

The Knowledge Ecosystem

Measuring the Value of Research Intensive Universities

IARU Position Paper

IARU believes...

The purpose of research-intensive universities is to make ground-breaking discoveries and to seek and transmit knowledge and new understanding.

In its own right and to the benefit of society.

This research should of course be independent and respect the fundamental principles of academic freedom. And this applies to all areas of human endeavour from the medical and natural sciences to the arts and humanities. And it involves both education and research.

It will never be possible to quantify every aspect of the entire value produced by research-intensive universities by simple metrics.

It is however necessary for the universities to be able to document their value to society, including taxpayers and politicians.

Today, this is done by applying a wide range of metrics in order to measure the three elements which constitute the core of research-intensive universities: Research, education and (knowledge exchange) technology transfer. It is mainly done by measuring *input flows* such as money and the number of students and *output flows* such as citations, number of publications and graduates.

These methods do not adequately show what IARU considers to be the *special value* of research-intensive universities: The fact that research, education and technology transfer/knowledge exchange, are concentrated in the same physical space and constitute a critical mass of excellent researchers and students, state-of-the-art infrastructure and a spirit of curiosity and innovation. This is only indirectly encompassed in simple in- and out-put metrics.

The key to understanding how research-intensive universities create value lies in what happens when the elements co-exist and form what could be described as a “**knowledge ecosystem**”.

IARU suggests that a new and comprehensive way to describe the overall value creation of research-intensive universities should include this knowledge ecosystem.

As such, we must – in addition to metrics for isolated research, education and technology transfer flows – describe and tell the many stories of the effects of the *synergy* created by the **co-existence** of research, education and technology transfer.

Introduction

1. IARU's members share the experience that expectations from society and stakeholders towards universities and their ability to document their value are increasing and are likely to increase for the foreseeable future.
2. These increased – and legitimate - expectations are often translated into societal and/or political demands.
3. Historically universities have maintained a commitment to excellence in spite of resistance to measuring it. But this resistance is changing, as stakeholders demand more evidence. IARU recognizes a need for a dual response to this development.
4. IARU's members recognizes the need to meet the constant challenge to improve the understanding among decision-makers and the general public of the fundamental societal role played by research universities.
5. We also recognize the need to improve and refine the ways in which universities can demonstrate the direct and indirect value they bring to companies and society as a whole. This should be done in a balanced way that takes into account that a good part of the value of research intensive universities can and should not be measured by a simple metric.
6. For quite some time, IARU has constituted a forum for debating the issue of measuring the value of research intensive universities. The discussions were initiated at the IARU Presidents' Meeting in April 2010 and further developed at subsequent workshops and through discussions at ETH Zürich in October 2010, in Copenhagen in April 2012 and again at a IARU Presidents' Meeting in Singapore 2013.
7. The following position paper is the result of these discussions and constitutes IARU's position on documenting the value of research intensive universities.

The value of research intensive universities can and must be established – but it is an act of balance to do so

8. Research and higher education are a high priority on the political agenda these years. Taxpayers and politicians alike are asking for value for money. Universities are increasingly being held accountable through “hard” facts such as bibliometrics, rankings, ability to attract funding, number of students and bottom line numbers that show the value of universities for companies and society.
9. At the same time, universities have vastly extended their reach and ways of achieving economic and social impact:
 - Technology Transfer Offices have proliferated in order to manage and license a growing IP from research.
 - Universities have created incubators and science parks to nurture new enterprises.
 - Many universities have instituted courses to help undergraduates and graduate students acquire the skills for successful entrepreneurship.
 - Some universities have taken equity positions in spin-off firms.
 - Some universities are engaging their students in “science-dating”, internships or other activities through which they help companies solving specific research tasks during their education.

- Many universities participate in solving societal challenges in partnership with governments.
 - Research-intensive universities are increasingly trying to mix disciplines and in that way search for holistic solutions to problems by drawing upon both natural sciences, social sciences and the humanities.
 - And many of these universities have understood that for many - if not most - of their graduate students, education and research are inseparably linked: By definition the outcome of research must be unknown from the outset. But at the end of a failed experiment, a university has at least educated a researcher. This is an important part of the value that universities create.
10. IARU believes that research intensive universities play an important role in their respective countries and beyond by contributing to society by reaching for the highest level of education and research.
11. IARU also believes that it is important for both universities and society to be able to sensibly document the impact of universities in order to attempt to prove to "investors", the public and to ourselves how our research and education contribute to society.
12. The ability to demonstrate specific kinds of impact has greatly improved, especially with the development of powerful tools for collecting, interpreting, and displaying massive amounts of data.
13. It should however also be taken into account, that universities and the political system still face a real challenge when documenting the comprehensive value of universities. The breadth of the universities' contribution poses a particular problem for the analyst, and there are several pitfalls to be taken into consideration:
- It is relatively easy to measure the impact of new inventions sold to the industry or to measure the value of spinoffs, i.e. applied sciences. Measuring the impact of fundamental research is much more difficult because of the long term timelines over which the value of fundamental research becomes evident.
 - There is a longitudinal problem: How long past investments in research take to bear fruit, but also how long developments going forward need to (and sensibly can) be monitored.
 - It also poses a challenge to find ways to measure the value of humanities and arts, educating good historians, language teachers, psychologists etc.
 - Many analytics are devoted to measuring outputs mainly important to science – e.g. bibliometrics – rather than outcomes important to society.
 - There is a high risk of perverse incentives encouraging "bad" behaviour. "What you measure is what you get", a fact which can also, potentially challenge the academic freedom, which is crucial to research intensive universities.
 - There is a lamppost problem: Ignoring the immeasurable or the tendency to measure in favour of what *can* be measured.
 - And finally: There is a risk, that a too intensive focus on measuring and documenting will overburden administrators and researchers, taking up time from core activities.
14. The act of measuring is thus an act of balance, showing only a very limited part of the comprehensive value of a university. This is why IARU suggests that it is necessary to show the

value of research intensive universities in alternative ways in order to document their value towards stakeholders and taxpayers/the general public.

The value streams of research intensive universities

15. The fundamental contribution to society by universities lies in creating and passing on knowledge for its own sake *and* engaging with society in its application.
16. Universities today are an integral part of society, actively participating in fulfilling “a third mission” for universities, namely involvement in socio-economic development, thus becoming the third element of what has been described as the “triple helix” – the collaboration between Government, Industry and Universities in order to create innovation and economic growth.
17. Today there is a clear tendency that universities contribute more and more to solving the grand challenges of society. This also leads to an increasing demand (for instance from foundations) for more holistic solutions, involving interdisciplinary research in order to solve these challenges, which continues to grow in complexity. Thus there is not only a greater focus on the triple helix model, mixing Government, University and Industry, but also a demand for universities to mix disciplines in order to come up with *sustainable solutions* to the challenges societies are facing.
18. This means that the way of looking at the value of a university should change.
19. A common way to describe output of research intensive universities today is by measuring the output of the three main **value streams** of research intensive universities:
 - a. **Research** (production and distribution of new knowledge through articles, publication and access to research)
 - b. **Education** (the knowledge and “soft skills” of candidates)
 - c. **Technology transfer/knowledge exchange** (collaboration with the outside world, hiring of graduates by industry, consultancy, patent/licensing/spinoff companies)
20. The challenge is, that quantifiable indicators such as citations, graduate salaries, number of patents etc., most often describe the value streams as separated and in terms of a simple input/output logic.

A fourth and new way of describing the special value of research intensive universities: The knowledge ecosystem

21. While it can make sense to measure the value streams separately, IARU argues that the crux of the specific value of research intensive universities is that the three main value flows of universities are interrelated and interact in a way that creates value far beyond the simple sum.
22. The fact that the three flows are gathered in one university, in the same organisational and physical space, is a key to understanding the special value of research intensive universities. Research, education and exchange of knowledge with the outside world fertilize each other: Challenges met by industry and society may inspire new basic and applied research, contact with students inspires the researcher, researchers include students in their work on research projects, companies exchange knowledge with graduates when they employ them or through internships, student projects etc.

23. This means that research intensive universities are able to simultaneously perform fundamental research with a sufficiently broad scope, be the pacemaker for the creation of new products and technologies, a think-tank for governmental strategies and regulations, a provider of skilled manpower to industry and society and provide valuable input to society and the way we think about life, culture, history – i.e. research that expands intellectual breadth and develops ideas and discourses about human experiences which will prepare us more effectively for an increasingly global and cosmopolitan world: Things which are not only giving us something to live from, but also to live for.
24. Another valuable consequence of this inseparable link between education, research and knowledge exchange is that research intensive universities always will be sure of creating value for society: By definition the outcome of research must be unknown from the outset. But at the end of a failed experiment, a university has at least educated a researcher. This is an important part of the value that universities create.
25. A way to describe this special value of research intensive universities caused by intertwined value streams – and thus painting a fuller picture of the value of universities – could be to show the vitality of this “knowledge ecosystem”.
26. In the ecosystem we include the interaction between the three value streams, taking place at a research intensive university and in relation to the outside world: The special value produced in the space between research and education. Between knowledge exchange with the surrounding world and research. And between education and knowledge exchange.
27. This cannot be done by using numbers. It has to be done by using words, describing the cases from real life to show how the ecosystem creates value. IARU thus believes, that much more emphasis should be put on telling the many stories of how research, education and knowledge exchange at the research intensive universities creates value far beyond a mere input/output point of view.
28. As IARU members we will strive to tell the stories of how the knowledge ecosystem works and we will, when possible, urge politicians and other opinion makers to apply this perspective and not only the quantifiable perspective when discussing the value of universities in the future.

Conclusions

29. However difficult, IARU recognizes that documentation of the value of research universities is demanded and that it is in the interest of universities to contribute to the political debate on the value of universities by suggesting alternative methods to show value which are meaningful to the universities themselves.

The overall value of universities as cultural and societal institutions is next to impossible to measure by simple metrics. First of all, the value of good high school teachers, people with language skills, economists, doctors, lawyers, musicians, historians etc. etc. cannot be measured in exact numbers. Secondly, the value of investing in university research and education is more often than not visible only in a long-term perspective.

30. IARU believes that a good part of the value of research intensive universities lies in the fact that their three value flows, research, education and knowledge exchange coexist in the same physical space and that they are thereby closely interrelated, constituting a **knowledge ecosystem**.

31. It is only possible to understand or describe the full complexity of the research intensive universities, when being able to describe what happens when the three value streams interacts in this knowledge ecosystem.
32. In order to paint a fuller picture of the special value of research intensive universities, IARU suggests that the many excellent examples of how research, education and knowledge exchange collaborate in order to create new meaning, new inventions and new contributions to society should be described.
33. Only in this way, will it be possible to take fully into account the complexity and time span of research, education and knowledge exchange and to describe how these value streams are inseparably intertwined and how this is what creates true value for society – whether it is in the field of humanities, natural sciences or social sciences. Discoveries and research results that might seem without any immediate benefit can turn out to be extremely valuable to future generations of researchers – and to society.
34. This is also why we believe that describing universities as ecosystems is a more fruitful way instead of seeing universities in a simple input/output perspective.