

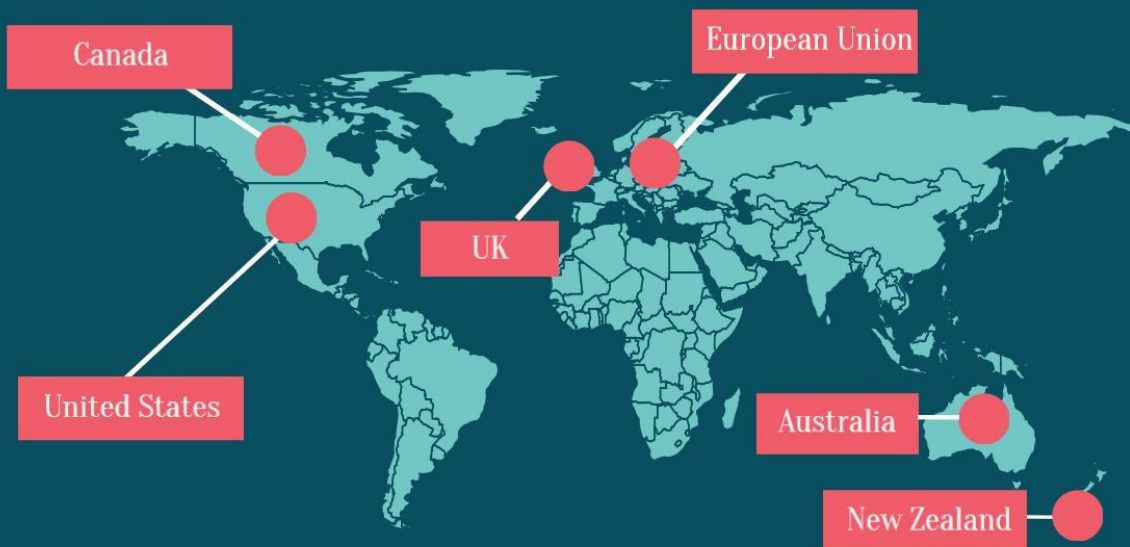
TAXONOMY OF INDICATORS FOR SOCIAL SCIENCES

A Menu of Indicators to Assess

RESEARCH IMPACT

This taxonomy includes 400+ indicators aggregated from an environmental scan of research impact across 32 countries. Whether or not you agree with the rise of the research impact agenda, funders globally are now asking researchers to outline potential ways to assess the impact of their work with non-academic audiences. Indicators are categorized in relation to Canadian Federation for Humanities and Social Sciences Impact Framework: Scholarship, Capacity Building, Economy, Society and Culture, Practice and Policy. Our hope is that you can peruse this menu of indicators and choose ones that might be relevant to your projects.

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RIPPLE

Research Informing Policy, Practice
& Leadership in Education

A Taxonomy of Research Impact Indicators for Humanities and Social Sciences.

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ABSTRACT:

This taxonomy provides an overview of the emerging international trends and indicators of research impact occurring globally for the humanities and social sciences. The catalogue includes 420 indicators aggregated from an environmental scan of research impact across 32 countries. Indicators are categorized in relation to the Canadian Federation of the Humanities and Social Sciences Impact Framework: Scholarship, Capacity Building, Economy, Society and Culture, Practice, and Policy. Humanities and social science researchers can explore the indicators in relation to their projects and grant applications.

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ABOUT RIPPLE:

Research Informing Policy, Practice and Leadership in Education (RIPPLE) is a program of research, training and knowledge mobilization aimed at learning more about how knowledge brokering can increase research use and its impact in education by facilitating collaboration between multi-stakeholder networks across public service sectors. Dr. Amanda Cooper, Assistant Professor in the Faculty of Education at Queen's University, is the Principal Investigator of RIPPLE, and Samantha Shewchuk is Program Manager. For more information visit: WWW.RIPPLENETWORK.CA

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2 Introduction to the Taxonomy

Whether or not you agree with the rise of the research impact agenda, funders globally are now asking researchers to outline potential ways to assess the impact of their work with non-academic audiences. The RIPPLE team believes that humanities and social science research makes valuable contributions to Canadian society, and we are committed to helping researchers respond to the new requirements and demands of research funders globally. Therefore, we conducted an environmental scan of research impact resources across 32 countries. We chose to package the findings in a final report, resource guidebook, and indicators taxonomy. The following taxonomy is a “menu” comprised of 420 possible indicators that you can use to identify how to measure your impact. The indicators in the following document were found in the 110 resources that included research measures, hence, the commentary of the strength and weaknesses of each is not included in this document. The indicators are organized into relation to the FHSS (2014) Research Impact Framework (Figure 1) articulating impact in relation to: Scholarship, Capacity (in teaching and learning), Economy, Society and Culture, Practice, and Policy. Each of the main categories are further sorted into layers so readers can quickly find indicators that are applicable to their own work. Our hope is that you can peruse this menu of indicators and choose ones that might be relevant to your projects.

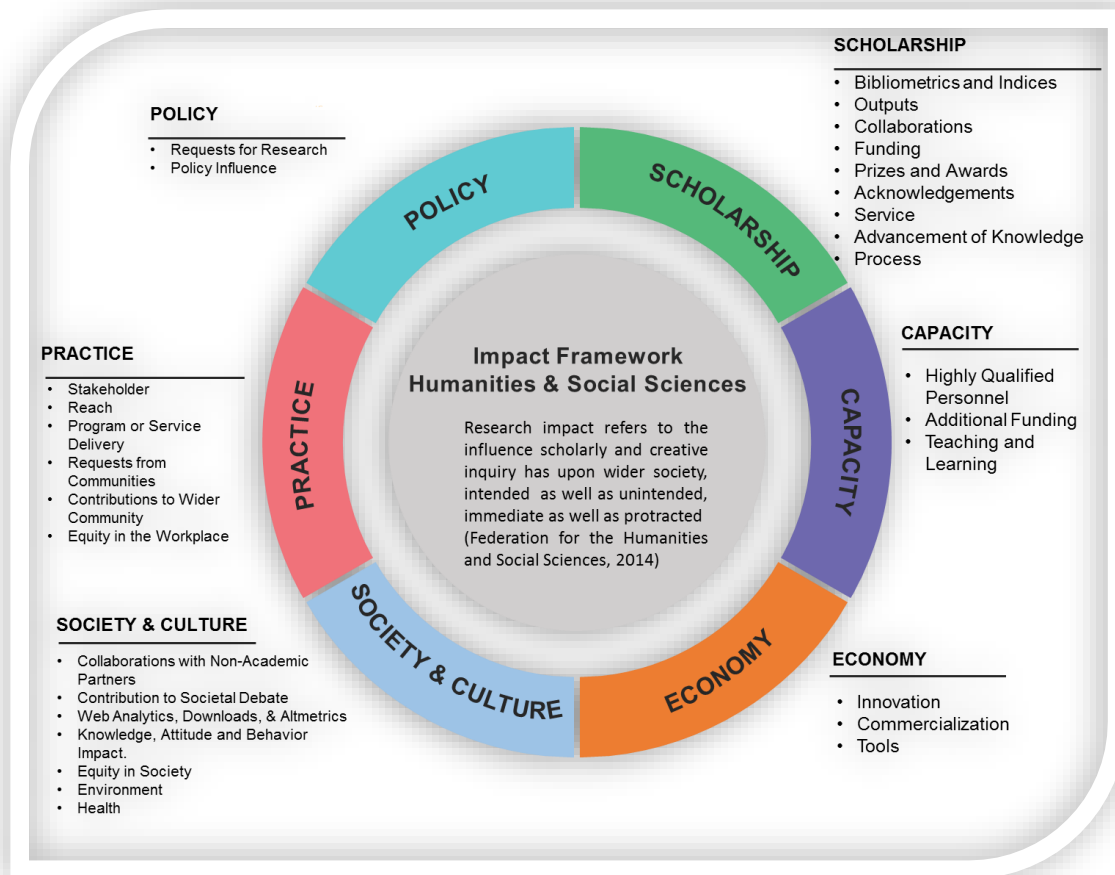


Figure 1. FHSS Research Impact Framework for the Humanities and Social Sciences (Adapted from FHSS, 2014)

By choosing appropriate indicators from the taxonomy, the FHSS Impacts Framework can be used to track the impacts of the Humanities and Social Sciences. It can also be used to describe the impacts at the individual, institutional, provincial, national, or international level. However, it is important to remember that:

- Research productivity and impact are complex; therefore relying on one measure or factor to evaluate your research performance is problematic and very likely to provide a distorted picture.
- Most of the indicators in this taxonomy measure an academics' output of research (i.e., # of journal articles produced). Community, cultural, societal, or policy impact are much more difficult to determine and, arguably, more important.

Figure 2 shows a word cloud of the all the indicators from this taxonomy and clearly depicts the dominance of number of research publications being the most frequently cited in the literature.

3 Scholarship

Table 1

Scholarship

Sub-Category	Indicators		
<p>1.1 Bibliometrics & Indices Includes relative citation impact, highly cited publications, h-index, proportion of citations in relation to field Does not include citations counted from policy documents, etc. as these are a proxy for policy category</p>	<ul style="list-style-type: none"> H-index (Holbrook, 2013) Universal h-index (Holbrook, 2013) G-index (Holbrook, 2013) 	<ul style="list-style-type: none"> Journal impact factor (Holbrook, 2013; University of Saskatchewan, 2012) Citation index (Baker, 2011; Franklin, 2007; Giménez-Toledo & Román-Román, 2009) Google lists of top journals (Memorial University, 2013) Quality weighting = $3*A+2*B+1*C/A+B+C$ (García & Sanz-Menéndez, 2005) 	<ul style="list-style-type: none"> Web of Science (WoS) (Memorial University, 2013) Eigenfactor level (Wilburtz, 2013) Average Impact Index (Giménez-Toledo, Román-Román, & Alcain-Partearroyo, 2007) Number of bibliographic citations for all technical papers published in journals, conference proceedings or elsewhere (Cozzarin, 2008)
<p>1.2 Outputs Counting of publications, conference publications, etc. - no analysis beyond frequencies, so not bibliometrics</p>	<ul style="list-style-type: none"> Number of new humanities titles (American Academy of the Arts & Sciences, 2013) New titles in the humanities, by discipline price of new print titles, by field (American Academy of the Arts & Sciences, 2013) Price of new print titles, by discipline (American Academy of the Arts & Sciences, 2013) Price of academic e-books, by field or discipline (American Academy of the Arts & Sciences, 2013) Number of peer-reviewed/professional 	<ul style="list-style-type: none"> Number of book sales/loans (Holbrook, 2013) Contributions to textbooks (Holbrook, 2013) Monographs (scholarly & practitioner) (Memorial University, 2013; Royal Irish Academy, 2011) Number of Review articles or essays (Memorial University, 2013) Number of Works submitted but not yet accepted or works designated 'revise and resubmit' (Memorial University, 2013) 	<ul style="list-style-type: none"> Place of publications (Holbrook, 2013) Share of international level publications by universities on the overall [country] scientific publications (Bach & Llerena, 2007) Share of international level publications by universities on the overall world scientific publications (Bach & Llerena, 2007) Number of popularized works (Bornmann, 2013)

Sub-Category	Indicators	
<p>publications and citation counts for a specified period of time for an individual, department, or university (Andras, 2011)</p> <ul style="list-style-type: none"> • Publications that are valuable to the communities, but may not be recognized academically because they are not published by a university press. (Memorial University, 2013) • Publications by single authors (Finland's Ministry of Employment and the Economy Innovation, 2014) • Number of promotional articles/research publications on research results and products for users (Finland's Ministry of Employment and the Economy Innovation, 2014) • Proportion of research projects completed or milestones reached (in the planned time and within specified budgets) (Finland's Ministry of Employment and the Economy Innovation, 2014) • Case books, treatises, case comments (University of Saskatchewan, 2008; Franklin, 2007) • Production of documentary, fiction, experimental or animated films (Royal Irish Academy, 2011) • Discussion papers and newsletters produced (Federation for the 	<ul style="list-style-type: none"> • Number of technical reports (Memorial University, 2013) • Number of multimedia (cd, web) (Memorial University, 2013) • Number of creative works and performances completed and in progress (Memorial University, 2013; Royal Irish Academy, 2011) • Performance indicators (Finland's Ministry of Employment and the Economy Innovation, 2014; Royal Irish Academy, 2011) • Academic presses (Royal Irish Academy, 2011) • Preparation of an edition of classical/medieval philosophical texts (which requires an exceptional combination of philosophical, linguistic and palaeographical skills). (Royal Irish Academy, 2011) • Completed dissertations (Royal Netherlands Academy, 2013) • Collections for non-scientists/scholars and interested individuals (Royal Netherlands Academy, 2013) • Editions of texts (Royal Netherlands Academy, 2013) • % of published output of unit (Royal Netherlands Academy, 2013) 	<ul style="list-style-type: none"> • Number of performances (University of Saskatchewan, 2008; Federation for the Humanities and Social Sciences, 2014) • Number of case books, treatises, case comments (Franklin, 2007; University of Saskatchewan, 2008) • Number of books (print or online), book chapters, booklets. (University of Saskatchewan, 2008; Memorial University, 2013) • Gallery exhibition, new media installations and performance, net art and virtual and real space interactivity. Public media, public lectures and talks. (Royal Irish Academy, 2011) • Editions of texts (Royal Netherlands Academy, 2013) • Articles in specialist publications (not being primarily scientific/scholarly journals) (Royal Netherlands Academy, 2013) • New media such as “e-journals, public databases, blogs, and wiki documents.” (Federation for the Social Sciences and Humanities, 2012)

Sub-Category	Indicators			
1.3 Collaborations <i>Determining proportion of publications authored internationally, nationally, and with other disciplines</i>	Social Sciences and Humanities, 2012)	<ul style="list-style-type: none"> • # of collaborations (University of Saskatchewan, 2012) • Percentage of research at and of non-national and external researchers recruited by institution (Commission of the European Communities, 2005) • Share of foreigners in researchers, teacher-researchers, post-doc students and research support staff paid by the State or by universities (Bach & Llerena, 2007) • Organizing ‘forward thrust’ projects. Evaluating projects in terms of future trends. Recruiting personnel to open new fields. (Hellström, 2012) • Number of projects/programs involving other Research Chairs (Finland's Ministry of Employment and the Economy Innovation, 2014) • Number of joint project/program sharing major facilities (Finland's Ministry of Employment and the Economy Innovation, 2014) • Share of funded papers with no national authors (Reale, Inzelt, Lepori, & van den Besselaar, 2012) 	<ul style="list-style-type: none"> • International partnerships (Franklin, 2007; University of Saskatchewan, 2008) • Collaboration with institutions considered as internationally excellent (Franklin, 2007) • Cross-unit and cross-institution collaborative groups (Franklin, 2007; University of Saskatchewan, 2008) • Freedom of movement and affiliation between groups. Self-selection to pursue topics (Hellström, 2012) • Interdisciplinary and multidisciplinary achievements/outputs (Franklin, 2007; University of Saskatchewan, 2008) • Share of funded papers which are internationally co-funded (Reale, Inzelt, Lepori, & van den Besselaar, 2012) • Share of national output with international co-authors (Reale, Inzelt, Lepori, & van den Besselaar, 2012) • Intensity of funding for collaboration (Reale, Inzelt, Lepori, & van den Besselaar, 2012) 	<ul style="list-style-type: none"> • Managing and incentivizing research partnerships to explore new fields and avoid lock-ins (Hellström, 2012) • Co-authoring/presenting of research results (Piggot-Irvine, Rowe, & Ferkins, 2015) • Share of projects with at least one foreign partner (thus considering only collaborations in which foreign partners have an official role) (Primeri, Reale, Lepori, Laredo, Nedeva, & Thomas, 2014) • Visiting foreign researchers who have conducted or are conducting scientific/academic activities in the center/unit (The Severo Ochoa Centers of Excellence Program, 2011)
1.4 Funding <i>Grants researchers hold, infrastructure grants, share of</i>	<ul style="list-style-type: none"> • Funding knowledge circulation (Reale, Inzelt, Lepori, & van den Besselaar, 2012) 	<ul style="list-style-type: none"> • Raising research funding for project, unit, institution, or field (Royal Irish Academy, 2011) 	<ul style="list-style-type: none"> • Post-doctoral grants received by research staff members (The Severo Ochoa Centers of Excellence Program, 2011) 	



Sub-Category	Indicators		
<i>funding given to humanities and social sciences from countries, revenue generated etc.</i>	<ul style="list-style-type: none"> Budget and share of total direct research funding budget (Reale, Inzelt, Lepori, & van den Besselaar, 2012) Budget for Joint Research Programmes (JRP) (Reale, Inzelt, Lepori, & van den Besselaar, 2012) Budget for attracting researchers from abroad (Reale, Inzelt, Lepori, & van den Besselaar, 2012) Extent of cross-border funding schemes (Reale, Inzelt, Lepori, & van den Besselaar, 2012) \$ of grants received (University of Saskatchewan, 2012) Federally Funded Share of Expenditures for Academic RD in the Humanities and Other Selected Fields (American Academy of the Arts & Sciences, 2013) 	<ul style="list-style-type: none"> Prestigious national and international research grants, personal funding (Royal Netherlands Academy, 2013) Fundraising (Royal Netherlands Academy, 2013) Personal grants (Royal Netherlands Academy, 2013) Analysis of funding for mobility (Reale, Inzelt, Lepori, & van den Besselaar, 2012) State funding for the humanities (Royal Irish Academy, 2011) 	<ul style="list-style-type: none"> Sponsored research funding (Tremblay, Zohar, Bravo, Potsepp, & Barker, 2010) # of grants received (University of Saskatchewan, 2012; Bloch, Sørensen, Graversen, Schneider, Schmidt, Aagaard, & Mejlgaard, 2014) \$ of revenue generated Effective openness of the research funding (University of Saskatchewan, 2012) Numbers and Revenues of Local, State, and Regional Humanities (and Humanities and Arts) Councils (American Academy of the Arts & Sciences, 2013)
1.5 Prizes and Awards <i>Prizes that recognize research achievement</i>	<ul style="list-style-type: none"> Number of academic prizes/awards received; nominations for prizes/awards (Baker, 2011; Bloch, Sørensen, Graversen, Schneider, Schmidt, Aagaard, & Mejlgaard, 2014) Faculty national awards (Burke & Minassians, 2002) 	<ul style="list-style-type: none"> National and international awards and citations (University of Saskatchewan, 2008) Nobel prizes and other prestigious awards (Wilburtz, 2013) 	<ul style="list-style-type: none"> Number of civil society prizes/awards received; nominations for prizes/awards (Royal Netherlands Academy, 2013)
1.6 Acknowledgements <i>Proxies of influence</i>	<ul style="list-style-type: none"> Adjudication of awards; being asked to adjudicate awards (Memorial University, 2013) Citations in grant applications (Federation for the Humanities and Social Sciences, 2014) 	<ul style="list-style-type: none"> Appearing at invited lectures (Royal Irish Academy, 2011) Invited chapters appearing in books edited, or with contributions, by leading international scholars in the field. (Royal Irish Academy, 2011) 	<ul style="list-style-type: none"> Faculty recommendations (Holbrook, 2013) Angry letters from important people (Holbrook, 2013) Lawsuits (Holbrook, 2013) Arrests (Holbrook, 2013)

Sub-Category	Indicators		
	<ul style="list-style-type: none"> • Number of invitations to present at national and international conferences and congresses with business (Finland's Ministry of Employment and the Economy Innovation, 2014) • Reputation as measured by survey (Federation for the Humanities and Social Sciences, 2014) 	<ul style="list-style-type: none"> • Demonstrable utilisation by peers of researcher's output (Royal Netherlands Academy, 2013) • Demonstrable recognition by peers for researcher's output (Royal Netherlands Academy, 2013) • Esteem of senior fellows (Holbrook, 2013) 	<ul style="list-style-type: none"> • Invited editorship of a special edition of an international journal (Royal Irish Academy, 2011) • Post-publication peer-review (e.g., book reviews, dedicated symposia) (Federation for the Humanities and Social Sciences, 2014)
<p>1.7 Service <i>The action of helping or doing voluntary work for a person, organization, etc.</i></p>	<ul style="list-style-type: none"> • Amount of public service completed by an individual, unit, or institution (Burke & Minassians, 2002) • Externally reviewing (national/international) submitted journal articles, book proposals, edited volumes, and manuscripts (Royal Irish Academy, 2011) • Internal and external administrative activities related to the functioning of the University (e.g., program chair, coordinator, department head, advising, recruiting, external examiner for dissertations etc.) (Memorial University, 2013) 	<ul style="list-style-type: none"> • Organising international conferences (Royal Irish Academy, 2011) • Serving on a committee that ranks grant or scholarship applications (Memorial University, 2013) • Membership of juries for thesis awards (Royal Netherlands Academy, 2013) • # of workshops, public presentations, conferences hosted, and meetings facilitated (University of Saskatchewan, 2012) 	<ul style="list-style-type: none"> • Service in an association or society concerned with the improvement of teaching and learning (Memorial University, 2013) • Editing or contributing to a professional journal on teaching one's subject (Memorial University, 2013) • Organizing or hosting conferences, departmental speaker series, talks (Memorial University, 2013)
<p>1.8 Advancement of Knowledge <i>New or improved research tools, methodology, etc.</i></p>	<ul style="list-style-type: none"> • Databases created (Federation for the Social Sciences and Humanities, 2012) • Research tools, and library tools. (Federation for the Social Sciences and Humanities, 2012) 	<ul style="list-style-type: none"> • Improved research systems (Bornmann, 2013) 	
<p>1.9 Process <i>Conferences, scholarly lectures, etc.</i></p>	<ul style="list-style-type: none"> • Number of conference papers/proceedings (Ernø-Kjølhede & Hansson, 2011; Royal Netherlands Academy, 2013) 	<ul style="list-style-type: none"> • Scholarly lectures and other professional presentations (Memorial University, 2013) 	<ul style="list-style-type: none"> • Seminars/ symposia/ conferences – number; type; number of participants (Masset, Mulmi, & Sumner, 2011)

4 Capacity Building

Table 2

Capacity Building

Sub-Category	Indicators
<p>2.1 Highly Qualified Personnel Includes measures of graduate students, faculty members, researchers etc.</p> <ul style="list-style-type: none"> • Graduate student support (Burke & Minassians, 2002) • Graduate quantitative and writing skills (Burke & Minassians, 2002) • Graduates who participated in community service (Burke & Minassians, 2002) • Preparation of new students (Burke & Minassians, 2002) • Satisfaction (alumni, employers, students) (Burke & Minassians, 2002) • Students participating in research (Burke & Minassians, 2002) • Number of students studying abroad (Burke & Minassians, 2002) • Teacher training (Burke & Minassians, 2002) • Workforce training (Burke & Minassians, 2002) • Research competence development (Hellström, 2012) • Mentoring activities supporting learning. (Hellström, 2012) • Success of graduate/undergraduate presentations and grants (Holbrook, 2013) 	<ul style="list-style-type: none"> • Number of capacity building experiences for younger (Bloch, Sørensen, Graversen, Schneider, Schmidt, Aagaard, & Mejlgaard, 2014) researchers (phd, postdoc) • Number of industrial phds (Bornmann, 2013) • Number of graduates/graduation rate (Burke & Minassians, 2002) • Well-educated graduates that flow to firms (Bornmann, 2013) • Number of professional development courses offered (Bornmann, 2013) • Number of degrees awarded (Burke & Minassians, 2002) • Time to degree (Burke & Minassians, 2002) • Workforce and economic development (Burke & Minassians, 2002) • Job placement rates (Burke & Minassians, 2002) • Licensure test scores • Transfer rates (Burke & Minassians, 2002)

Sub-Category	Indicators		
	<ul style="list-style-type: none"> • Training – number of trainees; extent of training; duration of training; number and type of manuals (Masset, Mulmi, & Sumner, 2011) • Number of institute researchers finding employment elsewhere in the field (Finland's Ministry of Employment and the Economy Innovation, 2014) • Skills, knowledge gained and lessons learned which are transferable to other areas of project team members' life and work (Piggot-Irvine, Rowe, & Ferkins, 2015) • Members more aware of self in relation to the concern/issue in the community or organization (Piggot-Irvine, Rowe, & Ferkins, 2015) • Shifted perspectives (Piggot-Irvine, Rowe, & Ferkins, 2015) 	<ul style="list-style-type: none"> • Population with tertiary education (Commission of the European Communities, 2005) • Integration of research as a learning outcome in courses (Federation for the Humanities and Social Sciences, 2014) • Number and quality of experiential learning / research opportunities for students (Federation for the Humanities and Social Sciences, 2014) • Number of Post-Docs in Centres Career steps of HR employed at centres and job mobility of employees (Finland's Ministry of Employment and the Economy Innovation, 2014) • Number of specialized training opportunities created by Networks (Finland's Ministry of Employment and the Economy Innovation, 2014) • Number of publications and conferences involving trainees (Finland's Ministry of Employment and the Economy Innovation, 2014) 	<ul style="list-style-type: none"> • Percentage of doctoral programmes with industry placements by institution and percentage of researchers that benefit (Commission of the European Communities, 2005) • Education of students in close cooperation with the business community (Ernø-Kjølhede & Hansson, 2011) • Number and quality of experiential learning/ research opportunities for students (Federation for the Humanities and Social Sciences, 2014) • Greater valuing of trying new ideas and being creative (Piggot-Irvine, Rowe, & Ferkins, 2015) • Number of jobs created within consortia (all partners) (Finland's Ministry of Employment and the Economy Innovation, 2014)
<p>2.2 Additional Funding <i>Funding from external sources including donations from citizens.</i></p>	<ul style="list-style-type: none"> • Technological investments by private and public investors (Masset, Mulmi, & Sumner, 2011) • Technological investments by a specific institution (Masset, Mulmi, & Sumner, 2011) • Private funding charitable giving for humanities activities (American Academy of the Arts & Sciences, 2013) 	<ul style="list-style-type: none"> • Percentage of individual grants awarded by Community (Commission of the European Communities, 2005) • Amount of commissioned research by societal actors (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) 	<ul style="list-style-type: none"> • Trends in R&D investment in [Country] (Finland's Ministry of Employment and the Economy Innovation, 2014) • Industry contributions as a proportion of total funding (Finland's Ministry of Employment and the Economy Innovation, 2014)

Sub-Category	Indicators		
	<ul style="list-style-type: none"> Individual, Corporate, and Foundation giving to arts, culture, and humanities organizations (American Academy of the Arts & Sciences, 2013) Sources of funding for academic research and development in the humanities and other selected Fields (American Academy of the Arts & Sciences, 2013) Change in the adequacy of operational support of research infrastructure as a result of the research activity (Baker, 2011) Amount of third-party funding (Bornmann, 2013) 	<ul style="list-style-type: none"> External funding for other research (University of Saskatchewan, 2008) In-kind contributions made by communities to faculty research In-kind contributions that faculty members make to communities (Memorial University, 2013) % contribution of industry to total budget (Finland's Ministry of Employment and the Economy Innovation, 2014) Trends in R&D investment of partners (Finland's Ministry of Employment and the Economy Innovation, 2014) 	<ul style="list-style-type: none"> Foreign investment (Burke & Minassians, 2002) Private fundraising (Burke & Minassians, 2002) Amount of external funding relating to research cooperation with non-academic institutions (Bornmann, 2013)
2.3 Teaching and Learning	<ul style="list-style-type: none"> Faculty workload (Burke & Minassians, 2002) Faculty Credentials (Burke & Minassians, 2002) Student-faculty ratios (Burke & Minassians, 2002) Class size (Burke & Minassians, 2002) Accredited programs (Burke & Minassians, 2002) Faculty, availability (Burke & Minassians, 2002) Faculty evaluation (Burke & Minassians, 2002) Teaching material, course development (Ernø-Kjølhede & Hansson, 2011) 	<ul style="list-style-type: none"> Ability to attract and retain distinguished, entrepreneurial faculty (Gardner, Fong, & Huang, 2010) Influencing curriculum design (Holbrook, 2013) Research seminars, course or curriculum development; course materials prepared for students (Memorial University, 2013) The presence of one's research and creative work in university courses and in schools (Memorial University, 2013) Number of courses developed and introduced (Finland's Ministry of Employment and the Economy Innovation, 2014) 	<ul style="list-style-type: none"> Invitations to contribute to the teaching literature (Memorial University, 2013) Availability of curricula/courses and effective take-up of professional training in line with industrial needs (Finland's Ministry of Employment and the Economy Innovation, 2014) Number of participant (non-university) staff contributing to research training and/or teaching (Finland's Ministry of Employment and the Economy Innovation, 2014) symposia/seminars held (Finland's Ministry of Employment and the Economy Innovation, 2014) Development of course materials/new courses (Federation

Sub-Category	Indicators
	<ul style="list-style-type: none"> Teaching/lecture hours for master's and PhD students (Royal Netherlands Academy, 2013) The development of university and public school curricula (Federation for the Social Sciences and Humanities, 2012)

5 Economy

Table 3

Economy

Sub-Category	Indicators
3.1 Innovation <i>Mention of innovation</i>	<ul style="list-style-type: none"> % of projects that lead to one or more commercialized innovations or are brought from one stage of the innovation process to another (Cozzarin, 2008)
3.2 Commercialization <i>Patents, spin offs, copyright etc.</i>	<ul style="list-style-type: none"> Quality of results as e.g. Measured in number of peer reviewed publications innovative research and innovation (Finland's Ministry of Employment and the Economy Innovation, 2014) Number of patent applications (Bornmann, 2013) Number of patents produced (Bornmann, 2013) Number of transferred patents (Finland's Ministry of Employment and the Economy Innovation, 2014) Income derived from patents, patent licensing, copyright, and trademark (Federation for the Humanities and Social Sciences, 2014) % of companies participating in the program still conducting research Number of confidential disclosure agreements executed during the year to enable disclosure of know-how (Gardner, Fong, & Huang, 2010) Number of material transfer agreements executed (Gardner, Fong, & Huang, 2010) Number of business ideas incubated (Finland's Ministry of Employment and the Economy Innovation, 2014) Increased private sector capacity and receptivity the results of

Sub-Category	Indicators		
	<ul style="list-style-type: none"> • Number of expenditures (Commission of the European Communities, 2005) • Number of active licenses (Gardner, Fong, & Huang, 2010) • Number of licenses/options executed within the year based only on know-how (Gardner, Fong, & Huang, 2010) • Total income from royalties (Gardner, Fong, & Huang, 2010) • Number of full-time professionals in technology transfer offices (Gardner, Fong, & Huang, 2010) • Number of commercialization agreements (Franklin, 2007; University of Saskatchewan, 2008) • Legal expenditures on protection of intellectual property (Gardner, Fong, & Huang, 2010) • Number of industry linkages (Franklin, 2007; University of Saskatchewan, 2008) • Average gross commercialization income (University of Saskatchewan, 2008) 	<ul style="list-style-type: none"> • +5 years after the project is completed (Cozzarin, 2008) • Predictions of outcomes of technology investments (Masset, Mulmi, & Sumner, 2011) • Number and impact of breakthrough technologies (Finland's Ministry of Employment and the Economy Innovation, 2014) • Market orientation and (inter)national relevance to industry (Finland's Ministry of Employment and the Economy Innovation, 2014) • Addresses significant challenges that meet business needs (Finland's Ministry of Employment and the Economy Innovation, 2014) 	<ul style="list-style-type: none"> • research and development (Finland's Ministry of Employment and the Economy Innovation, 2014) • Share of funded patents in total national patent output (Reale, Inzelt, Lepori, & van den Besselaar, 2012) • New or improved products/services/processes launched (Finland's Ministry of Employment and the Economy Innovation, 2014) • Addresses significant challenges that meet business needs (Finland's Ministry of Employment and the Economy Innovation, 2014)
3.3 Tools <i>Creation of tools, software, products, services, processes, etc.</i>	<ul style="list-style-type: none"> • Number of new products provided (Bloch, Sørensen, Graversen, Schneider, Schmidt, Aagaard, & Mejlgaard, 2014) • Number of services provided (Bornmann, 2013) • Number of tools or instruments created (Bornmann, 2013) 	<ul style="list-style-type: none"> • New program and service development (Davies, Nutley, & Walter, 2005) • Number of artifacts, exhibitions, standards, designs created (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) • Number of guidelines, manuals, codes of conduct (De Jong, van 	<ul style="list-style-type: none"> • Number of new prototypes and demonstration facilities (Ernø-Kjølhede & Hansson, 2011) • New processes, concepts, techniques, models, typologies (Ernø-Kjølhede & Hansson, 2011) • New software created (Royal Netherlands Academy, 2013) • Contributions to technological advances (Franklin, 2007)

Sub-Category	Indicators		
	<ul style="list-style-type: none"> Number of new or significantly improved processes put into practice (Cozzarin, 2008) # of publicly available products and services (University of Saskatchewan, 2012) 	<ul style="list-style-type: none"> Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) Procedures for performance measurement by industrial partners (Finland's Ministry of Employment and the Economy Innovation, 2014) 	<ul style="list-style-type: none"> Tools/instruments mentioned in full texts (Moed, Linmans, Nederhof, Zuccala, López Illescas, & de Moya Anegón, 2009) New technologies created (Cozzarin, 2008; Cressman, Holbrook, Lewis, & Wixted, 2009)

6 Society & Culture

Table 4

Society & Culture

Sub-Category	Indicators		
4.1 Collaborations with Non-Academic Partners	<ul style="list-style-type: none"> Partnerships between universities and external parties/stakeholders (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) Coordination between specialisms/disciplines through learning mechanisms. Strategic integration of disciplines (Hellström, 2012) Perceived value of community/university engagement Entity allows local groups who have an interest in their work to contribute their ideas or become partners on a project (University of Saskatchewan, 2012) 	<ul style="list-style-type: none"> Capturing the effects of collaboration and integration via common topics, core curricula and elimination of bottlenecks (Hellström, 2012) Mobilization of groups or researchers to work on a particular problem requiring the input of many. Assembling epistemic resources to achieve a particular goal (Hellström, 2012) Protests/demonstration/sit-ins (Holbrook, 2013) Sustained community trust and support, reflected in returning to do further research with the same community. (Memorial University, 2013) 	<ul style="list-style-type: none"> Number of formalized collaborations (Bornmann, 2013) Number and quality of partnerships between researchers and the private sector (Federation for the Humanities and Social Sciences, 2014) Increased networking/collaboration between research partners, firms, community groups (Bornmann, 2013) Actual collaboration in research, testing and evaluation with stakeholders (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) Number of new participants and/or associate members (Finland's Ministry of Employment and the Economy Innovation, 2014)

Sub-Category	Indicators		
	<ul style="list-style-type: none"> Partners trust that each shares a commitment and willingness to collaborate for a similar vision (Burford et al., 2013) Culture of collaboration across groups. Many concrete interrelated interaction activities (Hellström, 2012) Number of advisory roles and board memberships (Federation for the Humanities and Social Sciences, 2014) Number of personnel contributing from each participant (Finland's Ministry of Employment and the Economy Innovation, 2014) 	<ul style="list-style-type: none"> Joint publications among science-industry partners (Finland's Ministry of Employment and the Economy Innovation, 2014) Nature of links between researchers and partners (Finland's Ministry of Employment and the Economy Innovation, 2014) 	<ul style="list-style-type: none"> New partnerships developed (Piggot-Irvine, Rowe, & Ferkins, 2015) Proposals submitted with partners for new projects (Piggot-Irvine, Rowe, & Ferkins, 2015) Number and quality of partnerships between researchers and community groups (Federation for the Humanities and Social Sciences, 2014)
4.2 Contribution to Societal Debate <i>Media coverage</i>	<ul style="list-style-type: none"> Contributions to public debates and appearances in the national or international media as an expert (Royal Netherlands Academy, 2013) Press Releases – number of press releases published and in what for (Masset, Mulmi, & Sumner, 2011) Quotes in media (Holbrook, 2013) 	<ul style="list-style-type: none"> Other kinds of invitations based on one's reputation as a teacher, such as a media interview on a successful teaching innovation (Memorial University, 2013) Requests for media appearances (Federation for the Humanities and Social Sciences, 2014) 	<ul style="list-style-type: none"> Media coverage of research (newspapers/ TV / online) (Federation for the Humanities and Social Sciences, 2014) Media mentions (Holbrook, 2013) Press Conferences – number of press articles that resulted and in what for (Masset, Mulmi, & Sumner, 2011)
4.3 Web Analytics, Downloads, & Altmetrics <i>Proxies of influence</i>	<ul style="list-style-type: none"> Research-related social media (Federation for the Humanities and Social Sciences, 2014) Social networking contacts (Holbrook, 2013) Downloads from databases or open access repositories (Federation for the Humanities and Social Sciences, 2014) 	<ul style="list-style-type: none"> # of website hits, Facebook likes, and Twitter followers (University of Saskatchewan, 2012) Public use of research-based web resources on social and cultural issues (Federation for the Humanities and Social Sciences, 2014) 	<ul style="list-style-type: none"> Number of article or product downloads (Royal Netherlands Academy, 2013) Blog mentions (Holbrook, 2013) Trending in social media (Holbrook, 2013)
4.4 Knowledge, Attitude, and Behaviour Impacts	<ul style="list-style-type: none"> Post research identification of a direct or derived societal impact (Baker, 2011) 	<ul style="list-style-type: none"> Impact on artistic, performance, cultural and literary work (Franklin, 2007) 	<ul style="list-style-type: none"> Demonstrable contribution to social issues (citations, references, knowledge utilisation in public media, including TV/radio science

Sub-Category	Indicators		
	<ul style="list-style-type: none"> Entity contributes positively to society by working to address social problems or global issues (Burford et al., 2013.) As a result of the entity's messages or activities, people have their own personal initiatives with similar goals (Burford et al., 2013) 	<ul style="list-style-type: none"> Decision-making takes into account the social, economic, and environmental needs for future generations (Burford et al., 2013) People have a sense of power that they can effect change (Burford et al., 2013) 	<ul style="list-style-type: none"> programmes) (Royal Netherlands Academy, 2013) Technology adoption (Masset, Mulmi, & Sumner, 2011) Change in attitudes (Bornmann, 2013)
4.5 Equity in Society	<ul style="list-style-type: none"> Reduced poverty (Masset, Mulmi, & Sumner, 2011) Sustained livelihoods of the poor (Masset, Mulmi, & Sumner, 2011) Increased household income (Masset, Mulmi, & Sumner, 2011) Socio-economic, geographic and historical considerations (high vacancy rates, cost of living, housing affordability, employment rates, etc.) (Canadian Homelessness Research Network, 2013) 	<ul style="list-style-type: none"> Increased diversity (Holbrook, 2013) People aren't stigmatized because of their behaviour, appearance or activities including economic activities (i.e. Sex work) and substance use. (Canadian Homelessness Research Network, 2013) 	<ul style="list-style-type: none"> A formal anti-discriminatory policy is operationalized through an active commitment to reduce and eliminate issues such as racism, sexism and homophobia. (Canadian Homelessness Research Network, 2013)
4.6 Environment	<ul style="list-style-type: none"> Policy debate on climate change or the environment has been influenced by research (Bornmann, 2013) Action is consciously taken to share with others how to protect and restore the natural environment (Burford et al., 2013) Long-term commitments to protect the environment are created Entity is aware of the interconnectedness between the environment and their sphere of activity (Burford et al., 2013) People have respect for nature (Burford et al., 2013) 	<ul style="list-style-type: none"> Action is consciously taken to contribute to a greater understanding of the way nature is organized in systems and cycles (Burford et al., 2013) Action is consciously taken to contribute to a greater understanding of the natural world as a source of personal fulfillment (Burford et al., 2013) Number of activities/projects towards goal of environmental sustainability (Burford et al., 2013) 	<ul style="list-style-type: none"> The environment and community of life is celebrated (Burford et al., 2013) Entity acts to reduce its environmental impact or remedy its contribution to (Burford et al., 2013) Entity tries to have a positive effect on the natural environment (Burford et al., 2013) Entity implements a policy of purchasing (Burford et al., 2013) Environmentally sustainable products, e.g., recycled paper, even if cheaper alternatives exist (Burford et al., 2013)

Sub-Category	Indicators		
4.7 Health	<ul style="list-style-type: none"> Improvements in child nutrition (Masset, Mulmi, & Sumner, 2011) 	<ul style="list-style-type: none"> Improvements in health care (e.g. Improved surgical treatment of brain tumours through pre-op MRI and intra-op ultrasound) (Tremblay, Zohar, Bravo, Potsepp, & Barker, 2010) 	<ul style="list-style-type: none"> Improved regulatory measures (e.g. For drinking water quality) (Tremblay, Zohar, Bravo, Potsepp, & Barker, 2010)

7 Practice

Table 5

Practice

Sub-Category	Indicators		
5.1 Stakeholder Indicators <i>Indicators relating to stakeholder perspectives, training etc.</i>	<ul style="list-style-type: none"> Communications and interactions with stakeholders and the wider public (emails, visits, workshops, media publicity, etc.) (Finland's Ministry of Employment and the Economy Innovation, 2014) Feedback from stakeholders and communication summaries (Finland's Ministry of Employment and the Economy Innovation, 2014) Research developments (based on stakeholder input and discussions) (Finland's Ministry of Employment and the Economy Innovation, 2014) A clear planning process including how the practice was developed, and what agencies, systems and individuals were consulted. 	<ul style="list-style-type: none"> Opinion of stakeholders (Finland's Ministry of Employment and the Economy Innovation, 2014) Survey of partners (Finland's Ministry of Employment and the Economy Innovation, 2014) The recipients have evidence of positive feedback on the impact (Piggot-Irvine, Rowe, & Ferkins, 2015) Enhanced understanding of vocabulary, perspectives, preferences and so forth. among different boundary groups (interactional expertise) (Piggot-Irvine, Rowe, & Ferkins, 2015) That clients' feedback on the quality of the practice and its outcomes is collected. (Canadian 	<ul style="list-style-type: none"> Occasional/structural interaction with stakeholders to establish relevance (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) Opinion of partners regarding changes in capacity and receptivity in their organizations (Finland's Ministry of Employment and the Economy Innovation, 2014) Core users' assessment of relevance and applicability - including ability to implement results in practice and ability to work across disciplines and sectors (Ernø-Kjølhede & Hansson, 2011) Level (%,#) of participation by key stakeholders, and their constructive early 'reactions' (e.g.

Sub-Category	Indicators		
	<p>(Canadian Homelessness Research Network, 2013)</p> <ul style="list-style-type: none"> • Mechanisms that are in place for ongoing feedback and complaints (for non-anti-discriminatory issues) (Canadian Homelessness Research Network, 2013) 	<p>Homelessness Research Network, 2013)</p> <ul style="list-style-type: none"> • A practice design that reflects the needs of its population. (Canadian Homelessness Research Network, 2013) 	<p>take-up, expressed feedback) (Knowledge Brokers Forum, 2011)</p>
<p>5.2 Reach Indicators <i>Number of people that received research product, or in a network.</i></p>	<ul style="list-style-type: none"> • Establishment of formalized knowledge networks (Ernø-Kjølhede & Hansson, 2011) • Establishment of knowledge networks and other cooperation relations focusing on knowledge production (Ernø-Kjølhede & Hansson, 2011) • # of outputs (information, \$, service transactions) (Knowledge Brokers Forum, 2011) • Delivery milestone achievement (Knowledge Brokers Forum, 2011) • Number and nature of network milestones and objectives achieved (Finland's Ministry of Employment and the Economy Innovation, 2014) • Number of partners positioned in high value segments of production chain (Finland's Ministry of Employment and the Economy Innovation, 2014) • Dissemination/presentation of findings and learnings to boundary partners and wider community (Piggot-Irvine, Rowe, & Ferkins, 2015) 	<ul style="list-style-type: none"> • Evidence demonstrating the impacts of networks on national, international norms, regulations and policies (Finland's Ministry of Employment and the Economy Innovation, 2014) • Evidence demonstrating the networks' contributions to the health and social well-being of Canadians (Finland's Ministry of Employment and the Economy Innovation, 2014) • Creation or expansion of stakeholder networks or network relations, new contacts (Piggot-Irvine, Rowe, & Ferkins, 2015) 	<ul style="list-style-type: none"> • Number and size of firms, sectors, provinces and regions using results of the network research (Finland's Ministry of Employment and the Economy Innovation, 2014) • New global and local linkages (Cressman, Holbrook, Lewis, & Wixted, 2009) • Use of research output by targeted audiences (Davies, Nutley, & Walter, 2005) • Number of university-industry links within the network (Finland's Ministry of Employment and the Economy Innovation, 2014) • Story telling (in a health promotion project involving radio) (Federation for the Social Sciences and Humanities, 2012) • Demonstrable utilisation by external target groups (Royal Netherlands Academy, 2013) • Number of works translated (Royal Netherlands Academy, 2013)

Sub-Category	Indicators		
5.3 Program or Service Delivery Indicators	<ul style="list-style-type: none"> • Demonstrable civil-society effects of research (Royal Netherlands Academy, 2013) • That the practice fills a gap in services for the target population. (Canadian Homelessness Research Network, 2013) • An effective process for complaints (Canadian Homelessness Research Network, 2013) • State or level of health, disease, incidence, etc. (Knowledge Brokers Forum, 2011) 	<ul style="list-style-type: none"> • An effective and comprehensive intake system that includes basic information about the client, their background, their needs and other relevant data. (Canadian Homelessness Research Network, 2013) • That the organization, through its practice, assesses each client's level of acuity, risk and resilience in order to match the client to an appropriate level of service and support (Canadian Homelessness Research Network, 2013) 	<ul style="list-style-type: none"> • # or % of entities or individuals showing intended actions/adoptions (Knowledge Brokers Forum, 2011) • Participants and boundary partners change in perspective and knowledge, attitude and skills (both individually and collectively) (Piggot-Irvine, Rowe, & Ferkins, 2015) • A shared intake and assessment tool to reduce duplication and support effective service delivery (in communities with multiple services) (Canadian Homelessness Research Network, 2013)
5.4 Requests from Communities for Researchers to Advise on a Problem <i>Consulting – not policy specific</i>	<ul style="list-style-type: none"> • Academic researchers enabled to conduct research 'in the field' by working in practice concurrently (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) • Requests for consultancy/advice from community groups (Federation for the Humanities and Social Sciences, 2014) 	<ul style="list-style-type: none"> • Contributions to service facilities, community organizations, public debate (University of Saskatchewan, 2008) • Demonstrable recognition by external target groups (Royal Netherlands Academy, 2013) • Special problem requests with faculty (Holbrook, 2013) 	<ul style="list-style-type: none"> • Projects commissioned by or carried out in cooperation with target groups (Royal Netherlands Academy, 2013) • Town hall meetings (Holbrook, 2013)
5.5 Contributions to Wider Community <i>Events with Non-Academic Audiences</i>	<ul style="list-style-type: none"> • Public forums (Federation for the Social Sciences and Humanities, 2012) • Attendance at public events (Federation for the Humanities and Social Sciences, 2014) 	<ul style="list-style-type: none"> • Lectures for professionals or a wide audience (Royal Netherlands Academy, 2013) 	<ul style="list-style-type: none"> • Participation in public education programs (Holbrook, 2013)
5.6 Equity in the Workplace	<ul style="list-style-type: none"> • Entity's activities or events create a safe environment for people (Burford et al., 2013) 	<ul style="list-style-type: none"> • Decision-making processes are ethical (Burford et al., 2013) • Regular monitoring of how people are treated (Burford et al., 2013) 	<ul style="list-style-type: none"> • People feel that they are treated equitably and with fairness (Burford et al., 2013)

Sub-Category	Indicators		
<ul style="list-style-type: none"> • People feel that there is transparent communication (Burford et al., 2013) • Different points of view are heard and incorporated (Burford et al., 2013) • People feel that their own individual identity and approach is respected (Burford et al., 2013) • Women feel they are valued (Burford et al., 2013) • Entity acts in a manner that is impartial and non-discriminatory (not discriminating on the basis of nationality, ethnic origin, colour, creed or religion) (Burford et al., 2013) • Differences of opinion are acknowledge and valued through dialogue (Burford et al., 2013) • Individuals express their own opinions (Burford et al., 2013) • People feel that their opinions are respected (Burford et al., 2013) • People become aware of how their existing knowledge, skills, resources, and/or traditions can contribute to a project or the whole entity (Burford et al., 2013) • People feel that the work environment is pleasant and harmonious (Burford et al., 2013) 	<ul style="list-style-type: none"> • Teams include members with different characteristics (e.g., gender, culture, age, and other aspects of individual difference such as personality) (Burford et al., 2013) • People have self-respect (Burford et al., 2013) • People are inclusive (talk to everyone and no one is left out) (Burford et al., 2013) • People respect the differences in others (Burford et al., 2013) • People feel that they are encouraged to explore their own ideas and/or reflect on their own individuality (Burford et al., 2013) • People feel that they are encouraged to develop their own visions and goals for projects, and/or for the whole entity (Burford et al., 2013) • People investigate what is right and good by themselves, rather than adopting other people's opinions (Burford et al., 2013) 	<ul style="list-style-type: none"> • People treat each other with equity and fairness (Burford et al., 2013) • Truth-seeking, non-judgmental, confidential channels are in place for individuals/teams seeking guidance on the application of ethics, reporting violations and examining violations of ethics (Burford et al., 2013) • People feel that they can participate in the vision and activities of the entity or project without compromising their personal beliefs or values (Burford et al., 2013) • People's behaviour is consistent with their words (Burford et al., 2013) • Ongoing mutual respect for each other and appreciation of diversity (Piggot-Irvine, Rowe, & Ferkins, 2015) • People are perceived to be respectful in their interactions with others (Burford et al., 2013) • People are perceived to be trustworthy (Burford et al., 2013) 	

8 Policy

Table 6

Policy

Sub-Category	Indicators
6.1 Requests for Research <i>Number of consultations/presentations, reports to policymakers/decision makers, serving on panels, etc.</i>	<ul style="list-style-type: none"> Consulting for governments (Federation for the Humanities and Social Sciences, 2014) Participation in legislation and strategy planning (Bornmann, 2013) Number of board memberships (Federation for the Humanities and Social Sciences, 2014) Consulting for think-tanks (Federation for the Humanities and Social Sciences, 2014) Contributions to expert meetings (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) Invitations to participate as an expert witness, an advisor, on an expert panel, or committee (Federation for the Humanities and Social Sciences, 2014) Commissioned reports (Federation for the Humanities and Social Sciences, 2014) Advisory and consultancy roles (De Jong, van Arensbergen, Daemen, van der Meulen, & van den Besselaar, 2011) Management to be on committees adjudicating policy changes (Masset, Mulmi, & Sumner, 2011)
6.2 Changes in Public Policy <i>Proxies of influence in public policy</i>	<ul style="list-style-type: none"> Citations in government documents (Federation for the Humanities and Social Sciences, 2014) Level of commitment of governments to agreement (Masset, Mulmi, & Sumner, 2011) Government agency linkages (University of Saskatchewan, 2008) Mention by policy maker (Holbrook, 2013) Number and nature of policies and practices of the user sector have been influenced by research findings (Finland's Ministry of Employment and the Economy Innovation, 2014) Policymakers' perceptions of relevance of the studies (Masset, Mulmi, & Sumner, 2011) Quotes in policy (Holbrook, 2013) The presence or absence of legislation and/or policy impedes or enables the development and implementation of the practice (Canadian Homelessness Research Network, 2013) Changes (i.e., implementation, reinforcement) in policies attributable to policy research (Masset, Mulmi, & Sumner, 2011)

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