

# Project Snowball: benchmarking metrics for research performance

**John Green** introduces a project that aims to help universities benchmark their research performance through a standard set of common metrics.

**T**here is growing recognition within universities of the need for research intelligence and performance management frameworks. These can focus institutional strategies on research quality, raise the profile of an institution's research, manage talent, and build a high-quality research environment. There is, however, considerable dissatisfaction with the data and tools available to integrate information from disparate systems, and a frustration that different stakeholders, including funders, demand similar information in differing formats with differing definitions. Institutions and funders have tended to implement their own bespoke solutions; examples of success from collaborative approaches are few and far between, whether within or outside the sector. This leads to duplicated effort, systems that are manually intensive, and inefficiency. This situation exists in all research-intensive countries.

## A starting point: a study of research information management

In 2010, Imperial College London and Elsevier conducted a joint JISC-funded study of research information management within the higher education sector in England. The study reviewed the sector's efforts and experiences in implementing research management systems, and evaluated and compared the tools that universities currently use to manage data related to research. It also aimed to identify problems with the approaches used and to publicise elements of good practice.

The key conclusions were as follows:

- Institutions should work more collaboratively to harmonise their approach to research management processes and to minimise wasteful duplication of investment in research management systems

- Institutions and funders should work more collaboratively to identify commonality in systems and processes so they might share data in more cost-effective and less resource-intensive ways
- Institutions should develop stronger relationships with suppliers and work with them to define their needs more clearly
- A national framework for data and metric standards should be developed with stakeholders and used across the sector
- Suppliers should participate in the development of data standards with the sector in an effort to drive consistency in research systems
- Institutions, supported by funding organisations, should be encouraged to develop long-term system strategies focused upon core research management processes and information needs

The study revealed that institutions and funders recognise data as an essential element in strategic management and decision-making, but that there is a lack of consensus among stakeholders on the metrics that should be used for measurement and evaluation. The study showed that, without clear and shared metrics, institutions find that it is almost impossible to benchmark meaningfully and that, as a result, they are hampered in their ability to establish strategic direction.

The lack of a shared definition of metrics makes it difficult for institutions to measure performance against peer institutions and plan for the long term. With each institution wanting different data structures and metrics, suppliers are hindered from developing data systems that could be used across the sector. In part, this inconsistency is driven by the different perspectives of different stakeholders; each regards their own way of interpreting the

data through specific metrics as critical, rather than considering it as one particular view on what could essentially be a common set of metrics shared by all stakeholders. With no holistic approach, it is not unusual for institutions to submit different values for the same data point in various external data-gathering exercises in order to maximise the benefit to the institution (for example, by interpreting the definitions of specific data points, such as the precise meaning of 'researcher', to suit the purpose at hand).

The focus on, and pressures of, external data requests have meant that institutions have allowed the demands of other stakeholders to determine the data and the data-definitions they collect and measure, rather than considering what would be best suited to their own purposes.

## Second phase: Project Snowball

Following the completion of the JISC-funded study, the Imperial College/Elsevier team began a second phase of work that would address and build on some of the recommendations. This was launched as a self-funded, voluntary project in November 2010. The project objectives were agreed as follows:

- Define a set of metrics needed for effective and long-term institutional research information management and reach a consensus on how these metrics should be calculated
- Define all possible sources of the data elements of the metrics calculations
- Establish a three-year roadmap to enable the adoption of that vision within the higher education sector and across key stakeholder groups (HEIs, funders, research councils, government departments and other agencies, private funding bodies, suppliers, and other administrative entities)

The initial study found that the ways in which institutions hold research-related data – and perform calculations based on that data –



differ across the sector. Because of this lack of consistency, making meaningful comparisons between institutions is difficult. The focus of the second phase project was to address these issues by enabling institutions to benchmark against key research performance and activity metrics on a like-with-like basis.

The project has a tightly defined overall goal: to facilitate external benchmarking by ensuring that institutions can confidently compare research data in a like-with-like manner. It aspires to facilitate and drive the storage and provision of meaningful data for use by higher education institutions and other stakeholders. Achieving a consistent understanding of metrics will simplify interaction between institutions, suppliers and funders, enable more effective benchmarking, and improve the efficiency of data management.

Eight universities have collaborated on the project: Imperial College London, Queen's University Belfast, University College London, the University of Bristol, the University of Cambridge, the University of Leeds, the University of Oxford, and the University of St Andrews. Starting in November 2010, a series of regular workshops have allowed the Snowball partner institutions to shape the project's objectives, to agree definitions of metrics and sources of data, to share experiences and knowledge, and to discuss and determine the project's progress and outcomes.

This second phase project has been named 'Snowball' because it aims to create a 'snowball effect' across the sector. In 2009-10, the eight universities within the Snowball partnership accounted for 37% of the value of competitive research proposals awarded by the UK research councils and were responsible for over 37% of UK-authored articles and 38% of UK citations. Taken together, they therefore provide a strong and influential core from which to enlarge the sphere of influence across the sector. It is hoped that the eight Snowball partner institutions will drive momentum and build support for a set of standardised metrics, sources and methodologies shared across UK higher education institutions, funding bodies, and other stakeholders. Further, by developing a consensus on defined metrics, data sources, and an implementation roadmap, the sector as a whole will be encouraged to adopt standardised metrics. With this framework defined

and agreed, it will allow institutions to develop their own tools that can benchmark consistently in the external context.

### Definition and prioritisation of Snowball project metrics

The primary goal of the project is to deliver a set of consistently defined metrics that could be used by institutions for external benchmarking. Within the prioritised areas of research activity, the Snowball team identified 66 separate metrics from a large number covering the whole of the research management process (see Figure 1). These reflected Snowball team members' experience and knowledge of internal and external stakeholders' demands for information, and their understanding of the type of information that is, or could be, collected internally and externally.

The Snowball team is aware that a variety of stakeholders collect very similar data, but that the definitions they use vary considerably; 'grant success rates' and 'researcher', for example, are calculated and defined in a variety of ways by different institutions. Discussions in the Snowball team workshops have been invaluable in exposing these differences and exploring how core terms such as these can be aligned across the sector.

There are also difficulties – and some resistance – to the use of any kind of metrics in the arts and humanities. Reasons for this include the poor coverage of the major databases, differences in referencing behaviour, and the speed of publication. While recognising that some metrics will be more relevant in some fields than others, the project aims to be inclusive across all subject fields represented within an institution. Differences across disciplines were kept in mind during discussions.

Snowball partner institutions were clear in their commitment to identifying a shared framework for research metrics, but were also keen that any presentation of the data should allow for flexible interrogation. By its nature, institutional benchmarking requires users to 'slice and dice' data in a number of ways to answer key questions. To ensure this was possible, the pivotal units – the denominators – through which data could be manipulated were identified by the Snowball team (Figure 1). All the Snowball partner institutions expressed a desire to measure performance and activity

through volumes of research grant applications and awards over time, for example, and wanted to interrogate this metric from a number of perspectives, including by department, by funder type, by unit of assessment, or by a specific research theme. Denominators such as these would enable detailed interrogation of key benchmark measures and give users the flexibility to perform meaningful analysis of the data.

### Snowball metrics calculation pilot

Project Snowball originally aimed for consensus among a group of influential UK higher education institutions (HEIs) on a set of metrics that would facilitate strategic, evidence-based decision making and cross-institutional benchmarking. The Snowball project partners have subsequently evolved Snowball into a more ambitious vision. Having agreed a set of metrics that aim to represent the entire research landscape as much as possible, and having come to a consensus on the specific definitions of a priority sub-set of those, the project partners have agreed to test the feasibility of the metrics' definitions by calculating them.

The feasibility test involves HEIs and Elsevier contributing data into a shared environment. Third party data will also feature. Critical to success is that the data collection is as easy as possible, to ensure that it is scalable to the project partners' entire HEIs, and would also be scalable to all HEIs in the UK.

The feasibility test will result in an interactive pilot in which data is shared securely. The pilot will allow participating HEIs to view their progress over time, as well as benchmark themselves against each other.

The current focus is on the feasibility of calculating priority metrics and on sharing them between participating HEIs for benchmarking. The pilot is interactive, minimally labour-intensive, and uses a method that is scalable across an entire HEI, and to all HEIs in the UK.

The Snowball project partners agreed a sequential approach:

- The **selection of all affiliation name variants** that represent each institution. This enables generation of publication and citation metrics at institutional level; it ensures that name variants that are not yet known by the technical experts can be ►



Research grants	Research inputs	Research process	Outputs/outcomes
	1a) Research applications 1b) Research awards ● Price/overhead recovery ● Philanthropy	2a) Research spend (income) ● Space utilisation ● Staff recruitment ● Start/end date slippage	3a) Publications and citations 3b) Esteem measures 3c) Collaboration (co-authorship) ● Socio-economic impact
Postgraduate education	1c) PGR volumes ● PGT volumes ● International PGT volumes ● UG to PG conversion rates	● PG experience – contact time ● PG experience – facilities	● Alumni/destination of leavers 3d) Completion rates ● Skills development (impact)
Enterprise activities	1d) Industrial income ● Industry engagement	● Contract turnaround times ● Industry research spend (income) ● UG to PG conversion rates	3e) Patenting 3f) Licensing income 3g) Spin-out generation/income ● KTPs numbers ● Consultancy income
Denominators	(number of) People	Organisations	Themes/schemes
	● Researchers, authors ● Principal/co-investigators ● Academic staff by category ● Research assistants ● PGR students ● UG/PGT students ● Postdoctoral staff ● Support staff	● Institution ● Faculty ● Department/school ● Unit of Assessment (UoA) ● Groups/clusters ● Funders by type ● Centres/institutes	● Standard grants ● Strategic initiatives (calls) ● Grand challenges ● Subject areas ● Keywords

Figure 1: An overview of data and denominators spanning the research management process

included, ensuring complete representation of each HEI's output in the metrics.

- The **matching of HEI researcher names to Scopus author names** (Scopus is the world's largest abstract and citation database of peer-reviewed literature). This enables assignment of an HEI's articles to HESA<sup>1</sup> cost centres and the reporting of publication and citation metrics at HESA cost centre granularity. HESA cost centres are being used as a shared external framework, whose consistency will enable cross-institutional benchmarking. Automatically generated researcher-author matching statistics indicate that the methods are successful.
- Snowball project partners have agreed an approach for **research funding applications**

and **awards** metrics. HEIs input pre-aggregated applications and awards data (at HESA funder category, HESA cost centre and institutional levels) into the metrics calculation pilot. This simplified methodology facilitates easier data provision whilst ensuring a rich data set for benchmarking. Provision of aggregated data also removes concerns around data protection considerations. The Snowball project partners have agreed that **research income metrics** should be included in the metrics calculation pilot. HESA data for all UK HEIs are displayed and at the same levels of granularity (HESA funder category, HESA cost centre and institutional levels) as for the applications and awards metrics.

1 HESA is the UK government's official agency for the collection, analysis and dissemination of quantitative information about higher education and, as such, oversees the definition of terms such as cost centre and funder category for the effective reporting of consistent data from UK HEIs to government agencies.

The priority Snowball metrics are evolving as the metrics calculation pilot is built. In particular, a significant clarification has been applied to the collaboration metric, to take into account HEI's research groups that are stationed overseas. Not all desired metrics form part of the metrics calculation pilot, with metrics in several areas – such as research outcomes, impact and esteem indicators – not being addressed yet. Nevertheless, efforts to move ahead in these additional areas are being actively progressed.

### Data sharing agreement

The assignment of an HEI's papers to HESA cost centres is achieved by assigning the papers to the HEI's named researchers. Concerns around the UK Data Protection Act have been considered in light of this and a data sharing agreement has been developed amongst the partners in order to ensure proper governance of the data sharing between them.

### Global need for standardised metrics for strategic planning, and benchmarking

As well as a high level of interest from within the UK, Project Snowball has been contacted by many HEIs and organisations outside the UK, with an interest both in receiving guidance about metrics and in sharing data and benchmarking with their peers. This has stimulated us to initiate international research to assess the extent to which the key elements of this project have global application. The project is currently in contact with representatives in research-intensive nations to investigate in more depth whether the aims of Project Snowball are interesting to, and scalable to, countries outside the UK. **RG**

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For more information, and to download the initial study of research information management, visit [www.projectsnowball.info](http://www.projectsnowball.info)