategy.	Long-term role and funding of Research Liaison posts to be determined.	IT Strategy states that Research Liaison support will be developed	To be agreed.	1. To be agreed.

9. Abbreviations

AHRC	Arts & Humanities Research Council
BBSRC	Biotechnology & Biological Sciences Research Council
CRUK	Cancer Research UK
DCC	Digital Curation Centre
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic & Social Research Council
INSPIRE	Infrastructure for Spatial Information in the European Community
IRIS	Integrated Research Information System
JISC MRD	Joint Information Systems Committee Managing Research Data Programme
LAMP	Linux, Apache, MySQL, Perl/PHP/Python
MRC	Medical Research Council
NERC	Natural Environment Research Council
RCUK	Research Councils UK
RDM	Research Data Management
RIN	Research Information Network
STFC	Science & Technology Facilities Council

10. Document History

Version	Date	Author	Detail/Reason for Change
Draft 1	29.03.2012	A. Burnham, J. Tedds	First draft to Research Computing Management Group (RCMG) 4 April 2012. Approved in principle.
Draft 2 (\...20120426)	26.04.2012	A. Burnham, J. Tedds	In place as at 26 April 2012 Second Draft to RCMG 13 June 2012 – Approved.
v01	14.06.2012	A. Burnham, J. Tedds	Current RCMG approved version. Minor edits/corrections from Draft 02.

Appendix A.
Funder Requirements (DCC 02.2012)

● Full Coverage
 ◐ Partial Coverage
 ○ No Coverage

Research Funders	Policy Coverage		Policy Stipulations					Support Provided			
	Published outputs	Data	Time limits	Data plan	Access/sharing	Long-term curation	Monitoring	Guidance	Repository	Data centre	Costs
AHRC	●	●	●	●	●	◐	○	●	○	◐	○
BBSRC	●	●	●	●	●	●	●	●	●	◐	●
CRUK	●	●	●	●	●	●	●	◐	●	○	○
EPSRC	●	●	●	○	●	●	●	◐	○	○	●
ESRC	●	●	●	●	●	●	●	●	●	●	◐
MRC	●	●	●	●	●	●	○	◐	●	○	◐
NERC	●	●	●	●	●	●	●	●	●	●	◐
STFC	●	●	●	●	●	●	●	◐	●	◐	○
Wellcome Trust	●	●	●	●	●	●	●	●	●	◐	●

Appendix B.

Digital Curation – Digital Curation Centre Definition

What is digital curation?

Digital curation involves maintaining, preserving and adding value to digital research data throughout its lifecycle.

The active management of research data reduces threats to their long-term research value and mitigates the risk of digital obsolescence. Meanwhile, curated data in trusted digital repositories may be shared among the wider UK research community.

As well as reducing duplication of effort in research data creation, curation enhances the long-term value of existing data by making it available for further high quality research.

The digital curation lifecycle

Digital curation and data preservation are ongoing processes, requiring considerable thought and the investment of adequate time and resources. You must be aware of, and undertake, actions to promote curation and preservation throughout the data lifecycle.

The digital curation lifecycle comprises the following steps:

Conceptualise: conceive and plan the creation of digital objects, including data capture methods and storage options.

Create: produce digital objects and assign administrative, descriptive, structural and technical archival metadata.

Access and use: ensure that designated users can easily access digital objects on a day-to-day basis. Some digital objects may be publicly available, whilst others may be password protected.

Appraise and select: evaluate digital objects and select those requiring long-term curation and preservation. Adhere to documented guidance, policies and legal requirements.

Dispose: rid systems of digital objects not selected for long-term curation and preservation. Documented guidance, policies and legal requirements may require the secure destruction of these objects.

Ingest: transfer digital objects to an archive, trusted digital repository, data centre or similar, again adhering to documented guidance, policies and legal requirements.

Preservation action: undertake actions to ensure the long-term preservation and retention of the authoritative nature of digital objects.

Reappraise: return digital objects that fail validation procedures for further appraisal and reselection.

Store: keep the data in a secure manner as outlined by relevant standards.

Access and reuse: ensure that data are accessible to designated users for first time use and reuse. Some material may be publicly available, whilst other data may be password protected.

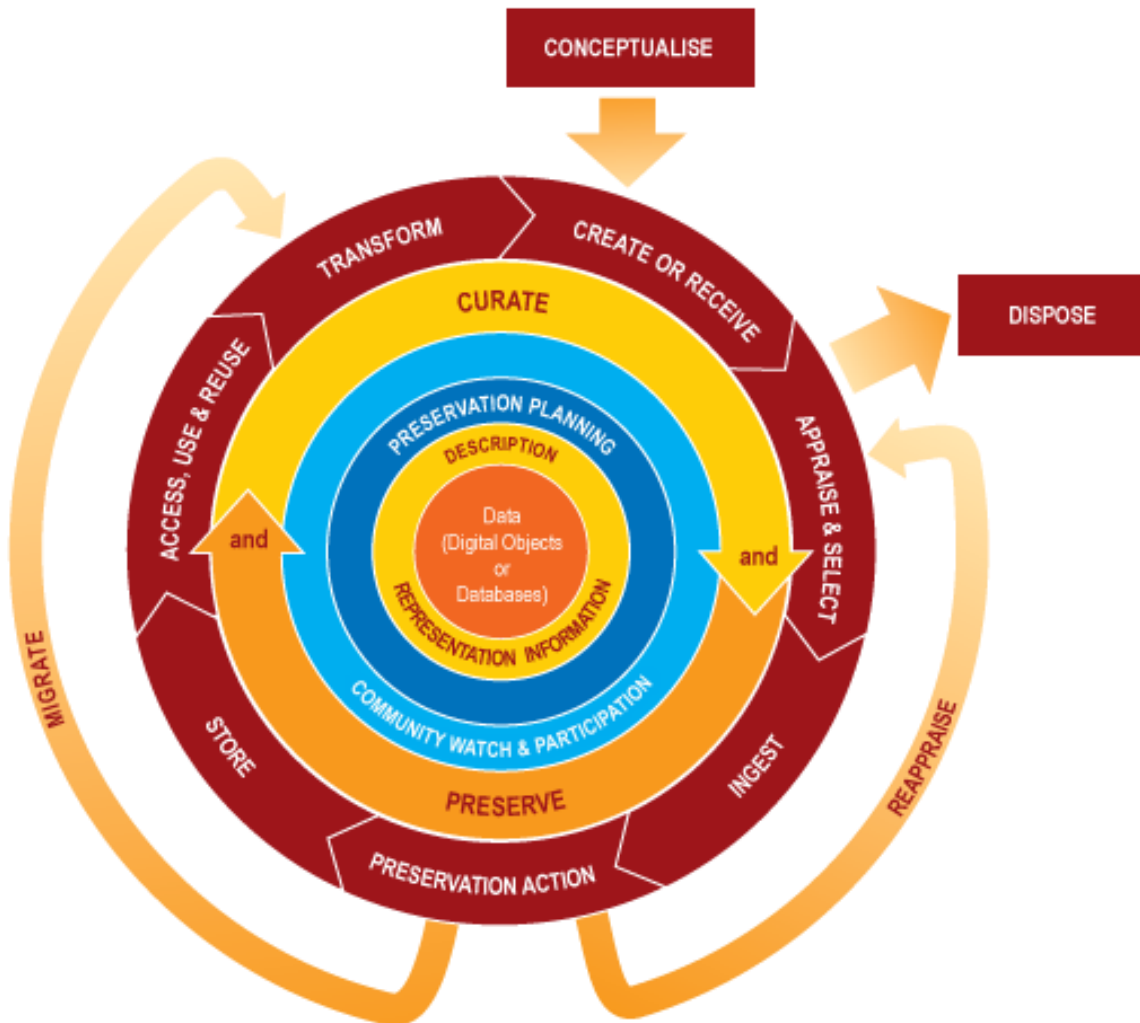
Transform: create new digital objects from the original, for example, by migration into a different form.

<http://www.dcc.ac.uk/digital-curation/what-digital-curation>

DCC

Appendix C.

Digital Curation Centre Data Lifecycle Model



<http://www.dcc.ac.uk/resources/curation-lifecycle-model>

DCC