Producing Indicators of Institutional Quality in Ontario Universities and Colleges: Options for Producing, Managing and Displaying Comparative Data

report

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Higher Education
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I. Introduction: The Birth of a Quality Measurement Culture

There is considerable demand for comparative data related to postsecondary institutions and their performance. Broadly speaking, this demand comes from three sources. *Parents and students* may want comparative data in order to compare and contrast institutional strengths and weaknesses prior to choosing an institution (secondary schools and their guidance counselors are also important consumers in this regard). *Governments and policymakers* may want such data in order to guide public policy with respect to higher education. And *institutions* themselves may want this data in order to benchmark their own performance against that of peers.

Despite the considerable demand for common information, institutions historically have not provided much of it. Part of their hesitation to do so stems from uncertainty and suspicion around the combined issues of data ownership, data management and data reporting. For one thing, institutions are worried that some stakeholders (i.e. government) may have overly simplistic notions of what constitutes a useful quality indicator. Particularly among Ontario universities, the experience with Key Performance Indicators (KPIs) still rankles. Moreover, institutional reluctance to share data seems to stem from the idea that there will be *single* repositories of data and *single* reporters of data (such as the *Maclean's* university rankings), which gives rise to concern about data governance.

As soon as anything is measured on a common scale, universities and colleges are well aware that there will be a temptation on the part of some not just to compare one institution against another, but also to place all institutions (or whatever academic unit is being measured) in an ordinal fashion depending on the results. In short, as soon as anything is measured, the results can be ranked, and this creates a certain amount of trepidation among institutions.

Around the world, the arrival of university rankings systems has been traumatic for higher education institutions. Because the public tends to take claims about relative quality at face value, institutions quickly find themselves in a position where for prestige purposes they are required to manage the indicators chosen by the (usually) commercial entity producing the rankings. Some adapt to this, while others kick against the new ranking systems by boycotting its activities or trying to create alternatives to rankings.

When *Maclean's* first began publishing university rankings in Canada in 1991, the reaction from institutions was largely dismissive, accompanied by boycotts by several institutions. However, institutions have come to recognize that ranking and guides from third parties are an inevitable part of the higher education landscape, if occasionally distasteful ones. Having moved past the stage of boycotts, there have recently been a number of responses to the arrival of the *Maclean's* university ranking, including:

- **Competing Commercial Rankings.** The *Globe and Mail* has created an alternate set of university rankings, designed to look more specifically at issues of student satisfaction. Although it has not gained the prominence of the *Maclean's* Rankings, it has revealed some of the differences between how institutions fare on student satisfaction and engagement measures and how they do on more input-oriented rankings such as *Maclean`s.*
- **National Survey of Student Engagement (NSSE).** The NSSE was originally devised in the Unites States in large part as a response to commercial rankings such *US News* and *World Report*. In essence a questionnaire on student engagement and satisfaction, NSSE is organized via consortia, which allows institutions to compare their performance against selected peer institutions (it is this aspect of NSSE which makes it popular among administrators, as it fulfills an important internal benchmarking role without being a ranking instrument). Following recommendations on quality and quality measurement in the Postsecondary Review conducted by former premier Bob Rae, Ontario institutions administer the NSSE at least every two years and make the results available to the public.

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The community colleges have adapted a related instrument, the College Survey of Student Engagement (CSSE), to their own purposes and created the Ontario College Student Engagement Survey (OCSES) which is also now administered on a regular basis across the province.

- **Common University Data Ontario (CUDO)**. Recently, Ontario Universities have begun publishing a reasonably broad set of common data relating to student intake and admissions, educational spending, and student engagement (i.e. NSSE scores) among other things. This data is published electronically by all institutions in a common format, though it is deliberately not made available in a format which would facilitate inter-institutional comparisons.

Thanks in part to these various initiatives, there is already a great deal of common publicly available comparative data on institutions. In addition to those sources outlined above, useful data is also generated through College Key Performance Indicators, granting councils, Thompson Reuters ISI, the G-13 Data Exchange[1] and Statistics Canada. Not all of it is necessarily up-to-date or completely comparable, but in principle a tremendous amount of information is available.

Legitimate concerns and complaints still exist about how particular aspects of institutional activity are measured. But the principle of providing more and better comparative data is now much more widely accepted within the higher education community. The moment is ripe to begin pushing a comparative agenda, provided that such an effort is done with tact and diplomacy, is not accompanied by a great fanfare about lack of accountability of institutions, and – most of all – is done with due and serious attention to the very real problems of accuracy in measurement.

There are a number of issues involved in ensuring accurate data, and for the most part they lie beyond the scope of this paper. However, one thing required for true comparability is that data needs to be provided at a field-of-study (e.g. biology, law, sociology) level. The criticism made by University of Toronto President David Naylor, that institutions are composed of departments of varying standards whose efforts are not easily averaged, is one which has both methodological and political resonance. For instance, when comparing the research productivity of the University of Toronto with that of York University, each institutions' different array of program offerings needs to be recognized. Not all indicators should be focused at a field-of-study level – data on student services are probably best measured at an institutional level – but many measures would benefit from portrayal at this level. It will therefore be important – regardless of the data architecture eventually chosen – that any new system of quality indicator data make significant progress towards having quality indicators portrayed at a field-of-study level.

In sum, there has been a recent proliferation of quality measurement indicators and systems. As these new systems have arrived, the importance of any single indicator or systems has declined.   This is an important development, for as the stakes attached to any single ranking has declined, so too has institutional resistance to common measurement systems. That makes the present time an auspicious one to begin discussions of an expanded system of quality indicator data.

The purpose of this paper is to sketch out how such an expanded system of quality indicators could be created. In section II, we look at the kinds of data demanded by different stakeholder groups. In section III, we look broadly at the kinds of data that might go into a system of quality indicators, its current availability, and the kinds of changes in data collection and reporting that would be required in order to make these indicators truly comparable. In section IV, the key decisions with respect to choosing a data production and management model are outlined, as are some specific general models of data management.
A recommended structure of a data architecture for Ontario is also included. Finally, in section V, a series of "Next Steps" are outlined.

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[1] The G-13 is a self-selecting group of the country's most research-intensive institutions.   The current members are the University of Toronto, the University of Waterloo, Queen's University, the University of Ottawa, the University of Western Ontario, McMaster University, McGill University, l'Université de Montreal, l'Université Laval, the University of British Columbia, the University of Alberta, the University of Calgary and Dalhousie University

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II. The Demand for Data on Quality

Broadly speaking, there are three major sets of "clients" for information about institutions. The first is internal: university boards of governors and college governing boards, institutional managers, senates, etc. The second is the public at large and the governments through which institutions receive billions of dollars in funding. The third are what might be called "consumers": students, prospective students and their families. Each of these has different data needs, and institutions respond to their demands for data in different ways.

The first clientele for information – Boards of Governors and institutional administrators - is in a sense the most demanding. When information is required for local decision-making, it usually receives the highest priority. Nearly all universities in Canada (and most colleges) have at least one full-time staff person who does nothing but collect and analyze institutional data. At the larger institutions, it can be half-a-dozen people. But this is a fairly recent development; as late as the 1980s, most institutions would not have had an office of institutional research *per se*, and indeed the professional body that unites these people in Canada was only created in 1989. Not all of these "institutional research offices" came into being in the same way. Some grew out of space planning offices; others came from academic or budget planning departments. Therefore, each institutional research office has slightly different pre-occupations and responsibilities and produces data in a somewhat different way.

Though this clientele is in a sense responsible for the diversity of data collection practices in Canada, it is also currently a major force pushing for the standardization of data as well. Governing boards in particular are increasingly interested in benchmarking their performance against that of appropriate comparator institutions. For them, the lack of comparable data is becoming, if not an obstacle to appropriate governance, then at least a serious irritant along the way. Of particular importance to this group are indicators relating to inputs, research, and student engagement.

The second client, the public and their representative governments, arguably only really became interested in institutional data reporting in the early 1990s, as fiscal restraint became an established feature of public finance.[2] As funds became scarcer, governments and policy analysts began asking what kind of return they were getting on their investment in higher education. In some cases, notably in Ontario and Alberta, governments began making a portion of institutional funding conditional on institutions either publishing certain pieces of data in a common format or meeting certain common benchmark targets. The fact that these benchmarks were frequently trivial, or were based on outputs without reference to inputs, significantly prejudiced institutions against government demands for more data[3]. Even when the requests were generally sound and sensible, institutions tended to be suspicious and this reticence hampered the creation of public, comparable data sets. This perceived reluctance to create or share data on a comparable cross-institution basis has in turn sometimes led people in government to bemoan institutions' "lack of accountability".

However, as time has passed, governments are no longer interested in comparable inter-institutional data just for reasons of fiscal restraint. As a more audit-based culture of management has become the norm in the public sector, there is an increasing need for governments to have data which permits them to quantify the effects of their investments. Therefore, governments have a particular interest in indicators that relate to research outcomes and student outcomes, notably with respect to student satisfaction and employment.

We turn now to the data available to the clientele for the third group of "clients": students, prospective students and their families. Institutions are currently asking them to invest approximately $25,000 in tuition

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[2] This is not to say that no data was available prior to that point – various Statistics Canada efforts of varying quality were available prior to that – it is merely to say that it was at this point that governments became significantly more interested in gaining access to comparable data on subjects that were either outside Statistics Canada's data collection practices or in gaining access to data of a more refined quality than was possible through Statistics Canada surveys.
[3] See Finnie and Usher (2005)

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alone for an undergraduate education. Even if this represents only a fraction of the true cost of education, it represents a substantial personal investment. Where consumer durables are concerned – automobiles, for instance - it is normal for purchasers to consult various kinds of consumer guides which rate aspects of automotive performance and permit shoppers to compare both price and performance. By doing so, they permit consumers to look "under the hood" of many different types of cars before they proceed to test-drive a few of them.

Given the size of the investment demanded of parents and students, it is to be expected that potential students and parents desire similar kinds of data when making decisions about education. Protestations that universities are more complicated than cars and hence are less amenable to statistical reductionism are true but irrelevant – consumers want comparison data and it is very difficult to make an intellectually respectable case against giving it to them. There may indeed be a case to make that comparable data on *institutions* is considerably less useful than comparable data on *programs of study*, but that is a very different argument.

Institutions do, of course, strive to give students and prospective students information about their activities. Institutional "view-books" and prospective student websites have become much more informative in recent years. However, these are essentially sales brochures and provide comparative cross-institutional data only in those instances where it cast the producing institution in a positive light. They are not substitutes for comparable cross-institutional data, especially in the area of institutional resources (e.g., how rich is the institution?), student services, student life and student employment outcomes.

This brief survey demonstrates that there is a considerable market for comparable information about Canadian universities. Institutions themselves need it for management purposes.   Governments need it for accountability purposes. Students and parents need it to make good decisions about their educational investments. But the specific types of data desired by each group are slightly different. The following section will explore the various sources of comparable institutional data available to those who wish to compare the inputs, throughputs and outputs of Canadian universities.

III. The Provision of Data on Quality

Having established the demand for comparable data on educational quality, we turn now to examining how this data is currently provided. As noted in the introduction, there is already a considerable amount of data available.

A. Possible Areas for Quality Indicators

In this section we will look at the possible types of indicators that might be desirable to potential users in constructing various systems of inter-institutional data comparison. The analysis covers a broad category of indicators: Input Indicators, Research Indicators, Teaching and Learning Indicators, Internal Service Indicators and Output Indicators. In each area, the range of possible indicators is considered, as well as the level at which the data can be reported.

Not all indicators included here are intended to be measures of quality in their own right, but they may help to interpret or normalize other indicators. Number of faculty, for instance, is not a measure of quality but it is necessary in order to interpret data on research productivity.

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i) Input Indicators

A number of different types of inputs are relevant to quality measurement in higher education, either as quality indicators in their own right, or as modifiers. Broadly speaking, these can be divided into the following categories:

Student input indicators: These include the number of students at an institution and their distribution by gender, ethnicity, aboriginal status, disability status, etc. It would also include measures of the average ability of incoming students, determined either through entering grades (which can be described either as an average or by distributions across various ranges), or through some sort of standard testing measure (the grade 11 EQAO English exam results, for instance).

This data could be reported at the institutional level (as it frequently has been in *Maclean's*). However, since this data is captured at the individual student level, it would be equally possible to aggregate the data at a field-of-study level.

Institutional Income indicators: These would include a variety of measures, including income from federal and provincial sources, tuition income, research income, and total income. These data are collected and reported at an institutional level.

Instructor numbers: At the simplest level this would simply involve counting instructors: full-time, part-time, sessional, etc. It could also include the number of graduate students acting as instructors in classes. This data could be presented at either the institutional or field-of-study level.

ii) Research Indicators

This is perhaps the one area of institutional activity where the range of quality indicators used is relatively well-established and widely accepted. These include:

Publications: A straight count of peer-reviewed journal articles is possible, as is a count weighted by the citation-impact co-efficient of the journals in which the articles appear (often known as the Average Research Impact Factor, or ARIF). As the unit of data collection for this is inevitably the individual researcher, results for both can be aggregated to either the institutional or field-of-study level.

It should be noted here that there are some significant questions about how best to measure academic production in the humanities and (to a lesser extent) the social sciences, where peer-reviewed journal articles are not considered to be quite as reliable an indicator of scholarly stature. This is partly because much valuable work in these areas is published in the form of monographs and/or non-peer reviewed publications (such as work done for government commissions and similar projects), and partly because scholarly publishing is much more fractured in these fields, with more small niche journal and fewer "standards" of the kind exemplified in *Science* and *Nature*. This is a problem that humanities researchers face the world over and is not to be dismissed lightly. However, provided results are reported at the field-of-study level instead of just the institutional level, decent inter-institutional comparisons can still be made. Field of study comparisons will also control for the obvious advantages possessed by institutions with medical schools (which have by far the highest publication rates of any field of study).

Citations: Another way of measuring research productivity is to simply count the number of citations received by individual researchers, though this approach seems to have lost some favour to the ARIF model. As with publications, this data can be displayed at either the institutional or field-of-study level.

Research Dollars: Success in attracting external research funding is often considered a measure of success in research. There are a number of possible indicators here, including: total dollars from private sources, total

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dollars from public sources, proportion of granting council applications that are accepted, etc. As with other research measures, this data can be aggregated at either the institutional or field-of-study level.

Patents and Commercialization: The final common measures in research are measures of how well research is commercialized, measured either by patents awarded or the dollar value of commercialization of institutional discoveries. In principle, this could be measured at either the institutional or field of study level, but it would take a significant change in data collection practices to do so. Currently, this data can only be collected and reported at the institutional level.

iii)   Teaching and Learning Indicators

Teaching and Learning are central to postsecondary education. Indeed, they are the primary reason that institutions receive public funding. There is some suggestion that the quality of teaching and learning is declining in Canadian universities (e.g. Cote and Allahar 2007), but this may simply be a confusion of inputs and outputs. However, as Pascarella and Terenzini (2005) report in their meta-analysis of findings on educational development in college, there were indeed substantial gains to cognitive development, but most of these occurred in the first two years of PSE.

Measuring teaching and learning is difficult to do and it is hard to say that any country does it well. Probably the most advanced concerted effort to measure learning on an inter-institutional basis is the College Learning Assessment effort, led by the Council for Aid to Education, which is used by about 100 colleges in the United States. In Canada – and particularly Ontario – there has been a move to make the National Survey on Student Engagement (NSSE) and its college counterpart, the Ontario College Student Engagement Survey (OCSES) a kind of standard measure of quality in learning. However, while the NSSE is frequently sold as a measure of quality, it is in fact a measure of the "learning environments" believed to be correlated with positive learning outcomes (Pascarella and Terenzini, 2005) rather than a direct assessment of outcomes. Teaching evaluations and use of teaching resources are other ways of measuring teaching and learning, though both suffer from defects and neither in any way measures learning. In short, there is data available in this area, but its use in quality measurement will always be contested to some degree.

At present, there are four basic approaches for developing metrics for comparisons in teaching and learning.

Measuring Cognitive Development: It is possible to measure learning in some direct fashion, simply by measuring cognitive gains from the first to final year through some form of testing. This approach is essentially that being used by the College Learning Assessment (CLA). Gains to cognitive ability are of course not the only expected outcome of postsecondary education – gains in subject-matter knowledge are also possible (though they are much more difficult to test for in an economical manner). In theory at least, this data could be reported on either at an institutional or a field of study level, although the cost of testing to derive reliable results at the latter level may be prohibitive.

Measuring Learning Environments: Instead of measuring learning directly, another favoured approach is to survey students about their experiences in PSE and from this draw some conclusions about the quality of their "learning environment". This is the NSSE/OSCES approach. This data is meant to be reported at the institutional level, although in principle there is no obvious reason not to report certain types of NSSE/OSCES data at the field-of-study level where statistically reliable samples are available.

Teaching Evaluations: Another way to look at teaching value is simply to look at satisfaction with teaching, either through simple questions about satisfaction (as in the NSSE/OSCES or the Strategic Counsel surveys) or directly through the course evaluation forms that are mandatory at many institutions. One obvious drawback of this kind of data is that short-term evaluations of courses say nothing of the long-term value of a particular course or set of courses. Another possible weakness, highlighted by Cote and Allahar (2007), is some faculty's perception that students are biased in favour of instructors who are more generous markers.

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Teaching Resources and Assignments: One of the classic proxies for teaching quality is class size, despite the ambiguity of the research linking small classes with better learning outcomes at the postsecondary level. This can be measured either using the class as the unit of measurement (i.e. an average of "x" students per class) or with the student as a unit of measurement (i.e. an average of "x" classmates, on average). A cruder and more indirect measure of an institution's "teaching intensity" which is sometimes used is the student-staff ratio. A final measure sometimes used as a measure of teaching resources is the percentage of classes taught by full-time or tenured staff.

iv)   Internal Service Function Indicators

Canada has what – in the international context – is a fairly unique tradition of using measures of student satisfaction indicators as a way of measuring quality. Among the types of indicators which have been used in the past and could be used again in the future are:

Student satisfaction measures: Simple satisfaction scores from a variety of surveys exist: satisfaction with teaching, libraries, students services, student aid, residences, IT resources, etc. can all be used as indicators of institutional quality.

Spending indicators: Measures of institutional spending on student services, IT and libraries are sometimes seen as proxies for quality in these areas.

Library Indicators: There are a number of traditional indicators in this area which focus on budget size (either in absolute terms or as a percentage of the overall budget), annual acquisitions and total holdings. However, given that libraries' traditional mission of facilitating access to books and monographs is being widened to include providing access to networked resources, a number of new types of indicators have recently been developed by the Association of Research Libraries. These sets of statistics, known "E-metrics" provide ways of measuring the volume, cost and cost-effectiveness of electronic holdings.

v)   Output Indicators

Completion and continuation rates: One of the most obvious measures of institutional success and quality is the ability of entering students to complete a program. Completion measures come in a variety of forms depending on what is considered 'completion' and the number of years allowed for completion. Continuation rates – that is, the rate of passing from one year to the next (normally, from first to second year) – are also sometimes used. This data should be – but is not always – available at either the program or the institutional level.

Graduate satisfaction: Graduate views on the usefulness of their educational experience and their satisfaction with their educational experience is a common measure of quality, in both the university and college sectors. Provided it is collected in sufficient detail (i.e. with a large sample size), this data can be displayed at either the field-of-study or institutional level.

Employer satisfaction: Though not in common use at the university level, college program quality has been using employer satisfaction with graduates from particular programs for close to a decade now. Again, subject to sample size restrictions, the data can be portrayed at either the field-of-study or institutional level.

Student employment indicators: Another common measure of success in terms of outcomes is employment outcomes, or statistics related to employment, unemployment and income. These are typically collected within a year or two after graduation, which is perhaps not the best time to be looking at outcomes, as a longer perspective might be more useful. However, for ease of data collection purposes, this short time frame has become the standard. Data portrayal can again be made at the institution or program level.

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Lifelong learning indicators: A less used, but potentially relevant indicator, of educational success is the rate at which graduates return to education for future studies. Returning to school can either be considered as "good" in its own right, or it can be used to interpret employment figures (in that low employment figures might be the result of high numbers of graduates attending further education). Institutional and program comparisons can again be made here.

vi)   Other indicators

The foregoing has been a quick tour of the kinds of indicators that have either been used in the past as proxies for quality, or make up part of the data necessary to make inter-institutional comparisons on a serious basis. But it is by no means exhaustive, and the list of issues which require measurement may legitimately change over time.

B. Availability of Data and Possibilities for Enhancement

This section examines the general availability of data in each of the five large indicator areas. For each set and sub-set of indicators, the current status of data collection is examined, as are the possibilities for data enhancement and the effort required to turn data in this area into a comparable, useful public quality indicators.

i)   Input Indicators

By and large, most of the input indicators already exist in one form or another. Data on students input indicators is plentiful at the university level and is already publicly available through CUDO at both the institutional and field-of-study level (data in this area lags somewhat at the college level). The only slight flaw in the availability of student input indicators is it remains difficult to get useful data on student demographics at an institutional or field-of-study level with respect to aboriginal students, students with disabilities and other under-represented groups.

Financial indicators are also available at the institutional level at universities thanks to CUDO. College data might be improved in this respect.

The area in which CUDO data is the least useful is faculty. Data is not available at the field-of-study level, and reporting on the use of non-full-time faculty in teaching is inconsistent at best.

In short, most of the elements for good quality indicators are already present. Work in this area is primarily about refining data definitions, and deepening the reporting of data in student and faculty numbers down to the field-of-study level.

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Table 1 – Summary data on Input Indicators

	Currently Collected	Necessary Level of Measurement	Possible levels of Reporting for Quality Indicator Purposes	Status of Publication	Action Required to Make it a Public Quality Indicator
Student Input Indicators – numbers	Yes	Individual student	Field of study, institution	Through Statistics Canada	Improved timeliness of data, aggregation at field-of-study level
Students Input indicators – demographics	Yes	Individual student	Field of study, institution	Partial through CUDO	Improved collection of data, aggregation at field-of-study level
Student Input indicators – academics	Yes	Individual student	Field of study, Institution	Partial through CUDO	None at universities; collection at college level
Financial Indicators	Yes	Institutions	Institutions	CUDO	None
Faculty numbers	Partial	Individual instructor	Field of study, institution	Statistics Canada (institutional level only)	Common definitions of faculty categories, reporting on faculty totals at field-of-study level

ii)   Research Indicators

There is a tremendous amount of data available on research indicators. What is missing is the collation of this data into a useable format.

The *Observatoire de Science et Technologie* (OST) already runs a service which cleans data from Thomson Reuter's ISI system of scientific bibliometrics for use in Canada. This service could easily be used to provide data for quality indicators, though it would require some significant expenditures every year in order to process the data. Work would also need to be done in terms of ensuring that lists of instructors and their fields of study are up to date.

In terms of research dollars, each institution already generates data on public and private research funding for the Canadian Association of University Business Officers (CAUBO), so no change in reporting would be required in order to compile comparable data. Other data on public research funding is available through publications such as Research InfoSource, or through reports of the three granting councils. With only a small amount of re-working, this data too, could be used for quality indicator purposes.

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Data on patents and patent citations is available from Science-Metrix; data on commercialization is available from institutional sources (though it is not clear if reporting standards are consistent across institutions). The Science-Metrix data would require some refinement before being published, much along the lines suggested above for the OST data. Data on commercialization income would require some agreement on definitions and reporting standards.

Table 2 – Summary Data on Research Indicators

	Currently Collected	Necessary Level of Measurement	Possible levels of Reporting for Quality Indicator Purposes	Status of Publication	Action Required to Make it a Public Quality Indicator
Publications	Yes (Thompson, Elsevier, etc)	Individual instructor	Field of study, institution	N/A	Would require work with *OST* to standardize accurate reporting and standardize field of study categories.
Citations	Yes	Individual instructor	Field of study, Institution	N/A	See above
Research Dollars	Yes	Individual instructor or field of study	Field of study, institution	Total granting council annual reports	Collation
Patents and Commercialization	Yes	Institution	Institution	N/A	Work with Science Metrix, as per OST, above

iii)   Teaching and Learning Indicators

Though the reported indicators may not necessarily reflect actual learning, there is a substantial amount of data on teaching and learning environments available, though some work would be required to turn these into useful public quality indicators.

Direct measures of learning represent the biggest gap in terms of indicators; there are, simply put, none available for the general undergraduate population (though in a field like Law, the pass rate on bar exams could fulfill this function). To create direct learning indicators would require the widespread adoption of the CLA or a similar instrument. This option should certainly be considered by institutions and by the Government of Ontario, but is unlikely to occur for a number of years.

Measurement of "learning environments" is already widespread. Universities already publish a certain amount of NSSE data through CUDO; OSCES results have not yet been made available but colleges are moving to make results accessible to the public. No data is available at a field-of-study level, however. While some NSSE and OSCES data can only be used at an institutional level (e.g. data on libraries and institutional climates), such data directly related to teaching practices could presumably be used at a field-of-study level, where sample size permits.

In terms of teaching evaluations, data on satisfaction with teaching is available both through NSSE and through the Strategic Counsel surveys. For more precise and detailed data, information from mandatory

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course evaluations could be used. However, considerable work is required to ensure the data is accurate, reliable and comparable across institutions. This might be justifiable, however, if it led to very high quality data at a field-of-study level.

Teaching resource data in terms of average class size is already publicly available at an institutional level at universities but not colleges, though only at an institutional and not field-of-study level. The Globe and Mail/Strategic Counsel survey measures average number of classmates at an institutional level in universities. For this data, disaggregation by field of study is possible but is not currently practiced. Data on the use of full-time and/or tenured staffing teaching duties is not available anywhere.

In sum, there is a considerable amount of data with respect to learning environments and teaching, which requires considerable work in order to be useful as quality indicators. However, in what is perhaps the most important quality indicator area of all – direct learning outcomes – there is a complete lack of direct data which can probably only be remedied if the Ministry requires institutions to develop and begin reporting on common indicators in this area.

Table 3 – Summary Data on Teaching and Learning Indicators

	Currently Collected	Necessary Level of Measurement	Possible levels of Reporting for Quality Indicator Purposes	Status of Publication	Action Required to Make it a Public Quality Indicator
Measuring Learning Directly	No	Individual student	Institution, possibly field of study	N/A	Would require adoption of CLA or similar testing regime and a commitment to publishing data
Measuring Learning Environments	Yes	Institution, possibly field of study	Institution, Possibly field of study	By institution	None if used at an institutional level; disag. of data if used at field-of-study level
Teaching Evaluations	Yes	Individual Professor	Institution or field of study	Sometimes published within individual schools; partial through CUDO and Globe and Mail	None, if CUDO or Globe data is used at an institutional level; disag. of data if used at field-of-study level. If course evaluations used, considerable work in terms of standardization and reliability
Teaching Resources	Yes	Individual classes, individual students	Institution or field of study	Partially through CUDO or Globe and Mail	

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iv)   Internal Service Function Indicators

Student satisfaction indicators are widely available through various surveys and sources, and the only action required is choosing which one(s) to use as common standards.

Spending indicators already exist in the college and university financial statistics given to Statistics Canada, as well as through provincial consortia such as CUDO on the university side and CFIS on the college side. However, particularly with respect to student services and IT spending, the data could stand some greater level of detail and precision than is currently available.

Library indicators exist at the university level with respect to budgets, holdings and acquisitions, (and satisfaction, though these are more properly included in the first set of indicators listed in this section). New metrics to reflect the more networked and electronic services provided by modern libraries exist but are not in widespread use. These may come into wider use as CARL libraries begin to follow the lead of their American cousins, but in the short term these would either need to be mandated by the Ministry of Training, Colleges and Universities (MTCU) or remain ignored altogether.

Table 4 – Summary Data on Service Function Indicators

	Currently Collected	Necessary Level of Measurement	Possible levels of Reporting for Quality Indicator Purposes	Status of Publication	Action Required to Make it a Public Quality Indicator
Student Satisfaction Indicators	Yes	Individual student	Field of study, institution	CUSC, Globe and Mail	Data availability at field-of-study level
Spending Indicators	Yes	Institution	Institution	CUDO, CAUBO	Some elaboration of certain spending categories
Library Indicators	Partial	Institution	Institution	ICARL	More widespread adoption of metrics relating to electronic networked resources

v)   Output Indicators

Of the output indicators we have examined, most are currently collected in some form by institutions and their consortia.

Completion rates by field of study are already required through CUDO and KPIs (though CUDO uses a 7-year-to-completion standard which is longer than most international standards in the area). Continuation rates (usually meaning transition from first to second year) are less widely available but are easy enough to compute from existing data. Similarly, data on graduate employment rates after six months, for colleges and universities, and two years, for universities, are available at a field-of-study level.

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Data on employer satisfaction is captured (and reported) at the college level but not the university level. The current survey of employers would need to be revamped and extended if such information were desired.

Data on graduate satisfaction and graduate employment are both currently collected. At the college level, it is collected and reported by institution and field of study as part of the KPI process. At the university level, data is collected through an annual survey of university graduates conducted by OUAC, but data is not reported by institution and the sample size at the university level is less than required to match the sophistication of college data. Employer satisfaction data is captured at the college level but not the university level.

Data for lifelong learning indicators are presently available through graduate surveys. However, the somewhat limited time span of most of these exercises (very few graduate follow-up surveys in Canada occur more than two years after graduation, though Statistics Canada`s National Graduate Survey follow-up takes a five-year view) might not make them the ideal vehicle to ask such questions. A newer, longer follow-up survey could be introduced to capture this data, although tracking graduates for extended periods of time is a costly and resource-intensive exercise.

Table 5 – Summary Data on Output Indicators

	Currently Collected	Necessary Level of Measurement	Possible levels of Reporting for Quality Indicator Purposes	Status of Publication	Action Required to Make it a Public Quality Indicator
Completion rates	Yes	Individual student	Institutional and field of study.	Through KPIs	None
Graduate satisfaction	Partial	Individual student	Institutional and field of study	In colleges through KPIs, not in universities	Data availability in universities
Employer satisfaction	Partial	Individual student	Institutional and field of study	In colleges through KPIs, not in universities	Data availability in universities
Employment indicators	Yes	Individual student	Institutional and field of study	Through KPIs	None
Lifelong learning indicators	Partial	Individual student	Institutional and field of study	N/A	Data availability at field-of-study level, longer time frame

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Conclusions on Quality Indicators

From the foregoing study of quality indicators, we have seen the following:

Substantial amounts of data usable for quality indicator purposes do not require institutional input. Data on student satisfaction and research output, for instance, can be obtained from third-party sources. It is not necessarily the case that an expanded indicator set requires greater resource allocation from institutions themselves.

Across all five main indicator areas, there already exists a substantial amount of data which could be used for public quality indicators. This data simply needs to be collected, collated and produced at a more detailed level to make it more useful as quality indicators. This will require some additional resources, but is technically feasible.

Indeed, there appears to be only two areas in which significant work needs to take place in terms of development of basic methodology and measurement techniques. The first is "Measures of Learning", where there is simply nothing resembling adequate data, even though teaching and learning is a central task of the higher education sector. The simplest solution here in the short-term would probably be to adopt a relatively off-the-shelf solution such as the CLA while continuing to conduct research on other direct measures of learning outcomes. The second is library indicators, where current measures are somewhat outdated.

To say that data is potentially available is not the same as saying that making it available will be easy. There are a number of hurdles to producing this data which relate directly to the willingness of institutions – who, understandably, have internal constituencies that are wary about releasing indicator data – to produce such data. It will only happen, in fact, in the right kinds of circumstances and with the right kind of "architecture" for the management of data production and presentation. It is to this that we now turn.

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IV. Managing the Collection and Distribution of Data: Imagining an Architecture for Quality Indicator Data

There are a number of possible ways of imagining an architecture for collecting, managing and publishing data related to quality in postsecondary education. It is easiest to sketch out this architecture by looking at six key questions that need to be answered in the development of a system of quality data indicators.

1.   Who Decides What Indicators Will Be Included?

This goes to the heart of the architecture question. At some point, there needs to be a final authority over what goes into the indicator set.

There are two basic existing models for this. In most performance indicator systems, it is a single overarching authority such as a government or a ministry that decides which indicators should be included. In a few, such as the CUDO model, it is a collective decision made by the information providers (i.e. institutions). The Common Data Set in the United States also works on this model, though a consortium of media outlets that use the common data also play some role in the development of indicators.

Both models share a defect in that governments and institutions are each themselves one set of "clients" or users of data, and each will likely have a bias towards indicators that matter more to them. It is probably important at the very least to find a way to include the perspective of all three users of data in decisions about the choice of indicators, and some kind of consultation mechanism which includes all stakeholders is probably a minimum requirement for an effective data architecture.

However, in the end, someone will need to adjudicate this issue. The Higher Education Quality Council of Ontario (HEQCO), which does not directly represent any of the three basic interest groups, is an obvious candidate to fulfill this role.

2.   Who Decides How Indicators will be Defined and How Data Will Be Collected?

Given the complexity of collecting comparable data at different institutions and the location of expertise, it would seem that CUDO and a college equivalent are the best candidates to make decisions on indicator definitions and collection. Since institutions themselves have been tasked with generating the necessary data, they should be managed by representative consortia.

With respect to data generated from surveys, or data collected from external bodies (as is the case with the research indicators), CUDO could still play an important advisory role, though it might not be as decisive. For these indicators, HECQO itself, or HECQO in association with other user groups might also participate in the decision making process.

3.   Who Collects the Data?

Traditionally, most quality indicators are collected by institutions themselves. In many instances, this is not by choice but by necessity or government fiat. However, as we have seen in the preceding section, a large number of indicators need not be collected by institutions, especially if they are related to research,

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satisfaction, or post-graduation experiences. If indicators in these areas are chosen for a common data architecture, data collection could conceivably be done by third parties.

4. Who Decides How Indicator Data Will be Used and Displayed?

This is a crucial decision, because it goes to the heart of how the system of public quality indicators will work. There are effectively two options here.

The first is that the system could be run as a "closed shop", with access limited to those actors who are involved in some sort of data consortium (which would presumably include institutions themselves, government and select media). The result of this would likely be improved benchmarking capabilities for institutions, better potential measures for Multi-Year Accountability Agreements (MYAAs) for government and some improvement in existing league table or indicator systems. If this model is adopted, then the nature of the data display could probably be decided amongst the consortium participants themselves.

The second is that the system could be run as an "open shop", with full access provided to all via the Internet. This would still provide all the advantages of option one, but would also permit a great deal of experimentation from parties interested in looking at performance of the higher education system. This is both an opportunity and a risk. It is an opportunity as any increase in the number of people working with data in education is probably a good thing, and some of this experimentation might provide insight into the nature of the indicators and education quality overall. It is a risk in that overenthusiastic amateurs may use the indicators to come up with some measures of quality which are seen as frivolous or even harmful to the reputation of particular institutions.

If this is the route that is taken, then it is probably imperative that decisions about display **not** rest with the primary users groups. It will be of high importance to ensure that data be displayed with an eye to maximum usability by people who are not necessarily expert in postsecondary education data. This is a role for which HEQCO, with its public reporting role, would seem more suited than a consortium of data providers.

5. What is the role of Non-Government, Non-Institutional Actors?

This question needs to be answered in the context of the intended use of indicator data. There are, effectively, three possible models:

- The first model would be to include them in a multi-party consortium. The US Common Data Set model, for instance, would limit non-governmental, non-institutional actors to major media outlets (in this case, presumably *Maclean's* and *The Globe and Mail*). In return for privileged access to the data, these institutions could provide financial support to the agency charged with collating and organizing all the institutional data. In the Canadian case, one could imagine that media groups might also participate through the funding of multi-institutional surveys (such as the one done by Strategic Counsel).

  This model is attractive, not least because it creates a potential source of funding for the project. But it also implicitly creates a cartel-like atmosphere, as the media outlets implicitly become monopsonist consumers of the data. For media to have an incentive to participate, the raw data from these different sources would likely have to remain open only to members of the cartel (i.e. government, institutions and media). If all raw data were going to be public anyway, they would have an incentive to stay out and act as free riders.

- The second model would be to include many non-governmental, non-institutional actors (not just media) in the development of quality indicators but not give them privileged access to the data and, indeed, to ensure that all data was available on an open-access basis to all. This would almost

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certainly result in the forfeit of any possible financial contributions from media group. However, it would also prevent the emergence of a cartel.

- The third model would be to exclude non-governmental, non-institutional actors from any kind of participation in the development of indicators. Under this model, the management of quality data would be shared between the government, HEQCO and the institutions. A decision could be taken to make some data public in a particular format (as has been the case with CUDO), but fundamentally, it would be run in the interests of serving the data needs of government and institutions.

6. How Is Institutional Co-operation Ensured?

This document has shown that while not all quality indicator data need be collected from institutions, it still remains the case that a significant amount of data can *only* be generated from within institutions. This is potentially a problem, because if institutions choose not to provide data, then the entire enterprise is imperilled.

The reasons why institutions are not always happy to provide data for comparative exercises are a mix of the serious and the self-serving. The reasons that deserve the most attention are: the cost of providing data, the difficulty in providing data that is genuinely compatible across institutions, and the fear that other institutions may be "cheating" with their data. Of these, the latter two can probably be dealt with through a data governance structure which includes institutions as a matter of course (as described above). The third – cost – is a serious one, which deserves serious consideration. Good institutional statistics do not come cheaply, and few if any institutions are able to devote the necessary resources to this task. A new quality indicator initiative should be accompanied by additional funding to be devoted to the task of institutional research.

Then there is the possibility that institutions might balk at universal voluntary participation in a quality indicator data initiative for self-serving reasons. Put simply, some individuals at some institutions may believe that accurate comparative quantitative data on particular indicators will portray their institution negatively, and on those grounds may seek to delay or derail any attempt at comparative data architecture. These concerns should not be allowed to prevent the creation of accurate, comparative data sets.

In the final analysis, the Government of Ontario has the ability to compel institutions to produce and make public data for quality indicators. This is not a power that should be used lightly, and should not be used to run roughshod over institutions' legitimate concerns about cost and comparability. However, in the context of a broadly collaborative effort to improve the quantity and quality of institutional data available to all stakeholders, it would not be unreasonable to set down firm and binding guidelines about the provision of data. This could, in fact, become a requirement in future MYAAs signed between institutions and the Government of Ontario. This is not to say that all the data produced will then be the subject of government benchmarks in the MYAAs. It is simply to say that the provision of common quality indicator data – some of which *could* be used for benchmarking purposes – would simply be an expectation written into the accountability agreements.

The Three Basic Models

Broadly speaking, there are three basic models of managing common quality indicator data, as shown below in table 6. This is not to say that these are *only* three possible models for common data collection; it should be obvious from the preceding discussion of the six questions that there are a large number of ways to combine elements of all three models. But most possible configurations of answers to the six questions lead one to something that looks very like one of the three models described below.

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Table 6 - The Three Models of Common Data Management

	Accountability Model	Transparency Model	Open Access Model
Choice of Indicators	Government	Institutions and media	All stakeholders, mediated by HEQCO
Definition of Indicators and Mode of Data Collection	Government	Institutions and Media	Primarily Institutions, with input from HEQCO
Collection of Data	Institutions	Institutions	Multiple sources
Decision on Use and Display of Data	Government/institutions	Media organizations	Use of data is completely undefined, HECQO to ensure maximum usability
Collection of Data	Institutions	Institutions	Multiple parties, as required
Role of Non-Government/Non-Institutional Actors	None	Media contributes to funding	Many actors consulted, but no funding role
Ensuring Institutional Co-operation	Government order	Voluntary	Government order

The first, which might be called the "Accountability Model", is seen in various types of performance indicator systems. In this model, governments unilaterally make decisions about what data needs to be collected and displayed. Usually, these models tend to focus on a few types of outcomes variables, or occasionally, satisfaction variables. KPI systems in Ontario and Alberta currently follow this model.

The second, which might be called the "Transparency Model", is seen in a number of different rankings and indicator systems around the world, most notably in the US with its Common Data Set. In this model, institutions and media come to some sort of agreement about what data will be collected and displayed. These systems are likelier than Accountability Models to have at least some focus on input variables. As such, they tend to be less useful for accountability purposes.

But there is a third potential model which might be called the "Open Access Model". In this model, a wide variety of data is collected and displayed, based on consultations with the full spectrum of stakeholders. Different stakeholders may each then use the data in different ways. Government still plays a regulatory role, ensuring that a steady stream of data appears in a common format. But it does so not simply for the purpose of gaining data for its own accountability purposes, but for the larger purposes of creating what might be called a "datasphere" which allows multiple higher education stakeholders – including institutions themselves – to benefit.

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Picking a Model

Picking among these models requires one to step back somewhat and take stock of certain factors relating to quality indicators in general.

The most important point to recognize is that "quality" will always be a contested concept. Different stakeholders are going to care about different aspects of institutional performance and will want different ways of measuring it. No quality measurement system with a single set of indicators is ever going to secure acceptance from a broad mass of stakeholders, and any attempt to impose an official set of quality measures that are meant to respond to the needs of diverse stakeholders will inevitably meet stern and probably quite justified opposition.

This is not to say that there should not be *any* attempts to measure quality. Diverse stakeholders have legitimate interests in developing indicator systems with which to compare institutions and to mark their progress over time. What is illegitimate is not the measurement of quality but the idea that there can be a single, comprehensive measure of quality. The danger in ranking and benchmarking systems comes from over-reliance on a single set of instruments (e.g. *Maclean's*). As noted above, as the number of measurement systems increases, the importance of any single set of measurements will decrease. Institutional managers will have less reason to adhere to a single set of quantitative judgments (e.g. *Maclean's*) and more incentive to pick and choose appropriate quantitative measures from within a denser ecosystem of institutional rankings, benchmarks and comparisons.

In other words, there is a considerable benefit to avoid creating a single set of indicators which only responds to the needs of a single stakeholder (e.g. government), and to attempt to create a diverse set of indicators which can satisfy multiple stakeholders and be used in a variety of ways. To be sure, this approach is a more uncertain one, as it will be impossible to predict how end-users will end up portraying the data. The benefit is that there will be a vastly enriched "datasphere" about higher education, which could make for a significantly improved policy environment.

This argues strongly for some version of what we have above referred to as the "open access" model. Assuming the process of capturing stakeholder data needs goes well, such a system could benefit governments (by providing data for accountability purposes), institutions (by providing data for benchmarking purposes) and students and parents (by providing more comparative data generally about institutions). The data could serve all of these stakeholder interests while at the same time being "owned" by none – the function of data ownership and management would be separated completely from data publication.

This option would require a substantial amount of extra work in terms of institutional data collection, which will cost money and which should be generously funded. It would also require a third party (most likely HEQCO) to mediate stakeholder interests, collect and aggregate all the various pieces of data from various parties, ensure data consistency and make data publicly available.

Other models are possible, of course. An accountability model would certainly be cheaper and possibly less controversial (though this would depend to a large degree on the indicators chosen for accountability). But given the considerable long-term benefits of an enriched postsecondary education datasphere, these would seem to be ample reason to choose a model along the "open access" lines.

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V. Next Steps

If the Government of Ontario and/or HEQCO decide that they wish to pursue a common data strategy, the following steps need to be taken.

- First, at the outset, a decision needs to be made with respect to which basic model of common data management is desired: an accountability model, a transparency model or an open access model. This decision clarifies the roles of stakeholders in subsequent steps.

- Second, a set of indicators to be used in quality measurement will need to be decided upon. The indicators chosen need not all be implementable in the first year of operation. For instance, if it is decided that better measures of libraries or learning outcomes are desired, it will take several years to develop and test appropriate measures and indicators in these areas. If an open access model is chosen, a broad consultation among stakeholders would need to be undertaken at this point.

- Third, a model of costs and funding needs to be designed. To the extent that new data needs to be collected and dissected, adequate allowances need to be made for data collection and processing costs. As much of the resistance to increased quality data reporting comes from overstretched institutional research offices, consideration should be given to providing institutions with a separate envelope of funding specifically for the purpose of creating common data.

- Fourth, a requirement to produce the common data specified in the second step (above) needs to be written into the Multi-Year Accountability Agreements. Again, this is not to suggest that institutions should be benchmarked according to each indicator provided – it is simply to ensure universal production of common indicators.

At this point, data collection and verification could commence. If an "open access" model were chosen, it is at this point that work on data presentation would also need to begin.

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