Towards the estimation of the economic value of the outputs of Scottish HEIs:

Next Steps Project

Report to the Scottish Funding Council

Summary

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1. Introduction

There is considerable policy interest in the economic role of higher education institutions (HEIs). In particular there is increased interest in exploring the overall value of higher education to society and in how higher education can support wider economic growth and development through 'knowledge transfer' from higher education institutions. Encouraging flows of knowledge from higher education institution into wider society is thought to be important in maximising the benefits to be derived from public investment in higher education. In Scotland, this has led the Scottish Funding Council [1] to distribute a proportion of higher education funding according to a range of 'metrics' which measure some aspects of knowledge transfer and to seek the development of additional metrics that could capture other aspects, in particular non-commercial or non-market activity. A similar approach to allocating funding for 'knowledge transfer' activity has been adopted by the higher education funding councils in other parts of the UK also through specific funds such as the 'Higher Education Innovation Fund'.

Until fairly recently, the metrics used by the Funding Councils for assessment of 'knowledge transfer' activity have tended to be mainly focussed on HEI outputs that are commercial or market-based, relate to interaction with businesses and which are also relatively easy to measure (licensing, patents, consultancy contracts and so on.) However it is beginning to be recognised that non-market outputs of higher education institutions (such as community interactions) could also have significant economic and social value linked to their support of knowledge flow to the wider community. If this is the case it could be desirable to include measures for these within the portfolio of knowledge transfer metrics so that valuable activity can be supported. Therefore there is a growing need for the development of methodologically sound measures of non-market higher education institution outputs that could potentially be used for resource allocation purposes.

Primary purpose of this study

The current 'Next Steps' study was essentially a 'proof of concept' study, piloting the application of new methodology to 3 non-market areas of higher education institutional activity that are potentially important in the knowledge transfer context, namely community engagement, cultural outreach and public policy advisory activity. The intention was to use real world HEI data where possible to 'test' the new methodological framework's potential to identify areas of high value and where additional relevant metrics for resource allocation through the knowledge transfer grant could be devised. The study covered the 19 Scottish HEIs who are funded by the Scottish Funding Council and included within statistics collected by the Higher Education Statistics Agency (HESA.) [2]

[1] The Scottish Funding Council is responsible for the distribution of a large proportion of public funding for higher and further education in Scotland.
[2] There are in fact 21 HEIs operating in Scotland. The two additional HEIs are the Scottish Agricultural College (SAC) which is funded directly by the Scottish Government and not the SFC and the Open University which receives some funding from the SFC but is not included in Scottish HESA data.

2. Conceptual Framework, definitional and related issues

HEI engagement with the surrounding community, be it the business community, the policy community or local citizens, is increasingly considered to be a potentially important and valuable aspect of 'knowledge transfer'. However surprisingly little is known about how much of this takes place and whether it is a significant or minor aspect of HEI work. Most of the existing literature relating to knowledge transfer is focussed on university interactions with business and industry; the role that HEIs may play in the community or their cultural impact or role as 'civic players' has rarely been studied in any systematic way. [3] Therefore from the beginning this study was seeking to break new ground in studying aspects of HEIs that, in the UK at least, had so far been paid very little serious attention. In the course of the study it became apparent that, in order to apply robust approaches to assessing the non-market work of higher education institutions and to estimate the economic value of this work, the study would challenge a number of preconceived notions and ways of thinking about higher education institutions in the UK. These related in particular to ways of thinking about economic and legal status of HEIs, their relationship with government and definitions of what constitutes 'value' from HEIs .

The study applied the methodology developed in its precursor report *Towards the estimation of the economic value of the outputs of Scottish higher education institutions* (Kelly, McNicoll & McLellan, December 2005.) This earlier report had outlined the development of a comprehensive and methodologically rigorous approach to capturing the larger part of the economic value of Scottish HEI outputs. The 2005 report devised a holistic and overarching framework for estimating the value of higher education institutional outputs.

Essentially it proposed: firstly **identification** of the outputs of HEIs (what HEIs actually produce), **quantification of** the volume of HEI outputs(how much they produce) and finally finding ways of **pricing** the outputs to impute value.[4] It is very important to note that the 'price' to be applied was not necessarily equivalent to the money an HEI actually received for doing something. The study was seeking to estimate economic value, rather than 'financial value'. Hence a range of economic techniques were proposed for application to derive the 'market' or 'economic efficiency' prices.

The present 'Next Steps' study further developed the original conceptual framework to identify potential performance indicators or 'metrics' for the relevant non-market areas. In considering

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[3] See Holdsworth and Quinn(2006) *HEIs and Local Communities: Forward and Backward Linkages* and Bogdanovic, Lebeau and Longhurst (2006) *The Civic Role of higher education* for literature reviews on aspects of these interactions.

[4] The approach devised in the study for estimating the economic value of Scottish higher education institutions was rooted in the fundamental principles of welfare economics. It was consistent with national and international best practice and was in line with developments in the Office of National Statistics and government statistical services for productivity measurements of non-marketed services. While the techniques involved were not entirely new, it was the first example in the UK of the application of welfare economic principles to assessment of higher education outputs.

the development of performance indicators for higher education institutions a number of conceptual issues were identified as being of key importance:

- Understanding the economic and legal status of higher education institutions in the UK and how this affects their behaviour and operations
- Understanding the complex relationship between HEIs and government agencies and the vital importance of differentiating between higher education institutional outputs and wider desired outcomes
- Understanding different types of 'value' : financial value, economic value, market value, economic efficiency value and social value and how the interpretation of 'value' for policy purposes can be legitimately influenced by the application of 'social weights' (known as 'social welfare functions')

These issues are addressed in full in the study report, but the main elements are outlined below.

- **The economic and legal status of higher education institutions**

By both their constitutions and economic characteristics, Scottish HEIs are not public sector bodies but are *private non-profit institutions (NPIs)* . (Indeed most, if not all, are registered charities.) The classification of HEIs as private non profit institutions is firmly rooted in the European System of Accounts[5] . It is a matter of fact rather than of interpretation and this status has a strong influence on institutional motivations, operations and behaviours. HEIs do not behave exactly like commercial enterprises or businesses (for instance they are not driven by profit or the need to satisfy shareholders) nor do they behave like public sector organisations (for instance they have more freedom to determine their own missions, goals and how they want to achieve these.) Any performance indicators for HEIs have to be devised with cognisance of the incentives and motivational drivers of an NPI .

- **Resources Inputs Activities Outputs and Outcomes (RIAOO)**

While Scottish HEIs are private institutions and are not part of the public sector they nonetheless have a complex relationship with government agencies, particularly since the UK public sector is usually an institution's largest single client. Misunderstanding as to the status of HEIs (for instance a mistaken belief that they are 'public sector') has led to much obfuscation when discussing development of HEI 'performance indicators' that could assist government resource allocation. When evaluating its investments Government (see the UK Treasury 'Green Book')[6] correctly looks for the investment's impact on the government's overall desired outcomes. This is frequently undertaken within a framework which considers Resources, Inputs, Activities, Outputs and Outcomes (RIAOO). Public sector investment in higher education institutions fits into this framework and from a government perspective the most important thing is the final outcomes achieved (e.g. growth in GDP, increased social inclusion, a higher skilled workforce.)

[5] ESA(95)
[6] HM Treasury (2003) *Green Book: Appraisal and Evaluation in Central Government*

But while HEIs may be able to deliver *outputs* that contribute to government objective outcomes (e.g. they can teach an agreed number of students, arrange open public lectures, run art workshops for children from deprived areas) they cannot actually deliver the *outcomes ,* which are dependent not only the work of the HEI but on a range of additional factors over which the HEI may have little or no influence (e.g. the willingness or ability of the students to learn, the global economic climate etc.) Therefore the development of performance indicators or 'metrics' for HEIs need to be based on *outputs* and not on *outcomes*. The confusion of outputs with outcomes and insufficient understanding (among HEIs themselves as well as among government agencies) of where HEIs sit within in the RIAOO framework often means government and HEIs appear to be talking at 'cross-purposes.' HEIs frequently adopt the 'language' of outcomes which makes it sound like they are on the same side of the production boundary as government. But in reality HEIs are on the *supplier side*, not the commissioning side. There is a further point here which is extremely important – and that is the necessity of clearly distinguishing outputs from outcomes in discussions of 'higher education (HE) generally' and 'HEIs' specifically. This distinction is drawn and emphasised in all the internationally recognised source documents but can become blurred in consideration of HE. In particular there is a tendency to conflate the operations of HEIs themselves with those of the HE system as a whole (and the latter can include, in addition to the institutions, students, private and public sector clients, parents of students, alumni and so on.) [7]

- **Understanding different types of value**

The study authors encountered a range of views and unease within some sectors of the academic community over quantitative analysis of the community and cultural engagement of HEIs. The view was sometimes expressed that the importance of HEI cultural activities is beyond economic evaluation and that attempts should not be made to assign monetary values to cultural outputs. The full study report examines this issue in detail, including assessment of the cultural economics literature. In relation to cultural outputs in particular it should be highlighted that measurement in monetary units is essentially an attempt to find a common unit of account for different types of output and *does not in itself imply an actual monetary value*.

It must also be recognised that to the extent that support for work of a 'cultural' nature (howsoever defined) uses resources that would otherwise be applied elsewhere (building a Chemistry lab for example, or paying health worker salaries), it has an *opportunity cost* and therefore will always have an economic dimension. The full study report also explains the difference between **financial value**, **economic value**, **market value**, **economic efficiency value** and **social value** . For example, financial value may be related to the financial amount

[7] So a situation could arise where the government can truthfully say 'We have increased our spending on higher education' but the HEIs could equally truthfully say 'our funding has been cut'; if the additional expenditure has been for student maintenance, for example, it is expenditure on the *HE system* and not money to the HEIs.

involved in a transaction (money changing hands) but economic value (particularly for non-market goods and services) does not have to be related to money per se but rather to the use of resources of one kind or another. The application of social weights (known as 'social welfare functions') can also mediate the outcome of an economic evaluation.

Social valuation and social welfare functions

The application of social weights to obtain a social valuation is basically about interpreting an economic evaluation in the light of social policy objectives. For example, when considering HEI cultural or community outputs, one might be particularly interested in promoting social inclusion and the social value of the output in question(a public lecture, a drama performance, an art workshop) may be related to the extent to which it attracts different groups of society. So, for example, if an art workshop in Glasgow is attended by many school pupils from a school in Easterhouse (say) , it may be regarded as more socially beneficial than if it was attended mainly by school pupils from Bearsden (say.)

Weights can legitimately be applied to economic evaluations in order to assess the social value for policy purposes. The UK Treasury Green Book gives specific sets of weights that can be used for equity assessment. . So while the economic value of an event such as a concert may be assessed in terms of 'Ticket prices x attendees' (or 'Time spent x number of attendees', as the exemplar evaluations show in this study), there may be a different social value imputed to the same event depending on the social distribution of the audience. An example showing the application of social weights is given in Table 1.

Table 1: Economic and social valuation of two different concerts

Economic and social valuation of two different concerts									
		Classical Concert				**Popular Concert**			
Weight (from the Green Book)	Income Band of audience (Quintile)	No. of attendees	Ticket Price (£)	**Unweighted economic efficiency Value (£)**	**Weighted Social Value**	No. of attendees	Price (£)	**Unweighted Economic efficiency Value(£)**	**Weighted Social Value**
2.2 – 2.3	Bottom	0	20	**0**	**0**	50	5	**250**	**550-575**
1.4 – 1.5	2nd	10	20	**200**	**280-300**	60	5	**300**	**420 – 450**
1.0-1.1	3rd	50	20	**1000**	**1000-1100**	80	5	**400**	**400 -440**
0.7 -0.8	4th	40	20	**800**	**560-640**	40	5	**200**	**140-160**
0.4 – 0.5	Top	20	20	**400**	**160-200**	10	5	**50**	**20-25**
	Total number attendees	120	20	**2400**	**2000-2240**	240	5	**1200**	**1530-1650**
Cost to put on performance	(Cost)			(2300)	(2300)			**(**1400)	(1400)
				Economic value higher than cost of provision = economically efficient; no reason for public subsidy	Social value lower than cost of provision = no reason for public subsidy support			Economic Value lower than cost of provision = economically inefficient, would need subsidy support	Social Value higher than cost of provision = Socially beneficial = argument for public subsidy support

As Table 1 illustrates, the economic value of the classical concert equates to £2400 (which is based on the number of attendees x ticket price , assuming the ticket price is fixed on a market basis.) The economic value of the popular concert equates to £1200 (again based on number of attendees x ticket price and assuming the ticket price is set on a market basis.) However when Treasury Green Book weights are applied (according to the income band of the attendees), the imputed social values are different. In the case of the popular concert, the social value is higher than the economic value and is also higher than the cost of providing the concert. In this case there would be an argument for providing public subsidy to enable the concert to be organised as there is a social gain.

The classical concert however has a lower social value than economic value, so there is no reason for public subsidy support. This is particularly true since the economic value is also higher than the cost of provision so one would assume a provider could organise the concert for profit and does not need public support.

This is obviously a stylised example; however it gives an explanation of how one can mediate the results of an economic evaluation to take account of social objectives.

3. Data Generation and Usage

A full account of the data generation process, the data sought and the steps involved is contained within the final study report. It combined extended desk-based literature review and data searches with personal interviews and discussions with a range of HEI personnel to identify the relevant outputs and the data available. The study used survey information from a sample of 8 different Scottish higher education institutions (which made up c.42% of the total turnover of Scottish institutions) as well as drawing on a range of published data (the Higher Education Statistics Agency (HESA), the Higher Education Business and Community Interaction Survey (HE-BCIS) and the data produced by the Society of College, National and University Libraries (SCONUL) and the Audit of Sports Provision 2007) . The sample institutions were:

1. Ancient, City-based, large (University of Edinburgh)
2. Old, City-based, large (University of Strathclyde)
3. Old, Campus-based, medium-size (University of Stirling)
4. New, City-based, small (University of Abertay)
5. New, City-based, medium-size (Robert Gordon University)
6. Study-relevant specialist, small (Edinburgh College of Art)
7. Study-relevant specialist, small (Glasgow School of Art)
8. Study-relevant specialist, small (Royal Scottish Academy of Music and Drama)

Types of output included

For the purposes of this study, in order to be considered a relevant community, cultural or public policy advisory output, an output needed to have the following key characteristics:

- Should be additional to 'core' (generally degree course) teaching, research and commercial consultancy activity
- Has to reach or involve people beyond the boundaries of the institution
- Has to reach or involve non-academic audiences

For example the delivery of lectures which are part of a formal degree course was considered a 'Teaching' output. However an open 'Town and Gown Lecture' is an additional outreach activity and was considered a 'community engagement' output.

Data Constraints

There were significant challenges and constraints relating to data generation. The main issue was that while higher education institutions appeared to consider their outreach activities and support for 'public service' advisory activity to be a substantial element of their work, they had previously had no reason to centrally collate data on many of the outputs of these activities. Much of the relevant data was thought to exist but the devolved nature of many of the activities of interest meant that, in the absence of any 'automatic harvesting' systems for this data, a very large number of individuals were required to generate the information manually. It was commented by a number of respondents that if there were sufficient incentive to collate the data (i.e. sufficient to overcome the resource cost of collation), institutions could put such systems in place.

The original methodological framework had envisaged the following approach:

- Identification and development of sets of relevant 'outputs'
- Derivation of natural volume unit measures for these outputs
- Using extant statistics as far as possible, supplemented by surveys and sampling of Scottish HEIs, to quantify the volumes of relevant output for the most recent year possible
- Using economic theory to define the prices to be applied to each volume of output to derive 'values' for the outputs

Given the challenges and constraints relating to data collection the full implementation of the above framework with full data was not possible. However it was considered possible to use the partial data obtained to go some way towards testing the framework for at least some sets of identified outputs.

Therefore in this pilot study analysis was restricted to some aspects of the following HEI activities:

- Events open to the public
- Performances open to the Public
- External sports facilities usage
- External Library resource usage
- Public Policy Involvement

While the data provided by institutions for the current study was partial, it gave some indication of the type, range and extent of activity involved. It was also sufficient to assist in supplementing data in HE-BCIS and other sources to produce exemplar partial estimates of total Scottish HEI volume outputs in some of the areas considered.

Notes on Pricing outputs

The original precursor report (Kelly et al 2005) explored in detail the wide range of economic techniques that could be used to impute value to the outputs of higher education institutions, particularly where these are 'non-market' outputs. These techniques include 'shadow-pricing' with approaches frequently used in the environmental and cultural economics literature such as 'willingness to pay', 'willingness to accept' and other 'contingent valuation' techniques. Being able to impute value in a methodologically sound way would enable overall estimates of the economic value of the outputs to be made.

It is important again to emphasise that the prices being sought are not necessarily related to the actual financial sum an HEI may have received for a particular output . This is especially important because an HEI may sometimes receive no financial payment (for instance, entrance to many public lectures is without charge ; another example is where Professor X serves on a government expert advisory committee but no fee is charged for his time) but a shadow-price can still be deduced . When seeking to 'shadow-price' HEI outputs one is ideally looking for examples of what may have been paid in a 'parallel market' i.e what would the HEI have received if this output was being delivered under 'market' circumstances. This might be, for example, typical ticket prices for a popular concert or the consultancy fee that would normally be charged by Professor X for similar levels of time and expert advice delivered by him to other clients.

Value of Time and the 'Time-Cost' method

Reasonably good data was available on event and exhibition attendances. From this it was possible to make estimates of the 'time spent' by visitors and event audiences in attending or visiting a performance or exhibition. In order to impute value to these HEI outputs therefore – many of which were not priced or which carried only a nominal charge - it was decided to apply the 'time-cost' method. The basic idea of the time-cost method is that a person's time is a scarce resource and as such has economic value. When attending a free HEI performance, exhibition or lecture the attendee is spending time rather than money, but the amount of time they are willing to spend can be taken as an indicator of the value that they place on the performance or exhibition. The time cost method is one which is well established and recognised in the evaluation of transport schemes (where it is known as the 'travel-cost' method.) The economic value of, for example, public lectures provided by HEIs could therefore be estimated in this way:

Economic value = No. of Attendees x Average Length of Attendance x Unit price of Time spent.

The Department for Transport (DfT) publishes estimates of the per-hour value of both 'working' and 'non-working time' and hence it is possible to use official government data in the valuation of time spent. For this study the figures adopted for the preliminary estimates were

taken from the February 2007 DfT TEN Note *Values of Time and Operating Costs.* It was also assumed, in the absence of specific information regarding audience characteristics, that the time spent was leisure time rather than business time.

It was decided to apply the 'Time Cost' method to:

- Public Lectures & General Events open to the public
- Performing Arts Events
- Galleries/Museums/Exhibitions
- Wider Community use of Library Services

A different approach was adopted for the two remaining output types included in the exemplar estimates. The two remaining output types were:

- Sports Centre community memberships

There was a relatively clear 'parallel' market for these in the form of the prices charged by commercial gyms and fitness centres. Hence in imputing value to Sports Centre Memberships an equivalent commercial gym membership fee was used as a shadow-price.

- Hours of public policy advisory work delivered

Pricing HEI staff contributions to public policy and advisory work is reasonably straightforward. This is because the same HEI staff contributing as advisors or committee members to the work of public or third sector bodies (UK-wide, Scottish Parliament, local government, regional development agencies, policy and health networks and advisory groups, charities etc) also frequently undertake paid commercial consultancy which draws on their same skills and expertise. It is perfectly reasonable therefore to put an economic value on their time that is equivalent to the amount that would have been paid for their time commercially. The main issue in relation to public policy advisory work is obtaining data from HEIs on the estimated number of hours HEI staff spend on this. Comprehensive central data was not readily available at the time of this study – however analysis of survey data from a survey of 210 staff at one institution had revealed a wide range of relevant 'public policy/advisory' activity and this was used to derive a conservative estimate of hours of public policy work delivered. It should be pointed out that, given the limited database used, the estimate for public policy advisory outputs is likely to be a considerable **underestimate** of the volume of this type of work undertaken by Scottish HEIs.

By using a combination of data sources (HE-BCIS, HESA, SCONUL and the 2007 Scottish Universities Sports Audit) together with information provided by the participating HEIs, it was possible for exemplar estimates to be made at an aggregate level , and for a 'composite year', for all Scottish HEIs, for some of the outputs under consideration.
These exemplar estimates are shown in Table 2 overleaf.

Table 2: Exemplar Estimates of Economic Value

Preliminary Value Estimates : Annual Values (Composite year)						
	Est. Numbers	Est. hours spent per event	Total Time spent	Hourly Time Value (2002 Prices)	Total Value £	Value £
Public Lecture Attendance	28624	1.5	42936	4.46	191495	191495
Performing Arts	217248	2.6	564845	4.46	2519208	2519208
Gallery/Museum/ Exhibition Visitors	1727964	1.5	2591946	4.46	11560079	11560079
Source: Derived from HEBCIS, HESA and survey info. and Department for Transport TEN						
		Est Number of visits per FTE user	Hours spent	Total time spent	Hourly Time Value (2002 Prices)	Total Value (£)
External Library Visitors (FTE)	16640	64	1.5	1597440	4.46	7124582
Source: Derived from SCONUL 2005/06 and Department for Transport TEN						
External Sports memberships 2006		equiv. mkt p.a gym membership	Est.Value			
Public(Community Memberships) of Sports Facilities	4807	612	2941884			2941884
Source Scottish Universities Sport Audit 2007 and web price searches						
	Hours per ac/staff	Scottish HEI Academic staff numbers(04-05)	Total est hours	Hourly rate	Total Est value	
Public Policy Advisory work	5	15115	75575	86	6499450	6499450
Sources: Estimates based on single institutional survey info						
Hourly rate based on av. £600/day consultancy rate for senior						
consultant (av. of 900/600/300)						
					TOTAL	**30836698**

4. Conclusions and recommendations

This was a challenging study, both in the need to further refine and explain the conceptual framework and in the difficulty of obtaining and processing usable data. However even the partial estimates made reveal that there are some areas worthy of further consideration as part of the 'knowledge transfer agenda' that have hitherto been 'invisible'.

Recommendations

There are a number of recommendations arising from this study.

1. That further consideration be given to including a range of non-market output indicators within the portfolio of knowledge transfer grant metrics
2. That these could include some of the measures developed within this study, with initial emphasis on public policy advisory outputs which have a very high potential economic value associated.
3. That consideration be given, potentially through workshop discussions with the HEIs, of the extent to which ancillary policy relevant data could be generated without becoming overly burdensome to the HEIs. It would be strongly recommended that existing data collection systems such as the HE-BCIS be used where possible, although these would need to be more robust than they are currently. As HE-BCIS is in the process of moving to be undertaken by the HESA, this could make considerable sense in terms of a single data collection point.
4. Consideration could also be given to the collection of information that could enable generation of volume indices for agreed outputs (e.g. attendances at public lectures) together with data on distributional information that could inform social weights (eg the postcode/catchment areas of schools in which 'science week' seminars are delivered.)
5. Potential measures could include:

   Public Lectures & General Events open to the public

   - *Estimated annual attendance numbers and number of attendee hours spent*

   Performing Arts Events

   - *Estimated annual attendance numbers and number of attendee hours spent*

   Galleries/Museums/Exhibitions

   - *Estimated annual visitors and numbers of visitor hours spent*

   Wider Community use of Library Services

   - *Number of external (i.e non-academic) users of HEI Libraries*

   In relation to wider use of an institution's information resources and knowledge base, consideration could also be given through workshop discussion to the possibility of using an institutional repository measure to reflect knowledge flow from an HEI such as:

   - *Annual number of full article downloads from institutional repositories*

Wider Community use of Sports Facilities

- *Number of external (community) user memberships of HEI sports facilities and centres.*

Public policy advisory outputs

- *Number of hours of public policy advisory work delivered per member of staff per annum*

Public Policy advisory outputs

As this is an area of potentially highest economic value, priority consideration should be given to the inclusion of a measure of Public Policy advisory outputs in future knowledge transfer metrics. Policy advisory outputs can be defined as the time spent in the provision of advice to public sector or third sector organisations for no remuneration or nominal remuneration (i.e. expenses only or below market rates). The mechanisms for provision of advice may be through serving on advisory committees and boards, participation in professional (but primarily **non-academic**) networks or giving presentations/workshops to public sector or third sector bodies. HEI staff typically report this type of activity as a matter of course within their annual personnel appraisals and hence a possible route for HEIs for harvesting this information is through their personnel departments.

Essentially the relevant data required is:
Number of hours of public policy advisory work delivered per member of staff per annum

A measure which indicates per member of staff per annum (rather than per member of academic staff) is a recognition that a number of non-academic staff (in particular senior administrative staff) in HEIs are also engaged in 'public service' work of this nature.

While the output measures considered above by no means capture all of the community and cultural outputs of an HEI (and in the course of this study a range of other community and cultural outputs are mentioned), they are ones for which it would appear to be possible to develop indicators and the estimated economic value of the outputs suggests that it would be an exercise that would be worth pursuing. Certainly it would be first steps in acknowledging that such outputs have economic value and, for the policy makers, enabling an assessment to be made on resource allocation to encourage non-market activities that may not have direct *commercial* value but which can be seen to have economic and social value.

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