Research Consulting

Jisc

Jisc Equipment Data Service review

Data and systems discovery

Prepared on behalf of Jisc

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Jisc Equipment Data Service review

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Executive Summary

Background

Jisc commissioned Research Consulting to undertake a review of institutional and supplier systems workflows, including identifying institutional sources of truth for equipment data records, in order to optimise data harvesting for the Equipment Data Service (EDS).

The project took place between February and April 2024 and involved interviews (17 participants), written contributions and a workshop webinar.

Gathering and sharing data about research equipment has an important role in the research ecosystem

Gathering and sharing data about research equipment has an important role in the UK's research ecosystem. It enables compliance with funder requirements and facilitates proactive sharing of equipment and collaboration, both within academia and with other sectors, including business, SMEs and public sector organisations. It also provides a tool for managing equipment within institutions, developing local equipment portfolios and assisting in the prioritisation of projects and investment for the strategic development of research infrastructure nationally and regionally. There is considerable potential for social, economic and environmental benefits arising from the effective sharing of equipment data.

Data about equipment can provide useful additional context about research capability, giving visibility to this aspect of the research process. There is a growing trend towards integrating, connecting and contextualising all elements of the research process within systems. These can pull together expertise profiles, publications, datasets, impact, grants and projects, and incorporating equipment data can enrich and add value to the view of research capability presented by these systems.

Navigating a challenging landscape for equipment data

The current landscape of data about research equipment is highly varied, both in approaches and in quality of data

Some institutions rely only on very basic methods of data collection about research equipment and highly manual processes, such as spreadsheets circulated to departments on an annual basis. Other institutions have had established systems in place for some time, with varying levels of ongoing maintenance or potential for future sustainability.

The lack of clear ownership of research equipment data in many institutions presents a challenge to both effective current workflows and potential for future investment in improved systems.

There commonly appear to be low levels of integration between systems and in many cases multiple datasets

Most institutions report multiple "sources of truth" about aspects of research equipment, including local systems intended to meet departmental needs; multiple sources, formats and locations of data internally and legacy datasets about assets purchased previously but still in use, which require reconciliation with data from current systems in active use.

There are also challenges in integrating multiple central systems, or integrating central and local systems and this lack of integration necessitates further manual processes and workflows, including duplication of data entry.

The funder mandate for sharing information about research equipment remains the main driver

Complying with funder requirements was consistently referenced by interviewees, written contributors and webinar participants as the most significant reason for needing to gather and manage data about research equipment. Where there were perceived issues with the quality of data and the systems or workflows to manage this data, these were articulated as posing a risk to full compliance with funder requirements. Some participants also expressed uncertainty about the current status of the mandate and doubts about its longer-term future.

More detailed, contextualised data may encourage greater use for collaboration

There is uncertainty about the extent to which data about research equipment is currently used to facilitate collaboration. Bringing together information about items of equipment with details of the expertise of people who manage it; how it can be used (e.g. use cases and case studies) and descriptions of services it supports could help to drive increased use. This could also inform and align with broader research policy priorities, such as evidencing aspects of the People, Culture and Environment element of REF 2029.

There may be a tension between basic levels of data which can be more easily automated and greater granularity

More detailed, nuanced records about research equipment may be harder to automate and may also require greater expertise to create and maintain accurately. Ease of editing and updating of equipment records by people closest to the equipment itself can help to enrich data.

Some aspects of metadata could fit into automated workflows, such as grouping items and creating links, building aggregations of equipment visible as facilities or presented in hierarchies or within subject taxonomies to describe their relationships and relevance.

With more sophisticated presentations of data and enhanced discovery, including improved ways of searching data about research equipment, value could also be added to the data as it is used. For example, interactions, searches, record views, or item reviews could be captured to contextualise the equipment further. Mapping of geographical distribution of equipment may also support further investment in research infrastructure within specific regions. It may also be possible to explore how well equipment data is used within target audiences such as SMEs or by other stakeholders outside academia.

It is notable that a UKRI initiative, InfraPortal, which maps larger research infrastructures was not referenced by participants in this project, but appears to display at least some of these more sophisticated features, including group ownership of infrastructure records, geographic mapping, clustering by discipline, sector, region and use of topic-based case studies.

Cultural change and raising awareness

Showing the value of data about research equipment could help to encourage cultural change in institutions, increasing the level of awareness of equipment data and encouraging greater engagement. Use cases and case studies were mentioned as particularly effective ways of highlighting value, as was greater contextualisation of equipment use and its connection to research outputs, impact and quality assessment exercises. Metrics relating to equipment usage or record views and engagements can also help to show value.

Providing clear ownership of equipment, which may sit best with academics, technical staff or departmental / facility managers, could improve accuracy and maintenance of data. It could also drive advocacy and help to articulate the value of collaboration and sharing equipment.

Research equipment data could form part of open data initiatives

Research equipment data from EDS could form part of co-ordinated open data initiatives, but currently both the quality challenges and the limited coverage of EDS would limit opportunities for this.

Work such as the PIDINST metadata schema for instrumentation and cookbooks for creating instrument PIDs within the ePIC infrastructure or mapping the PIDINST metadata into DataCite shows how instrumentation can be cited in research outputs, aiding reproducibility.

There is scope to encourage wider sharing of information about research equipment through researcher-specific information (such as in ORCID), whilst the UKRI InfraPortal initiative already shares information about larger-scale research infrastructures, based on open source data.

Although not an open data source, potentially more encouragement could also be given to capturing researcher-specific engagement with equipment (both owned and shared) by using the Researchfish use of facilities and resources field when reporting on grant activities.

Recommendations

The review has identified two **strategic directions** for the Jisc EDS which should inform future development

The project aim was to identify optimal workflows for institutional data to move into the EDS. The fragmentation and range of key users / owners evident through this review have made that difficult. What the review has identified is two strategic directions which present a clear opportunity to consider how the EDS is developed to address the concerns and opportunities evident in the review.

Firstly, it is apparent that many **institutions lack internally coherent and manageable databases for equipment**. A strategic development for the Jisc EDS would be to extend functionality such that individual institutions could use a protected / confidential area of the EDS to manage their equipment internally. This would allow devolved users to manage, add and update equipment records, and for an institutional manager to control and approve what is allowed to be visible on the public EDS service. This positions the EDS as a tool that supports a low-cost service to universities to manage their equipment portfolio and compliance with funder requirements.

Secondly, **sharing equipment information in isolation is not optimal in terms of supporting collaboration**. Examples of equipment being integrated into CRIS public portals are already evident using commercially available systems – for individual institutions and for clusters of universities. The long-term direction of travel suggests that the EDS information is more effectively used to facilitate collaboration when it is connected to other contextual information, such as:

- the profiles of academics in that area / department;
- the publications emerging from that area or using the equipment;
- the research projects from that area or using the equipment;
- the larger research infrastructures within which the equipment may be located (e.g. InfraPortal); and
- use cases and case studies of research that relate to the equipment

A number of shorter-term tactical options for improvements are also suggested

This project has also identified a number of shorter-term tactical options for improvement of the EDS, its interface with institutional data and its support and engagement with the wider user community. These include:

- improving the EDS search functionality, which will involve updating the metadata schema;
- Improving clustering and expression of hierarchical relationships, such as department, discipline, facility, and purpose (for example, supporting the activity of a specific regional consortium of institutions, such as N8);
- implementing the API link for harvesting data from Pure and gathering this into the EDS;
- considering options for supporting Kit Catalogue and its users, as a currently unmaintained open source system for managing equipment data, noting that for some institutions it may currently appear to be the only "free or cheap" alternative to managing equipment data in a spreadsheet and particular concerns that without urgent (but not necessarily extensive) maintenance it may soon cease to function; and
- considering options for including equipment-related systems support within systems specifications in Jisc's procurement framework, the Research Management Systems DPS.

Additionally, Jisc should continue to proactively grow the EDS user community, aiming to provide guidance, advice and support for stakeholders, particularly to address the areas where challenges have been identified. This may include a 'recipe book' or space to share potential workflows, approaches to integration or solutions to issues identified, recognising the diversity and variety of systems and processes currently in use.

As preparation for exploring the longer-term strategic options outlined above, Jisc should also facilitate and lead discussions with software vendors (including CRIS and finance systems) to scope functionality and adaptability, aiming to maximise systems use for collaboration and sharing (as well as for compliance).

Contents

1. Background and approach

About this section

Jisc commissioned Research Consulting to undertake a review of institutional and supplier systems workflows, including identifying institutional sources of truth for equipment data records, in order to optimise data harvesting for the Equipment Data Service (EDS).

This work comes over a decade after the initial development of the EDS, and alongside renewed policy interest in provision of research equipment and infrastructure. This includes the potential role of data about equipment in the People, Culture and Environment element of REF 2029 and Research England's current Condition of the Estate (COTE) survey of the current state of research infrastructure in England.

This section briefly introduces the EDS and this project and provides an overview of the methodology used.

1.1 Introduction

The EDS was created in 2013 and has been operated by Jisc since 2019

Jisc took responsibility for operating and managing the EDS in 2019. The system currently comprises over 20,000 items of equipment, from 54 universities and 7 other research performing organisations. Individually, institutions list between zero items (The OU, Heriot-Watt and Brighton) and 4,000 items (Cambridge).

Under Jisc's management the EDS aims to:

- support discovery and reuse of equipment and facilities;
- support UKRI compliance;
- promote collaboration relating to research assets;
- support procurement and financial efficiencies;
- provide transparency around the research estate; and
- generate impactful research outcomes with economic, social and environmental benefits.

The EDS was originally developed in 2013 by the University of Southampton with funding from the EPSRC. It was intended to facilitate compliance with new funder mandates to report all equipment purchases over a specific value threshold (currently £138k), improve efficiency and stimulate greater collaboration in the sector.

This project forms part of ongoing work by Jisc to optimise data quality and flow from institutional systems

This project aims to better understand institutional processes and information sources for research equipment data. This should assist in Jisc's work to optimise data quality and flow from institutional systems and equipment suppliers, improving data harvesting and reducing bureaucracy.

Areas for ongoing work by Jisc including improving data quality and coverage, optimising data harvesting, maximising use and value of the data and providing better support to institutions.

1.2 Methodology

Areas of investigation

This project aims to:

- Review sources of equipment asset information within institutions including finance systems, CRIS systems, funder systems, booking systems and items of equipment to identify the sources of truth.
- Identify other potential sources of data within institutions.
- Map 'typical' and 'optimal' workflows for institutional staff and systems compiling asset registers that contain research equipment and sharing this data with the EDS.
- Consider the feasibility of automation and integration of systems at any steps in the workflows.
- Review the equipment data harvesting method in light of possible new data workflows and recommend changes to optimise/automate.

Methodology and approach: overview

The review was undertaken through four primary methodological approaches:

- interviews with 15 people in 12 institutions which contribute data to the EDS;
- a further 19 institutions, selected to be representative of current EDS users, based on numbers of items recorded, were invited to share written input and 8 responses were received;
- desk research and two further interviews on approaches to equipment data utilising CRIS systems within the UK and internationally; and
- an online open workshop involving 19 active participants to discuss and validate interim findings and secure additional input.

Interview participants and the institutions which contributed written responses are listed in Appendix A. Further detail about methods are included in Appendix B.

Limitations and exclusions

This project sought to provide a balanced picture of systems, processes and workflows for equipment data. However, limitations and exclusions to this project include:

- the varied nature of institutional systems for capturing and managing data about research equipment created challenges in identifying single typical or optimum workflows;
- stakeholders identified for interviews and for approaching for written contributions were all drawn from the list of around 60 institutions currently contributing data to the EDS. It should be noted that this a minority of the total number of research performing organisations which receive UKRI funding;
- more focused work is already planned for later this year relating to specific minimum field and metadata requirements; and
- the sample of written contributions was small, although respondents do reflect a wide range of different types of institution.

Acknowledgements

The support and assistance of the Jisc team led by Balviar Notay and John Kaye has been invaluable in undertaking this work.

Interview participants and institutions represented in the written contributions are listed in Appendix A, and we extend our thanks to all those who participated and took time to engage with this project.

2. Current landscape of research equipment data management

About this section

This section outlines six areas describing the main challenges relating to managing research equipment data, identifies key internal and external stakeholder groups for research equipment and describes example use cases for data about this equipment.

The section concludes with a discussion of activities, responsibilities and systems across the research lifecycle, considering the stakeholders involved at each stage and illustrating the complexity of typical workflows relating to managing data about research equipment.

"we have data but it's in a system of variable quality compiled by unknown processes" - interviewee

2.1 Challenges in managing research equipment data

This project identified six broad areas of challenge relating to equipment data

From the interviews and written contributions, six key areas emerged describing the challenges relating to managing research equipment data (Figure 1). These areas often overlap and are interlinked, but also describe distinct dimensions of the challenge of managing research equipment data. They are explored in turn in this section.

Figure 1. Challenges in managing research equipment data.

Ageing systems	Ownership	Setting thresholds for reporting
• In-house bespoke systems no longer fit for purpose • Initial investment in equipment systems c.10 years ago has dropped away	• Not clear who currently owns the equipment register • Staff who owned equipment data workflows have left • Contrast between people best placed to enter or maintain asset register & people with knowledge of research equipment	• Value at purchase (e.g. UKRI compliance threshold of £138k vs internal thresholds for reporting as low as £5k) • Potential for sharing? • Rechargeable use? • In working order? • Obsolescence?
Data quality	**Multiple systems & data sets**	**Manual processes**
• Limited data fields or metadata • Records not maintained • Visibility controls and protecting confidential information	• Local systems to meet departmental needs • Multiple sources, formats and locations of data internally • Integration between central systems, or between central and local systems	• Annual requests for data about equipment • Manual updating of records • Maintaining a spreadsheet • Data manipulation, review of data exports & URL management for transfer to EDS

Ageing systems are a significant challenge

In many research-intensive institutions, investment and development of systems to manage data about research equipment were catalysed by the Wakeham Review and

subsequent Research Council mandates relating to recording and sharing of research equipment. This is now over a decade ago and the following issues are reported:

- initial levels of investment have not been sustained in more recent years, leading to broken systems, links or increasingly out-of-date implementations;
- interfaces may have failed between legacy systems and Jisc's EDS, either through lack of active maintenance or at the point of Jisc system upgrades; and
- strategically, research equipment and systems for managing data about it may have been deprioritised over time, as other policy initiatives have come to the fore.

> *"The database itself was developed over 10 years ago. We're currently looking to replace the backend infrastructure, because we've really run out of support for it."* - interviewee

Ambiguities or lack of clarity about **ownership** of research equipment data presents a further challenge

Within institutions, ambiguities or lack of clarity about ownership or responsibility for data about research equipment creates a further challenge to managing current systems and workflows and implementing enhancements. Ownership issues include:

- lack of clarity regarding who currently owns the research equipment register, and its relationship to other institutional equipment records;
- staff who owned equipment data workflows have left;
- there may be a tension between the people or roles best placed to create and maintain asset register records & people with direct operational knowledge of individual items of research equipment; and
- institutional processes for IT or system enhancements may depend on business cases with clear ownership of proposed projects (and their associated costs) – this may not be possible in relation to fragmented equipment data. This may also mean that considerations relating to equipment data lack visibility within wider change processes; these wider change initiatives may therefore overlook potential effects on, or relationships to, equipment data and associated systems or workflows.

> *"I keep the lights on for it, but it is not a service, which is really owned by anyone or pushed by anyone."* - interviewee

Setting **thresholds for reporting**

Although UKRI's threshold for reporting research equipment is clearly set out with a value threshold of £138k or above, practice in institutions varies, with internal thresholds for sharing data about equipment starting from £10k. If data collection is not limited solely to UKRI funded items above the value threshold, other criteria for including or excluding items of equipment need to be applied. These may include:

- anticipated potential for sharing (within or between institutions);
- presence of a meaningful grouping of items, supported by relevant expertise to enable use (i.e. a facility or service, not just an individual item of equipment);
- potential for rechargeable use by target audiences (SMEs, industry, public sector organisations such as the NHS);
- whether the item is fully maintained and in working order; or

- currency or obsolescence of the equipment.

The currently ongoing Research England COTE survey uses the indicator of proportion of time in use for research (used for this purpose at least 25% of the time). "Predominantly used for research purposes" is defined as being used for research purposes for greater than 75% of the available time. Few of the institutional systems which feed into the EDS would be able to provide usage-based data showing time spent on research activities, although a number of institutions have separate booking systems which could potentially provide at least a partial view of such information.

"Anything that would come under our capitalisation rules could be included. Just because a piece of equipment isn't a part of a £1m microscope doesn't mean it isn't useful for researchers to be aware of it. So, we don't want to have too much of an arbitrary cut off." - interviewee

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There are significant challenges in relation to **data quality** within institutions and in the EDS

There are significant challenges in relation to data quality within institutions and in some cases this is reflected in the data in the EDS:

- systems may only provide for limited data fields or metadata;
- records of equipment have not maintained over time;
- data have not been removed from the system when items are disposed of; and
- visibility controls may not be sufficiently granular to protect confidential information.

"There are no data or metadata standards, the data quality is extremely poor, when there's a defined set of fields, but there's also lots of optional fields and it's not consistent how they're used." - interviewee

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Most participants report challenges with **multiple systems & datasets**

Most institutions report multiple "sources of truth" about aspects of research equipment. These include:

- local systems intended to meet departmental needs (e.g. for equipment booking or maintenance);
- multiple sources, formats and locations of data internally;
- legacy datasets about assets purchased previously but still in use, which require reconciliation with data from current systems in active use; and
- challenges in integrating multiple central systems, or between central and local systems.

"We had multiple separate instances of [a commercial booking system] across the institution, none of those people necessarily knew about other people that were using it." - interviewee

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Institutions also report high levels of reliance on **manual processes**

There is evidence of high levels of reliance on manual processes for gathering and managing data about research equipment, with unsophisticated processes, a lack of automation in workflows and low levels of integration of systems. There are only limited examples of functions that support the key equipment users / owners to update and manage entries through the year.

Individual equipment data records may require manual creation and updating, as well as periodic manual audits or checks (for example, monthly update requests for institutional asset registers or annual requests to check data provided to EDS).

:In some cases, the research equipment dataset within the institution is entirely held and managed in a single manually updated spreadsheet.

> ***"I maintain, in Excel, a list of all our facilities and any pieces of equipment linked to those facilities. I email the departments once a year, to say, can you check the data and update it?"*** **- interviewee**

2.2 Internal and external stakeholders for equipment

There is a disconnect between the core group of stakeholders who engage most closely with research equipment and its use, and wider stakeholders with responsibility for equipment data

Figure 2 presents a view of core stakeholders, both internally and externally.

The core group of internal stakeholders who engage most directly with the use and management of equipment include technical services staff, academics, departmental administrators, research facility managers, and PGRs. However, there is a disconnect between this core group of active equipment users, and the wider range of internal stakeholders with some responsibility for managing data relating to equipment.

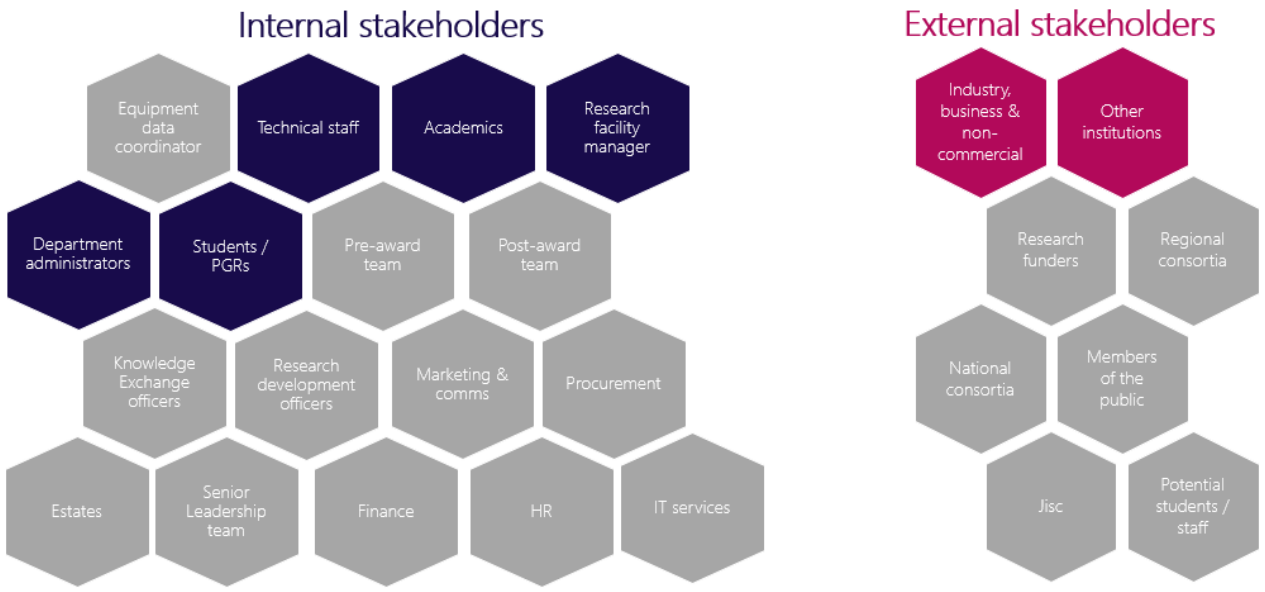
Participants in this project exemplify this, with IT, research services, technical services, research infrastructure and marketing and communications represented amongst interviewees. In many cases, where local users or owners of equipment are involved in reviewing or maintaining data about equipment, this is done via centrally provided spreadsheets.

The primary external audiences for the information within the EDS are potential collaborators: industry and academia

EDS exists as a tool to demonstrate compliance with funder requirements. These requirements and the data which are provided are also intended to facilitate collaboration based around sharing resources and optimising use of existing equipment.

Key external stakeholders for EDS data are therefore research funders (for compliance) and audiences interested in collaborations utilising research equipment. These potential collaborators include academics in other research institutions, potential partners from industry, business or non-commercial organisations (including the NHS).

Figure 2. Internally and externally, a wide range of stakeholder have potential interest in equipment data, although smaller subsets of stakeholders engage most directly with research equipment.



2.3 Use cases for equipment data

> *"The key aspect is the use case: what do you want this data for should be the first thing to clearly specify before figuring out the workflows. There is a bit of a conflict there in terms of the use cases ...[for example] to foster collaboration or provide visibility for very, very expensive infrastructure"* – interviewee

The most powerful and significant driver for equipment data remains compliance with funder terms

Complying with funder requirements was consistently referenced by interviewees, written contributors and webinar participants as the most significant reason for needing to gather and manage data about research equipment. Where there were perceived issues with the quality of data and the systems or workflows to manage this data, these were articulated as posing a risk to full compliance with funder requirements.

There is interest in knowing whether funder commitment to the requirements relating to equipment data sharing remain as strong as they were following the Wakeham Review, with some participants expressing uncertainty about the current status of the mandate and doubts about its longer-term future. Research funders reaffirming the importance of this to the research community could encourage wider engagement with relevant institutional systems and processes.

It was also noted that Research England's COTE survey has highlighted current gaps in, or challenges to, gathering data about research equipment within some institutions.

> *"I think nearly everyone did this in the first place, because we were told we had to do it. And I think that's still got to be the key reason for most people, because it's really intensive to do. And even with all the effort going into it the output's still not great."* – webinar participant

In addition to compliance, a wide range of further potential use cases for equipment data have been suggested...

In addition to complying with funder requirements to report equipment over the value of £138k (and therefore potentially to facilitate the sharing of that equipment between institutions), use cases for equipment data are shown in

Figure 3 and include:

- contextualising research outputs, linking equipment to publications & research data creation;
- facilitating internal (as well as external) sharing of equipment within institutions, (including potentially sharing equipment below the £138k value threshold for compliance reporting(;
- income generation through facilities and equipment services and consultancy;
- highlighting broader public engagement work and use of facilities by different types of external partners e.g. from industry, SMEs or public sector organisations;
- helping to manage equipment – e.g. booking, maintenance, financial management as an asset (capitalisation, depreciation);
- condition and use monitoring;
- planning projects and investments; and
- in some cases, as routes to attracting researchers keen to work with cutting edge technology in their field.

...and some potential risks have been identified

Participants reported a small number of potential perceived risks which are a factor in the level of detail or visibility which institutions might wish to provide for certain types of equipment. These perceived risks are also shown in

Figure 3 and include:

- theft;
- possible misuse of equipment;
- revealing sensitive or confidential information (such as details relating to possible animal research activities); and
- visibility of obsolete equipment.

Mitigations already in place for these include suppressing records entirely, only making records visible to certain users (e.g. within the institution) or reducing the granularity of detail available about certain items (e.g. location information).

Figure 3. Example use cases.

2.4 Activities, responsibilities and systems across the research lifecycle

Responsibility and expertise for equipment management is largely at local or departmental levels

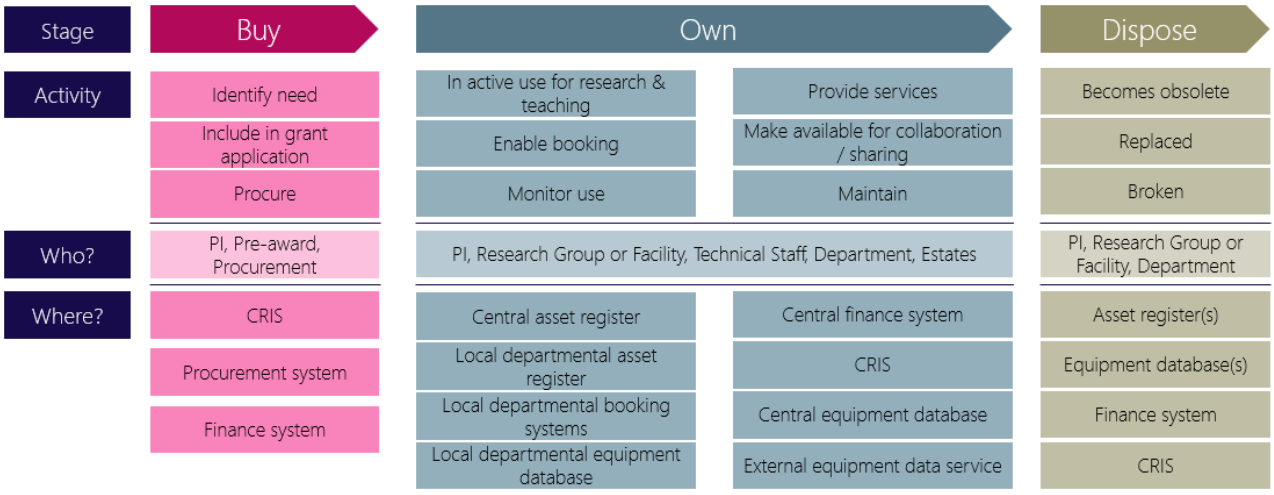
Responsibility and expertise relating to research equipment and its management largely resides at local or departmental level. This may be with Principal Investigators, the research group or facility, or technical and departmental staff.

However, data relating to research equipment is commonly found within for one or more central workflows and systems. These may be jointly or separately intended to support the procurement, management and disposal of research equipment.

This potential tension between equipment ownership and control of data about equipment raises questions about how the creation and maintenance of this data can be most efficiently managed.

Figure 4 illustrates different activities, people and systems involved at each stage of the research lifecycle.

Figure 4. Activities, people and systems involved with equipment data across the research lifecycle.



Although there is a clear preference for automation if possible, participants also see core internal stakeholders as having a key role in adding or updating equipment data

Participants in this project expressed a preference for automation in data creation and updating where possible and where the data quality is sufficiently good. However, where manual intervention is needed to edit, update or maintain data records, this should sit close to equipment owners. Stakeholder groups identified to create and maintain these records include:

- technical staff;
- academics (eg heads of research groups or grant holders); or
- equipment or facility managers.

A supportive role in ensuring data quality and consistency (for example in the structure and detail of metdata) could be provided by people in central professional services including:

- research office staff;
- research information system administrators or library staff supporting CRIS systems / repositories; and
- procurement or finance staff.

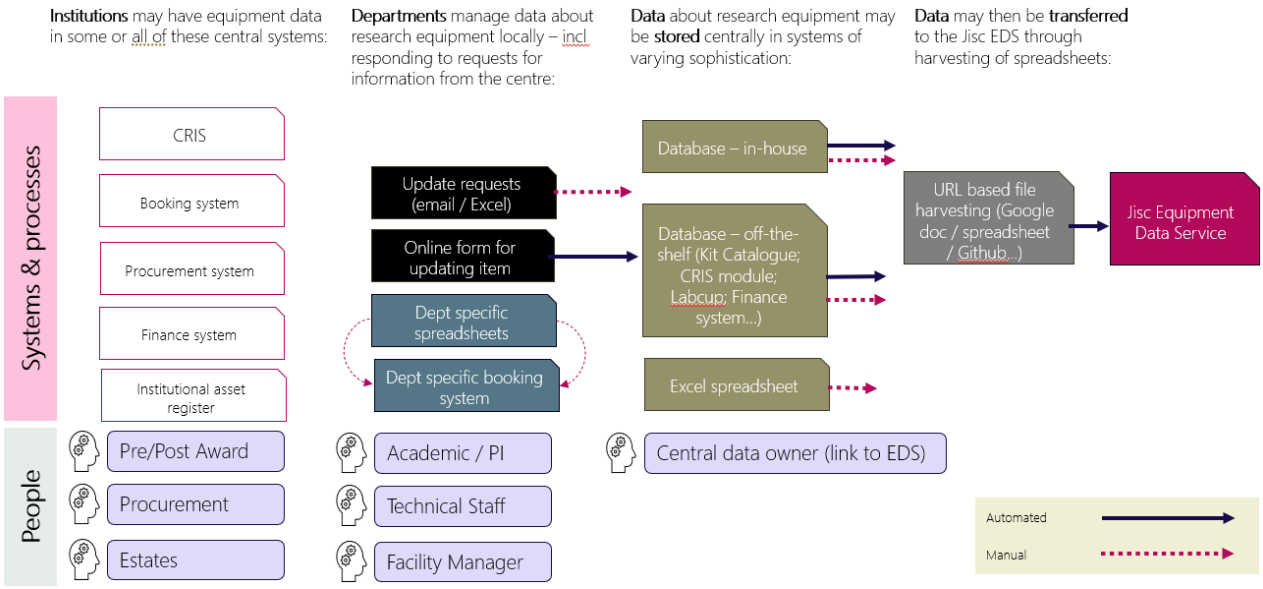
A flexible and customisable approach to administrative rights and access permissions was also suggested, so that universities could set their own administrators and editors and potentially enable anyone with responsibility for the equipment to manage the relevant data (either directly or via delegation from other users). Additionally, permissions to create and edit data records could sit with different users to approvals or visibility controls.

"The source of truth is essentially the facility managers and the equipment managers. The problem is that these people know a lot about equipment and facilities and how they are used, but they're not familiar with metadata. So it ends up being a very collaborative workflow including the researchers managing the equipment and facilities, the CRIS manager, the library... But the ultimate source of truth would lie with the facility manager"
- interviewee

A typical workflow needs to capture the variety of systems and variation in manual or automated processes

Given the variety of systems in use for managing research equipment data and the extent to which manual or automated involvement in processes may differ considerably between institutions, Figure 5 attempts to provide a composite picture of how data is gathered, managed and used across institutions consulted.

Figure 5. Typical institutional workflow for equipment data.



3. Landscape of in-use systems and workflows

About this section

This section explores the current landscape of in-use systems and workflows within institutions. Varying levels of sophistication and integration have been identified within the institutions consulted for this project, ranging from no system in place to more advanced solutions. Three example of more advanced systems and workflows are described: CRIS based approaches; finance systems feeding into a fixed asset register and examples of standalone equipment systems.

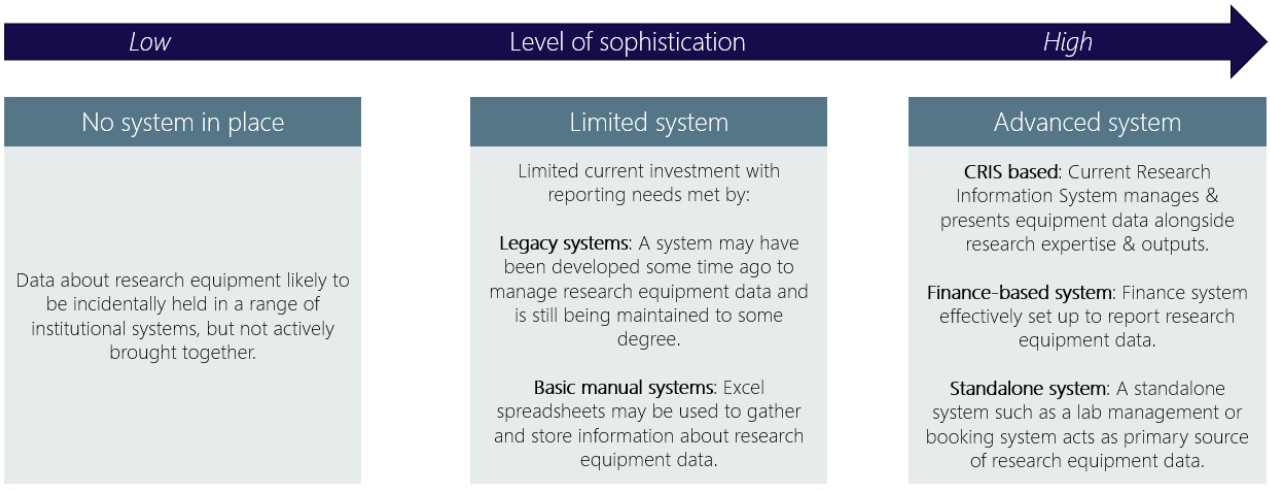
The section considers requirements for potential future systems as well as minimum fields for meaningful data capture, and the tension between use of minimum data records and more the provision of detailed information in order to maximise collaboration and interest in equipment use.

3.1 Levels of implementation of systems for equipment data

Sophistication of existing systems for equipment data vary considerably

Interviewees and written contributions describe a range of approaches and levels of implementation of systems for capturing and managing data about research equipment. This ranges from effectively no system in place, to more sophisticated and integrated systems (Figure 6).

Figure 6. Different levels of implementation of systems capturing equipment data.



There are a range of sources of truth for equipment data within institutions, of varying levels of sophistication...

Project participants indicate broad agreement about the sources of truth for equipment, although there are clearly also some polarised experiences based on whether specific systems are in use at particular institutions.

It appears that separately maintained, manually updated lists of research equipment and Departmental or institutional asset registers are most frequently used to manage information about research equipment.

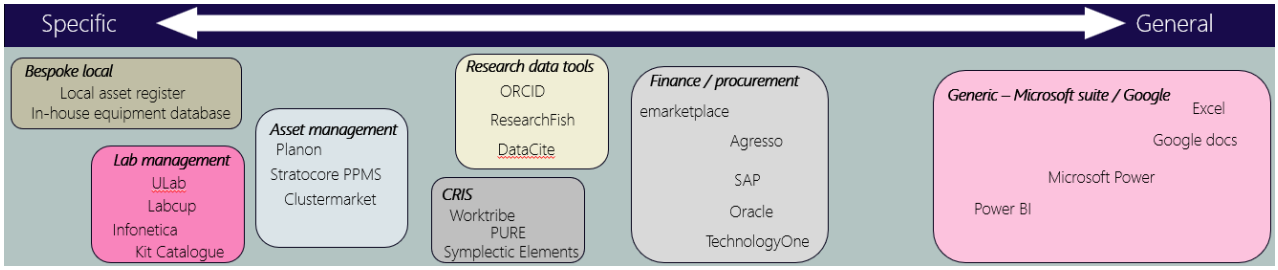
…but levels of data integration and automation are low

Participants report that current levels of systems integration and data automation are low, with low levels of automated data capture and updating.

There is a wider spread of views on whether workflows support data entry and updating and, to a greater extent, the integration of institutional and departmental systems.

The range and variety of systems in use in different institutions or considered to be relevant to the management of equipment data is illustrated in Figure 7.

Figure 7. Systems mentioned by participants.



There are indications of current or potential institutional investment in research equipment

There is evidence of activity ongoing in institutions to update or enhance systems for gathering data about research equipment. Planned improvements (although in some cases with uncertain funding or unclear timeframes for delivery) were noted in 9 out of 12 UK institutions represented in the interviews and 3 out of 8 represented in the written contributions. This was echoed in webinar responses.

In some cases, solutions are currently being built or optimise in anticipation of beginning to share data with Jisc over the coming months. In one institution, a project manager with specific responsibility for research infrastructure has been appointed.

In other institutions, there is a recognised need to improve management of data about research equipment, but a lack of clear ownership creates challenges in prioritising this for investment.

There is also evidence of a polarised pattern of views about scenarios relating to research equipment in the future. Participants appear to lean towards agreement around potential inclusion of research equipment in a CRIS and improved workflows for booking and use of equipment, as well as for investment and development of systems and improved databases. There is however, less expectation of increased automation & reduced manual processes, even if this is regarded as highly desirable.

3.2 Current Research Information Systems

CRIS-based approaches to managing data about research equipment link

A CRIS such as Pure can present information about equipment data in an engaging, contextualised way, alongside showcasing expertise, research outputs, projects & collaborations linked to the institution. Pure enables hierarchical views of equipment,

equipment to outputs, projects and people

aggregating and clustering items within facilities. A number of UK institutions are already exposing their equipment data via Pure portals, including some which do not currently have any equipment listed in the EDS, such as the University of Bath and the University of Aberdeen.

The metadata about equipment which is currently captured by Pure appears to map to Uniquip / EDS data fields and partially to the PIDINST metadata schema, although there are technical barriers to interfaces between Elsevier's proprietary system, Pure, and EDS or other open systems.

Similar functionality is included in Symplectic Elements. Examples of use of this functionality include a US collaborative statewide initiative covering 12 institutions in Ohio which brings together expertise, equipment and patents. Amongst UK Symplectic users who engaged with in this project, interest in the use of this system for equipment data is apparent, but appears not yet to have been implemented.

Five institutions represented amongst participants either already use, or are aiming to use, their CRIS for managing data about research equipment.

Internationally, there are examples of other successful implementations of CRIS systems providing visibility for very high value research infrastructure, such as the Flanders Research Information Space.

We use Pure and the Jisc Equipment Data Service to showcase equipment and to link it to the research it is being used for. – **written contribution**

One institution reports integration of other systems with a CRIS; others currently have low levels of integration between CRIS systems and others, including the EDS

At one institution, ULab is used in an integrated way to capture data about research equipment from facility managers and ultimately to feed into the institution's CRIS (Pure).

However, in other institutions low levels of integration are reported for CRIS systems and other institutional services, such as procurement systems. There are also technical challenges reported, including ensuring appropriate limits to the surfacing of CRIS data via discovery layers or website content management systems.

Elsevier's approach to managing access to data within its systems means that Jisc needs to be whitelisted and put in place authentication for each individual institutional Pure repository in order to use the API to feed data into the EDS. This means that equipment is discoverable via individual institutional Pure repositories, but not easily harvested by the EDS.

Example workflow: Current Research Information System

CRIS systems can present information about equipment data in an engaging, contextualised way. In many institutions, use of such systems has become an established part of recording and sharing information about publications, projects, data, expertise profiles and collaborations and academic staff and others have become familiar with using these systems to add and maintain information about their own work. An example of a workflow using a CRIS includes the following steps:

Creating a new record

- Potential trigger points for record creation include the approval of an award, new equipment coming into use, or identification of a need to report or showcase the equipment.
- Creation of a record takes place either via records imported from another institutional system (e.g. from grant management system / equipment management system) or through manual data entry by Facility / equipment managers. These records may be created via a form or directly within the CRIS.

Integration to CRIS

- CRIS manager oversees integration of data into the CRIS

Data checking

- Metadata is checked for comprehensiveness and consistency.
- CRIS publication records are checked for links to, and acknowledgements of, relevant equipment.

Ownership and updating of live data

- Facility, technical, academic and other staff "own" the equipment they are responsible for, updating the relevant equipment records themselves (with checks undertaken on metadata quality and completeness).

Data transfer to EDS

- Data is made available in Uniquip format for harvesting by EDS, linking to data in the CRIS portal.

3.3 Finance systems and fixed-asset registers

There are successful implementations of fixed-asset registers based on exported information from finance systems, although metadata fields may lack granularity

Implementations of fixed asset registers based on exported information from institutional finance systems were noted, with examples using Agresso (one implementation successfully operational for nearly a decade) and SAP.

In nine institutions, finance systems and / or fixed asset registers are used to contribute information to the institutions' internal equipment dataset, typically in the following ways:

- providing an initial outline record of new equipment as it is procured and first added to the institutional asset register;
- providing regular updates (e.g. every quarter) regarding existing equipment, as changes are made by departments. It is noted that requests for updated information from departments may carry more weight and elicit fuller responses in the context of the institutional legal and compliance needs served by the asset register.

Limitations of this approach include the potentially limited metadata fields available in data records, and the different types of data fields which may be relevant for financial purposes but less informative for equipment sharing. Initial outline equipment records may therefore require manual review, edits and additions.

One strength of this approach of managing equipment data is that data capture can begin with procurement and can be highly automated. However, as one institution noted, automation by itself does not outweigh issues caused by poor data quality, inadequate workflows or processes and lack of clear ownership.

Example workflow: finance systems and fixed asset registers

Procurement and finance systems are essential elements for the acquisition of new items of equipment and may feed into fixed asset registers which are used by many institutions to manage information about a wide range of owned infrastructures and items. However, the level of detail provided by these systems and registers tends to be relatively basic and focused on financial and compliance considerations. They tend to be managed as internal data assets, only visible to specific groups of staff. These systems and registers therefore seem to be most effectively used in providing a basic initial record for new equipment. This can then be augmented with additional details provided by departments or individuals closer to the equipment. Usually, integration with another system such as the EDS will be needed to enable external audiences to view data about equipment. An example of a workflow using finance systems and fixed asset registers includes the following steps:

Finance system

- Procurement record is created and relevant research expenditure identified.
- Changes notified including transfers, movements, retirements from service.

Fixed Asset Register (FAR)

- Updated throughout the month to reflect changes, capital acquisitions over the internal capital reporting threshold are added to FAR.
- Data in FAR reconciled at month end.

Departmental data review

- Buyer / PI / Department receives an email requesting additional details (e.g. contact, location, description, date commissioned into use).
- Annual Asset Verification list to Faculties and Departments to confirm details / add changes.
- Annual process identifies any instances of consolidation of smaller items into a new asset.

Research Office reporting & making equipment externally visible

- Annual review of FAR by Research Office to identify items for reporting (above a higher financial threshold than the internal capital reporting threshold).
- New items identified by the Research Office are added to the institution's Research Facilities Directory.
- When Directory record is created, PI is prompted to add additional details regarding the item(s) of equipment.

Data transfer to EDS

- Export of shareable records from the Directory is made available on a server for harvesting by EDS.

"As an institution we are currently implementing a singular asset management system, to harmonise and bring together all equipment into one central system. ...an agreed workflow from procurement through to disposal has been agreed across the institution and will streamline the way in which the university handles its assets."- written contribution

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3.4 Standalone systems

Kit Catalogue was developed as part of the sector's response to the initial Research Council mandates for improved equipment sharing, but has not been maintained

Kit Catalogue was created by Loughborough University as part of the initial interest in improving capture and sharing of data about research equipment a decade ago. Two interviews were with institutions which currently still use this system, although in both cases active consideration is being given to decommissioning the local implementations of the system in the very near future. In one case, this appears to be out of active interest in commissioning an alternative system with enhanced functionality. In the other case, this appears to be due to challenges of maintaining Kit Catalogue and a concern that it may cease working within months.

Kit Catalogue was referenced by another interviewee as the type of system their institution could consider implementing, as an improvement on the limited spreadsheet-based system they currently operate.

There does seem to be potential appetite from one current user and from one potential user to see Kit Catalogue maintained, in order to provide a "free or cheap" alternative to managing equipment data in a spreadsheet. A user with substantial experience of the system estimates that a relatively limited amount of development time would be sufficient to bring it up to date ("I reckon I could do it myself in in two or three days, but it's just finding that time").

> ***"Kit Catalogue is a pretty good piece of software, it just needs a little bit of maintenance to get it up to a modern standard, really not a huge amount of work. …we could really do with a bit of a commitment someone taking on properly to keep it maintained. Because there aren't any other free or cheap alternatives"*** - interviewee

An implementation of lab management software LabCup aims to start feeding data into EDS later this year

Another institution aims to begin feeding data into EDS later this year from their implementation of LabCup. This implementation is owned by Technical Services, with a high level of buy-in to using and maintaining the data about research equipment. It does not intergrate with other systems, but does use the same asset number as the institutional asset register (Planon). It also sits alongside (but is not integrated with) Clustermarket for resource booking.

Stratocore PPMS is used in various ways for booking equipment

A further standalone system referenced in both interviews and in written contributions is the equipment booking system Stratocore PPMS. In one institution, multiple implementations of this system were in use across the organisation, before work was undertaken to rationalise procurement. In another institution, this system is used to support provision of rechargeable facility and equipment services, but not as a data source for EDS.

3.5 Characteristics of future systems and workflows

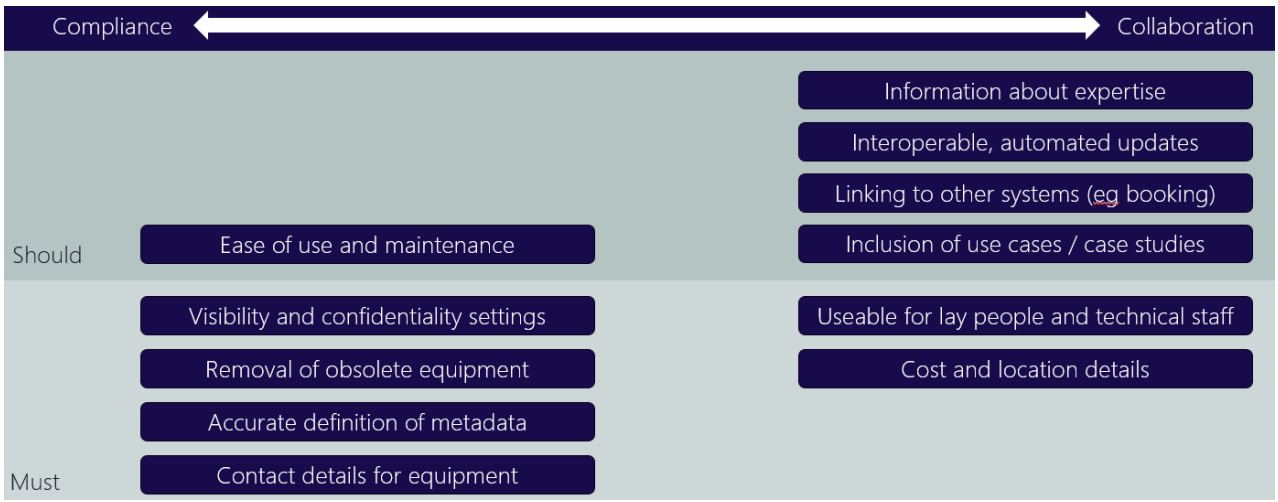
Characteristics of a future system for equipment data

Participants identified a range of characteristics of a future system for sharing data about research equipment. These are presented in Figure 8 as components of systems for compliance or to facilitate collaboration, clustered according to whether they are essential for such a system ("must have") or desirable, to add functionality ("should have").

These characteristics include features which are essential to underpin compliance, such as contact details for equipment, accurate metadata, visibility and confidentiality settings and the removal of records for obsolete items. Additionally, ease of use and maintenance of records would be desirable for compliance-based systems.

To underpin collaboration, essential aspects would include usability for both lay people and technical staff and cost and location details. Desirable features to support collaboration would include information about expertise connected to the equipment, interoperability of records (including automated updating), linking to other systems (such as for booking) and the inclusion of use cases or case studies.

Figure 8. Essential and desirable features of compliance- or collaboration-based systems.

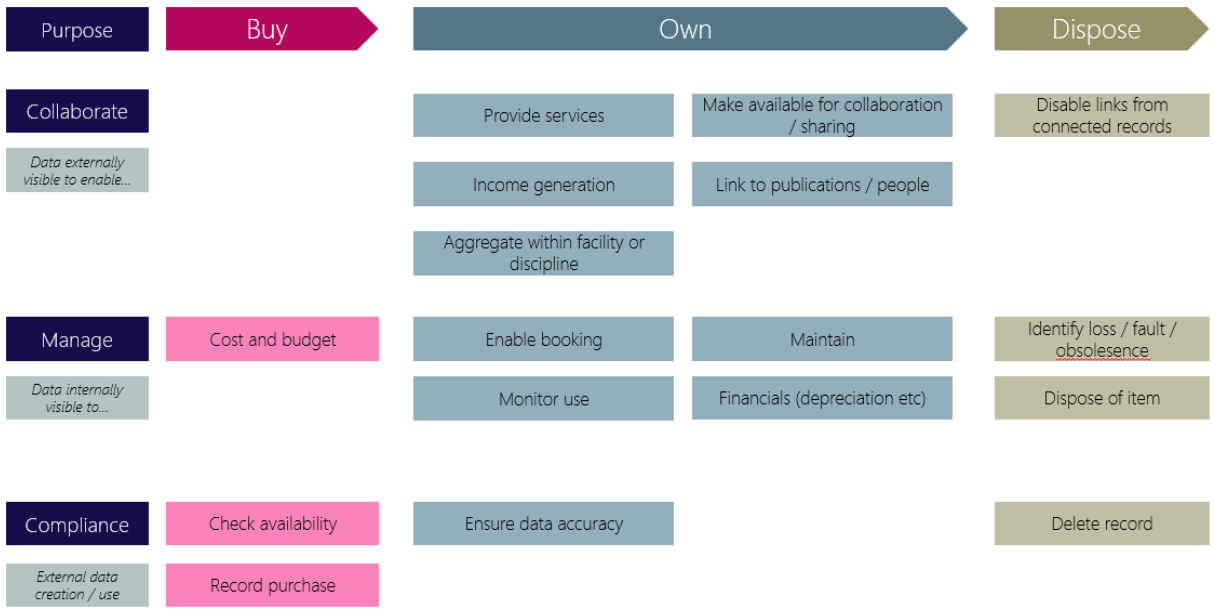


Defining optimum workflows for research equipment data

In view of the complex, fragmented and varied landscape of systems, processes and workflows for equipment data in institutions, defining a single optimum workflow is challenging.

Figure 9 instead presents a suggested optimum distribution of activities and processes for each stage of the research lifecycle, depending on whether the use case is compliance, equipment management or collaboration.

Figure 9. Distribution of activities and processes for compliance, management and collaboration.



3.6 Minimum required fields for equipment data records

PIDINST metadata schema for instrumentation, endorsed by the Research Data Alliance, proposes nine mandatory fields for records

Endorsed as a Research Data Alliance (RDA) recommendation, the PIDINST metadata schema for instrumentation sets out the following mandatory fields for records:

- Identifier - Unique string that identifies the instrument instance;
- identifierType - Type of the identifier;
- SchemaVersion - Version number of the PIDINST schema used in this record;
- LandingPage - A landing page that the identifier resolves to;
- Name - Name by which the instrument instance is known;
- Owner - Institution(s) responsible for the management of the instrument. This may include the legal owner, the operator, or an institute providing access to the instrument;
- ownerName - Full name of the owner;
- Manufacturer - The instrument's manufacturer(s) or developer. This may also be the owner for custom build instruments; and
- manufacturerName - Full name of the manufacturer

However, core data fields which are required for basic records about research equipment vary depending on use case and system

Specific systems vary in their metadata fields, with some mapping closely to the PIDINST schema and others varying more substantially.

Use cases and potential workflows which serve these will also have a significant role to play in the level of granularity required for data about research equipment. Different use cases which are drivers for gathering data require different levels of detail and different definitions of minimum mandatory fields. For example, meeting compliance requirements would suggest an emphasis on purely descriptive logging of items. In one interview, a minimum level of detail proposed was a description and a contact.

A wider range of compulsory fields are evident in current equipment systems. These include:

- name of item;
- description;
- location (site / building / postcode);
- owner (of data);
- owner (of equipment);
- contact details;
- organisational unit (location of equipment within a hierarchy);
- visibility (ranging from only visible internally to fully publicly accessible information);
- manufacturer; and
- asset number / equipment ID.

More detailed metadata may be needed to encourage and facilitate collaboration

In contrast, to drive effective collaboration and information sharing and to add value, more granular, contextual information is needed. For example:

- technical details (including performance specs, dates of purchase/operation, bespoke or commercial product);
- more detailed information about ownership (group / dept, facility, collective, associated researchers / projects);
- use case examples;
- contacts;
- key words and search classification (this may cover a range of dimensions for searching, such as disciplinary area, type of equipment, relevant sectors); and
- images.

However, addition of new metadata requirements for data feeding into the EDS should be balanced with a need to be pragmatic and to avoid over-complicating or over-engineering the schema. The aim should be to optimise the level of detail and level of completeness which institutions can reasonably be expected to provide in their data, and which are likely to be most useful for users.

4. Conclusions and recommendations

About this section

This section sets out the main conclusions from this project and proposes two strategic directions for the Jisc EDS which should inform future development.

These two strategic options are to extend EDS functionality so that individual institutions could use a protected / confidential area of the system to manage their equipment internally and, in the longer-term, to use the EDS to support CRIS-based approaches to supporting increased collaboration through enriching and contextualising data about equipment through links to researcher profiles, research outputs and grant information.

Additionally, a number of shorter-term tactical options for improvements are also suggested.

4.1 Conclusions

The current landscape of data about research equipment is highly varied, both in approaches and in quality of data

Some institutions rely only on very basic methods of data collection about research equipment and highly manual processes, such as spreadsheets circulated to departments on an annual basis. Other institutions have had established systems in place for some time, with varying levels of ongoing maintenance or potential for future sustainability.

The lack of clear ownership of research equipment data in many institutions presents a challenge to both effective current workflows and potential for future investment in improved systems.

There commonly appear to be low levels of integration between systems and in many cases multiple datasets

Most institutions report multiple "sources of truth" about aspects of research equipment, including local systems intended to meet departmental needs; multiple sources, formats and locations of data internally and legacy datasets about assets purchased previously but still in use, which require reconciliation with data from current systems in active use.

There are also challenges in integrating multiple central systems, or integrating central and local systems and this lack of integration necessitates further manual processes and workflows, including duplication of data entry.

The funder mandate for sharing information about research equipment remains the main driver

Complying with funder requirements was consistently referenced by interviewees, written contributors and webinar participants as the most significant reason for needing to gather and manage data about research equipment. Where there were perceived issues with the quality of data and the systems or workflows to manage this data, these were articulated as posing a risk to full compliance with funder requirements. Some participants also expressed uncertainty about the current status of the mandate and doubts about its longer-term future.

More detailed, contextualised data may encourage greater use for collaboration

There is uncertainty about the extent to which data about research equipment is currently used to facilitate collaboration. Bringing together information about items of equipment with details of the expertise of people who manage it; how it can be used (e.g. use cases and case studies) and descriptions of services it supports could help to drive increased

use. This could also inform and align with broader research policy priorities, such as evidencing aspects of the People, Culture and Environment element of REF 2029.

There may be a tension between basic levels of data which can be more easily automated and greater granularity

More detailed, nuanced records about research equipment may be harder to automate and may also require greater expertise to create and maintain accurately.

Some aspects of metadata could fit into automated workflows, such as grouping items and creating links, building aggregations of equipment visible as facilities or presented in hierarchies or within subject taxonomies to describe their relationships and relevance.

With more sophisticated presentations of data and enhanced discovery, including improved ways of searching data about research equipment, value could also be added to the data as it is used. For example, interactions, searches, record views, or item reviews could be captured to contextualise the equipment further. Mapping of geographical distribution of equipment may also support further investment in research infrastructure within specific regions. It may also be possible to explore how well equipment data is used within target audiences such as SMEs or by other stakeholders outside academia.

It is notable that a UKRI initiative, InfraPortal, which maps larger research infrastructures was not referenced by participants in this project, but appears to display at least some of these more sophisticated features, including group ownership of infrastructure records, geographic mapping, clustering by discipline, sector, region and use of topic-based case studies.

Cultural change and raising awareness

Showing the value of data about research equipment could help to encourage cultural change in institutions, increasing the level of awareness of equipment data and encouraging greater engagement. Use cases and case studies were mentioned as particularly effective ways of highlighting value, as was greater contextualisation of equipment use and its connection to research outputs, impact and quality assessment exercises. Metrics relating to equipment usage or record views and engagements can also help to show value.

Providing clear ownership of equipment, which may sit best with academics, technical staff or departmental / facility managers, could improve accuracy and maintenance of data. It could also drive advocacy and help to articulate the value of collaboration and sharing equipment.

Research equipment data could form part of open data initiatives

Research equipment data from EDS could form part of co-ordinated open data initiatives, but currently both the quality challenges and the limited coverage of EDS would limit opportunities for this.

Work such as the PIDINST metadata schema for instrumentation and cookbooks for creating instrument PIDs within the ePIC infrastructure or mapping the PIDINST metadata into DataCite shows how instrumentation can be cited in research outputs, aiding reproducibility.

There is scope to encourage wider sharing of information about research equipment through researcher-specific information (such as in ORCID), whilst the UKRI InfraPortal initiative already shares information about larger-scale research infrastructures, based on open source data.

Although not an open data source, potentially more encouragement could also be given to capturing researcher-specific engagement with equipment (both owned and shared) by using the Researchfish use of facilities and resources field when reporting on grant activities.

4.2 Recommendations

The review has identified two **strategic directions** for the Jisc EDS which should inform future development

The project aim was to identify optimal workflows for institutional data to move into the EDS. The fragmentation and range of key users / owners evident through this review have made that difficult. What the review has identified is two strategic directions which present a clear opportunity to consider how the EDS is developed to address the concerns and opportunities evident in the review.

Firstly, it is apparent that many **institutions lack internally coherent and manageable databases for equipment**. A strategic development for the Jisc EDS would be to extend functionality such that individual institutions could use a protected / confidential area of the EDS to manage their equipment internally. This would allow devolved users to manage, add and update equipment records, and for an institutional manager to control and approve what is allowed to be visible on the public EDS service. This positions the EDS as a tool that supports a low-cost service to universities to manage their equipment portfolio and compliance with funder requirements.

Secondly, **sharing equipment information in isolation is not optimal in terms of supporting collaboration**. Examples of equipment being integrated into CRIS public portals are already evident using commercially available systems – for individual institutions and for clusters of universities. The long-term direction of travel suggests that the EDS information is more effectively used to facilitate collaboration when it is connected to other contextual information, such as:

- the profiles of academics in that area / department;
- the publications emerging from that area or using the equipment;
- the research projects from that area or using the equipment;
- the larger research infrastructures within which the equipment may be located (e.g. InfraPortal); and
- use cases and case studies of research that relate to the equipment

A number of shorter-term tactical options for improvements are also suggested

This project has also identified a number of shorter-term tactical options for improvement of the EDS, its interface with institutional data and its support and engagement with the wider user community. These include:

- improving the EDS search functionality, which will involve updating metadata schema;
- Improving clustering and expression of hierarchical relationships, such as department, discipline, facility, and purpose (for example, supporting the activity of a specific regional consortium of institutions, such as N8);
- implementing the API link for harvesting data from Pure and gathering this into the EDS;
- considering options for supporting Kit Catalogue and its users, as a currently unmaintained open source system for managing equipment data, noting that for some institutions it may currently appear to be the only "free or cheap" alternative to

managing equipment data in a spreadsheet and particular concerns that without urgent (but not necessarily extensive) maintenance it may soon cease to function; and
- considering options for including equipment-related systems support within systems specifications in Jisc's procurement framework, the Research Management Systems DPS.

Additionally, Jisc should continue to proactively grow the EDS user community, aiming to provide guidance, advice and support for stakeholders, particularly to address the areas where challenges have been identified. This may include a 'recipe book' or space to share potential workflows, approaches to integration or solutions to issues identified, recognising the diversity and variety of systems and processes currently in use.

As preparation for exploring the longer-term strategic options outlined above, Jisc should also facilitate and lead discussions with software vendors (including CRIS and finance systems) to scope functionality and adaptability, aiming to maximise systems use for collaboration and sharing (as well as for compliance).

Appendix A. Project contributors

The following stakeholders contributed to this project.

Table A1. Project contributors – interview participants.

Name	Organisation	Role
Lee Allan-Smith	University of Reading	Project Setup Manager
Ian Brewis	Cardiff University	Central Biotechnology Services (CBS) Operational Director
Pablo de Castro	euroCRIS; University of Strathclyde	Board Member (euroCRIS); Open Access Advocacy Librarian (Strathclyde)
Arthur Clune	University of Sheffield	Chief Technology Officer
Peter Edwards	University of Leeds	Application Support Analyst
Ciara Gray	University of Brighton	Senior Marketing and Communications Officer (Research and Knowledge Exchange)
Liam Gretton	University of Leicester	Research Technology Services Manager
Christöpher Gutteridge	University of Southampton	Research Application Support
James Houghton	University of Nottingham	Research Facilities and Equipment Manager
Emma McArdle	University of Exeter	Project & Operations Manager
Tricia Murkin	University of Oxford	Research Systems and Finance Manager
Charlotte Murphy	University of Exeter	Director of Technical Strategy and Services
James Pickett	University of Surrey	Digital Productivity Services Manager
Mesh Pillay	Callaghan Innovation	Manager – Length, Mass and Pressure, Light
Pamela Ridgeon	University of Reading	Infrastructure Project Manager
Christopher Wilkinson	University of Cambridge	Equipment Sharing Platform Manager
Chris Yorke	University of Southampton	Associate Director of Research IT

Table A2. Written responses from institutions.

Organisation
University of Durham
University of Edinburgh
Imperial College
University of Lancaster
University of Liverpool
Liverpool School of Tropical Medicine
Norwich BioScience Institutes (includes Earlham Institute, John Innes Centre, Quadram Institute Bioscience, The Sainsbury Laboratory)
University of York

Appendix B. Methods

Interviews with 15 institutional stakeholders and equipment managers

Interviews took place between mid-February and late March with 15 people working with equipment data in 12 UK institutions. Most interviewees were identified and initially invited to participate by Jisc, supplemented by interviewees identified by Research Consulting.

Additional evidence

Additional evidence was gathered through desk research on the use of CRIS systems to share equipment data in a contextualised way, alongside researcher profiles, information about publications, datasets and grants.

Additionally, two further interviews were held in April with contacts familiar with international projects relating to research equipment data.

Inviting written contributions

The Research Consulting team also approached 19 other institutions by email with a short set of questions, inviting written contributions. In selecting the institutions to approach to invite a written contribution, we aimed for a spread based on the number of equipment items listed for each institution in the EDS.

The questions asked were:

- Can you describe where the relevant data is currently held (e.g. systems, spreadsheets) and give an overview of the current process for compiling and updating the asset register for research equipment within your institution?
- Are there any particular pain points or challenges in the data and current workflows?
- What are the main improvements which you think could be made to the process, considering efficiency and data accuracy? Do also consider the interface of your data to the Equipment Data Service.
- What are the priorities for managing data about research equipment in your institution? For example, institutional policies, funder compliance, asset management and maintenance, procurement or for collaboration and external use.

8 written contributions were received from this wider set of stakeholder institutions.

Workshop webinar

On 11 April, the project team and Jisc hosted a virtual webinar. This two-hour workshop provided an opportunity to:

- review the outcomes of the work so far and test assumptions and findings;
- provide an overview of the institutional systems, workflows and data landscape relating to equipment asset registers and to outline and map typical current workflows;
- review gaps and pain points; and
- enable participants to input ideas to improve and optimise workflows and data capture.

During the webinar, Mentimeter was used to capture participant views and ideas on specific questions, further aiming to test and validate initial findings.

Jisc Equipment Data Service review

Data and systems discovery

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