Research information management
Developing tools to inform the management of research and translating existing good practice

Imperial College London

JISC

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Acknowledgements

This study was commissioned and funded by JISC. It has been conducted with the support of Imperial College London and Elsevier.

This study involved a series of discussions with staff at twenty-one English higher education institutions. We are grateful to all those who agreed to participate and to those who helped arrange interviews. The study also involved participant workshops at the University of Bath and the University of Leeds. We are grateful to the staff at these institutions who helped make this possible, to Alison Foreman for facilitating the workshops, and to those who took part.

The project website and report were designed by Alexander Turner www.alexand.co.uk

The findings of this study were first reported at a post-project workshop at Imperial College London on 27 August 2010.

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1. Introduction

Universities' core business is research. It is key to a university's reputation and is central to its mission. Nationally, governments recognise that research is critical for expanding the university knowledge base, driving improvements in teaching, and in advancing social and economic gains. As universities have sought to increase and diversify revenue streams and to reduce their dependency on block government funding, externally sponsored research, in particular, has achieved greater prominence.

Developing and managing a research portfolio is not easy. The landscape in which research grants and contracts are bid for and won is competitive and globalised, with competition only likely to intensify as a result of the current financial situation. Recent years have seen a trend toward research becoming more international and more interdisciplinary, making the management of research funding an increasingly complex task. On a broader level universities are heavily regulated and scrutinised by governments who seek transparency and value for money. Mechanisms such as the Research Assessment Exercise (RAE) and the Research Excellence Framework (REF) have placed significant demands on universities to ensure they demonstrate quality and value-added outcomes in their research. With a bleak financial outlook for universities these demands are only likely to increase. There is an even more pressing need to manage resources efficiently and to be effective in identifying opportunities.

Research management has evolved to fit this dynamic research environment. People, processes and systems are key factors in delivering research excellence, both operationally and strategically. The functions of university research offices and the demands on staff working in research management have become more varied, growing to embrace a wide range of activities and responsibilities. Yet, as was demonstrated in the Professionalising Research Management report (2009), this is a young profession, characterised by a lack of coordination, few shared structures, and with no regulated qualification framework[1].

Something similar is true of research management systems, which have developed without a coordinated approach to cope with increasing demands. Competitive academic environments require efficient and responsive systems; increasing breadth and complexity in the research portfolio requires systems to be flexible and able to handle a range of different scenarios; and increasing regulation requires active management and measurement of both academic and administrative staff. The information that is obtained from these systems is required for a variety of reasons. Strategically, it informs an institution of its performance and competitiveness and allows it to take decisions based on that information. Operationally, systems are required to support day-to-day administration of research and fulfil the needs of external stakeholders.

Within the higher education sector there is a growing recognition of the need for research intelligence and well-established performance management frameworks. These can help focus institutional strategies on research quality, raise the profile of an institution's research nationally and internationally, manage talent, and build a high-quality research environment. Yet there also appears to be considerable dissatisfaction with the systems on offer, and a lack of coordination between institutions as each implements their own solution to problems that are shared across the sector.

This study aims to understand the current research management systems landscape. It has focussed on how information from data can be used to inform strategic decision-making at a variety of levels, and on how research management can be improved across the sector. It is not a system-specific

[1] John Green and David Langley, Professionalising Research Management (2009). Available at www.researchdatatools.com

study and seeks to develop an understanding of system needs, especially with relation to information intelligence independent of specific products. Ultimately, however, effective implementation of a software system is as critical as the product itself. There is a need to review the university sector's success in implementing research management systems with the aim of translating good practice and providing a resource for the sector. This study seeks to evaluate the ways in which institutions across the sector create and implement tools for managing research-related data from systems, and to compare the variety of tools available. By doing this it has aimed toward a fuller understanding of how system tools can be best implemented.

2. Aims and objectives

The aims of this study are to:

- Develop an overview of the systems used by the institutions involved in the study
- Evaluate the ways in which institutions across the sector create tools for managing research-related data from systems
- Compare the variety of tools available in the marketplace
- Share possible ways of integrating tools
- Develop an understanding of research management metrics
- Review the sector's success in implementing research management systems
- Build upon and share Imperial College London's experiences developing and implementing a range of research management systems
- Translate good practice and provide a resource for the sector

The objective is to provide an interpretation of the landscape on which further work could be based to implement the findings of this study.

3. Methodology and implementation

3.1 Approach to the research study

This study uses an inductive approach to research. No specific theory or hypothesis has been tested; rather, information has been collected in an attempt to arrive at key conclusions that can be related back to existing theories or to develop new concepts.

3.2 Selecting the sample

The study is confined to English institutions. The Evidence UK Higher Education Research Yearbook 2009 lists 110 higher education institutions that are considered research active (i.e. they receive funding to carry out research-related activities).[2] This reconciles broadly to current Higher Education Funding Council for England (HEFCE) data that lists 130 higher education institutions to whom it distributes funding for research-related activities.[3] The slight difference can be explained by the broader definition of higher education institution used by HEFCE.

Having established the total size of the higher education sector within England and identified those institutions that receive research funding, the next step was to select a robust and representative sample. A sample size of roughly 20% was identified as large enough to give confidence in the statistical significance of any cross-sector data and trends identified, balanced with the three month timescale within which the study was to be completed.

Twenty-four institutions were approached to take part in the study, with a bias toward research-intensive universities. This was because the study focuses on research information systems and was not concerned with teaching activities and their systems.

Institutions were selected against the following criteria:

- Total turnover
- Amount of externally sponsored research income
- Geographic location

Letters were sent to directors of research offices, copied where possible to pro vice-chancellors for research, at each of the twenty-four target institutions. These explained the background and objectives of the study and invited them to participate. Of the initial selection, three declined. These were not replaced with comparable institutions as it was felt that twenty-one institutions represented a sufficient sample size. The institutions interviewed are listed in appendix A.

In 2008 approximately £3.7bn of external research funding was given to higher education organisations in England. The sample selected for this study represented £2bn of that funding, accounting for almost two thirds of this total value.[4] The number of institutions selected for the sample accounts for a disproportional amount of value: essentially the average value of research income for the sample selection is higher than that of England as a whole. Institutions with varied research portfolios and one specialist institution were included, but it was felt that a more complete picture of the sector could be achieved by skewing the sample toward those with higher levels of research income, and that it was in institutions handling larger research volumes that the need for research management systems and information analysis would be the most pressing.

3.3 Project interviews

Letters were sent to the institutions who had agreed to take part in the study inviting them to nominate staff involved in the management of research and systems to be interviewed. As a result a range of staff involved in research were interviewed, including senior academic staff, such as pro vice chancellors for research (PVCRs), directors of research offices, sys-

[2] Evidence, UK Higher Education Research Yearbook 2009 (Thomson Reuters, 2009).
[3] HEFCE data is taken from http://www.hefce.ac.uk/pubs/hefce/2010/10_08/
[4] Evidence, UK Higher Education Research Yearbook 2009 (Thomson Reuters, 2009).

tems and IT staff, and research office staff. This broad selection meant that at the majority of institutions it was possible to capture the views of both the academic and administrative communities.

Before each interview secondary data was compiled. In keeping with most public sector organisations, a large amount of data was available on each institution's website. Copies were taken of annual accounts, annual reports, and strategic or corporate plans. Analysis from the Evidence UK Higher Education Research Yearbook 2009 was also included.

Interviews were conducted on a semi-structured basis and covered a broad range of topics including research strategy, organisation, IT relationships, current IT systems used for the management of research, the implementation of systems, and performance measurement. To ensure consistency, a standard question list was prepared to be used at each interview (appendix B). This addressed a range of questions related to research management systems, but was focussed on the two project deliverables: tools to support research and best practice in implementing systems. This list was used at each interview, but it was felt that presenting interviewees with a long list of questions was not the best method to collect information and so the prepared questions were used as broad topic areas for discussion and not all were asked specifically at each interview.

The interviews were conducted in single group sessions and lasted between one-and-a-half and two-and-a-half hours. Imperial College London staff led the interviews. At each there were at least three interviewers, at least one of whom was a project leader. Each of the project partners, Imperial College London and Elsevier, were represented at all of the interviews. Independent notes were taken by all interviewers. These were compared and collated following the interview and were checked by another member of the project team for bias. Detailed notes that summarised and represented the outcomes of the interview were then agreed. In some cases the interviewees provided further supplementary data post-interview, such as systems data or more recent strategic plans, which were used to validate the interview write-ups as necessary.

Interviewees were assured of their anonymity in advance of all meetings and some comments have been edited to preserve this. Where necessary, repetitions and non-standard English have been removed.

The advantages and disadvantages of interviews as a method of data collection have been much debated. In this study interviews were appropriate to the exploratory nature of the research. Interviews are inherently adaptable and a skilful interviewer can follow up particular ideas, probe responses and investigate motives and feelings. Other indicators such as body language, hesitancy or the use of metaphors can be picked up through face-to-face interviews and would not be possible through other mechanisms such as surveys or online exercises. Interviews offer each interviewee the opportunity to think aloud and uncover issues not previously thought about, which can contribute to a rich set of data, something that was apparent during the course of this study.

Despite the advantages, a number of pitfalls need to be negotiated when adopting an interview-based study. It is important to avoid leading questions and bias during interviews, though it must be acknowledged that interviewees can inadvertently contribute to bias by concealing answers when pushed on sensitive topics. During this study the interviewers were keen to avoid bias, and vetted the questions with colleagues before settling upon a final list. During interviews, effort was made to ensure questioning was consistent and did not steer

answers in a certain direction through tone or body language. In addition, an external facilitator was used to review and analyse the interview notes to provide external moderation.

3.4 Project workshops

After interviews had been conducted at the sample institutions, participants were invited to take part in one of three regional project workshops. These workshops were used to validate the findings of the project interviews and to develop a consensus. To avoid bias and provide a fresh perspective on the results, the workshops were organised and facilitated by an external provider. Members of the project team sat in on the workshops and made notes but did not actively contribute.

The workshops were held in locations chosen to attract as many attendees from as many institutions in the sample as possible: Leeds, Bath, and London. All but five of the institutions interviewed were represented at the project workshops, though not all interviewees were able to attend and some of the attendees had not participated in the project interviews.

Each workshop lasted two hours though in each instance the approach was tailored to fit the audience attending. The primary objective was to establish a framework that would encourage open discussion and debate and to find consensus where possible. To facilitate this, key findings and representative quotations were drawn from the write-ups of the project interviews. These were divided into eight sections:

- Suppliers and the marketplace
- Performance management
- Performance management targets
- IT relationships and strategies
- Research system satisfaction
- Vision for future systems
- Research system implementation
- Lessons learned from implementation

Each section was written on flipcharts, with the top ten findings based on the interview transcripts listed on each page. Slides of relevant quotations from interviewees in each section were also used. After considering each section in turn, attendees were asked to identify themes with which they strongly agreed or disagreed. A brief discussion followed to pull together findings in each area, and to establish where a particular finding might have been misinterpreted or where there was general consensus about a finding.

After each workshop notes were written up and collated between the project team (appendix C). The findings were combined to ensure that:

- Pertinent themes from the interviews were correctly identified
- Stakeholders' vision of future research information systems had been discussed and captured
- Elements of good practice that could be shared across the sector to improve implementation had been examined

Finally, the findings were assimilated with the validated findings from the project interviews to form the basis of the final project report. Time was taken to identify conflicting opinions and to draw out consistent findings.

Considerable enthusiasm was generated during the workshops and without exception all participants were keen to work together in future and to take the findings of this study forward in some form.

4. Suppliers and the marketplace

4.1 Institutional research information management needs

Institutions need to understand their strengths and weaknesses, and to match their strengths to the landscape in which they operate. They may opt to do this through clear targets and an equitable performance management framework aimed at growing the research base and thereby improving their reputation and stature. While this is a broad ranging endeavour, research data is a critical component of the information required in order to understand how an institution can develop and deliver its research strategy. From a research information management perspective the following needs were identified.

	What institutions want from research information
1	Help academics identify funding opportunities to perform research
2	Calculate costs to perform research in order to complete grant applications in compliance with full economic costing (FEC) requirements
3	Monitor academics' funding applications and monitor success rates
4	Manage funds once awarded, include invoicing and cash collection at appropriate milestones
5	Aggregate and benchmark research outputs and outcomes, including publications, patents, and licences
6	Showcase strengths of individual and institutional research activity, for example through online academic profiles and esteem measures
7	Help researchers collaborate by facilitating and tracking opportunities, especially in interdisciplinary areas, within institutions, across departments, and with researchers from other institutions
8	Help institutions collaborate by facilitating and tracking opportunities with corporations, national and local government bodies, and with other institutions
9	Facilitate business development activities by capturing and analysing a meaningful record of previous activities undertaken with specific funding bodies or potential partners
10	Identify talent externally for potential academic recruitment
11	Facilitate scenario planning at individual and aggregate levels, e.g. income sensitivity to key staff movements or major projects

Figure 1: What institutions want from research information

Day-to-day operational needs relate to identifying, applying for, and managing research grants. First, institutions aim to help researchers identify funding opportunities, either through the research office or more usually by providing tools to the academics themselves. Once funding has been identified, researchers need to calculate costs associated with a project. Costing activities are more usually driven by the research office and need to adhere to full economic costing (FEC) policy. Pricing is in accordance with funders' terms and conditions. As grant applications reach decision-points, research offices will typically seek to monitor grant success, generally by measuring the number, frequency, financial value and outcome of applications. These are often broken down by absolute and percentage growth measures. Following successful grant applications a post-award team in the research or finance office typically manage funds to complete financial execution of the grant.

Research offices need to support the management and development of academic and institutional performance. Although institutions differ in their use of outcomes to influence their personal and institutional development plans, all those interviewed required the research office to monitor research outcomes – usually publication metrics or patent, license and esteem measures. In some cases these are benchmarked by discipline, geography, institution or research cluster. The need to showcase the strengths of an institution tends to be addressed by using the same outcomes – again, at both an individual and aggregate level.

Another grouping of needs centres on the increasingly interdisciplinary and international nature of research. Research offices seek to help researchers collaborate by enabling them to identify expertise, affiliations and relationships that can support their research goals. These needs may be served by using grant and outcome data to identify complementary and additive relationships with outside parties. Coordinating this activity, and maintaining a record on an institutional level of what has and has not worked with potential partners, is a recognised need in research offices and business development teams.

Finally, at a strategic and institutional level, management systems are expected to provide information valuable to long-term planning. This is particularly relevant in terms of faculty planning and financial planning. In the former, research information tools help to identify talent for recruitment. Closely related is the need to scenario plan financial and organisational change. The funding revenue that underpins the institutional finances is often sensitive to key departments or faculty. Information can provide both the level of sensitivity (e.g. by projected grant income contribution percentage from a single member of faculty) and highlight potential answers to mitigating risk (e.g. through identifying external talent and monitoring the distribution of principal investigator income and awards).

4.2 How suppliers and institutions might meet these needs

Institutions articulated consistent responses when asked how they would like information to be delivered by their management systems and analytical tools. They frequently spoke of the need for:

- Common, consistent, seamlessly integrated, underlying datasets
- User-friendly, intuitive interfaces
- Dashboard-driven, customisable, drill-down reporting capabilities
- Regular and automatic updates, including harvesting of grants and outputs data
- Flexible systems (often requiring integration with specialist finance/human resources/ intellectual property/publications packages)
- Common key performance indicators and benchmarks

- Compliance with full economic costing guidelines and the requirements of both the REF and research councils' joint electronic submission system (JeS)

"We want a system that is user friendly and captures all the data we need to inform the senior management, but which also enables individual academics to present their profile."

"We want a cradle to grave process as seamless as possible, [and] only have interventions when there is an exception or to check."

"We want everything at the push of a button."

4.3 Who are the suppliers, and what do they supply?

Many institutions and suppliers split their organisations or products into pre- and post-award categories (i.e. business process support prior to and after the decision to award a grant). However, there are more periodic and strategic needs. In the table below suppliers are mapped to the eleven identified information needs.

	Agresso	Alta	Atira (Pure)	BluQube	DSpace	Elsevier (Scopus, SciVal)	ePrints	Imprints	InfoEd	Inteum	MyIP	Oracle Grants	pFACT	ResearchResearch	SAP Grants Mgmt	Symplectic	TechnologyOne	Thomson (InCites, WoS)	Wellspring
1 Identify funding			■			■			■					■					
2 Calculate costs	■								■				■						
3 Monitor grant success			■						■										
4 Manage funds	■			■								■			■		■		
5 Monitor research outputs																			
Publication			■		■	■	■	■	■							■		■	
Intellectual property		■							■	■	■								■
Esteem			■						■							■			
6 Showcase strengths																			
Individual			■		■	■	■	■								■			
Institutional			■		■	■	■	■								■			
7 Researcher collaboration						■													
8 Institutional collaboration		■				■			■		■					■		■	■
9 Business development		■							■		■								■
10 Identify talent						■										■			
11 Scenario plan																			

Figure 2: Suppliers mapped to information needs

This illustrates that few suppliers attempt to meet all eleven needs, and that most engage with only a limited section of the holistic set of requirements. This raises the question of why suppliers are fragmented in their provision to serve such a disparate set of requirements.

The leading suppliers in the research management space have been identified. Those referred to most frequently are listed in appendix D.

Interviews showed that institutions were all engaged in looking for new developments or replacements to current systems. As *"nobody in the country is happy with systems that they have"* many interviewees identified new suppliers aiming to provide systems that address multiple needs in the information landscape.

4.4 Challenges articulated by research offices

Suppliers face four key challenges in designing systems to meet market needs:

- Diversity of stakeholders within institutions and particularly those who have the power, influence or ability to make decisions in this area
- Perceived diversity of institution types
- Variety of activities and processes by which research is managed within institutions
- Lack of shared standards in data and data definitions across the sector that make it difficult to define systems requirements consistently across institutions

These challenges make it difficult for suppliers and institutions to understand each other's constraints and needs.

In terms of stakeholder diversity, research management draws on multiple functions within an institution (finance, human resources) and multiple stakeholders (academics, management, finance, human resources, IT, and the research office). As research cuts across most, if not all, of these stakeholder groups the requirements become increasingly complex and confused. This means a diverse customer base influences the requirements for any system: academics, managers, operational staff, and strategists.

"[Academics are] repelled by the bureaucratisation and centralisation of systems."

Institutions themselves are not homogeneous. The number of researchers ranges from tens to thousands, and research funding income from thousands to millions. Inevitably, therefore, there is a diversity in the extent and complexity of information and systems required, which varies across the sector. For example, institutions with large medical faculties or which focus on arts and humanities have significantly different information needs.

Research offices are variable in structure, role and activities, and research management is relatively young as a profession. Though research information managers are becoming more significant and are expected to develop systems and information, in the majority of institutions their roles and remits are not clearly defined. More importantly, these people are expected to translate business processes that are highly variable within and between institutions into systems. The difficulty for the suppliers is how to develop cost effective systems with core functionalities that can meet the expectations of such a diverse customer base.

"[There is little] thought leadership and knowledge development around best practice."

The lack of standards both in data and data definitions compound the challenge for suppliers. The difficulties facing suppliers are how to develop information systems that meet the vocabulary of not only the diverse range of

institutions but also of their stakeholders, such as funders, government agencies, and industrial partners. Institutions and other stakeholders within the sector are insufficiently joined-up to establish common research data terminologies and structures. As such, institutions are loath to commit to investment in research systems. Instead, short-term shifts in research policy drive short-term institutional needs, which they fulfil with ad hoc and piecemeal systems implementation.

This perceived diversity also spurs a lack of collaboration or collective purchasing among institutions, although there are occasional institutional clusters that collaborate to move their information management agendas forward. The supplier landscape reflects the situation, in that it is diverse, with most suppliers having entered the industry through an ability to deliver one aspect of institutional needs. While suppliers understand key areas like human resources and finance and have robust and well-established relationships with institutions in these areas, the relationships in research management are less established, resulting in a lack of shared knowledge and understanding between supplier and institution.

"It would be great if the top five could collaborate – especially as they all have the same finance system."

Suppliers are not felt to be delivering against institutional needs or to understand fully research management. As one interviewee commented, *"Suppliers do not know what research offices do on a daily basis."*

However, there was also sympathy for suppliers, as institutions often have difficulty articulating their needs, partly because research is seen as a moving target and partly because of the technical and linguistic challenges of communicating complex technical requirements.

"How educated are we at asking suppliers the right questions?"

A common relationship-failing stems from suppliers' lack of knowledge about other systems and related business processes. This is often compounded when information is shared across systems and processes. This can result in significant scope creep as system requirements begin to overlap. Again, some sympathy was extended to suppliers as many of the interviewees acknowledged difficulties in briefing suppliers on variable business processes and lack of standard requirements. Research offices are, with occasional exceptions, not prepared to accept out-of-the-box functionality, unlike more uniform functions such as human resources or finance.

"I want everything I need and nothing else. I must be the customer from hell."

Some interviewees were frustrated by suppliers taking a resolutely single product or a one-size fits all approach. Research offices were also frustrated by some of the larger suppliers who seemed to view research management as an entry point into other major system areas, usually finance, student management or human resources.

5. Performance management

5.1 Data collection

The opportunity to report information on performance within an institution has increased as a response to external drivers such as the RAE. As a consequence some institutions have appreciated the usefulness of research data and have begun to develop demand from various elements within the institution (vice chancellors, PVCRs, heads of departments). While this acknowledgement of the need for data and information has grown, many institutions have failed to update tools that were implemented in response to external drivers. So, for example, ad hoc systems implemented in response to the RAE 2008 have already fallen into disuse.

While there was an acknowledgement among the institutions of the need for data to manage performance, there was confusion and contention about the implications of collecting and disseminating such data. Most of the sensitivity surrounded the belief that academic culture negates the need for accountability for performance, and many were concerned that collection of data, even at an aggregated level, was inevitably built up from an individual level. This was associated with a fear that individual data would be used to judge performance of academics.

"Academia is based on stochastic processes and a dashboard at an individual level would be a disaster."

While the majority of institutions accepted the need for data to performance manage their institution at all levels there were a few who were strongly opposed. They argued that it was inappropriate to allow the centre of the institution to micro-manage and that it should be left to departments and individuals to manage themselves. Justifications for this viewpoint ranged from the need for academic freedom to one example where unions had not allowed data to be used to judge performance at an individual level (although the use of such data had been accepted by unions at several other institutions). One PVCR expressed a moral dilemma about using performance management data, arguing that it would be unfair for staff in one area to face cutbacks if it is apparent that they are performing better individually than those in areas that are maintained.

Though some strong views were held, all institutions recognised data as an essential building block to inform and to measure at all levels, and to support decision making.

"Unless you have it you cannot make informed decisions; you would be acting based on opinions and hearsay."

Despite the concerns of some institutions opposed to management of academic performance, the importance of data at an individual academic level was generally recognised. The reasons for this were:

- Increased competition and research complexity (e.g. interdisciplinarity)
- Increased importance of research strategy and the need for data to inform and evaluate it
- Statutory reporting and submission of data to the REF, HESA and funding organisations

At one successful institution, the PVCR and the director of the research office regularly discussed success rates and volumes of applications and awards. The information was provided at institution, faculty, and departmental levels, with the ability to drill down to individual level when needed. A framework existed for the PVCR to discuss information with deans against targets, and to use information with research facilitators who worked with academics at local level, matching strengths to funding opportunities. At this institution there were clear institutional and discipline-specific benchmarks: for example, that grant income be in the top ten of the appropriate RAE unit of assessment.

In some instances there were formal performance management frameworks that were clearly designed to incentivise academic performance. For example, at one institution there were mechanisms by which junior academic staff could progress to senior lecturer level if they achieved specific targets, such as securing a major grant within a three-year timeframe, two major grants within a five-year timeframe, and four quality publications that could be submitted to the REF. These targets were set in consultation with the academics and unions were involved in the process. They were generic, explicit, and transparent, and readily accepted by the academic community. This ensured that young academics understood how to gauge their performance and had clear goals and ownership of their career progression. It also provided a strong incentive for them as system users to ensure their data were accurate and current, which in turn provided better data for the institutional picture overall.

It was recognised that institutions needed to act on the evidence provided by key performance indicators. This required a framework to enable senior staff to make independent assessments and take decisions. In institutions where performance measures existed without a clear decision making framework and information flow, little change actually appeared to happen.

Most institutions found it difficult to get academics to update data within systems, with resulting problems for data quality. Many were unsure how to motivate academics to validate or input data. Some had recognised that performance management at an individual level could be used as a potential incentive, whilst others had exploited systems which eased the burden for academics and encouraged engagement.

"We set income and publication targets for our academics. They rarely need the stick as the carrot works well"

5.2 Key performance indicators for research

Many senior staff, both academic and administrative, recognised the need for management information, but found it hard to decide what information was most important. The result was often that an institution had a plethora of data but no rigorous way in which to use it informatively. Others found it difficult to identify performance measures for research at all.

"How do you measure research when it is about people and ideas?"

The measures in figure 3 were seen as relevant, some of which are being used in some institutions, some of which are an aspiration for others. Most institutions identified with the need for performance measures, were the data available, timely, and reliable. Currently, the majority of data is retrospective, resulting in a challenge for institutions in their ability to predict their future funding flows and output measures.

Institutions consistently mentioned the difficulty in securing meaningful, up-to-date information related to comparator institutions, including that from funding bodies. Even where benchmarking data was available this was not structured consistently, published regularly, or available in a suitable format for institutions to use it meaningfully. As a result of this, some institutions had resorted to sharing their own data with one another in an effort to generate meaningful benchmarks. However, such moves were relatively informal or ad hoc and often the shared data was too old to be useful for setting a strategy.

Several institutions which used clear frameworks for performance management had markedly improved their research income and their reputation, as measured by performance and league tables. An example of the consistent factors that have contributed to this success are outlined in figure 4.

	Measure	Granularity
Inputs	Research income	Growth; per year; by academic, FTE, department, funder type
	Research application success rates	By funder; per year
	Volumes of research applications	By funder; quarterly, monthly
	Volumes of research awards	By funder; size banding; quarterly, monthly
	Research overhead, FEC income	By funder; quarterly, monthly
	Post-graduate student numbers	Against targets; per year
Outputs	Publications in quality journals	Numbers, citations, by academic
	Esteem measures	
	Impact measures; innovation activities; patents; licenses	
	Numbers of external collaborations	National, international
Peer benchmarks	Institutional peer group	National, international
	Departments or academic discipline	National, international
	Staff numbers	Departmental, national
	Research office resourcing	FTEs in UK institutions

Figure 3: Identified benchmarking measures

Case study: delivering results through performance management	
Strategy	Research strategy developed using internal and external research data
	Senior academic team used research data to identify strengths and weaknesses
	Research income targets and milestones incorporated into research strategy
Execution	Strong emphasis on evidence based decision making by vice chancellor
	Key performance indicators set at faculty level and progress reviewed monthly by vice chancellor and heads of faculty
	Individual level targets set by heads of faculty and reviewed against external peers
	Performance against targets and feedback fed into annual appraisal mechanism
Results	Individual level review is not mandatory but take up is high (c100% across institution)
	RAE 2001 to RAE 2008 performance = +6 places
	Research income growth (2005 to 2008) = +59%
	Research income growth ranking (2005 to 2008) = +18 places

Figure 4: Case study: delivering results through performance management

6. IT relationships and strategies

While almost all institutions visited in the study had a published research strategy, only one had a properly developed and signed off IT strategy (let alone one that was published, even internally). Many commented that research management systems were driven by external factors, particularly the RAE and REF. Several had implemented systems of varying degrees of sophistication in order to meet the specific needs of the last RAE. Only one had devised an IT strategy for research and allied systems that met the needs of the institution rather than externally imposed requirements. Several acknowledged that systems that had been built to deliver the requirements of RAE 2008 had subsequently fallen into disuse, with data not being maintained.

"The principle drivers for our systems are often external, e.g. RAE or REF; but they shouldn't be – just as a research strategy should not be developed to respond to the RAE but to respond to our strengths and the external environment, our systems should be defined to run our business with the inevitable consequence that they will deliver what is needed for the RAE/REF."

The failure of institutions to view information systems as tools to manage their research business and instead the propensity to create them in reaction to other pressures has lead to wasteful ad hoc implementations. In the project workshops attendees began to discuss the need for work at a national and strategic level to improve the situation. Many expressed the need for better future planning; the information that government and its bodies will require in the future needs to be better defined so that it can feed into the specification for a university information and research management system now. It was felt that this would be an improvement on the current situation in which each institution responds to externally-prescribed metrics and implements systems in specific response, an approach that must be hugely inefficient to the sector overall.

"It is hugely important for system planning to occur across all levels of the sector, not just within individual universities."

"The lack of a long-term vision makes it hard to invest and to co-operate within a university let alone across the sector."

Most institutions visited said that any IT strategy which existed was held within the domain of the IT department or its directorate. Usually development of such a strategy was not carried out at a high level in the institution and often it fell within the domain of the registrar or head of administration. One institution commented that strategy was defined by the director of IT's budget proposal, which was examined in the annual planning round, so confusing strategy with budgeting and indicating how research systems are often judged as a cost rather than an investment. Many commented that the research office had only limited formal input into the definition of IT strategies or priorities. Possibly as a result of this, most commented that research was given a low priority for investment; in every institution interviewed, systems to support finance, human resources and students had, almost without examination, question or discussion, been prioritised for capital investment over research. Many suggested that this was because research is complex and that research system requirements are therefore harder to articulate or agree upon; that external reporting is constantly changing; and, significantly, that the champions for research management systems are more diffuse (resting with PVCRs, directors of research offices, deans, the academic community in general, or a combination of them all) than in other areas of the administration, where there are always clear champions for new systems to support administration.

"The director of research is well positioned to have a strong influence on IT strategy via structural routes within the university […]

though whether he can really influence the desired result is another matter."

"There is a misalignment between institutional imperatives and the direction of IT investment."

"Research needs get lost in the noise of demands for other, more easily understood, systems."

One institution developed its IT strategy through its corporate information services division but the PVCR said that *"having grand visions for systems is not a good idea […]. I have no vision for information systems."*

Possibly as a result, most institutions reported historically low levels of investment in research management systems even though there is an increasing awareness of the need to invest as a result of RAE 2008. In most cases, initiating new research system projects was dependent on individuals or research offices bidding to either the IT department or to a variety of committees. As it was not always clear where the decision would be made it was felt that any proposal should be discussed in as many forums as possible to generate general buy-in and momentum. In several institutions research systems were perceived to be a cost and not a benefit, and few conducted cost-benefit analysis, let alone considered return on investment, when defining priorities.

"There is a lack of recognition of the investment required for an aspirational research management system compared with that required for a finance system, for example."

"I do not know where decisions are finally made to prioritise capital spend on IT systems."

It is perhaps not surprising that most interviewees said that research strategy and IT strategy (where and if it existed) were developed in isolation and that the planning and resourcing of research systems was not aligned with organisational priorities (and could be skewed by externally imposed requirements). Many recognised the need for the business to drive and be involved in the development of the IT strategy but found it hard to achieve this; one commented that the IT department preferred to implement systems that they knew were achievable rather than those which added value to the business. There was clearly a shared difficulty in establishing exactly what a research system or research systems strategy should look like.

"Research systems are hard to deliver."

"Research systems are a nebulous totality which mean different things to different people and which therefore makes it difficult to gain engagement when talking about the amorphous totality."

Despite the lack of formal involvement of those managing research in the development of IT and investment strategies, in almost all of the institutions participating in this study relations between the IT department and the research office were said to be good at an operational level, often *"as a result of goodwill"*. Yet these relationships existed almost always at a personal level and not through formal structures. They had developed through work on projects in which there had been common goals. One interviewee commented that since no structures existed it was a question of *"having to get on"*; another suggested that relationships with other silos within the organisation were similarly weak (finance and library were mentioned). Whilst research office staff were felt to work collaboratively with IT staff, there was a feeling that academics and departmental administration were even more removed.

"Why aren't we all working together?"

7. Research system satisfaction

It was universally agreed that the current systems offering was unacceptable and that academics and administrative staff had low satisfaction levels with the systems they used. Indeed, none indicated that they were satisfied with their research system provision; academics in particular were unhappy. Most institutions interviewed were reviewing the systems used to manage one or more elements of the research cycle (pre-award including costing, pricing and negotiation; post award including invoicing, reporting, intellectual property and publications management). A major challenge identified was usability. Many systems had poor user interfaces that were reluctantly accepted by administrative staff, but those who used them less frequently, such as academics, found them harder to use. This had consequences for the extent to which academics would champion the development of new systems or engage with existing systems. There was a feeling that usability was key to getting academics involved in systems, and that it was important that academics be consulted early in the process when specifying and designing new systems.

"There is a culture of not involving academics in the specification of systems which serve both academic and administrative needs; the compromise between the two often suits neither well."

"Too much emphasis is placed on the system and on functionality rather than user experience."

Many institutions reported that they used composite systems in which information was transferred or re-keyed into a combination of systems. Locally-held spreadsheets and basic databases were often used despite it being recognised that such a variety of local systems could lead to huge difficulties in data cleanliness, management, and reporting. Several institutions admitted that much of their research management process relied on paper-based activities to fill gaps in the business process and to supplement ineffective systems. The consequent duplication of data entry through lack of integrated systems is a major source of frustration, particularly for academics, and a key reason for the more general dissatisfaction with existing systems.

"Generating meaningful data is labour intensive and sometimes you have to fight to get access to it."

As a result, data quality was a major issue that lead, in turn, to entire systems being viewed as untrustworthy; a situation in which, as one person suggested, *"data is used when it supports an argument but dismissed when it doesn't."* All of the institutions interviewed reported that a considerable amount of staff time was employed in data cleansing activities. There was a general recognition that, in the context of the current provision of systems, the ability for an institution to generate meaningful data is time-consuming and labour intensive. External agencies require reports to be in their own specific formats, meaning institutions have to report the same data in multiple ways, at significant cost.

"Universities should work together more to make their collective voice heard by external agencies."

The result is an environment in which it is hard to persuade staff of the advantages of developing holistic, integrated systems; many commented that painful implementations in the past dampened the appetite for new projects. The sector is well aware of infamous implementation failures (even at prestigious research-intensive institutions). Few were able to articulate examples of successful implementations of research management systems, despite good project management structures, relationships and, in some cases, academic support.
The memory of the failure of the MAC initiative

in the 1980s/90s (which attempted to get the sector to develop systems collaboratively) was often mentioned and several commented on the sector's inability to work together to address the underlying issues.[6]

"Future efforts are tainted by past failures."

"If we got 10 universities in the room to define a specification for an underlying system then we would be there for years, by which time demands would have changed – but how can that be when we are all undertaking the same core business?"

Two institutions are currently developing their own institutional in-house project *"to create a full research management system"*; another two are working collaboratively to develop a costing tool; and two had built in-house systems to manage RAE 2008, both of which were completely dependent on an individual: *"if he left then we would be in a complete mess."*

Figures 5, 6 and 7 illustrate research system development and usage in the institutions that participated in the study.

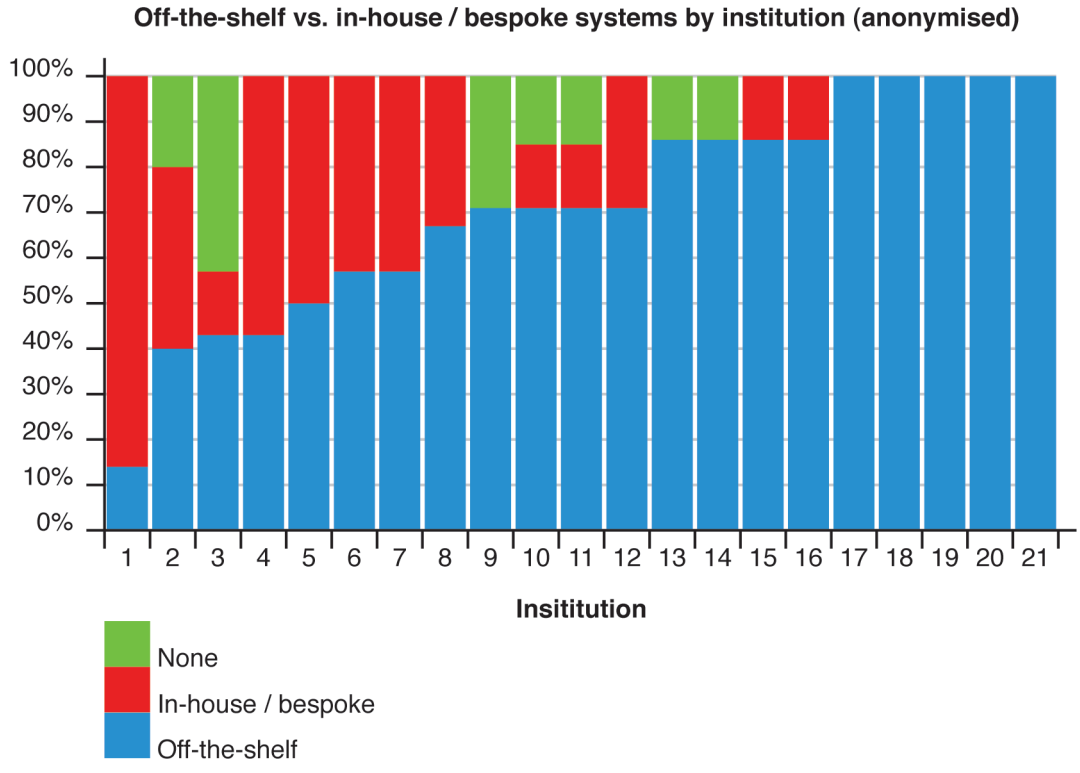

Figure 5: Off-the-shelf vs. in-house/bespoke systems by institution

[6] See Janette Hillicks, 'Development Partnerships between HE and Vendors: Marriage made in Heaven or Recipe for Disaster?', JISC InfoNet (May 2002), 4-6. Available at http://www.jiscinfonet.ac.uk/Resources/external-resources/development-partnerships

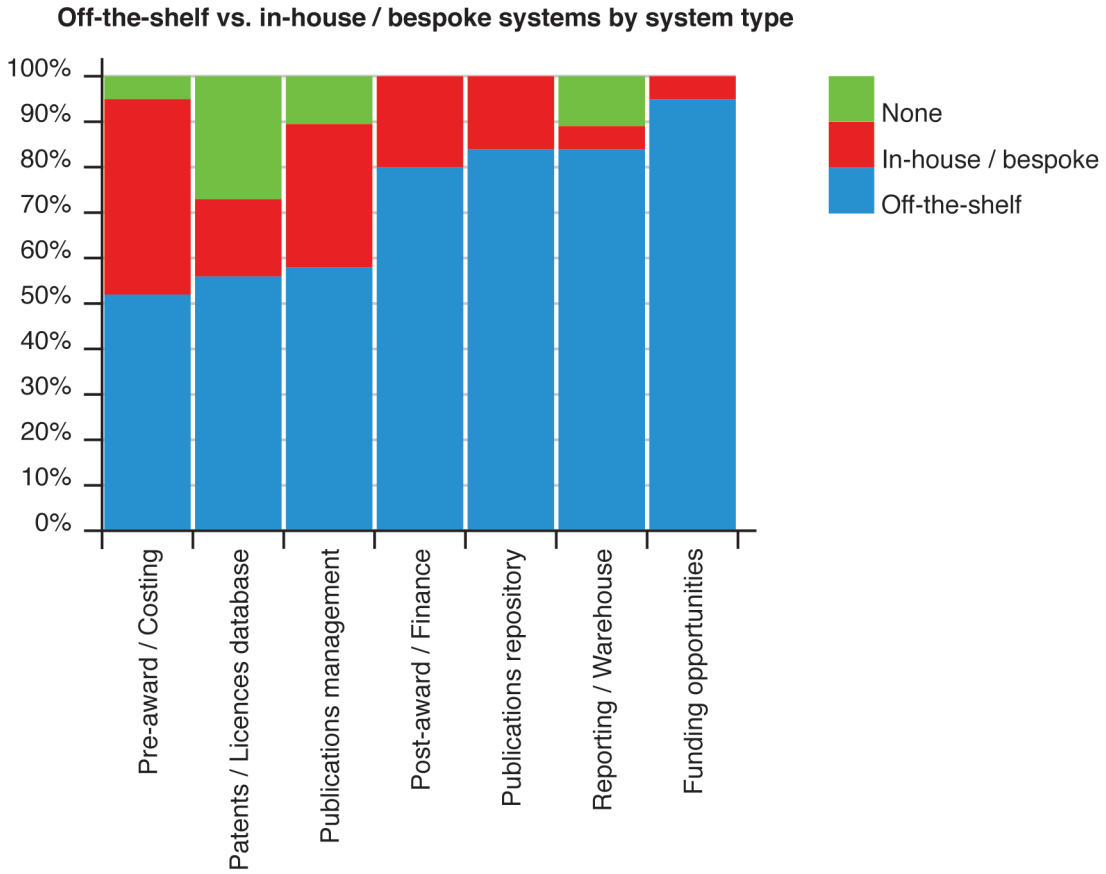

Figure 6: Off-the-shelf vs. in-house/bespoke systems by system type

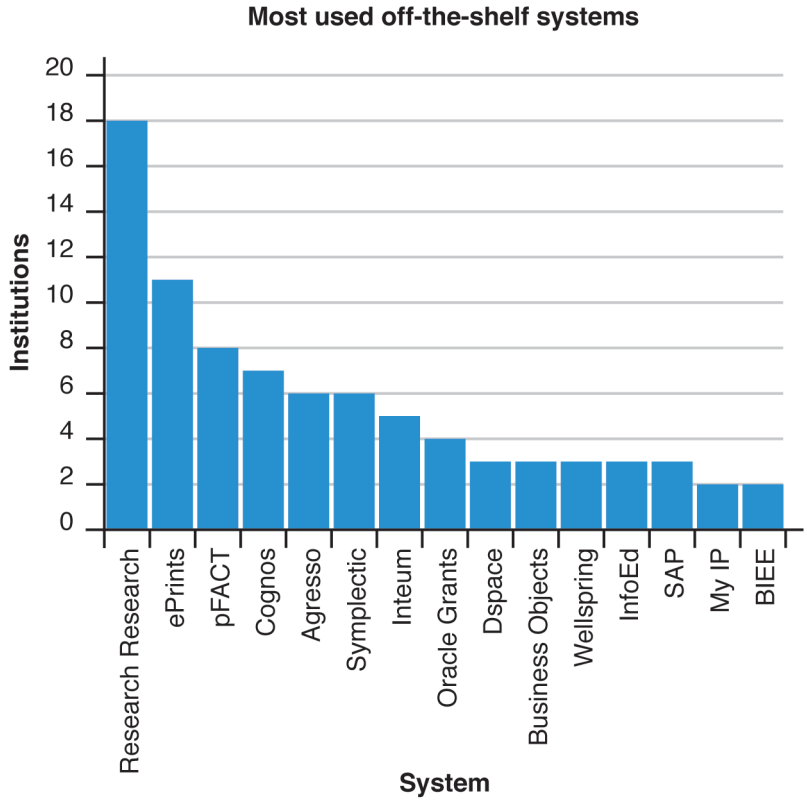

Figure 7: Most used off-the-shelf systems

8. Vision for research tools

Findings in this section fall into two categories: a vision of research systems to support processes and operational activities; and a vision of software tools to manage research information and which use data to monitor research performance. This study is focussed on the latter but the two are interlinked; data entered into management systems is later used to analyse research activities. This section includes a range of findings from both system and information perspectives.

8.1 Operational research systems

There was a consensus that the highest priority was to improve costing and pricing provision – or in many cases to develop replacement costing and pricing systems. It was clear that institutions had managed the introduction of full economic costing, which requires a better understanding of the costs of undertaking research activities, but the development of systems had severely lagged behind. The fact that institutions (and suppliers) have been slow to respond has resulted in sub-standard costing and pricing tools, which are poorly integrated into the research systems suite within institutions. A number of institutions had reverted to spreadsheet calculators to cost and price research applications, with obvious frustration at the amount of manual effort this took and the consequent challenge that exists for data integration.

A vision of an integrated costing and pricing tool that linked into pre- and post-award research databases was most consistently put forward by institutions as their highest priority. Almost every institution cited a fragmented research system suite and a lack of integration as the fundamental problems facing them and, consequently, the challenge and vision for the future involved making systems *"talk to each other"*.
"We want a seamless integrated system but don't even know how we can achieve something close to that."

The most frequent driver for integration of systems was the need to improve the quality and efficiency of research support available to the academic community. Research office staff complained consistently of duplication of effort and poor data quality, while academic staff underlined the need to design systems with easy-to-use interfaces and which were relevant to their needs. The need to ensure that systems were designed with academic needs firmly in mind was a recurring theme.

"The vision for systems is to ensure academics recognise the importance and usefulness of systems and for departments to have confidence in data. The challenge is to make systems valuable to individual researchers."

While many institutions articulated a research system vision that emphasised engagement and relevance to the academic community, most acknowledged that the RAE and the REF had become the primary drivers. As a result of this systems were reactive and focussed upon corporate needs rather than meeting the needs of corporate and academic leaders and masters.

The need to improve efficiency and maintain consistent data quality levels between research systems was not confined to those within the institution. Several institutions, including some of the most research intensive involved in the study, cited the need to integrate internal application systems with external funder systems, such as the joint electronic submission system (JeS) used by most UK research councils.

"Our system vision is driven by a need for greater process efficiency. We would like to develop a JeS interface, a dynamic link between our pre- and post-award systems and funder templates to reduce the need to fill in so much data."

Many of the institutions participating in this study recognised the need to improve the management of publication data and, in particular, to begin to link systematically awarded grant applications and academic outputs (i.e. publications). This was driven entirely by external influences in the sector, in this instance a recent research council output gathering exercise. Again, the inefficiency of this process, and concerns over data quality and academic control led a number of institutions to consider how they would develop links between research systems in the future.

This highlights the motives that underpin the vision for research tools. More often than not, institutions articulated a need for research systems driven by external policy influences. Perhaps unsurprisingly, exercises such as the RAE and the REF and the agendas of research councils play heavily in the decision-making within institutions to develop research systems. As such, systems projects continually change in scope and scale as the policy environment shifts, resulting in little coherence to strategies for research systems.

"There is a distinct lack of long-term vision when it comes to research systems. No-one is saying what do we need by 2015 or 2020? Instead we are constantly chasing our tails."

8.2 Research information tools

The most consistently articulated need, particularly from senior academics interviewed, was to ensure that holistic, timely and reliable information was passed to key decision-makers within the institution. In many interviewees' minds, this would be delivered through a data warehouse of information that could be used to measure performance through a series of indicators. Several interviewees described a tool that, in the words of one, *"sucked data onto a screen at the touch of a button."*

"Our holy grail is a dashboard for every academic that benchmarks them against peer groups and our own internal targets. It should help managers to decide which themes to target and where to invest."

The development of strategy and the setting of strategic objectives within institutions was an area covered in detail in all interviews. In all but one of the institutions the strategy process was based on information extracted from internal sources and usually contained an element of benchmarking that used sources such as the RAE or statutory reports. It is clear that information is increasingly used for strategic purposes and that there is a general desire to provide greater evidence-based strategy setting. However, the limitations of information used in strategy setting were understood by most institutions. Data was often several years out of date or piecemeal, only partially meeting institutions' needs. The same was true for the use and flow of information within institutions. The most cited requirements in institutions' visions to deliver their research information needs were tools that provided the following:

Holistic view of research information

The majority of institutions complained that their data was held in silos that could only be joined together through several separate extracts. This was considered a time-consuming process, usually made worse by inconsistencies that became apparent as reports were knitted together.

"What we have is functional and works OK for us but it is not holistic or joined up"

Access at degrees of granularity

There was no consensus as to the granularity at which data should be held and used to develop strategy or to assess performance; there were varying views, dependent mainly upon the strength of feeling towards the performance management of individuals. In some

circumstances institutions felt that research information should be aggregated at departmental and institutional level but in others that individual level analysis was critical – particularly so where data and annual performance reviews were closely intertwined. Institutions agreed the need to access data, at least within the research office, at an individual level to ensure that data quality could be monitored and to ensure data was targeted at the correct degree of granularity within the institutional hierarchy.

"Current discussions within the institution take place using data at the wrong level of granularity"

External benchmarking

The need to incorporate external benchmarking information was commented on by the majority and it was clear that the vision for research information tools should have an element of external benchmarking for meaningful interpretation. Most discussed the need for national benchmarking data and two indicated a need for international level data.

Academic staff require a user-friendly interface

Most interviewees commented on a desire to improve accessibility to information within their institutions and to engage with academics more directly to encourage ownership of data and buy-in to performance measures. The poor user interface was mentioned consistently as one of the key detractors of currently available systems. The result was a failure in academic engagement resulting in incomplete data that the research office had to spend time retrospectively completing.

Flexibility to deliver stakeholders' needs

It was recognised that a challenge within institutions was to identify those who needed or wished to engage with the information available and appropriate to them. As a result information could be presented in different ways to suit the variety of users, for example a vice chancellor's needs are different to a head of department's needs. That in itself is a reflection of the difficulty that the sector has in specifying what it requires from information tools. Too often institutional progress was hindered by the need to resolve conflicting user requirements and thereby deliver a system that was all things to all people.

A consistent theme of the interviews was the inability of institutions to articulate the detail behind their vision and to explain what an information tool might look like.

9. Good practice in implementation

9.1 Project management methodologies

The majority of institutions used some form of project management methodology, with the most common being a light-touch version of PRINCE2. The full methodology was often deemed too clunky so a customised and more flexible approach was preferred. Only one institution did not use a formal methodology. It was felt that IT departments had a tendency to over-regulate system projects, using their own administrative requirements in addition to those included within the project management methodology, and so increasing the time and costs incurred to deliver the system.

Despite the feeling that PRINCE2 was overly cumbersome as a project management methodology and that IT projects tended to be over-regulated, no institution was able to put forward a more suitable methodology. When questioned about the appropriateness of more flexible methodologies, such as Agile for example, institutions felt that they would be unable to work with such a loose style. It was clear that institutions preferred to err on the side of caution when selecting a project management methodology and adopt a rigid approach rather than seek the flexibility they desired.

9.2 Project structure

Senior academic leadership or championing of systems projects was deemed critical, with strong links to the strategic research committee (or equivalent) thought to be important. In PRINCE2 terms, the project boards that were felt to be most successful tended to comprise at least one senior academic and a range of stakeholder representatives. Interviewees found that academic sponsorship was crucial in order to generate buy-in from the user community for projects with academic end-users. Administrative leadership was usually provided by the director of the research office with project management provided by their team or jointly with the IT department. Secondment of research office staff to the project was thought preferable, ideally with staff time backfilled to allow a full focus on the project without the day job getting in the way (although in reality this rarely took place and staff were expected to carry out dual roles). This also prevented the project from becoming dominated by IT departments, who were generally able to dedicate staff to a project, and resulted in greater business focus.

9.3 Communication and engagement

Projects were deemed more likely to succeed where support existed across the institution; it was thought important to involve as many stakeholders as possible as early as possible to prevent them being perceived solely as research office projects. This involvement needed to include academic input into the requirements gathering process from the outset via user or advisory groups to obtain their commitment and engagement. Where academic stakeholders were engaged much later in the project it was more difficult to generate engagement and ownership, with systems ultimately failing to meet expectations. Early academic involvement ensured the end product is better suited to their needs as well as to those of research managers; it was often stated that the end users could not see the point of a system as it provided no real benefit to them. Many institutions recognised a need to maintain a focus on the long-term system deliverables (usually geared towards organisational management of research) rather than to deliver short-term benefits to academics within the project timeframe (which was sometimes a driver for the IT department, who saw it as proof of delivery). Automatic population of academic CVs and application forms, bank statement-style reports, academic timesheets and web population of esteem measures were all suggested as potential benefits to end users that could be explored.

It was generally agreed that it was essential to include something that academics could identify with and recognise as adding value to the system early in the project. Though it was agreed that academics needed to be involved, wider user involvement was deemed equally important. As systems were often likely to be used by academics' support staff (e.g. departmental administrators and personal assistants), it was recognised that their input could also be beneficial.

While it was felt important to consult with end users, there is a limit to the level of engagement that can be carried out. Projects can become caught up in consultation fatigue and as a result progress can be slowed. The project manager must balance the need for a breadth of input against delivery to budget and deadlines: more time spent specifying the system means less time to build it. Expectations must be managed carefully to avoid creating false hopes and, later, disillusionment when the final system does not meet with the hopes of those who provided input at an early stage. The look and feel of a system was believed to be almost as important in terms of system uptake as its basic function.

"We over specify what a system does and under specify how it does it."

It was felt that projects are unrealistic in terms of scope, timescale and resources, particularly as a result of scope creep creating further requirements during latter phases of the project. This affects the time and effort needed to complete the implementation. A particular cause for delay was the underestimation of the resources required to cleanse existing data or to convert it into a suitable format for migration into the new system. There was a feeling across the institutions that too much time was spent trying to deliver a perfect system, satisfying all stakeholders from day one. There was also agreement that, with clear communication, end users would understand and accept that research systems would need to evolve organically over time and that there would be teething problems along the way. However, no institution seemed to learn from its own experience.

"Managing scope is critical otherwise you spend too much time on the bells and whistles."

Realistic budgeting was acknowledged as important to ensure appropriate investment decisions can be made. There was a sense that research management systems were not seen as investments but were viewed purely as a cost, a view that must be challenged. Many of those interviewed recognised that substantial investment would be required to obtain a system of sufficient quality to get a real return on investment.

Dedicated staff with communications expertise were included in the project team in only some of the institutions interviewed. Their role was to engage with users and deliver change rather than just a system. At one institution, business intelligence analysts worked within IT but faced faculties. It was acknowledged that as many types of communication as possible should be utilised, not simply mass emails that were likely to be deleted or ignored. Examples of successful means of communication included workshops, open lunchtime sessions, seminars for academics and departmental administration staff, and leaflets or posters of systems being provided to all staff.

On a broad scale, experiences of systems implementations are often shared between institutions. This tended to be instigated by institutions looking for new systems who wanted to discuss matters such as system satisfaction, specification generation and general experiences with other institutions. This took place informally through personal networks rather than any recognised forum. There is a lack of

identifiable partnering between institutions, between institutions and suppliers, and very little by way of establishing commonality in terms of both systems and implementation methods.

9.4 Lessons learned from systems implementations

Although many institutions had a formal lessons learned process, it was often forgotten or omitted as new commitments arose. At best the lessons learned were noted then consigned to a repository never to be reviewed again. A recurring theme was the belief that while the staff involved in systems projects learned from their experiences, institutions as a whole did not.

"People learn but organisations don't."

A number of institutions had also been *"scarred"* by their experiences of difficult system implementations in the past. This had implications for future systems. At times it led to research systems being seen as *"too problematic"* among senior managers within institutions and generated a reluctance to invest further in new research tools. Where research systems were subsequently implemented it led to an over-cautious approach and heavy emphasis on managing cost rather than delivering benefits.

In institutions that had delivered successful projects there was invariably strong leadership for the project from the very top of the organisation – either explicitly or through association within the power structure of the institution. Universities pose the unique challenge that decision making usually involves the academic community (through senate). Successful projects always had a highly recognised individual championing the project and a person with whom the academic community could identify and who commanded respect. An important result of leadership is the ability to make clear and binding decisions within the structure of the project, rather than have ownership of the decisions deflected into the diffuse governance structure of an institution.

"Someone needs to take ownership of the process: it is impossible to please all of the people all of the time so somebody needs to be strong enough to stand behind decisions and follow through."

Lessons learned

Communication	Project Management
Invest heavily in communication at all stages of the project, especially early on	Be realistic about scope, timescale and resources required
Speak to other HEIs to learn from their experience and to help shape specifications	Avoid scope creep
Communicate that systems will not be perfect immediately but try to deliver quick wins to generate buy-in and momentum	Account for ongoing user support in post-implementation plans
Be realistic – it takes time, commitment and expertise to deliver the final project	Ensure strong leadership is obtained and secure senior academic sponsorship
Communicate that research information is needed so systems are required to capture this data	Do not underestimate data cleansing needs and ensure data ownership is clear

Figure 8: Lessons learned

10. Conclusions

10.1 Research information landscape

Managing research is complicated. The processes involve a huge variety of activities, including formulating strategy, putting together grant applications, publishing outputs and commercialising inventive materials. The list of activities carried out by those involved in research is seemingly endless.

There are competing stakeholders: those involved in funding, auditing and measuring the outcomes of research as well as the institutions that carry out and manage the research process. Stakeholders on both sides conduct some similar activities, use similar systems and require similar information to operate effectively. More often than not, however, the perception is that research agendas, activities and processes are different for different stakeholders. Additionally, institutions, for a variety of reasons, some more valid than others, regard their research activities and research management activities as different from each other. It is within this environment that this study has evaluated the research system and information needs of institutions.

Institutional development of systems is driven by an underlying perception that the process of managing research is highly varied across the higher education sector and that, because of the competitive nature of research, it should be carried out in isolation. Elements of this are of course true, but to what extent does having efficient management systems truly create a competitive edge for the quality of the research itself? This study uncovered pockets of informal collaborative activity within the research system environment and one more formal alliance emerging. Harnessing desires to identify similar processes and system needs, breaking down barriers to partnerships, and changing isolationist tendencies must surely figure more prominently in the future.

This lack of uniformity in process means institutions focus upon developing systems to meet their (perceived to be) specific needs and that suppliers have difficulty in viewing the marketplace holistically; they focus on segments of the research environment, building up isolated competencies in one or two specific areas. This results in a cocktail of systems within institutions, some off-the-shelf and many created in-house, which are developed without considering the research management environment holistically, which do not integrate with each other, and which use conflicting data structures. As a consequence research managers are frustrated by manual and duplicate activities and academics become disenfranchised and reluctant to use tools at their disposal. These are self-reinforcing elements; the challenge is how to break this circle of wasted effort and dissatisfaction.

Suppliers have an important role to play in developing products that meet market needs. Just as institutions must work towards greater coherence and standardisation of process, suppliers must seek to better understand the entirety of the marketplace. Suppliers should look to build data standards with institutions in an effort to drive consistency and they should recognise the need to use technologies, and perhaps provide services, that can assist with integration. One of the most worrying findings from this study is the significant amount of time wasted across the sector through duplicate data entry and the negative implications of this for data quality. It is unlikely that partnerships between suppliers will arise, but some kind of partnering with institutions should be developed in the future. Institutions are adamant that suppliers do not understand their needs yet at the same time recognise that often they do not have the skills to articulate their requirements. By working together more closely, the institutions' knowledge of research management could be traded with suppliers' expertise of translating business requirements and designing tools that are ap-

pealing to academic and administrative staff. A mechanism for kick-starting such partnerships, formally or informally, does not exist and should be addressed.

There is an absence of high level frameworks and standards in the UK with regard to data collection and data sharing. Bodies that fund research through the dual support system and which monitor research activity through statutory reporting and audit have failed to align activities and provide a framework – moreover a consistent framework – which institutions can identify with and align to. While the behavioural incentives behind exercises such as the RAE or REF may have increased research quality they have had different consequences for research systems. Rather than developing systems as part of a long-term vision to manage research effectively, institutions have waited for policy decisions and reacted to them by developing ad hoc, unsustainable research systems. In turn this has driven investment decisions within institutions, with the RAE or REF being one of the few levers with which to secure funding for system development. Periods of lean investment are characterised by sudden windfalls as assessment frameworks or changes in policy are announced. Surely it would be better to encourage the sector to consider a longer term, but still flexible, vision. This would enable the development of sustainable systems aligned to steady financial commitments, thus ensuring cost effectiveness in the long run.

10.2 Information tools

Institutions have witnessed an unprecedented rise in demand for information to assist the management of their research portfolios. However, it was highly variable across the sector as to: the extent to which information needs could be met; the purposes for which the information was to be used; and where in an institution responsibilities lay for providing, receiving and acting upon the data.

Institutions are thirsty for tools to manipulate and present clear information to a range of stakeholders but in almost all circumstances their capabilities fell well short of expectation. In some cases this was simply because institutions were at an early stage of implementation. In many, the inability to deliver requirements was a result of the underlying instability of databases, incompatibility of data and concerns regarding data quality.

At a more strategic level, few could articulate what they wanted to measure, for what purpose, and what frameworks were in place to effect change based on information. Institutions appear to have latched on to the need for instant information gratification driven by senior management needs. However, the need to address underlying issues such as the need to improve data quality and incompatibility were absent from many of the projects underway to develop data warehousing and dashboard tools. Similarly, few could identify the purpose and use to which the information would be put and few had a detailed picture of what information was most important. The result was an unfocussed approach which attempted to deliver the information needs of all stakeholders. Institutions paid scant attention to the need to tackle data quality early on – a critical, yet often ignored, activity. Many were critical of academic staff for disengaging and refuting information provided, yet few identified this as a direct result of data quality issues failing to be addressed early on in a project. Figure 9 illustrates the estimated levels of system development for the institutions participating in this study. It is noticeable that despite the high numbers of rudimentary and disconnected systems, there is a significant level of dashboard activity underway. Very few institutions demonstrated that they had a solid, integrated system base with consistent and common data structures in place before progressing to dashboard development.

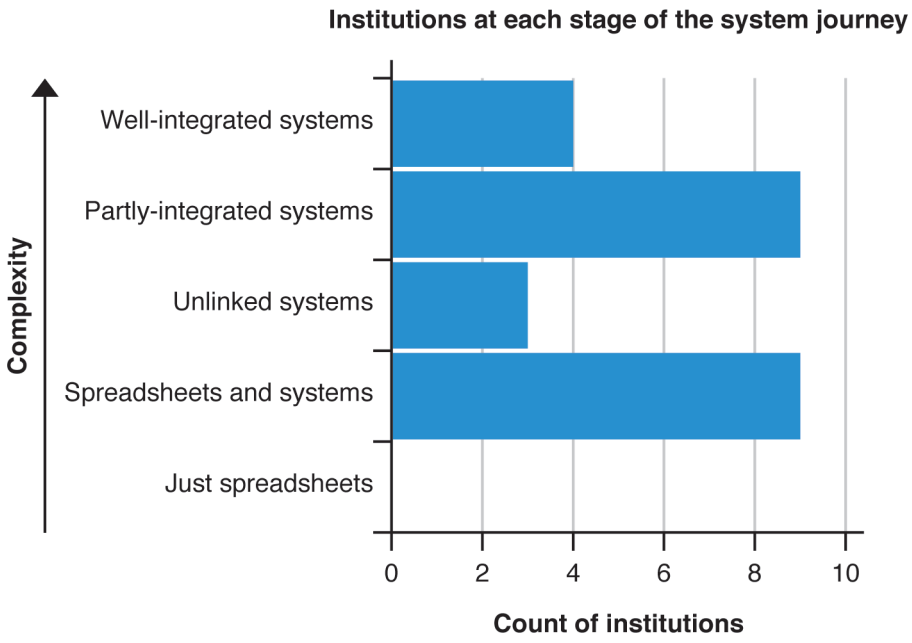

Figure 9: Institutional systems development – estimated progress

There was agreement over the concept of using research information to manage performance at an institutional level. Use of performance indicators at individual academic level gave rise to a wide range of views, with some strength of opinion that this was a step too far. Inevitably cultures vary from institution to institution and research information tools must have the flexibility to present data at varying degrees of granularity. For some institutions, aggregated units will take precedence over individual data, for others low-level detail will be of paramount importance. Either way, data should be built from the bottom up within a clearly defined framework so that flexibility exists in granularity but with consistency throughout. Without this consistency, data and dashboards become unstructured and disconnected from one other, leading to misinterpretation.

Institutions recognised a number of limitations in the data available. In particular, meaningful external data was extremely difficult to source and almost all key performance indicators were lagging rather than leading. The difficulties regarding external benchmarking data are not easily solved in the short-term. The requirement however is clear: institutions need to be able to understand their strengths (as funders do) and to foster efficient competition (thus increasing research quality).

The need to use information as a predictive tool was rarely mentioned by interviewees, with only a few institutions providing concrete examples of where it took place (mainly in finance). Institutions did not appear to recognise that a deep understanding of their past performance, analysis of trends and identification of correlations, would be useful in managing their business moving forward. For example, only one institution contemplated modelling scenarios such as the impact of particular academics leaving the institution or of particular funding streams being curtailed. A culture shift is needed to encourage institutions to

develop leading performance indicators and to reduce reliance upon historic reporting, which is quickly out of date.

Too often, institutions commented that manipulating data to meet their needs required deep expertise and dedicated expert staff simply to compile reports and build analysis models. At the heart of this issue was the complexity of the reporting tools used by institutions and the difficulties of combining data from distinct research systems. Suppliers should note the general dissatisfaction with information tools across institutions and the need for simple user interfaces that enable non-experts to 'slice and dice' data easily.

10.3 Best practice in implementation

Many institutions either had no IT strategy or one that was developed and guarded by the IT department. It was often suggested that research management systems were perceived to be difficult (both to specify and implement) and that as a result research was given a low priority for investment. In comparison systems to support finance, human resources and students, almost always secured investment easily. Explanations for this included the constantly changing external landscape but also questions of ownership. Responsibility for research systems is less focussed within institutions; a range of stakeholders feel the need to be involved whereas in other areas of the administration there are always clear systems owners. As a result most institutions felt there had been low levels of investment in research management systems.

It is apparent that not all institutions have clear and transparent frameworks for deciding infrastructure investments. In some cases this has led to proposals being discussed in many different committees (just to gain momentum), almost invariably without a coherent business case.

Many research system projects were judged by interviewees as unrealistic in terms of scope, timescale, budget and resources, reflecting again the need for properly developed project initiation documents and project controls. It was often suggested that stakeholders wanted to specify perfect systems from the outset rather than focussing core functionality first. This often led to daunting, poorly defined system projects which subsequently encountered difficulties with functionality and data cleansing and migration. Few institutions had attempted to segment their project delivery in to phases to make projects more manageable. Similarly, few described how they had managed to anticipate data quality issues and set aside adequate resources to tackle this up front.

Most felt that IT projects tended to be over-regulated and that they were driven predominantly by IT departments. In many cases this inhibited wider involvement throughout projects, to the perceived detriment of project outcomes.

Academic sponsorship and involvement was deemed to be essential to the success of research systems projects and, in particular, the involvement of academics early in the requirements gathering process was deemed critical. A key ingredient of successful implementations was uniformly felt to be strong leadership at the very top of the institution – leaders with credibility with the academic community and sufficient seniority and empowerment to defend the project from interference by different stakeholders en route. In tandem with strong leadership and focus was the need for clear and authoritative decision-making. Too often, because of the consultative operating style within many institutions, decisions were taken with systems projects in an effort to please all stakeholders. Success was strongly linked to those institutions with project leaders capable of making tough decisions.

Academic and user engagement

Do	Do Not
Include a range of stakeholder representatives on the project board	Focus purely on functionality; the user experience of the system is also important
Involve users in early-stage design and requirements gathering	Let the needs of a small group of academics drive the project
Break down barriers with users through advisory groups and inclusion in testing	Address only corporate needs; also deliver visible benefits to academics
Secure academic sponsorship of the project	Spend too much time on requirements – allows less time to build the system

Figure 10: Academic and user engagement

It was often the case that, when considering new research systems, institutions talked informally to those in the sector with whom they had links or those who they understood to have been involved in similar developments. However, there was no rigorous or formal process to harness experiences within the sector or to build a bank of experience (with the unsurprising consequence of lack of commonality of systems and implementation methods). It is disappointing that many of the issues identified in this study reflect very similar issues identified in the MAC initiative underlining that the sector appears slow and unwilling to learn from its past experiences.

While there are understandable reasons for the lack of shared experience across the sector, it was alarming that many institutions admitted that they seldom learned from their own implementation experiences. Invariably research system projects included a lessons learned element in the project process, but it rarely carried weight within institutions. Ironically, it is perhaps these experiences from which institutions could learn most.

This study has identified many areas where there is duplication of effort, inefficiency in process, system implementation, and waste of resources – and found little evidence of lessons being learned. It would be salutary to carry out a study to quantify the costs to the sector overall, but that in itself may be a poor use of valuable resource given the strength of evidence.

11. Recommendations

1. Institutions within the sector should work more collaboratively with each other to harmonise their approach to processes and thereby minimise wasteful duplication of investment in systems across the sector. Consideration should be given to the establishment of a network or body charged with facilitating institutional links and mapping core processes in detail.

2. Institutions and funders should work more collaboratively to identify commonality in systems and processes so that they may share data in more cost effective and less resource intensive ways. Consideration should be given to the establishment of a framework or network to achieve this, with clearly identified terms and deliverables, and with engagement at decision-making level within stakeholder organisations.

3. Institutions should develop stronger relationships with suppliers and work with them to define needs more clearly. Significant progress could be made by exchanging expertise between those involved in actually managing research and suppliers whose expertise is in translating business processes into effective tools. This may require institutions to invest time and resources in understanding the holistic research management environment.

4. A national framework for data standards – encompassing both data and data definitions – should be developed across the sector, thereby enabling institutions to specify generic systems for reporting metrics, aligned to the tools for managing their individual institution.

5. Suppliers should look to participate in the development of data standards with the sector in an effort to drive consistency in research systems. Consideration should be given to the benefits this would bring to the sector through easier integration of systems and efficiencies in data exchange.

6. Institutions, supported by funding organisations, should be encouraged to develop long-term system strategies focussed upon core research management processes and information needs. The vision for future systems should include mechanisms for addressing the instability of research databases, incompatibility of data between systems and concerns regarding data quality.

7. Notwithstanding the differences that exist in the appetite for performance management within the sector, each institution should establish a clear framework to address:

- Responsibilities within an institution for reviewing and acting upon information
- The level at which performance management data is to be carried out, but with access to underpinning detail to ensure confidence in data exists
- Succinct and consistent performance measures which avoid information overload and confusion

8. Work should be undertaken jointly by funders and the sector to harmonise external benchmarking data and to ensure it is accessible to institutions in a timely and consistent manner. The benefits for doing so are mutually beneficial: institutions better understand their strengths and weakness, funders foster efficient competition and research excellence.

9. The sector should develop a culture that moves away from reactive information towards using information to anticipate change. Suppliers should be encouraged to equip institutions with user-friendly modelling tools to allow them to do this.

10. Institutions should have transparent methodologies for developing their IT strategies, involving all key stakeholders across the business. They should have clear and transparent frameworks for deciding IT infrastructure investments supported by properly

constructed business cases that articulate both cost and expected benefit. They must develop a more robust and business-like approach to prioritising IT investment decisions.

11. The composition of project teams to manage the development and implementation of research management systems must be balanced to include representatives of the business (including academics and managers) as well as IT staff. Key academic stakeholders must be involved early in the project to scope requirements effectively.

12. Projects should always involve champions who have credibility with the academic community and sufficient gravitas within the institution to provide unchallenged leadership.

13. Resources for data cleansing, migration and conversion must be properly identified in a project and anticipated from the outset. This was one of the most consistent areas of difficulty in system implementation across the sector.

14. At an individual institutional level, ways in which lessons can be learned from past implementations should be developed to establish a corporate memory.

15. The sector should develop a framework within which they can build a knowledge base of experience across the sector and share lessons learned of specifying, developing and implementing research management systems. This needs supporting and facilitating nationally.

16. A programme for taking these recommendations forward should be agreed by all stakeholders (JISC, funders, suppliers, institutions) with lead partners responsible for taking forward specific recommendations.

12. References

Evidence, *UK Higher Education Research Yearbook 2009* (Thomson Reuters, 2009).

John Green and David Langley, *Professionalising Research Management* (2009). Available at www.researchdatatools.com

John Green, Scott Rutherford and Thomas Turner, 'Best practice in using business intelligence in determining research strategy', *Perspectives: Policy and Practice in Higher Education***, 13:2 (2009)**

Janette Hillicks, 'Development Partnerships between HE and Vendors: Marriage made in Heaven or Recipe for Disaster?', *JISC InfoNet* (May 2002). Available at http://www.jiscinfonet.ac.uk/Resources/external-resources/development-partnerships

Appendix A: Institutions visited

Appendix B: Interview questions

Background

Strategy

What is your research strategy?
What are your strategic research objectives?
Who is involved in formulating research strategy?

Organisation

How is research support organised within your institution?
How has research support developed over time?
Where does it fit in the wider organisational structure?
How do research support/ business development/ technology transfer work together?
What role does finance play in research support?
How many staff FTEs work within research support?

Research and IT relationships

How is IT strategy developed?
What role does research support play in shaping IT (research) strategy?
How would you describe the relationship between research support and IT?
What is your vision for research systems within the institution?

Current systems

Approach

What systems do you have in place to support research?
(including: pre award; post award; outputs; IP; business development; contracting)
What influenced the direction you have taken with system development?
What is your general approach to system development – in-house v off-the-shelf?
To what extent do you have the ability to integrate and/or exchange information between systems?

Satisfaction

How satisfied are you with your current provision?
How satisfied are your academics with your current provision?
Where do you feel you are on the research systems journey?
What areas of your current research systems provision are strongest?
What areas of your current research systems provision are weakest?

Future direction

What are your top three priority areas for research system development?
What key elements are driving your research system priorities? What are the needs?
How would you assess your/ your institution's knowledge of research system products?

Project implementation

Project process

Do you use any formal project management methodologies? If so, which?
How successful has your institution been in adopting this methodology?
What role does research support play in the project process?
What steps do you take to resource projects with research expertise? (secondments etc.)
Who provides project leadership? Project governance/ control?
How do you manage project risks and issues?

Engagement

To what extent are research systems projects communicated within the institution?
What difficulties, if any, do you have in engaging with stakeholders?
What mechanisms do you use to establish research system requirements?
Who is involved in the requirement development process?

Suppliers

Do you have a mechanism for evaluating products on the market?
Who is involved in this evaluation? Are research support staff involved?
Do you feel suppliers understand your needs? If not why?
Have you encountered any gaps in the marketplace?

Post-project evaluation

What benefits have research systems delivered to administration within your institution?
What benefits have research systems delivered to academics within your institution?
Do you have a lessons learned process from system implementations?
Have you taken these lessons forward?
What advice would you give to other institutions based upon your experience
Have you/ do you intend to share any of your project experiences with other institutions?

Performance measurement

Current reporting capabilities

What level of importance does your institution place on research management information?
How would you assess your current research management information capabilities?
Do you set KPIs for academics and research support? If so, what are they?
What are the aggregation levels used for performance measurenent? E.g. individual, research group, department, etc.
Do you benchmark your performance against your strategic objectives?
Do you benchmark your performance against comparator institutions??
Do you pay attention to league tables? If so, which?
How do you identify and select appropriate peers? Do you benchmark on an institute level or on a subject area/discipline level?
What, if any, resource is allocated to the management of research intelligence?
To what extent is your management information historic vs. predictive?

Information flow

What processes do you have in place for analysis and reporting of research information (at an institutional and research office level)?
Who is responsible for managing research information?
What role does research support play in managing research information?
Who receives research management information?

What action, if any, is taken as a result of research management reports?

Research information evaluation

Where would you describe your position on the research information journey?
What barriers exist to developing research information capabilities?
What are your key management information needs moving forwards?

Appendix C: Project workshop notes

Black text shows information that was written on flipcharts and powerpoint slides.
Red text shows information obtained in the workshop through debate and discussion.
✓ indicates where a workshop attendee strongly agreed with the statement.
✗ indicates where a workshop attendee strongly disagreed with the statement.

1. University of Leeds

Thursday 15 July 2010

Gill Harrison	Project Director, Research Support Process Project	University of Leeds
Vincent Holland-Keen	Support Officer/Business Analyst	University of Leeds
Nicola Keggin	Research and Information Systems Manager	University of Liverpool
Sandrine Daniel	Research and Information Systems	University of Liverpool
Rose Levick	Senior Information Analyst, Planning and Development	University of Liverpool
Lita Denny	Head of Research Operations	University of Manchester
Lisa McClare	Research Operations	University of Manchester
Mark Hagon	Research Operations	University of Manchester
Pete Wheldon	Business Data Analyst	University of Newcastle
Louise Miller	Accounting Administrator	University of Nottingham
Lynne Leader	Liaison Manager (Research and Enterprise)	University of Salford
Tim Snow	Development team	University of Sheffield
Rachel Curwen	Research Policy Officer	University of York
Heather Watson	Research Support Office (grants and contracts) Manager	University of York
John Green	Chief Co-ordinating Officer	Imperial College London
Scott Rutherford	Head of Research Systems	Imperial College London
Thomas Turner	Projects Officer	Imperial College London
Baker Evans		Elsevier
Felix Haest		Elsevier
Alison Foreman	Facilitator	

1.1. Validating Findings

1.1.1. Suppliers and the marketplace

- The difficulty for suppliers is delivering broad one-size-fits-all solutions to a marketplace characterised by local, customised needs (though there are clear generic features, common to all institutions) ✓✓
- Institutions are generally constrained by legacy systems which suppliers cannot integrate with ✓✓
- Suppliers think they can use one area/system as a means to access/sell other more profitable products ✓✓
- Suppliers can only meet specific needs, none can meet the spectrum of requirements across the research lifecycle ✓
- Institutions structure their research support differently (often with ill-defined processes) which makes relationship-building with suppliers complicated ✓
- There is a general lack of suppliers in the marketplace for institutions to choose from ✓
- Generally suppliers promise much but deliver little when it comes to research systems
- Institutions are not skilled in asking what they want from suppliers
- Suppliers do not understand the HE market let alone the research management sphere
- Many off-the-shelf solutions offered by suppliers are designed for the US market not the UK
- Institutions generally feel they must build research systems themselves or in partnership with others, (the decision to build in-house is often taken not because it is thought to be the best option but because of the lack of willingness to alter processes)
- Linking to other systems is a big problem and suppliers seem unable to help
- Suppliers feel that institutions place severe constraints on them and that they are unwilling to compromise

1.1.2. Performance management

- Benchmarking against comparator institutions is difficult because of lack of available data, there is a conflict between the need to compare and collaborate and compete for funding ✓✓✓
- Providing reports and management information is largely manual and labour-intensive and readily-available benchmarking data is lagged....a lack of commitment to consolidating systems and data contribute to this ✓✓
- There is a general use of performance management frameworks within institutions, particularly at central and strategic management levels (most feel that it is improving, within some HEIs there is no use of performance management but there are definitely aspirations) ✓
- An increasing thirst for information exists from senior academic/ admin management team (but they don't always know what they want. This thirst worries some people.) ✓
- VC, PCVR, deans/ heads of departments place increasing importance on research information to support management
- Concerns exist about the use of KPIs and transparency is key to introducing these successfully (there is a lack of clarity about what actions an institution can take in response to KPIs)
- There is a desire to retain flexibility at lower levels (departments) in setting performance targets
- Extremely small amount of predictive reporting takes place, generally all lagging indicators
- There is a lack of measures for the success of initiatives and business processes
- Senior academics do not fundamentally buy-in to the idea of performance management
- The institution recognises that performance management is a good idea but there is no idea of how they could put it into business in a way that academics would accept
- There is a culture among academics against performance

1.1.3. Performance management targets

- Publications in quality journals (numbers, by academics) ✓
- Research income (growth, per year)
- Research income by funder type (growth, per year, per academic, per FTE, per department, per school)
- Research application success rates (by funder, per year)
- Volumes of research applications (by funder, quarterly, monthly)
- Volumes of research awards (by funder, quarterly, monthly)
- Awards by financial size bandings
- Research overhead/ FEC income (by funder, quarterly, monthly)
- Post-graduate student numbers (against targets, per year)

1.1.4. IT relationships and strategies

- Historically low levels of investment in research systems until very recently (some are still under-investing) ✓✓
- Initiating research system projects relies on research office bidding to either IT/research committee rather than through coherent strategic direction, (there is a lack of cohesion between aspirations for the systems and the investment level) ✓✓
- IT strategy is generally developed by IT director with limited formal input from research office ✓
- Research strategy and IT strategy are developed in isolation and consequently planning, resourcing and prioritising of research systems is not always coherent ✓
- Relationships between IT and research office are generally good but often developed informally through project activities – formal relationship is often lacking ✓
- Research offices generally work collaboratively with IT although academics and departmental admin are further removed ✓
- Increasingly different institutional strategies are being intertwined, but this is a recent development

1.1.5. Research system satisfaction

- The integration or combination of systems, spreadsheets and databases is highly unsatisfactory ✓✓✓✓
- Generating meaningful data is time-consuming and labour intensive ✓✓✓
- Duplication of data entry because of lack of integrated systems is a source of frustration ✓✓
- Academics find system interfaces unfriendly and are unwilling to engage with systems/ information ✓✓
- Generally low levels of satisfaction with research systems for academic staff (who are the key users though; often administrators) ✓
- There is a recognition within institutions that the current research system offering must be improved ✓
- Data is generally regarded as untrustworthy and a lot of time is spent cleaning research data ✓
- Generally low levels of satisfaction with research systems for administrative staff (admin staff cope better with poor user interfaces etc. and are therefore happier than academics)
- Almost all institutions are involved in a review/ change of research systems
- There is an over-reliance on paper based activities still within research management
- There is a culture of not involving academics in systems, systems have to deal with academic and administrative needs; the compromise between the two often suits neither very well.
- Too much emphasis is placed on the system and functionality rather than the user experience of the system.

1.2. Vision for future systems

1.2.1. Vision for research tools

- Increased availability and sharing of research data at all levels of the institution
- Access to information for senior academic/

admin staff at the touch of button
- Decreased amount of manual intervention – more efficiency and less duplication of effort
- Seamless cradle-to-grave research systems that talk to each other
- More flexible and user friendly reporting for the research office
- Information dashboards which support performance measurement objectives and drivers of league table performance
- Automatic drill-down to detailed information
- Templates for funder information to reduce burden on academics
- Improved research costing tool
- Capture and storage of impact data
- Benchmarking of performance against national/ international peers
- Two-way links between internal systems and external funding databases
- Links between grants and outputs/ publications
- An easy way to push info out onto the web
- Visibility to other researchers/public
- Links to repositories – encourage open access

Key information and systems needs for different stakeholder groups

Senior academic staff
- Workload management – who is doing what? ✓✓

Management information linked to specific targets
- Performance management information
- Dashboards
- How much research is my deparment/ school/faculty doing?
- Financial plans monitored – know the achievable/warning system
- Funder relationship management
- Transparency in approval processes
- Supports realistic target setting
- Evidence to act

Senior administrative team
- Business intelligence on demand (this is the dream), but pulling together information from different sources can be a nightmare (HR/financial etc). It is only just becoming apparent how useful it is to have all this information together in one place
- Data warehouse
- Performance against KPIs
- Simple, flexible reporting
- Compliance – funder audits/legal compliance
- Quality assurance of research support
- Risk management – approval of research to proceed (not just financial)
- Save money – one set of data keyed in once and has integrity/consistency
- Access to data for statutory returns
- Cost recovery

Wider academic community
- What is left to spend on the project? ✓✓
- User-friendly ✓
- A system which provides tangible personal benefits to the end user, e.g. CVs and application forms, web population, fewer info requests
- A system which is intuitive so that infrequent users remember how to use it
- A system which provides information in their language/terms
- Individual portfolio
- One-stop-shop
- What is my margin this year?
- Academics like to be able to see what their peers are doing: who can I collaborate with or who am I collaborating with?
- How is my contract negotiation going?
- Academics need to upload info into the system; they have to be persuaded that it is worthwhile to do so and on an ongoing basis
- Academics are keen to link to the internet to show off their work; this can be used as a driver to get them to upload information into the system
- It may be possible to get academics to own

their data by linking it to promotions and reviews
- What happens if my research administrator leaves? (scenario planning)

Research administration community
- KPIs, but information is not always quantifiable/captured
- Operational KPIs
- Performance management – QA and audits (internal and external)
- Financial accountability
- Information is entered once and used many times
- Clean, trustworthy data
- Application and award management – where are we up to?
- Seamless information/data
- Information integration
- Simple to produce detailed operational and easily interpretable aggregated data

1.3. Good practice in implementation

1.3.1. Research system implementation

- Academic leadership is usually in place for research system projects
- Administrative leadership is provided by director of research
- Involvement from the strategic research committee is crucial
- Research office project management or at least joint project management with IT is crucial
- Seconding research office staff to IT project would be ideal – but day job often gets in the way
- A senior academic must sponsor the project in order to generate buy-in
- Academics should be involved sooner in the requirement gathering process rather then later
- Getting commitment and engagement from academics in research systems is difficult
- PRINCE2 project management is the preferred methodology – but rarely without some customisation
- Dedicated communication staff within projects are required to engage academics and deliver change
- IT departments sometime over-regulate system projects which increases time taken and costs incurred
- Projects can become caught up in consultation fatigue and progress on delivery can be slow

1.3.2. Lessons learned from implementation

Generally:
- Invest heavily in communication at all stages of the project
- Include a range of stakeholder representatives on the project board
- Secure academic sponsorship of the project
- Be realistic about scope, timescale and resources required
- Involve academics in early-stage design and requirements gathering
- Break down barriers with academics through user/ advisory groups
- Do not underestimate data cleansing needs and ensure data ownership is clear
- More time spent on specifying requirements means less time spent building the system

With academics:
- Ensure wide ranging academic input and try not to let the needs of a small group of academics drive the project
- Communicate that the journey is long – it will not be perfect from day one
- Deliver visible benefits to academics as well as corporate needs (e.g. CVs, reports for academics)

Factors that have contributed to successful implementations in their organisations
- Cross-university user engagement - working groups, re-engaging users, include users in test

- Ongoing user support
- Speaking to other HEIs to learn from their experience and to help shape your specifications - user workgroups (although time may be an issue), the willingness to share is there
- Knowing all of your markets
- Strong leadership
- Understand how people will interact with the system, not just its functionality
- Clear vision
- Avoid scope creep
- User testing
- User ownership – involvement throughout
- Communication – explain why it can't be delivered, be visible
- Co-ordinated approach from the supplier

Challenges encountered and what they have they struggled with when implementing systems

- Gruesome organisational business processes
- Slow and inefficient decision-making
- Scope creep, systems grow because the functionality is available but is not always needed
- New requirements coming in after implementation
- Agile approach – pros and cons
- Plan for subsequent development
- Users cannot visualise what they want until they've seen it
- Limited time and resources
- Availability of business and academic resource
- Senior academics are not always representative
- Systems grow because the functionality is available but is not always needed
- It is difficult to say no to a senior academic

2. University of Bath

Thursday 22 July 2010

Rob Head	Director of Research Development and Support Office	University of Bath
Katy McKen	Research Information Manager	University of Bath
David Langley	Director Research Enterprise Development	University of Bristol
Steve Popham	Research and Knowledge Transfer	University of Exeter
Jen Delmaestro	Research and Knowledge Transfer	University of Exeter
Glenn Swafford	Director, Research Services	University of Oxford
Paul Johnstone	Senior Management Information Analyst, Management Information and Planning Office	University of Warwick
John Green	Chief Co-ordinating Officer	Imperial College London
Scott Rutherford	Head of Research Systems	Imperial College London
Thomas Turner	Projects Officer	Imperial College London
Joy van Baren	Portfolio Manager User Experience	Elsevier
Nick Fowler	Director of Strategy	Elsevier
Alison Foreman	Facilitator	

2.1. Validating findings

2.1.1. Suppliers and the marketplace

- Institutions structure their research support differently which makes relationship-building with suppliers complicated ✓✓✓✓✓
- Institutions are not skilled in asking what they want from suppliers ✓✓✓✓
- Generally suppliers promise much but deliver/support little when it comes to research systems and products/relationships ✓✓✓
- Suppliers do not understand the higher education market let alone the research management sphere ✓✓✓
- Institutions generally feel they must build research systems themselves or in partnership with others ✓✓✓✗
- Institutions are generally constrained by legacy systems which suppliers cannot integrate with ✓✓
- The difficulty for suppliers is delivering broad one-size-fits-all solutions to a marketplace characterised by local, customised needs
- There is a general lack of suppliers in the marketplace for institutions to choose from
- Many off-the-shelf solutions (InfoEd) offered by suppliers are designed for the US market not the UK
- Suppliers can only meet specific needs, none can meet the spectrum of requirements across the research lifecycle ✗
- There is a lack of clarity/commonality in terms of requirements
- The scope of research management is more operational
- Suppliers target finance and libraries and expect other aspects of university administration to work around that
- Suppliers and institutions need to work together more
- Research services across the sector demand customised systems. By contrast, HR and finance departments have accepted generic systems, using elements of these as they see fit

2.1.2. Performance management

- VC, PCVR, deans/ heads of departments place increasing importance on research information to support management ✓✓✓✓✓✓
- Extremely small amount of predictive reporting takes place, generally all lagging indicators ✓✓✓✓✓✓
- Providing reports and management information is largely manual and labour-intensive ✓✓✓✓✓
- An increasing thirst for information exists from senior academic/ admin management team ✓✓✓
- Benchmarking against comparator institutions is difficult because of lack of available data and the statistics people want nationally are not established, which makes it difficult to benchmark effectively across departments and fields across the sector. Planning at a national level is needed ✓✓✓
- Concerns exist about the use of KPIs and transparency is key to introducing these successfully ✓
- There is a general use of performance management frameworks within institutions, particularly at central and strategic management levels
- There is a desire to retain flexibility at lower levels (departments) in setting performance targets
- It is not clear whether performance management means managing individuals, departments, other aggregates, or the university
- If the university amasses data on what an individual has done there are concerns among academics about how it will be used. Yet without individual data it is impossible to create aggregated reports, which are generally accepted by academics
- Institution has been accused by unions of using individual data to make people redundant
- Performance Management is an essential building block
- Data is used heavily at one institution and is

an active part of performance management. Heads of department see how people in their departments are performing
- There is a challenge in applying it across academic disciplines STEM V NON-STEM
- High visibility and access to data by academics helps acceptability
- Soft and hard data needs a holistic approach
- Motivating individuals to report and/or validate data remains challenging

2.1.3. Performance management targets

- Research income by funder type (growth, per year) ✓✓
- Research application success rates (by funder, per year) ✓✓
- Post-graduate student numbers (against targets, per year) ✓✓
- Research income (growth, per year) ✓
- Volumes of research applications (by funder, quarterly, monthly) ✓
- Volumes of research awards (by funder, quarterly, monthly) ✓
- Publications in quality journals (numbers, by academics) ✓
- Research overhead/ FEC income (by funder, quarterly, monthly)
- Application and award data
- Success rates
- Peer group comparisons
- Comparisons within disciplines
- Esteem measures
- Impact measures
- Innovation activities/patents/licenses
- What-if scenarios are very important but interweaving data to produce this is difficult, plus links to external systems are necessary but lacking
- Citations
- How research impacts and is affected by changes in other sections of the institution needs to be measured and anticipated (e.g. the impact on department X of department Y receiving less funding)
- It is necessary to cross different systems to get a fuller picture
- It would be good to be able to compare all the departments of, e.g., art in the UK, Europe and worldwide to measure performance. In some areas – arts and humanities in particular – it is difficult to assess performance from within an institution

2.1.4. IT relationships and strategies

- IT strategy is generally developed by IT Director with limited or effective formal input from research office ✓✓✓✓✓
- Initiating research system projects relies on research office bidding to either IT/research committee rather than through coherent strategic direction ✓✓✓✓✓
- Historically low levels of investment in research systems until very recently, and now a very tough climate to argue for and win big money ✓✓✓
- Research strategy and IT strategy are developed in isolation and consequently planning, resourcing and prioritising of research systems is not always coherent ✓✓✓
- Relationships between IT and research office are generally good but often developed informally through project activities – formal relationship is often lacking ✓✓
- Research offices generally work collaboratively with IT although academics and departmental admin are further removed
- The principal drivers are often external even though they shouldn't be, e.g. REF, RAE
- External relationships need to be nurtured eg library, finance
- There is a misalignment between institutional imperatives and the direction of the IT investment
- Research is viewed as less significant than finance and students

2.1.5. Research system satisfaction

- Generating meaningful data is time-consuming and labour intensive and sometimes you have to fight to get access to it ✓✓✓✓✓

- Almost all institutions are involved in a review/ change of research systems ✓✓✓✓
- The integration or combination of systems, spreadsheets and databases is highly unsatisfactory ✓✓✓✓
- There is an over-reliance on paper based activities still within research management ✓✓✓
- Data is generally regarded as untrustworthy and a lot of time is spent cleaning research data ✓✓✓
- Generally low levels of satisfaction with research systems for academic staff ✓✓
- There is a recognition within institutions that the current research system offering must be improved ✓✓
- Duplication of data entry because of lack of integrated systems is a source of frustration ✓✓
- Academics find system interfaces unfriendly and are unwilling to engage with systems/ information ✓✓
- Generally low levels of satisfaction with research systems for administrative staff ✓
- Need a 5-10 year vision/strategy instead of being driven by REF; people are constantly reacting to the moment instead of planning for the future
- It is hugely important for system planning across various levels of the sector
- Institutions should work together more to make their collective voice heard

2.2. Vision for future systems

2.2.1. Vision for research tools

- Increased availability and sharing of research data at all levels of the institution ✓✓✓✓
- Decreased amount of manual intervention – more efficiency and less duplication of effort ✓✓✓✓
- Seamless cradle-to-grave research systems that talk to each other, utopian concept ✓✓✓✓
- Capture and storage of impact data ✓✓✓
- Benchmarking of performance against national/ international peers, including research offices ✓✓✓
- Access to information for senior academic/ administrative staff at the touch of button ✓✓
- Information dashboards which support performance measurement objectives and drivers of league table performance ✓✓
- Links between grants and outputs/ publications, grants and people (staff/students), projects and outcomes ✓✓
- Improved research costing tool ✓✓✗
- Automatic drill-down to detailed information ✓
- Two-way links between internal systems and external funding databases ✓
- Templates for funder information to reduce burden on academics
- More flexible and user friendly reporting for the research office
- A national vision for data collection and systems including FEC, research outcomes etc.
- Easy to use
- Up-to-date information
- Accuracy of data and transparency is vital
- Timely
- Granularity between STEM and HASS
- Collaboration data – systems designed to hold their own institution's data primarily to fit external reporting requirements
- Government planning on a national strategic level is needed to answer needs fully; more togetherness is needed
- What is needed has to be decided on a national level; e.g. keywords, research fields, etc. all need to be universal to make comparisons easier
- A national vision needs to be established; a small group of people nationally is needed to co-ordinate; serious, credible players are needed to take it forward and put pressure on suppliers and government

Key information and system needs

- Comparisons of HEIs internationally and

also within, e.g., departments
- Academic views of departments
- Predictive reporting
- Web pages
- Portfolio of grants
- Accuracy
- Collaborations with other HEIs, e.g. authors working on a project together, international collaborations, industry collaborations
- Who is doing what with who and where?
- Where do academics sit on advisory boards?
- KPIs – staff numbers for comparison with other HEIs
- KPIs – what will help people to do their job? e.g. turnaround times
- KPIs – it would be helpful to see how research office staff compare with others in the sector (i.e. KPIs for research offices)

2.3. Good practice in implementation

2.3.1. Research system implementation

- Research office project management or at least joint project management with IT is crucial ✓✓✓✓✓✓
- A senior academic must sponsor the project in order to generate buy-in ✓✓✓✓
- Seconding research office staff to IT project would be ideal – but day job often gets in the way ✓✓✓
- Projects can become caught up in consultation fatigue and progress on delivery can be slow ✓✓✓
- Academics should be involved sooner in the requirement gathering process rather then later ✓✓
- Dedicated communication staff within projects are required to engage academics and deliver change ✓✓
- Administrative leadership is provided by director of research ✓
- Involvement from the strategic research committee is important ✓
- Getting commitment and engagement from academics in research systems is difficult ✓
- IT departments sometime over-regulate system projects which increases time taken and costs incurred ✓
- PRINCE2 project management is the preferred methodology – but rarely without some customisation; it is too bureaucratic which puts academics off and means it is difficult to get things done ✗
- Academic leadership is usually in place for research system projects ✗
- We need to provide vision but inform of the steps to that vision

2.3.2. Lessons learned from implementation

Generally:
- Be realistic about scope, timescale and resources required ✓✓✓✓✓✓
- Invest heavily in communication at all stages of the project ✓✓✓✓
- Do not underestimate data cleansing needs and ensure data ownership is clear ✓✓✓✓
- Secure academic sponsorship of the project ✓✓
- Involve academics in early-stage design and requirements gathering, this is critical ✓
- Break down barriers with academics through user/advisory groups ✓
- More time spent on specifying requirements means less time spent building the system
- Include a range of stakeholder representatives on the project board
- We require joint planning at different levels in the sector

With academics:
- Communicate that the journey is long – it will not be perfect from day one ✓✓
- Deliver visible benefits to academics as well as corporate needs (e.g. CVs, reports for academics), this is a big challenge ✓✓
- Ensure wide ranging academic input and try not to let the needs of a small group of academics drive the project ✓
- Key academic involvement ✓
- Perhaps UK dedicated resource from relevant parties, e.g. institutes, HEFCE,

JISC, ARMA

- Research offices need to learn IT language, e.g. 'techy' and modelling/requirements, specification methods
- Transparency about why are we doing things and what are the benefits and limitations
- Publicised meetings
- Realistic vision rather than over-promising and under-delivering
- Backfilling of resources/secondments
- Don't let it become a research office project, involve departments
- Having dedicated staff is hugely important; without them things go more slowly and as a result projects can be dominated by IT departments, who can dedicate staff to projects; sufficient resources should be dedicated to projects, and staff time backfilled

3. Imperial College

Friday 23 July 2010

Martin Reavley	Director - Research Services	University of Cambridge
Dawn Edwards	Business Systems Manager	University of Cambridge
Lilian Caras	Head of Business and Research	University of Hertfordshire
Bill Sturman	Head of Knowledge Management and Business Partnerships	University of Hertfordshire
Mary Phillips	Office of the Vice-Provost (Research)	University College London
Mike Griffiths	Director - Research Services	University College London
John Green	Chief Coordinating Officer	Imperial College London
Ian McArdle	Research Information Manager	Imperial College London
Scott Rutherford	Head of Research Systems	Imperial College London
Thomas Turner	Projects Officer	Imperial College London
Joy van Baren	Portfolio Manager User Experience	Elsevier
Nick Fowler	Director of Strategy	Elsevier
Alison Foreman	Facilitator	

3.1. Validating findings

3.1.1. Suppliers and the marketplace

- Suppliers can only meet specific needs, none can meet the spectrum of requirements across the research lifecycle ✓✓✓
- Institutions are not skilled in asking what they want from suppliers ✓✓
- Institutions structure their research support differently which makes relationship-building with suppliers complicated ✓✓
- Institutions are generally constrained by legacy systems which suppliers cannot integrate with ✓✓
- Institutions generally feel they must build research systems themselves or in partnership with others ✓✓
- Generally suppliers promise much but deliver little when it comes to research systems ✓
- Suppliers do not understand the HE market let alone the research management sphere ✓
- The difficulty for suppliers is delivering broad one-size-fits-all solutions to a marketplace characterised by local, customised needs ✓
- Many off-the-shelf solutions offered by suppliers are designed for the US market not the UK ✓
- There is a general lack of suppliers in the marketplace for institutions to choose from
- Institutions are very unstructured and users are intolerant and only interested in their own needs, it is difficult to meet everybody's needs
- It is a complex market and there is not enough volume for suppliers
- There are lots of exceptions to the rules
- There are lots of moving targets unlike HR and finance and by the time a system is delivered it is already out of date
- Suppliers often focus on one area only and not across areas, e.g. finance, students, whereas research management encompasses a range of activities; suppliers look downwards, not across and tend to focus on one activity
- Can institutions work towards commonality to help suppliers? External reporting would be a good start
- It is possible to have commonality as each institution is required to do the same things; institutions deal with the same funders, yet coping with that is a big task; fitting that with the different internal situations makes it even more difficult
- Is the return on investment worth the cost?
- Does the system deliver competitive advantages? If not, then why not share?
- Institutions need to work together more to pressure the marketplace
- It is difficult to define research information management
- REF provides a constraint because it is seen as defining what the systems need to do

3.1.2. Performance management

- An increasing thirst for information exists from senior academic/administrative management team ✓✓✓✓✓✓
- Extremely small amount of predictive reporting takes place, generally all lagging indicators, due to lack of sufficient data ✓✓✓✓✗
- There is a general use of performance management frameworks within institutions, particularly at central and strategic management levels ✓✓✓
- Concerns exist about the use of KPIs and transparency is key to introducing these successfully ✓✓✓
- Benchmarking against comparator institutions is difficult because of lack of available data ✓✓✓
- VC, PCVR, deans/ heads of departments place increasing importance on research information to support management ✓✓
- Providing reports and management information is largely manual and labour-intensive ✓✓
- There is a desire to retain flexibility at lower

levels (departments) in setting performance targets
- How do you measure research because it is about people and ideas?
- More involvement from academics is required but they are becoming more suspicious of a move towards a management style approach
- Academics often don't see themselves as part of a whole and therefore do not understand the need for aggregation, on the other hand many expect performance management for their appraisals
- Which measures matter?
- Management find it hard to work out the granularity and what is important for the HEIs strategy
- Do research managers know what they want to measure?
- All institutions have the same external reporting requirements

3.1.3. Performance management targets

- Research income (growth, per year)
- Research income by funder type (growth, per year)
- Research application success rates (by funder, per year)
- Volumes of research applications (by funder, quarterly, monthly)
- Volumes of research awards (by funder, quarterly, monthly)
- Research overhead/FEC income (by funder, quarterly, monthly)
- Post-graduate student numbers (against targets, per year)
- Publications in quality journals (numbers, by academics)
- Extent of external and international collaborations and co-authorship
- Numbers of research staff involved
- Numbers of fellows involved, difficult to find, would have to ask funders
- Metrics on an aging university, e.g. age-group bandings
- Impact (but how do you measure impact?)
- Run rates for spend – income vs. expenditure
- Pipeline info
- What-if scenarios
- Research degree qualification results
- PhD completion rate measurement (quite operational though)

3.1.4. IT relationships and strategies

- Historically low levels of investment in research systems until very recently ✓✓✓✓✓✓
- Initiating research system projects relies on research office bidding to either IT/research committee rather than through coherent strategic direction ✓✓✓✓
- Research offices generally work collaboratively with IT although academics and departmental administration are further removed ✓✓✓
- Relationships between IT and research office are generally good but often developed informally through project activities – formal relationship is often lacking, it should be a joint operation ✓
- IT strategy is generally developed by IT director with limited formal input from research office, remember that in some HEIs research strategy is a new concept and not top of the priority list but this is changing as a result of the REF and having an internal champion
- Research strategy and IT strategy are developed in isolation and consequently planning, resourcing and prioritising of research systems is not always coherent
- Why aren't we all working together?
- The memory of the failure of the MAC initiative in the 1980/90s has coloured people's perceptions: they think the sector cannot work together collaboratively; there is a danger in getting several (e.g. 10) people/institutions together: it will take so long to develop anything that by the time it has been developed demands have changed
- Who drives research? The academics?
- IT directors put forward things they think

they can deliver; research systems are difficult to deliver
- How a research system might add value is not appreciated; it is seen simply as a cost
- Research management systems are a nebulous totality that mean different things to different people; when they are taken down to a single function you get a good response from IT (e.g. FEC, costing) but it is more difficult to get engagement when talking about the amorphous totality

3.1.5. Research system satisfaction

- There is a recognition within institutions that the current research system offering must be improved ✓✓✓✓✓
- Duplication of data entry because of lack of integrated systems is a source of frustration, particularly for academics ✓✓✓✓✓
- Generating meaningful data is time-consuming and labour intensive, there is a lack of reporting tools ✓✓✓
- Academics find system interfaces unfriendly and are unwilling to engage with systems/ information ✓✓✓
- Generally low levels of satisfaction with research systems for academic staff ✓✓
- Generally low levels of satisfaction with research systems for administrative staff ✓✓
- Almost all institutions are involved in a review/ change of research systems ✓✓
- The integration or combination of systems, spreadsheets and databases is highly unsatisfactory ✓✓
- Data is generally regarded as untrustworthy and a lot of time is spent cleaning research data ✓✓
- There is an over-reliance on paper based activities still within research management
- There needs to be a lot of info in the system to appeal to academics (can admin staff put the initial data into the system?)
- Chicken and egg; until 80% complete it is difficult to see the potential and the benefits

3.2. Vision for future systems

3.2.1. Vision for research tools

- Increased availability and sharing of research data at all levels of the institution ✓✓✓✓✓
- Decreased amount of manual intervention – more efficiency and less duplication of effort ✓✓✓✓
- Seamless cradle-to-grave research systems that talk to each other ✓✓✓✓
- Access to information for senior academic/ admin staff at the touch of button ✓✓✓
- Information dashboards which support performance measurement objectives and drivers of league table performance ✓✓✓
- Benchmarking of performance against national/ international peers ✓✓✓
- More flexible and user friendly reporting for the research office ✓✓
- Automatic drill-down to detailed information ✓✓
- Capture and storage of impact data ✓✓
- Two-way links between internal systems and external funding databases, single-system ✓✓
- Links between grants and outputs/ publications ✓✓
- Templates for funder information to reduce burden on academics ✓
- Improved research costing tool ✓
- Can the funders talk to eachother as well? It would be a great step forward if they could achieve some kind of commonality, a coordinated approach
- The interface with funders needs to be consistent
- Intuitive system and ongoing support
- A single point of data entry for academics internally and externally across systems
- A research archive is useful for academics but there are confidentiality issues over new ideas, also if the academic leaves then they would not want to leave their research data behind
- System must be intuitive because there are a lot of temporary staff and academics may not

attend training sessions or be frequent users
- Impact repository – but do HEIs know the depth of info they need to record?
- Enterprise data (must be meaningful though)
- Academic timesheets
- Record volumes and profiles of researchers
- More user-friendly for academics

3.3. Good practice in implementation

3.3.1. Research system implementation

- Research office project management or at least joint project management with IT is crucial ✓✓✓✓✓
- Communication within projects are required to engage academics and deliver change e.g. workshops, open sessions at lunchtime seminars (has been quite positive) for academics and departmental administrative staff, leaflets/posters of systems to all staff ✓✓✓✓✓
- Seconding research office staff to IT project would be ideal – but day job often gets in the way ✓✓✓
- A senior academic must sponsor the project in order to generate buy-in ✓✓✓
- Academics should be involved sooner in the requirement gathering process rather then later, this is crucial ✓✓✓
- Projects can become caught up in consultation fatigue and progress on delivery can be slow ✓✓✓
- Administrative leadership is provided by director of research ✓✓
- Getting commitment and engagement from academics in research systems is difficult ✓✓
- Involvement from the strategic research committee is crucial ✓
- PRINCE2 project management is the preferred methodology – but rarely without some customisation ✓
- Academic leadership is usually in place for research system projects ✗✓
- IT departments sometime over-regulate system projects which increases time taken and costs incurred
- Money is a big issue in today's climate

3.3.2. Lessons learned from implementation

Generally:

- Include a range of stakeholder representatives on the project board and manage expectations throughout the project ✓✓✓
- Be realistic about scope, timescale and resources required ✓✓✓
- Do not underestimate data cleansing needs and ensure data ownership is clear ✓✓✓
- Invest heavily in communication at all stages of the project ✓✓
- Secure academic sponsorship of the project
- Involve academics in early-stage design and requirements gathering but be careful to manage their expectations and avoid disapointment
- Break down barriers with academics through user/advisory groups
- More time spent on specifying requirements means less time spent building the system
- The user experience of the system is also important, how will it do it not just what will it do
- Be realistic about financial investments
- Make sure you engage the correct people, e.g. PAs (don't just need to focus on the academics)
- Ongoing user support
- Patience is required; don't start doing your own thing while waiting for the central system as time, effort and money will need to be spent to absorb this into the main system

With academics:

- Communicate that the journey is long – it will not be perfect from day one ✓✓✓
- Deliver visible benefits to academics as well as corporate needs (e.g. CVs, reports for academics) ✓✓✓
- Ensure wide ranging academic input and try not to let the needs of a small group of academics drive the project ✓
- Networks across the stakeholder groups and partners are needed to articulate needs, not just in parallel

Appendix D: A perspective on suppliers active in the marketplace

Academic Analytics
Founded in 2005; based in Stony Brook, New York, USA.
Academic Analytics compiles and makes available the Faculty Scholarly Productivity Index and the Faculty Scholarly Productivity Database, a quantitative method for ranking doctoral programs at research institutions, including data on individuals, programs and disciplines.
www.academicanalytics.com

Agresso
Owned by Unit 4 N.V.; EUR380m turnover, EUR40m EBIT, EUR495 Market Cap; 3,500 staff; EuroNEXT150.
Founded in 1980; based in Sliedrecht, Netherlands. Offices in many countries, including UK and US.
Unit 4 N.V. offers enterprise resource planning systems as Agresso Business World, which includes CODA Financials. It provides professional IT services, contracts management, design and implementation of websites. Customers are small and medium sized enterprises in wholesale trade and distribution, health care, and accountancy sectors. Agresso is used as an enterprise finance system and includes pre- and post-award finance modules.
www.unit4.com

Atira
Privately held; 26 staff
Founded in 2002; based in Denmark.
Atira provide offer six primary services: Project scoping, system architecture, user-interface design, software programming and maintenance, documentation, and on-site implementation. Implementation often includes services such as systems integration or data conversion and aggregation. Also supply user education and second level support as part of an implementation project.
www.atira.dk/en/

Cayuse
Cayuse Research provides a set of integrated, web-based software modules that deliver flexibility and control in research administration. The suite is delivered out-of-the-box and offers user-configurable solutions, fast deployment, and immediate productivity, either one module at a time or as a complete set.
www.cayuse.com

COEUS
Coeus is an enterprise wide, cradle to grave electronic system developed by MIT that aims to simplify and make more efficient, proposal development and pre- and post-award management
http://osp.mit.edu/coeus/

Converis (by Avedas)
Privately held; 20 staff
Founded in 2004; based in Karlsruhe, Germany.
Focused on universities, funding agencies and other research organisations. Converis is an end-to-end research information system for research assessments, strengthening grant applications and improving research performance. Product and service-based offering combining publication management, bibliometrics, contract administration and grant reporting, and IT and workflow integration.
www.avedas.com

Elsevier
Publicly held; 7,000 staff.
Founded in 1880, based in London, Amsterdam and New York.
Elsevier publishes scientific information in print and electronic forms. SciVal is a suite of performance planning and measurement tools combining author, citation and publication data (Scopus) with grant and patent data to enable tracking, monitoring and benchmarking of grant and publication output, and identification of new commercial and collaboration opportunities.
www.scival.com

EPrints

Privately held; staffing and revenues unknown.
Founded by Southampton University, UK.
EPrints enables set-up of deposit-based repositories of research literature and related data objects. It offers open source software and support, commercial hosting, training and development services and open access advice and information. The repositories are optimised for Google Scholar and work with bibliography managers.
www.eprints.org

InfoEd

Privately held; $10m turnover; c.90 staff.
Founded in 1991; based in Albany, New York with representation in England, South Africa, and Australia.
InfoEd International sells grants and contracts modules to the global higher education sector. It also develops modules for expertise management, human studies development, clinical trials linkage to related protocols, grants, publications, patents, and invention reporting. Customers are medical centres and universities. InfoEd aims to enable full economic project costing of research projects.
www.infoed.org

Inteum

Privately held; $2.5-5m turnover; 10-19 staff.
Founded in 1992; based in Kirkland, Washington, USA.
Inteum launched Inteum Web in June 2010, an integration of previous products to help intellectual property and technology transfer offices to more effectively manage their intellectual property and licensing operations. Customer groups are established in the UK and Australia.
www.inteum.com

Oracle

$26,820m turnover, S9,838m EBIT, $122,000m Market Cap; 105,000 staff; NasdaqGS.
Founded in 1977; based in Redwood City, California, USA.
Oracle manufactures, markets, distributes, and services database and middleware software, applications software, and hardware systems worldwide. Oracle Financials is an enterprise finance system and includes pre- and post-award grants finance modules.
www.unit4.com

pFACT

Owned by Allocate Software, formerly Manpower, purchasers of P-Fact; £18.3m turnover, £1.8m EBIT, £46.2m Market Cap; 130 staff; AIM-listed.
Founded in 1991; based in London, UK.
Allocate provides workforce management solutions. Their MAPS workforce planning software covers defence, health and maritime. Customers are government, industrial, and commercial organisations. Allocate bought pFACT in 2008. pFACT is a higher education full economic project costing and financial appraisal tool that provides the costing of research projects
www.allocate-software.co.uk

ResearchResearch

Privately held; 35 staff.
Founded in 1994; based in London, UK.
Creators of ResearchProfessional and Research Benchmarks. ResearchProfessional is a database of funding opportunities covering the UK, Ireland, Netherlands, Sweden, Denmark, Australia and New Zealand and the European Community. Funding bodies include UK research councils, UK government, UK charities, European Community, the World Health Organisation, the World Bank and various development organisations. ResearchBenchmarks combines data from the RAE, the Higher Education Statistics Agency and previously awarded grants.
www.researchresearch.com

SAP

EUR11,101m turnover, EUR2,956m EBIT, EUR42,150m Market Cap; 47,500 staff.
Founded in 1972; based in Walldorf, Germany.
SAP provides enterprise resource planning business software, including an enterprise finance system. It also provides SAP BusinessObjects business intelligence and enterprise performance management solutions. BusinessObjects provides a reporting toolkit for data analysis and reporting.
www.unit4.com

Symplectic

Privately held; 6-10 staff.
Founded in 2003 by graduates of Imperial College London.
Symplectic offers Symplectic Elements, Repository tools, Content Management System and Invigilator Student Management. The flagship Elements is designed to meet the needs of the REF and to make publications management a seamless, simple process. Elements harvests an author's publications data from multiple online database sources to gather and continuously update journal publication information.
www.symplectic.co.uk

TechnologyOne

AUD$125m turnover, AUD$22m EBIT, AUD$261market cap; 700 staff; S&P/ASX All Ordinaries Index.
Founded in 1987; based in Queensland, Australia.
TechnologyOne serves international customers in financial services, education, health, government, community services, managed services, and utilities industries. Products include TechnologyOne Financials and in the university sector, TechnologyOne Student Management. TechnologyOne is used as an enterprise finance system.
www.technologyonecorp.com

ThomsonReuters InCites

CAD$13,535m revenue, CAD$2,039m EBIT, CAD$31,588m market cap; 55,000 staff; S&P/TSX.
Founded in 1934; based in New York, USA.
Thomson Reuters operates in two divisions: Markets and Professional. Professional provides information for the financial, legal, tax and accounting, healthcare, science, and media markets. This includes tools, analytics, and decision support solutions for the healthcare and science sectors. InCites is a Webof-Science, citation-based research evaluation tool for analysing institutional productivity and benchmarking output against peers worldwide.
http://researchanalytics.thomsonreuters.com/incites/

Wellspring

Privately held; c.15 staff.
Founded in 2003; based in Pittsburgh, USA with an office in Cambridge, MA.
Wellspring serves customers in the university, government, corporate and museum markets. In the university market it focuses on technology valuations and knowledge management software. Principal products for universities are Sophia Knowledge Management and the recently acquired Flintbox innovation exchange community.
www.wellspringworldwide.com

Appendix E: Imperial College London case study

Joy van Baren, Elsevier, Portfolio Manager User Experience

1. Introduction

1.1 Background

This case study was conducted in the context of the project Developing tools to inform the management of research and translating existing good practice funded by JISC Research Information Management Grant Funding Opportunity 11/09.

Imperial has successfully implemented a number of systems for managing research over the past few years including InfoEd (pre-award), Oracle Grants (post-award), Wellspring (IP management) and Time SMART (timesheets). Imperial has gained deep experience through these projects and, like other institutions implementing these systems, has had challenges and learned lessons. By means of an in-depth study of the history, current status, and future vision for research systems at Imperial this aims to provide a best-practice guide for the sector.

This document will describe:

- Imperial College's research-related IT systems and related information
- Project management methodologies utilised within the College
- The benefits to the College afforded by the implementation of these systems and use of these methodologies
- The lessons learned during these implementations concerning the systems themselves and the manner in which they were implemented

1.2 Approach and methodology

The basis for this case study was a three-hour interview with Scott Rutherford (Imperial College, Head of Research Information Systems) and Ian McArdle (Imperial College, Research Information Manager) conducted by Joy van Baren (Elsevier, Portfolio Manager User Experience). The interview was semi-structured; the framework of interview questions created for the sector evaluation interviews was used as a basis but several relevant new angles that came up during the interview were explored.

2. Research strategy and organisational context

2.1 Research strengths

Imperial is a highly research-intensive institute, as illustrated by the fact that 73% of research was judged world-leading or internationally excellent (4* or 3*) in the RAE 2008. Not surprisingly, ensuring the continued success of research is core to Imperial's strategy, which states the intention *"To remain amongst the top tier of scientific, engineering and medical research and teaching institutions in the world."* Interdisciplinary research and the application of research outcomes to industry, commerce, healthcare and society were highlighted as instrumental to achieving this goal.

Imperial increasingly invests in a research portfolio focused around research themes in which world class excellence can be assembled. These themes were identified by overlaying broad research themes at college level, discipline-based fundamental science and technology at department level, and common enabling technologies crossing all themes in a matrix structure.

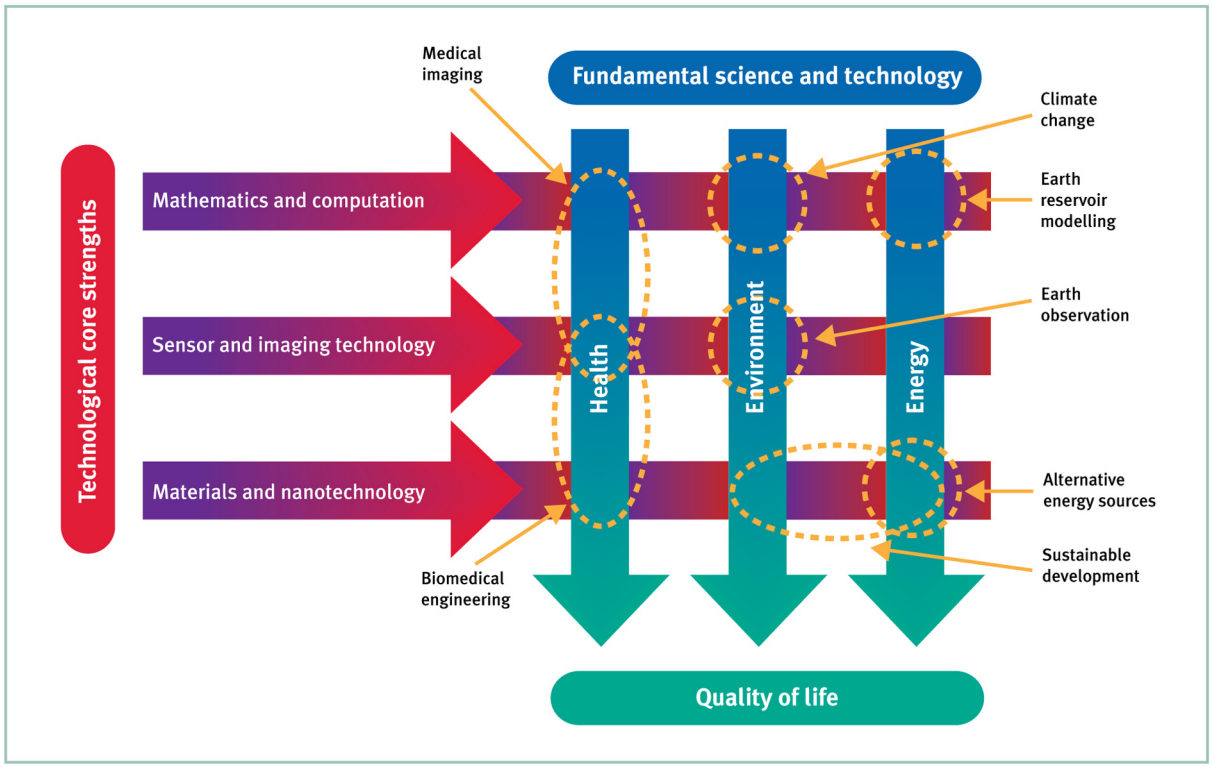

Figure 11: Imperial College London's thematic research strategy

2.2 Research strategy

The key organisational body for delivering research strategy is the Research Strategy Office, headed by the Deputy Rector for Research, and its College Strategic Research Committee. Strategic core teams focusing on research, education, and socio-economic impact have been established. The office monitors external factors influencing research strategy such as government agendas, funding policies, and the economic situation.

Imperial's strategy formulation process is described as *"halfway between evidence-based and opinion-based."* A combination of bottom-up and top-down processes are used: directions are set by senior management, but individual faculty members are increasingly asked to contribute their opinions and field expertise through mechanisms such as discussion groups and online surveys.

The three faculties each have their own strategic research manager. Strategic research managers bring in information on large funding opportunities and advise on application strategy, aiming to encourage a focused effort rather than a *"scatter-gun approach."* The strategic research managers also help foster connections that go beyond traditional department structures to facilitate interdisciplinary research.

3. Organisation of research support

3.1 Role of the research office

The central research office is responsible for developing and implementing systems to support the management of research, and provides expert advice on how to use them. The office also formulates research policies, and coordinates complex contracts, intellectual property, and pre-award EU funding.

3.2 Shift towards a decentralised organisation

Research support at Imperial was originally organised centrally, until an initiative was started in 2004 to move towards a partly decentralised support organisation. The main drivers behind this initiative were the desire to get closer to the faculties, increase awareness with academics, and to provide consistent cradle-to-grave support. The total number of FTEs in research support grew as a result of this change, but has remained stable since the completion of the initiative.

Today, administrative units are embedded in the faculties. They provide day-to-day administrative services such as developing grant applications, final approval of proposals, and contract negotiation. Post-award administration is handled by the faculty units.

4. Suppliers and the marketplace

4.1 Requirements for and evaluation of (new) systems

Imperial generally avoids building systems in house due to concerns such as cost, maintenance, and risk.

"We prefer to find a robust system and then customise the hell out of it."

A technical appraisal process is led by IT to score off-the-shelf solutions on characteristics such as robustness and support. The business evaluation process tends to be less formal; the library may assist in a cost-benefit analysis of comparable products in specialist areas. However, in many cases there are not enough suitable solutions in the market to warrant this.

"There has only been one occasion where we felt there were enough options out there to have a proper evaluation and tender process."

4.2 Problems with suppliers and delivery

It was remarked that the degree to which suppliers understand academic needs varies greatly per supplier. In niche areas suppliers seem to have more in-depth knowledge. For example, Symplectic originated from academia and is therefore quite familiar with the publication workflow. Large companies such as Oracle are more generalist; academia is just one of the many markets they serve and higher education is not central to their business. Another reason may be that many off-the-shelf systems are primarily focused on the US market.

Suppliers tend not to be very helpful with the need for integration and/or interlinking between different research management systems. Imperial went though substantial customisation efforts, the majority of which had to be done in-house, to achieve the required level of integration. Although integration between systems is now judged to be excellent, upgrading the systems whilst preserving the customisation is challenging. Upgrades can be difficult and time-consuming; a recent upgrade was described as *"quite painful"*.

4.3 Nature of the marketplace

The marketplace for research systems is seen as rather fragmented, with a limited number of products that address only part of the needs. Performance measurement and benchmarking was called out as an area for which not many solutions exist.

"I would not call it gaps in the marketplace, but rather a lack of options."

The research office has a good awareness and overview of suppliers and solutions available in the marketplace, because of the expertise and networks of its staff. Exchange of information and experiences with other institutions takes place on a regular basis.

5. Performance Measurement

5.1 Demand for data

The availability of high quality research management information is deemed very important.

"Unless you have data you cannot make informed decisions, you would be acting based on opinions and hearsay."

The demand for data and the emphasis placed on it have grown in importance over the past few years. The main drivers for this development are:

- Increased competition and research complexity (e.g. interdisciplinarity) results in an increased thirst for information within institutions
- Increasing importance of research strategy and need for data to inform and evaluate it
- Required submission of research outputs to the REF

There are three FTEs in research support at Imperial who are actively involved in performance evaluation measurement, benchmarking, and reporting.

5.2 Key performance indicators and amassing data

The aggregation levels used in performance measurement and reporting are the individual, research group, department, faculty, and institution. The ability to provide granular information about individuals has existed for approximately three years.

The majority of measurements and reporting initiatives have been driven by research support, and had previously been based on their assumptions of what the rest of the organisation would find useful. For a recent project however, several focus groups were conducted to identify what the various stakeholders would want to know, and how the data could be made more meaningful and actionable rather than *"just the straight figures."* Participants in these focus groups expressed an interest in the following key performance indicators: number of applications, success rates, volume of income, collaborative activity, and publications (*"high-quality publications in high-quality journals"*). Inventions and patents are deemed to be of secondary importance by most academics, as these activities are often an individual experience. However, at institution level this information remains highly valuable.

Key performance indicators as listed above are typically reported as an average over the previous three years, the last financial year, and the current year so far. In addition to such retrospective measures there are several predictive indicators such as a prediction for overall funding volumes at the end of the year based on amount secured thus far, and an extrapolated funding value based on a prediction of how long current grants will last.

Monthly reports are produced that give a broad overview of funding submission and award volumes, success rate, and operational financial data at department, faculty, and institution level. Receivers of this information are the senior management team, research support management, department heads, and strategy managers. Several departments create their own reports in order to get more granular information.

In addition to internal usage, capturing research output and impact is required for the RAE/REF submission. A concern here is the lack of consistency in demanded information and information format, resulting in ad hoc and often suboptimal solutions.

5.3 Benchmarking

A standard peer group is used for institution level benchmarking that includes Oxford,

Cambridge, UCL, and Manchester. It is important to have a clearly defined and stable group in order to efficiently gather and analyse data and to be able to track and interpret change over time.

League tables are used to get an external perspective and to track where research council funding is going. On several occasions this type of information has caused *"a bit of a stir"* and people have expressed a lack of trust in the figures. Additional data has been requested on several occasions and Imperial is able to retrieve underpinning data for most measures. Another challenge with benchmarking against competitors is that funding success rates are not published to the level of detail that is needed.

"In general it is hard to get external data."

For smaller organisational units such as a department or a specific scientific discipline the peer group is different from the standard institutional peer group. In those cases appropriate peers are selected based on the input of academics and strategy managers. Market share in the funding arena is an important benchmarking measure: who is securing funding in area X, or from funding agency Y.

Strategic stakeholders are included in requirements formulation for benchmarking to make sure that the data and analyses can inform strategy formulation and evaluation as much as possible. However, it is unavoidable that quite a few ad hoc requests from strategy managers will arise during the year: for example, *"how are we doing in environmental-related research?"* Answering such questions can be time intensive and sometimes difficult.

6. IT Relationships and Strategies

There are two main components to the Imperial IT strategy: technical infrastructure and business systems. The latter is the more relevant for this study. Within the business systems component there are three main streams: research, faculty, and students. The faculty stream focuses on post-award and operations, whereas the research stream focuses on pre-award and strategy. Underpinning elements that contribute to each of these streams in a matrix structure are business intelligence, people and identity management, and web.

One of the main challenges is that there is no clear mechanism for coordinating the different streams and activities into a coherent framework and prioritizing the initiatives. They compete for funding, and each have their own board. Although the research support staff at Imperial find that they have been rather successful in securing resources and funding for the implementation and customisation of research systems, it can still be challenging to compete with the need for core systems such as finance and human resources.

One of the key lessons learned from previous projects is that it is crucial to have research expertise in projects in order to ensure the requirements process is driven by subject matter experts rather than IT. This is the best way to ensure that the delivered functionality matches the needs of its target audience and fits their existing workflow.

7. Research Systems and Satisfaction

7.1 Research systems currently in place

Quite a number of research systems are in use at Imperial, including InfoEd (pre-award), Oracle Grants (post-award management), Wellspring (intellectual property management), Time SMART (timesheets), Symplectic (publication management), Spiral (institutional repository), and Oracle BIEE (research warehouse business intelligence). Most of the systems listed have been around for at least a

few years. In total it has taken 5-7 years and significant investment to get the current set-up of systems into place.

7.2 System satisfaction

Members of the research office are generally satisfied with the systems that are in place. The variety of systems, the degree of customisation that has been achieved, and the consistency (across departments, across interfaces) are seen as a strong point in particular.

"We are probably a bit spoiled compared to some organisations."

The research office believes that academic researchers and departmental administrators are reasonably satisfied. Obvious benefits of research support systems for academics are consistency in system functionality and interfaces, reducing the amount of bureaucracy (e.g. faster approvals), and having access to management information.

Although the degree to which information is captured in research systems is quite satisfactory, the need for manual intervention to get or to combine information in the required format is seen as an area for improvement.

"The process for tracking publications is automated, so it does not require active researcher input. The other systems and information types require manual effort which can be quite substantial in some cases."

8. Vision for Research Tools

8.1 Ongoing and planned system improvements

A variety of research systems are in place at Imperial to support all aspects of the research management process, and are customised according to Imperial's needs. Only in the last 2-3 years has the full potential of storing and exploiting data become apparent; after the initial drivers of compliance and risk had been fulfilled to a certain extent, the team moved on to using the systems for intelligence purposes: combining and analysing data to measure performance and inform/evaluate strategy.

"We are in the exploitation phase rather than the implementation phase."

Creating strategic dashboards for senior management is currently very much on the agenda. Quarterly reports are currently created manually and distributed to faculty principals, heads of departments, research strategy managers, and the rector's management board. To create such a report manually takes approximately a week full time, so moving to a fully automated system will be more efficient, and will allow for daily instead of quarterly reporting.

"We have had the ability to pull out huge amounts of data for reporting for a while, but we are now working towards full automation."

Reducing the amount of effort required in producing a report would also open up the possibility of customised reporting and benchmarking tailored to the needs of departments, groups, and even individuals. In the ideal end state, users would be able to access dashboards from their own desktop through a portal.

Fully integrated reporting has not yet been achieved, and comparing data across systems can be difficult in some situations. This can hopefully be addressed as part of the dashboards project.

8.2 Barriers

Several barriers were identified that will need to be surpassed in order to reach the envisioned research systems end state. First and foremost, data quality, comprehensiveness, and accuracy need to be ensured.

"Make sure that the data you are collecting is

accurate, and to the depth that you need, and contains all the data elements that you need."

Further systems integration would be required in order to ensure the high-level inclusion of all relevant data types into the data warehouse. On a more detailed level, an example that was mentioned was the potential usefulness of having consistent keywords applied to funding and publication data, which is currently not the case, but which would enable trend analysis.

Access to external data was mentioned before as a challenge, and could certainly stand in the way of accurate and flexible benchmarking. Obtaining data from funding agencies and other institutions is hard, and using it can be even harder as the data is usually in a format that is very different from those used in internal systems.

Finally, a culture change is required to overcome a reluctance to accept and use performance measures. Although a cultural shift has started, it is not yet complete.

"People need to see it as a tool that can help them rather than a threat."

9. Process Implementation

9.1 Project management framework

An adaptation of PRINCE2 is used as a project management framework. It is thought to be working well overall, and has helped to resolve difficulties and adhere to timelines. IT projects tend to take up more time and resources than initially planned, and in such cases PRINCE2 is very helpful to manage risks by tracking, escalating, and solving issues.

"The structure helps you to deliver."

Some pragmatic adaptations of the PRINCE2 framework have been made in order to make it more lightweight and *"less clunky"*. Imperial has also experimented with the more iterative Agile methodology, but not always successfully, due to the nature and culture of the organisation.

9.2 Project Leadership and Stakeholder engagement

Every project consists of one or more work streams and has a project director and a project board. The project board should ideally involve senior leadership.

"You need engagement at the top in order to be successful."

Ideal project leadership qualities include the ability to involve senior management, negotiation skills, understanding of politics, the ability to be both consistent and concise, and to avoid the dangers of scope creep.

"Maintaining a feasible scope is crucial."

One of the key lessons learned from previous projects is that it is crucial to have research expertise in projects in order to ensure the requirements process is driven by subject matter experts rather than IT. Research support can often act as subject matter experts in this area. Resource bottlenecks are a concern here, as people are involved in many different projects and are not always backfilled in the case of secondments.

Academics are increasingly involved in functional requirements elicitation activities for research systems, such as focus groups and surveys. Having an academic champion involved to represent the academic community throughout a project is perceived as extremely beneficial. It can however be a challenge to involve sufficiently senior champions, and keep them involved even if a project takes a long time to complete.

In addition to ensuring participation in requirements formulation, the research office reaches out to users of their systems in order to educate them and increase awareness of the systems and services available. Means identified to accomplish this include newsletters and on-site events such as training and road shows. All projects have a communications workstream to coordinate these activities and liaise with the different campuses and different parts of the organisation.

9.3 Post-project evaluation

As is common practice in the PRINCE2 framework a lessons learned session is conducted at the end of every project. In spite of these sessions it is felt that the repetition of the same mistakes across different projects is not uncommon, in particular when a new project involves a different set of players and stakeholders.

"People learn, but organisations don't."

10. Conclusions and lessons learned

Imperial has advanced significantly along its research information journey. Through significant implementation and customisation efforts, a range of systems are used to handle the day-to-day management of research according to the needs of the various parties that are involved. Through these efforts, and inspired by the new capabilities and information available, the organisation has started thinking about the future needs for research information management. The envisioned end state revolves around the creation of automatic and intelligent research dashboards integrating a broad range of internal and external data sources, which can be flexible and tailored to the needs of groups or even individuals. Although this ambitious end state has not yet been achieved, many of the underlying components have been brought into place.

One of the key lessons learned during the systems implementation process is that involving the right stakeholders (i.e. the eventual users of the system or consumers of the information) dramatically improves the changes that the system will prove useful and be accepted by the academic community. An insight into the information needs of various groups and roles is also crucial in presenting information in such a form that it is easily consumed and acted upon, and in defining a vision for future systems.

"Continuously question why people want the information they ask for."

Other essential takeaway messages are the need for a clearly defined project management framework, the importance of ensuring senior academic sponsorship and/or representation in the project, the observation that one can never communicate too much about a project, and last but not least a certain amount of courage required to keep working towards the envisioned end state and learn from all experiences – both successes and failures – encountered along the way.

"Act decisively and consistently: don't be afraid to admit that something isn't working and make the necessary changes."

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