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Skilling Up to Do Data:
Whose Role, Whose Responsibility, Whose Career?

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Summary

What are the roles necessary to effective data management and what kinds of expertise are needed by the researchers and data specialists who are filling those roles? These questions were posed at a workshop of data creators and curators whose delegates challenged the DCC and RIN to identify the training needs and career opportunities for the broad cohort that finds itself working in data management – sometimes by design but more often by accident. This paper revisits previous investigations into the roles and responsibilities required by a "data workforce", presents a representative spectrum of informed opinion from the DCC Research Data Management Forum, and makes some recommendations for raising capability, capacity and status.

Introduction

Co-sponsored by the Digital Curation Centre (DCC) and the Research Information Network (RIN), the Research Data Management Forum (RDMF[1]) is a community comprised mainly of data producers and custodians which meets twice per year to address pressing questions in the data world.

At its November 2008 meeting, which took an analysis of roles and responsibilities for effective data management as its theme, the RDMF concluded by agreeing three objectives for further work:

1. That the DCC should produce a white paper that identifies the training needs and career opportunities for those working in data management;
2. That appropriate measures for providing certification that will cover the skills acquired by practitioners already at work in data management should be explored and recommendations made;
3. That on behalf of the RDMF, the DCC should investigate options for the creation of a national data management education and training forum.

Whilst they were regarded as three distinct outcomes from the meeting, they are all elements of a single aspiration to recognise, enable and sustain those working with research data, at various points throughout the curation lifecycle[2]. Consequently, whilst addressing the first objective, it makes sense to give due consideration to all three.

The RDMF event was structured to allow contributions from the broad range of individuals working in the data management field: from data creators, the researchers in our universities, to librarians, the traditional custodians of knowledge; and from data scientists to the data managers working in our institutional or national data centres. Yet naming these four groups does not adequately describe the variations or the extent of activities or skills to be found amongst "data practitioners". Consequently, it was agreed that it would be misleading to focus on fixed designations such as data manager, since a large proportion of individuals in the broad research community occupy a position somewhere on a continuum that includes them all.

This white paper provides an overview of the roles and responsibilities for data management as currently perceived from within the community, their predicted evolution, and the present opportunities for providing and acquiring the necessary skills; from the basic toolkit that will equip researchers with the ability to plan for the longevity of their data to the more sophisticated suite of tools required by a data management professional.

Career options are explored in a similar manner, crossing the boundaries between researchers who work with data and out of necessity or expediency develop a data management brief and, at the other extreme, professionally committed data managers employed specifically to undertake a set of data tasks. To achieve effective data management, the package of capabilities and responsibilities that may need to be assimilated can apply to a diverse range of employment characteristics and roles, providing a significant challenge both to those delivering and those seeking a data practitioner's "toolkit".

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[1] Research Data Management Forum http://www.dcc.ac.uk/data-forum/
[2] The DCC Curation Lifecycle Model http://www.dcc.ac.uk/docs/publications/DCCLifecycle.pdf

Key Perspectives

In their July 2008 report to the Joint Information Systems Committee (JISC), Swan and Brown[3] immediately identified the heterogeneity of existing data-related roles. Whilst they attempted to "distinguish four roles: data creator, data scientist, data manager and data librarian", they acknowledged that "in practice, there is not yet an exact use of such terms in the data community, and the demarcation between roles may be blurred". In their definition of these four roles the crucial words 'training' and 'formal qualification' are for the most part absent. Data creators are described typically as researchers who have acquired a high level of expertise in handling and manipulating data; data scientists appear to be working closely with the data creators and may be involved in creative enquiry and analysis; and data managers tend to be computer scientists, information technologists or information scientists who have taken responsibility for the facilities necessary to the storage, access and preservation of data. Whilst one must infer that this latter group has acquired recognised qualifications in disciplines associated with data, it is only the fourth group, data librarians, that may claim to have been formally trained in the curation, preservation and archiving of data.

We carried out a review of the academic and non-academic programmes which exist in the UK and selected other countries which contain data-related components. (Table 1). The number of data librarians currently employed in the UK is extremely small (Swan and Brown put their estimate at five!) and there is no recognised career path in place to attract individuals already well-qualified in specific domain expertise and knowledge. They too, have arrived in their careers more often by accident than design[4]. In an interview by CILIP[5], Macdonald and Martinez-Uribe describe some data librarians as having "research skills, some library skills, some are statisticians and some are subject experts. Each of the UK's main data libraries addresses different academic audiences and institutional biases, and local staff have developed different skillsets accordingly"[6].

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[3] The skills, role and career structure of data scientists and curators: an assessment of current practice and future needs, Key Perspectives 2008.

[4] It was suggested that we look to the USA, which has a high number of data librarians, with a view to establishing how they are trained. But this perceived imbalance may have arisen through cultural differences rather than anything more tangible. The British and American higher education systems differ in their approaches to professional nomenclature for academic staff, and a closer inspection of roles amongst support staff may also reveal that what we in the UK think of as a 'data librarian' does not quite equate to the North American usage of that term.

[5] The UK's Chartered Institute of Library and Information Professionals (CILIP).

[6] Data librarianship – a gap in the market, CILIP 2008
http://www.cilip.org.uk/publications/updatemagazine/archive/archive2008/june/Interview%20with%20Macdonald%20and%20Martinez-Uribe.htm

Institution/ Provider	Programme/ Course	UG/PG	Mode	Notes
UNITED KINGDOM				
University of Wales at Aberystwyth	*Information Systems* MSc includes 'Data Collection and Data Analysis' module	PG	Attendance/ Distance	http://www.dil.aber.ac.uk/en/courses/MSc_Information_Systems.asp
"	*Records Management* MSc includes 'Digital Records' module		Distance	
University of Dundee	*Records Management and Digital Preservation* MSc	PG	Distance	http://www.dundee.ac.uk/cais/rmdp/
University of Glasgow	*Information Management and Preservation* MSc contains "Management, Curation and Preservation of Digital Materials" as a core module	PG	Attendance	http://www.hatii.arts.gla.ac.uk/imp/page10.htm
Kings College, London	*Digital Asset Management* MA programme	PG	Attendance	http://www.kcl.ac.uk/schools/humanities/depts/cch/pg/madam/
Loughborough University	*Information and Library Management* MA/MSc programme includes optional 'Digital Curation' module	PG	Attendance	http://cisinfo.lboro.ac.uk/epublic/wp5015.module_spec?select_mod=08ISP428
Northumbria University	*Information and Library Management* MA/MSc includes 'Data Law and Ethics' module	PG	Attendance/ Distance	http://www.northumbria.ac.uk/?view=CourseDetail&code=DTFILM6
"	*Records Management* MSc includes 'Electronic Recordkeeping' module	PG	Distance	http://www.northumbria.ac.uk/?view=CourseDetail&code=DTDRCM6
The Robert Gordon University	*Information Engineering* MSc	PG	Attendance	http://www.rgu.ac.uk/computing/courses/page.cfm?pge=31732
University of Sheffield	*Chemistry with Informatics (Computational Drug Design)* MChem or BSc	UG	Attendance	http://www.shef.ac.uk/chemistry/prospectiveug/courses/informatics.html
"	*Information Management* BSc includes 'Information Retrieval: Search Engines and Digital Libraries' module	UG	Attendance	http://www.shef.ac.uk/is/prospectiveug/courses/im.html
"	*Electronic and Digital Library Management* MSc / PGCert	PG	Attendance/ Distance	http://www.shef.ac.uk/is/prospectivepg/courses/edlm
University of Strathclyde	*Information and Library Studies* MSc/PgDip	PG	Attendance	http://www.strath.ac.uk/cis/courses/mscpgdipinformationandlibrarystudiespostgraduate/
University College London	*Information Management* BSc, *Library & Information Studies* MA, *Archives & Records Management* MA, *Records & Archives Management International* MA, *Electronic Communication & Publishing* MA, *Information Science* MSc, *Library, Archive & Information Studies* MRes. The Department of Information Studies also offers a number of short courses related to digital information management.	UG/PG	Attendance	http://www.ucl.ac.uk/infostudies/teaching/
IRELAND				

Institution/ Provider	Programme/ Course	UG/PG	Mode	Notes
University College Dublin	Archives and Records Management MA	PG	Attendance	http://www.ucd.ie/historyarchives/graduate/maarchives.htm
SWEDEN				
Luleå University of Technology, Sweden	*Digital Curation* Masters programme	PG	Attendance/ Distance	http://www.ltu.se/ies/org/systemvetenskap/d6723/1.43005?l=en
University of Borås, Sweden	*Digital Library and Information Systems* Masters programme	PG	Distance	http://is.gd/smpB
PAN-EUROPE (ERASMUS)				
University of Coimbra (Portugal), University of Cologne (Germany), University of Lecce (Italy), and University of Turku (Finland)	*European Heritage, Digital Media and the Information Society* Masters programme	PG	Attendance	http://www.europeanheritage.utu.fi/introduction/
UNITED STATES OF AMERICA				
University of Arizona	Graduate Certificate in *Digital Information Management*	PG	Distance	http://digin.arizona.edu/
University of California at Berkeley	*Master of Information Management and Systems*	PG	Attendance	http://www.ischool.berkeley.edu/programs/masters
University of Illinois at Urbana-Champaign	*Library and Information Science* MSc offers a specialism in Data Curation. The School also hosts a Summer Institute for Humanities Data Curation.	PG	Attendance	http://www.lis.uiuc.edu/programs/ms/data_curation.html
University of North Carolina at Chapel Hill	Two experimental curriculum development projects: *DigCCurrI* (Master's students); *DigCCurrII* (Doctoral students). Also, "DigCCurr Professional Institute: Curation Practices for the Digital Object Lifecycle"	PG	Attendance	http://ils.unc.edu/digccurr/institute.html
San José State University	*Master's Degree in Archives and Records Administration (MARA)*	PG	Distance	http://slisweb.sjsu.edu/mara/
NON-UNIVERSITY TRAINING				
Digital Curation Centre	DC1010 training provides an introduction to digital curation and the range of activities that should be considered when planning and implementing new projects, aiding researchers in developing sound data management and curation plans.	n/a	Attendance	http://www.dcc.ac.uk/events/digital-curation-101-2009/
UK Data Archive	UKDA offers an ad hoc programme of training and workshops in many aspects of data management and sharing.	n/a	Attendance	http://www.data-archive.ac.uk/sharing/advicetraining.asp
University of London Computer Centre	Digital Preservation Training Programme (DPTP). Begun as a JISC-funded project, DPTP is now maintained and administered by ULCC.	n/a	Attendance	http://www.ulcc.ac.uk/dptp/about-dptp.html ; http://www.dptp.org/

Institution/ Provider	Programme/ Course	UG/PG	Mode	Notes
nestor-DPE Summer School	Constitutes an introduction to long-term digital preservation, comprising metadata and standards within the context of long-term digital preservation, file formats/significant properties, OAIS, certification and selection criteria, storage technologies and long-term digital preservation strategies/planning.	n/a	Attendance	http://nestor.sub.uni-goettingen.de/summer_school_2008/

Table 1. Data-related educational programmes.

This "accidental" career choice is not restricted to data librarians. Speaking at the November 2008 RDMF workshop, Sam Pepler referred to his team of data managers at the British Atmospheric Data Centre (BADC) as comprising experimental researchers, computer scientists, information technologists and information scientists. The BADC group was reported[7] to be heavily IT-based, including system administrators, systems developers, infrastructure management and Web experts, and data modellers – all having followed typically random development paths but generally within IT. Helen Parkinson of the European Bioinformatics Institute described her team of biocurators as life scientists who manage life sciences data[8], most of whom are active computational research scientists; adding that it has proved quicker to turn bioscientists into data curators than it would be to turn computer scientists into data curators with any fluency in the biosciences[9].   Not surprisingly, when the data aspect of anyone's role is not core to their career aspirations, the retention of skilled staff has proved to be a problem.

From the observations of Macdonald and Martinez-Uribe[6], it might be imagined that amongst university information services there could be found the greatest opportunities to establish an identifiable career path for data practitioners, particularly in institutions where information and technology functions are organisationally combined and the barriers between discrete groups of experts are less rigid.

Roles and Skills

A SHERPA document published in August 2008[10], which sought to assist the writing of job descriptions, focused on staff managing data in the context of institutional repositories; but even in that structured context it was found that staffing requirements for a repository vary greatly among institutions, depending on the remit of the repository, and existing and available resources. The skill set identified by SHERPA does not describe a particular repository service function, but rather a spectrum of skills and knowledge that could be supplied from within the established IT and library community. It does not include the depth of domain knowledge that researchers insist is crucial to informed data management, although it does refer to the ability to manage user expectations.

Delegates to the RDMF workshop identified a set of core skills required in the management of data, which were subsequently mapped to each of the four roles described by Swan and Brown (Figure 1). Whilst recognising the risk of speaking in terms of fixed designations, this exercise framed the portfolios necessary to each role. The diagram depicts not only the skills that are apparently unique to each role but also their intersecting boundaries, the number of intersections made by ostensibly critical activities serving to re-emphasise the blurring of boundaries that everyone seemed to acknowledge.

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[7] Sam Pepler, Data Manager "Plumber" http://www.dcc.ac.uk/events/data-forum-2008-november/presentations/06.ppt

[8] Helen Parkinson, A data scientist's perspective on roles and responsibilities in data curation http://www.dcc.ac.uk/events/data-forum-2008-november/presentations/04.ppt#415,1

[9] This is at odds with Dr Bob Mann's view in DCC Case Study: Wide-Field Astronomy Unit, suggesting that the perceived ease of conversion may differ between domains and disciplines. "In short, it is easier to teach astronomy to an IT expert, than IT to an astronomer." http://www.dcc.ac.uk/docs/publications/case-studies/wfau.pdf

[10] Institutional repositories: staff and skills set http://www.sherpa.ac.uk/documents/staffandskills2008.pdf

CORE SKILLS FOR DATA MANAGEMENT
A follow-up from the second DCC Research Data Management Forum (November 2008)

DATA MANAGER

Risk / Disaster Management, Contingency

Data Legislation (rights, IPR, DP, etc)

Data Security, Access, Authentication

Conditions of Use

Monitoring Processes

Metadata

DATA CREATOR

Documentation (research, environmental, temporal) Context

Value of Data, Economic Issues

Data Preservation

Facilitation / Communication

Data Modelling

DATA LIBRARIAN

Negotiation Skills

Complaints and Expectation Management

Coordination of Practice across Institution

Data Appraisal and Retention

Advocacy, Promotion, Marketing, Raising Awareness

From Information Management to Knowledge Management

Standards Development

DATA SCIENTIST

Data Analysis and Manipulation

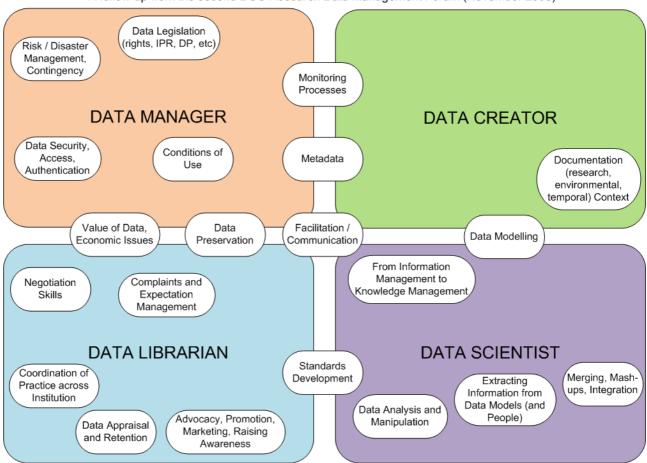Extracting Information from Data Models (and People)

Merging, Mash-ups, Integration

Figure 1. Core skills for data management, Chris Rusbridge and Martin Donnelly.[11]

Qualifications and Certifications

So does the above diagram tell us only that the skill requirements for data workers are multi-faceted? If so, it is not an especially practical message to inform the construction of a career path, or the design of a training programme.

Twittering from DigCCurr Conference on April 3, 2009, Kevin Ashley of the University of London Computer Centre noted an audience member's comment "that mid-career people need training that doesn't involve time and travel; we're working on that, folks!" But an analysis of precisely why is it needed would be welcome. One of the factors to consider is job mobility. At the European Bioinformatics Institute, for example, researcher-curators are obliged to move on once they have completed three years in post. This has obvious advantages and disadvantages when it comes to spreading skills and experience across the sector, but at the same time it repeatedly weakened the organisation's collective skillset and sense of internal continuity.

There is the question of employee recognition, of gaining appropriate reward (both in terms of salary and prestige) for a task which can take up a significant chunk of one's working life. There is the question of career progression/ advancement. And

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[11] Research Data Management Forum: RDMF2: Core Skills Diagram http://data-forum.blogspot.com/2008/12/rdmf2-core-skills-diagram.html

finally, there is the question of quality management – being assured that the person in role to look after precious, sometimes irreplaceable data has some form of external validation to hold such a position of responsibility.

Sheila Corrall's presentation[12] to the RDMF workshop considered the protagonists in the data-centric environment according to their principal specialism. She categorised IT experts as conduit specialists, library or information scientists as content specialists, and academics or professionals as context specialists. Applying that analysis, the activities of data scientists would traverse all three fields, although the demands for handling data in each of the fields is constantly evolving, producing a continual pressure upon everyone to up-skill. Whilst she saw a role for repository and subject librarians, who will need to add data to their portfolio, her perception of hybrid information specialists with boundary-spanning roles, ambiguous status and a variety of generic and specific titles for the same job confirms the generally received analysis of the data practitioner. Her approach, nonetheless, provides some clues to the potential shape for a training regime, which will have to address both the breadth and depth of competency requirements, combining technical expertise with contextual understanding (i.e., significant domain knowledge) and interpersonal skills. (For example, King's College London's MA in Digital Asset Management focuses on cultural heritage rather than research data, but the programme culminates in a dissertation project involving the application of computing in a discipline area in which the student has appropriate intellectual training – this could be an opening for prospective data librarians.)

Given, too, that knowledge and skills tend to be acquired on the job, and that there is an established practice of supplementing one's knowledge by attendance at specialist workshops and courses, any programme of formal training will have to be closely associated with real-life situations and practice, will need to offer options for flexible delivery, and must be affordable to both employees and employers, bearing in mind that there could be difficulties in sourcing funding for delivery as a traditional taught course.

Professor Corrall's main proposition was that data skills should be made a core academic competency, a concept that reflects the UK e-Science Envoy's work on a national e-Science curriculum, and the ICEAGE (2008) group's Curricula for Undergraduate and Masters Level Courses, where data handling is embedded in the curriculum.[13] Credit-bearing data management units would also be added to research training modules, online data skills tutorials would be provided, and practising stakeholders would be involved in the planning and delivery of training. There is a need to go beyond the workshop and the short training course, and embed preparation for a professional (and personal) lifetime of digital data curation within the academic curriculum. Such an approach would see data skilling evolve incrementally, from short courses to individual modules to accredited modules to specialist qualifications. As she concluded, if information studies departments in universities are to move in the direction of training data practitioners, they will need to know if there is a market before they will invest. That market could become visible as a consequence of an internal refocusing of university curricula. The big question is whether the importance

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[12] Research Data Management: Professional Education and Training Perspectives http://www.dcc.ac.uk/events/data-forum-2008-november/presentations/07.pdf

[13] Professor Corrall's call is echoed in a recent *Nature* editorial: "data management should be woven into every course in science, as one of the foundations of knowledge." (Nature, 2009).

of nurturing data skills can be sold to universities as a critical driver for restructuring the teaching programme.

An alternative (or, perhaps complementary) solution would be to integrate data management within postgraduate training programmes, whether embedded within the MRes curriculum run by Graduate Research Schools within the Faculties, via subject-specific Doctoral Training Centres (DTCs), or via separate, Human Resources-run training and development programmes (e.g., Aberdeen Skills for Postgraduate Innovation, Research and Employability (ASPIRE)[14]).

The current situation is depicted in Figure 2 below, together with suggestions on how we might tackle the problem within the existing framework.

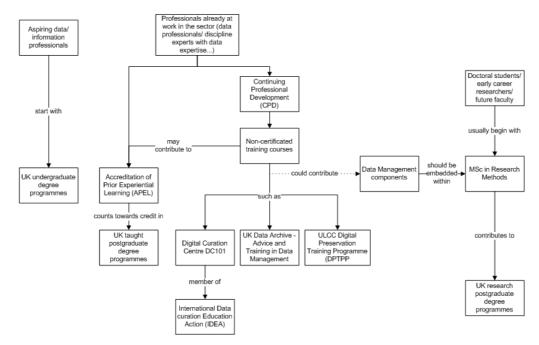## TRAINING OPPORTUNITIES FOR DATA PROFESSIONALS: THE CURRENT UK LANDSCAPE

Figure 2. Training opportunities for data professionals.

Most universities will award some amount of proportionate credit for prior experiential learning - Accreditation of Prior and Experiential Learning (APEL); of course, in order to award APEL, there must be an appropriate qualification already in existence, and APEL alone is not the answer: the Quality Assurance Agency (QAA) and individual institutions will have upper limits (typically around a quarter or a third of the total credit per level) which may legitimately be awarded on the basis of prior learning. In order to introduce this onto the curriculum, there is a need to lobby and seek to influence certain key players.

The Researcher Perspective

What is largely missing from this debate is evidence from the community of active researchers with respect to their own needs and aspirations within the research lifecycle. The National Centre for e-Social Science's Data Management through e-Social Sciences (DAMES) Project takes as its starting point the cogito that "while data

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[14] Skills for Research Excellence Programme http://www.abdn.ac.uk/aspire/

management tasks are a major part of most social science projects, researchers often don't have good fluency in these tasks, and consequently don't take advantage of their own data resources."[15]

The recent RIN-funded Case Studies in the Life Sciences project[16] investigated seven disciplinary groups, and found that data curation is only a minor element of the research lifecycle in the majority of research programmes, but that where there has been direct contact with data management professionals it is possible to identify examples of significant if isolated change, most typically as an unintentional impact or outcome from the participation of data experts in a research project. For example, the value of interaction with data professionals was illustrated by evidence from the study of the neuroscience group. In 2008 this group had already been the subject of an immersive study by the DCC's SCARP Project[17] into the curation of neuroimaging data for sharing and re-use (Whyte, 2008). One of the outcomes from this relationship was a declaration by the neuroscience team that "now we manage our data, whereas before we didn't." The key observation made by the original SCARP investigator was that effective curation needs human infrastructure, and how researchers' and investigators' heedful attention to each other's data will in effect underpin the curation activity within a team. The dividend from this "think local" approach should be taken into account when assessing the supply of data curation capabilities and it could provide a working rationale for institutional service organisations.

However, while the researchers who engaged with the Case Studies project responded warmly to the need for informed data management, their demands would be difficult to satisfy. More than one research group expressed a desire for the supply of centralised (institutional) informaticians who could be "parachuted in" for a short period to set up data management systems, as well as local and readily accessible informaticians constantly on hand with knowledge of the discipline, the project and the work done by the group, providing ongoing support and solutions to problems as they arose. For any institution these demands would represent a formidable challenge in terms of providing and managing such a highly skilled and flexible resource. The explicit requirement for a substantial level of subject knowledge also militates against the development of a central cohort that might be useful in multiple situations.

Whose Responsibility?

So whom do we need to influence or engage in order to get data-related issues embedded within academic programmes? The list is potentially quite lengthy, including: the QAA's subject benchmark review panels; leaders of academic programmes and their external examiners; heads of graduate schools with a responsibility for researcher training mechanisms and programmes, and the Human Resources services which support them; groupings of vice-principals with a responsibility for Research and/or Learning and Teaching; the Higher Education Academy (HEA), which aims to inform policy and support best practice for the aims of bettering the student learning experience. Other stakeholder groupings with a contribution to make to this debate may include research librarians, IT directors or vice-principals with a responsibility for information management, and professional bodies.

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[15] DAMES Project Web Page http://www.dames.org.uk/
[16] Case Studies in Life Sciences http://www.dcc.ac.uk/case-studies-in-life-sciences/
[17] DCC SCARP Project http://www.dcc.ac.uk/scarp/

Lastly, there is the question of the awards themselves: who would, could or should certify, accredit or otherwise endorse these changes? Table 2 (below) offers a quick overview of potential accrediting or certifying bodies, and the strengths and weakness of such a situation.

Accrediting/Certifying Body	Advantages	Disadvantages
Higher Education Institutions	Academic kudos. Mechanisms already in place for the Accreditation of Prior Experiential Learning (APEL).	Curriculum approval process can be slow and potentially over-formal.
Research Councils	Stability and discipline focus.	Subject to political changes in direction.
Data Centres	Significant experience with data management, hence ideally positioned to "approve" curriculum.	Diverse views on quality/ best practice.
The DCC or other projects	Impartiality.	Instability of funding.
CILIP and/or other professional groups	Impartiality. Experience of accrediting programmes.	Less of a dedicated digital/data focus.

Table 2. Options for accreditation or certification.

In the United States, the Data Management Association International (DAMA) offers a Certified Data Management Professional credential, "awarded to those who qualify based on a combination of criteria including education, experience and test-based examination of professional level knowledge. This credential is offered at the Mastery or Practitioner level. To maintain certified status and continued use of the credential, an annual recertification fee along with a 3-year cycle of continuing education and professional activity is required."[18] This certification is offered in partnership with the Institute for Certification of Computing Professionals (ICCP), which administers testing and recertification.[19]

While a small number of recent workshops has begun to engage with this issue (e.g., Education for digital stewardship: librarians, archivists or curators? (2008)[20], The International Data curation Education Action (IDEA) Working Group (Hank & Davidson, 2009)), given the multiplicity of options that has emerged in the paragraphs above, it can be argued there is a need to convene a national, and possibly even a global debate to resolve the demand for data management education and training. Indeed, the DCC and the School of Information and Library Studies at the University of North Carolina, Chapel Hill, have recently received funding from the UK's Joint Information Systems Committee (JISC)[21] and the US Institute of Museum and Library Services (IMLS)[22] for a project entitled Closing the Digital Curation Gap: International Collaboration to Integrate Practice, Research, and Teaching in Digital Curation, an international study which aims to establish and support the network of educators through face-to-face meetings and the provision of various IT tools. The initiative's overarching goals are to establish a baseline of digital curation practice and knowledge

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[18] Certified Data Management Professional - DAMA International http://www.dama.org/i4a/pages/index.cfm?pageid=3399
[19] ICCP - Institute for Certification of Computing Professionals http://www.iccp.org/
[20] Education for Digital Stewardship: *Librarians, Archivists or Curators?* Workshop at the Joint Conference on Digital Libraries, June 16-20, 2008, Pittsburgh, USA http://ils.unc.edu/jcdl2008/
[21] JISC: Supporting education and research http://www.jisc.ac.uk/
[22] Institute of Museum and Library Services http://www.imls.gov/

in small to medium-sized cultural heritage institutions, to develop a framework for the development of instructional content and the roles that stakeholder organisations might adopt, and to develop relevant instructional and awareness tools.

Extending the Debate: Towards a National Forum?

The landscape we have described is one in which the contours are very much in flux. Respecting that context, we acknowledge that a more focused and comprehensive treatment has yet to be made of the RDMF's recommendation to investigate options for the creation of a national data management education and training forum, and we expect to initiate this through in-house DCC brainstorming. However, the dimensions of this objective are considerable and its realisation could require a powerful mandate. On June 30, 2009, the draft final report of the RIN-funded Case Studies in the Life Sciences included the recommendation that "the UK Department for Business, Innovation and Skills should commission an assessment of the national requirements for skills in research data curation and support, with a view to producing appropriate, effective and sustainable models for training and careers in managing data throughout the lifecycle, and catering for the potentially diverging requirements of different domains of research". Should this assessment be undertaken, we would want to propose that the broader RDMF community be closely involved in the consultation.

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