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FROM MEASURING IMPACTS TO MAPPING IMPACT SYSTEMS:

LESSONS FOR THE IMPACT ASSESSMENT OF RESEARCH INFRASTRUCTURES FROM A STUDY ON THE EUROPEAN SOCIAL SURVEY ERIC[1]

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ABSTRACT

Commonly agreed standards and methodologies for Research Infrastructure (RI) impact assessment continue to be elusive, despite the efforts of several expert groups across the globe. Against this backdrop, Technopolis conducted a major impact study of the European Social Survey ERIC in 2016/17. A mixed methods approach yielded a broad range of valuable findings on the academic, non-academic and teaching impacts of the ESS. The study also arrived at the notion of 'impact systems': sets of RI-, country-, and sector-specific framework conditions that simultaneously highlight impact pathways, help formulate avenues for future impact optimisation, and enable meaningful comparison and benchmarking between participating countries. This paper posits that mapping impact systems will be a valuable component to any future RI impact study and contributes to the on-going debates about RI impact assessment standards.

BACKGROUND – IMPACT ASSESSMENT OF RESEARCH INFRASTRUCTURES (RIS)

Research Infrastructures (RIs) are focal points for continuous interaction between scientific, technological, socio-economic, political and policy development.[2] But operating RIs requires a growing share of public funding, and government and research funding institutions are increasingly interested in the the added value that RIs provide. Yet, it is difficult to quantify and understand returns on investments into RIs in conventional commercial terms. Investment in RIs brings a broad range of benefits that spread across wider society rather than serving merely the direct stakeholders (owners and users of RIs).

In 2014, The Global Science Forum (GSF) set up an expert group to examine potential priorities for RI policy that should be addressed at the global level. The GSF secretariat then carried out a review of existing reports and identified that a standard impact assessment framework is missing and there is no agreed model shared between funding agencies and/or RIs' organisations to measure socio-economic impact.[3] Other organisations, including most recently an ESFRI Strategic Working Group, are dealing with these concerns.

Currently, a heterogeneous set of methods is applied to capture the effects of RIs, most of which address standard economic impacts (direct effects) and to some extent economic multipliers. However, comprehensive and methodologically demanding studies are still rare. Core aspects of RI benefits, such as their impact on policy, human and social capital formation and innovation, are not extensively explored. Moreover, impact assessment will differ with scale (e.g. national mid-scale vs. large international facilities), type (e.g. different pathways and productive interactions for single-sited vs. distributed vs. virtual e-RI) or discipline (e.g. applied technical science vs. social sciences and humanities vs. environmental observation platforms).[4] A fully standardised set of performance indicators uniformly applicable to all RIs is unlikely ever to materialise: the breadth of different RIs (thematically, conceptually, structurally) does not appear to allow for such a level of standardisation in evaluation and impact assessment. However, a move towards more common frameworks (even if this does not extend to the point of standard indicators) would benefit the policy community, especially in terms of comparative endeavours to weigh up the value of various RIs.

1 Acknowledgements: Jelena Angelis, Annemieke Biesma, Victoria Blessing, Neil Brown, Anneloes de Ruiter, Katre Elias-Taal, Patrick Eparvier, Samuel Grange, Adam Krcal, Bea Mahieu, Ernestine Mbengue, Göran Melin, Kerli Müürisepp, Reda Nausedaite, Kalle Nielsen, Loic Perroud, Leonor Rivoire, Jasper Schipper, Paul Simmonds, Ingvild Storsul-Opdahl, Julia Synnelius, Appoline Terrier, Vincent Traag, Erik van Wijk (CWTS), Martin Wain, Elisabeth Zaparucha, Frank Zuijdam.

2 Griniece E., Reid A. and Angelis J. (2015) Evaluating and Monitoring the Socio-Economic Impact of Investment in Research Infrastructures, Technopolis Group

3 Moulin J. (2016) Workshop on Methodologies and Tools for assessing Socio-Economic Impact of Research Infrastructures, Global Science Forum (Paris, 3 November 2015)

4 Ibid.

THE IMPACT STUDY OF THE EUROPEAN SOCIAL SURVEY (ESS) ERIC

The ESS is an international, comparative survey of social and political values and attitudes, which was launched in 2002 and is now in its 9th round of data collection. In 2013, it was given the status of a European Research Infrastructure Consortium (ERIC). In total, 24 countries (including 'guest' countries) participated in the eighth round of data collection. Since its inception, over 120,000 people have registered as ESS users. Around 64% of these are students, a further 27% can be classified as academics (research/ faculty/ PhD) and just under 10% come from other societal domains (e.g. policy, NGOs, businesses, private individuals).

The impact study of the ESS ERIC[5] was undertaken in 2016/17 as a work package of the Horizon 2020 project 'ESS-SUSTAIN', and was carried out by Technopolis, with bibliometric analysis by the Centre for Science and Technology Studies (CWTS). The study assessed the academic, non-academic and teaching impacts that have been achieved through the ESS, by all different user groups and in all ESS member and observer countries. It also assessed how these impacts came about ('pathways' to impact), identified best practice, and made recommendations to ensure the long-term sustainability of the ESS. This study presents one of the largest and most recent endeavours to assess the impact of a major pan-European RI. In the absence of an existing standard approach, we opted for a mixed methods approach, comprising:

- Desk research/ document review of existing evaluations and impact studies of the ESS and other related material (e.g. literature on the impact of other European research infrastructures)
- Analysis of ESS user data (supplied by the ESS data warehouse situated at NSD in Bergen, Norway)
- Observation/ attendance of events organised by the ESS or featuring presentation of ESS data (e.g. the 3rd ESS conference, Lausanne, July 2016)
- 100 interviews with internal stakeholders (National Coordinators, General Assembly members, members of other ESS advisory boards and committees) and external stakeholders (academic and non-academic ESS users)
- An online survey (n=2238) of active ESS users (users who logged in to the ESS data portal at least once in the 12 months leading up to the point of surveying)
- A short online survey of student users
- Analysis of publication information captured by the ESS in the 'ESS Bibliography'
- Publication and citation analysis of ESS-based publications listed in Web of Science (WoS)
- 36 case studies featuring detailed description of specific instances of ESS use and its academic, non-academic or teaching impact.

Each method step produced valuable information in its own right. However, there was an over-arching logic in the mixed-methods approach, in that it was critical for the study team to develop a detailed understanding of the benefits that the ESS brings to its users (including advantages over other survey resources). These benefits could be qualitatively assessed once the ESS user-base had been defined and mapped, and only after this step did the study assess what outputs, outcomes and impacts had been generated as a result of the benefits brought about by the ESS.

The study thus progressed from general assessments (size of the user base, reasons for using the ESS) to specific examples of impact. Additionally, the study sequence helped develop an understanding of the ESS, particularly through the consideration of 'benefits'. These are not uniform, but often differ country-by-country, and highlighted many unanticipated benefits (for example around ESS use for teaching), which in turn shaped the selection of output and impact indicators later in the study.

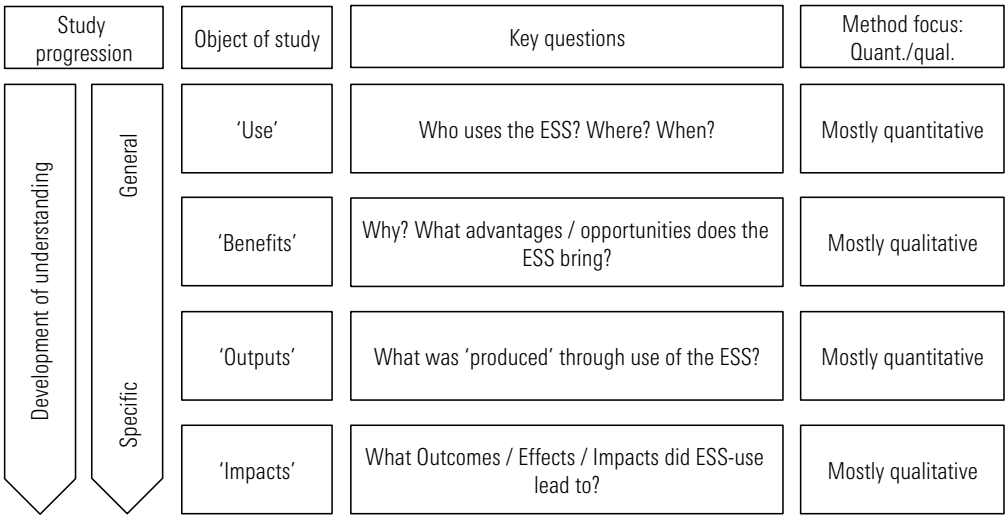

Fig. 1: Methods rationale for the ESS ERIC Impact Study

5 Kolarz P, Angelis J, Krcal A, Simmonds P, Traag V and Wain M (2017) Comparative Impact Study of the European Social Survey (ESS) ERIC. Technopolis Group. Available: http://www.europeansocialsurvey.org/findings/impact

MEASURING IMPACTS – FINDINGS OF THE STUDY AND SUCCESS OF THE METHOD

The methodology was successful in that it enabled a comprehensive picture to be created of the use-intensity, the benefits, and the academic, non-academic and teaching impacts of the ESS ERIC. The study highlighted substantial differences between countries on a range of measures, and reached findings in both quantitative (e.g. user numbers, institutional concentration, output numbers, citation impacts) and qualitative terms (e.g. types of impact, types of value added, new fields and research questions enabled). Key identified impact 'highlights' include:

- There are over 2,700 known ESS-based outputs, including 1,373 journal articles. 817 ESS-based journal articles are listed in Web of Science (WoS). 22% of these fall into the top-10% most cited articles within their respective microfield (10% would be the expected average). Even at the level of individual institutions, ESS-based work almost always scores higher on citation metrics than is generally the case for each institution's WoS-listed publications in the social sciences overall (based on Leiden Rankings).
- Whilst high-quality and highly impactful research has been conducted in many different places, there are several institutions that form major 'hotspots' of ESS-based work, both in terms of high publication output and impact, and in terms of high student numbers learning statistical methods via the ESS. The Universities of Ghent, Leuven, Radboud Nijmegen, Tartu, LSE, NTNU, Cologne and Zurich are all examples of such clustering.
- Non-academic impacts appear in a wide range of different organisations, often in government ministries or agencies. Immigration and quality of life/wellbeing are fields where many non-academic impacts have occurred, but several other fields also feature non-academic impacts, including law enforcement, policing and justice, health inequalities, LGBT rights, children and family policy, and active ageing.
- Impacts identified include supporting policy creation or policy change, political agenda-setting, as well as influence on political and public debate more broadly. Additionally, the ESS often influences government monitoring: statistical agencies and other entities have in several cases drawn on the ESS, either by integrating certain ESS data into their own monitoring reports, or adopting various methodological standards practiced by the ESS.

Robustly assessing the impact of an RI doubtlessly has merits in itself: it ensures money is well spent and demonstrates areas of particular strength. However, the ESS impact study also moved beyond descriptive to analytical dimensions to arrive at recommendations, and considered 'impact pathways', i.e. how the observed impacts were achieved, as well as the drivers and barriers to impact.

A difficulty in this task is that the impacts of the ESS are so varied that a short typology of impact pathways is almost certainly non-exhaustive and prone to over-simplification. Moreover, substantial differences observed between individual member countries in terms of use-intensity, output, perceived benefit and types of impact constitute a further complicating factor. To generate a better framework to assist future impact optimisation of the ESS, the study posited the notion of 'impact systems'.

THE USE OF IMPACT ASSESSMENT: MAPPING THE IMPACT SYSTEM OF THE ESS

Typically, research impact is thought of as a linear process. In the case of the ESS, a generic model might involve that a user first accesses ESS data and will then process it further. The ESS data might be immediately put to use as a teaching resource, replacing other data sets used in the past, leading to better teaching materials and more capable students (teaching impact). The ESS user might use the data to do further analysis and gain new knowledge, which is then published. The resulting outputs would be read, cited, and drawn on or responded to by other researchers, leading to changes in debates and academic perspectives (academic impact). Further, the new knowledge gained through the ESS may be disseminated (via published outputs or otherwise, via intermediaries or directly) to non-academic users. Research users then draw on the information, leading to debate input, policy or practice development (non-academic impact).

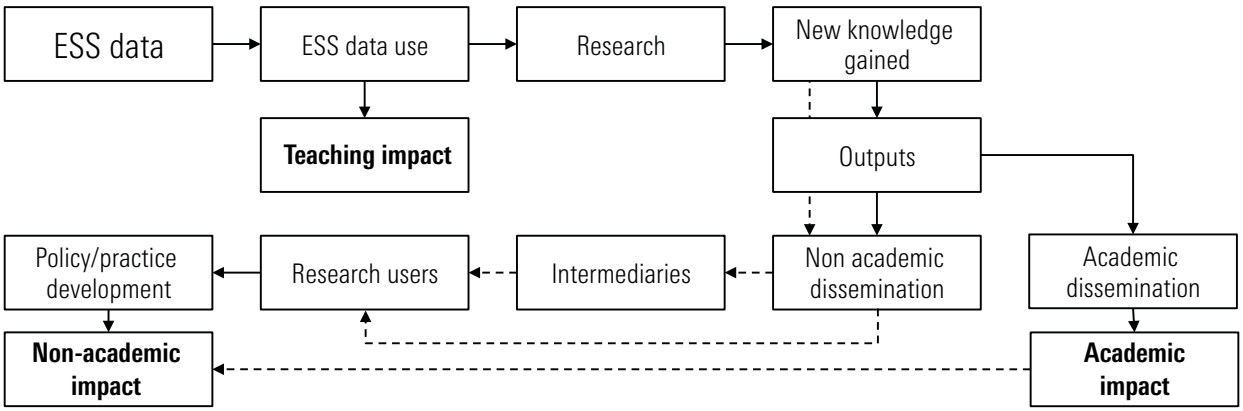

Fig. 2: The linear model of ESS impact

Linear models of this type have been envisaged in the past by organisations including the UK's Economic and Social Research Council.[6] Indeed, many impact case studies conducted as part of the ESS impact study follow variations of this generic formula.

However, a critical further finding of the study is that such linear 'stories' do not occur in isolation, and the likelihood of their incidence is dependent on context. The study identified a range of framework conditions that affect the extent to which people use the ESS in the first place, the purposes for which it can be of further use, and the overall ease with which knowledge transfer between academic and non-academic domains can take place.

Conditions of this type variously apply to the overall organisation and continuity of the ESS, the organisation and activities undertaken in terms of funding and at the level of national coordination, as well as more broadly at the level of overall academic, policy and knowledge transfer cultures in different countries. Research for the ESS impact study yielded a broad range of such framework conditions, notably including the following:

- Our survey results show that non-student ESS users most commonly first became aware of the ESS as students. When used in teaching, a generational effect therefore occurs, where student users move on to becoming academic or professional ESS users by virtue of existing familiarity in their subsequent academic or non-academic careers (should their remit permit this). However, the extent of ESS use for teaching purposes is also dependent on the availability of alternatives: some countries have many existing, high quality open access national datasets that students can use to learn, for instance, about statistical analysis and survey methods. Other countries have fewer alternatives, so the ESS becomes a more attractive option for teachers to use.
- To facilitate non-academic impact, a degree of 'translation' is often necessary. This can be in terms of simple data presentation (i.e. simplifying, visualising), so that ESS use in the news media becomes more feasible. ESS undertakes some such activities centrally, and National Coordination teams also make such efforts in some countries. Think Tanks, NGOs or other intermediaries may undertake further efforts of this kind, but different countries have different types and levels of proliferation of such organisations. In short, 'translation' may occur at central ESS level, or at country level by NC teams, or by organisations unconnected to the ESS.
- The notion of 'evidence based policymaking' differs between countries. Some have long-standing norms around making extensive use of survey data, others not so much. Moreover, in some countries direct use of data by ministries or government agencies is typical (and in some countries, sectoral ministries even part-fund the ESS with the intention of using ESS data for policy), whilst in others it is more common to contract academic experts to bring their knowledge into the relevant non-academic sphere in person. This affects the way in which policy impact is likely to occur.
- At the purely academic level, some countries have more pronounced traditions of quantitative methods in the social sciences, whilst others will place a far greater emphasis on qualitative and theoretical approaches, both in terms of research and teaching. Where the latter is the case, the ESS is likely to struggle much more to be used widely, especially when quantitative methods do not feature strongly on teaching curricula.
- Long term sustained funding of the ESS is an important condition for impacts to occur: without this, potential users have no guarantee of data availability in future, which presents difficulties for establishing the ESS as a go-to data source, or to use ESS data in policy monitoring activities. Likewise, many research questions or practical concerns require data from particular sets of countries to be available. Researchers or practitioners often wish to compare their country with other countries that are nearby, so inclusion of adjacent countries can be an important requirement. This is especially important in countries that are often 'grouped', e.g. the Baltics, the Visegrad group, the Eurozone, Scandinavia.
- In each country, some individuals may naturally gravitate to the ESS, but the national coordination team has an important role to play in terms of promotion: where promotion of the ESS is undertaken, user numbers grow, and so does the scope for impact. However, resources for promotion activities vary between countries, and over time.
- Different countries prioritise the transfer of knowledge from academia to practical fields in different ways, which in turn affects the extent and shape of that transfer. The UK's 'impact agenda' for instance ensures that the national research assessment system rewards cases of non-academic impact, providing an incentive to engage with non-academic domains. However, such impacts need to be based on excellent research, so outputs are an important part of the impact 'pathway'. Academics communicating ESS-based information without the presence of any particular outputs (for instance by providing a simple data training workshop to a non-academic organisation) may be more strongly incentivised in other systems.

Several other framework conditions were identified by the ESS impact study, mostly through qualitative engagement and often including highly country-specific institutions and norms. When put together, these conditions can be mapped into an impact system, which tracks the possible channels of ESS use and impact pathways and the likely intensity of use in different domains. It also helps account for why various channels of use and pathways to impact are more pronounced in some countries than in others. For example, the ESS is a particularly valuable teaching resource in countries that do not have existing social surveys as long-established teaching tools for statistical methods in universities. Whilst this is characteristic of smaller countries and those with weaker research systems, heavy ESS-use in teaching also entails a 'generational' effect, where student users become academic or professional users later in life; an effect likely to be especially strong in precisely those countries.

Figure 3 provides a generic overview of the ESS impact system. The various linkages (represented as arrows) may be stronger or weaker per country (even per topic or field), or affected by any number of contextual factors and framework conditions.

6 ESRC (2009) Taking Stock. A Summary of ESRC's Work to Evaluate the Impact of Research on Policy and Practice

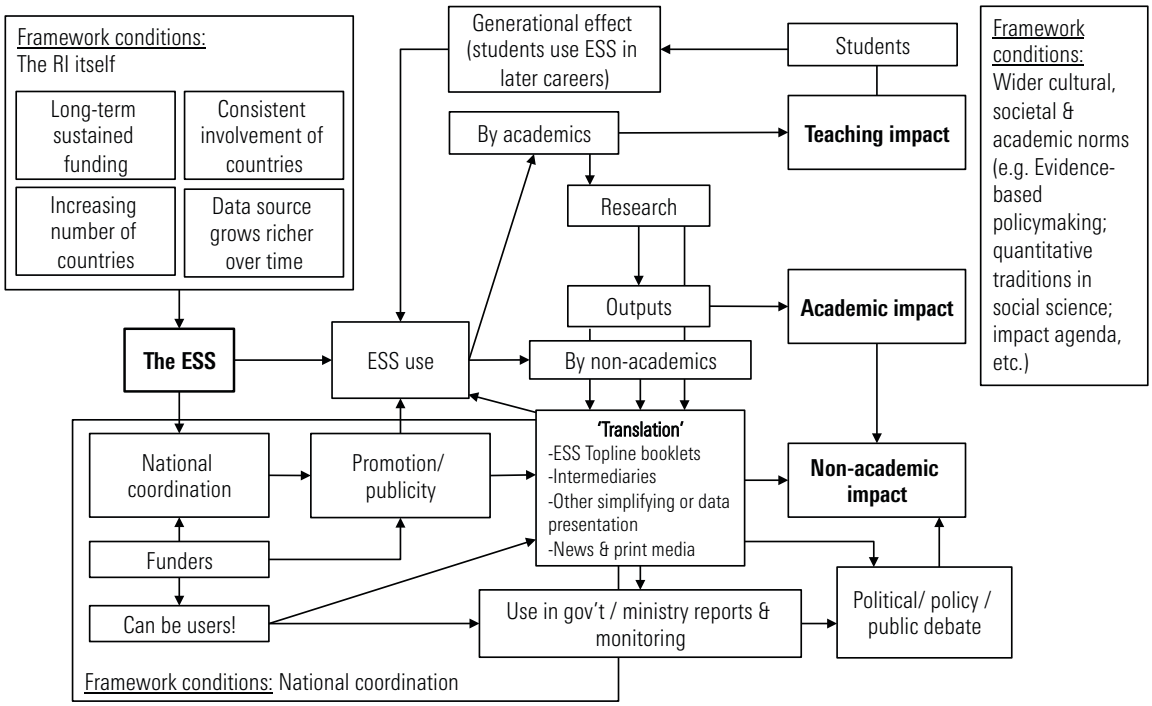

Fig. 3: The ESS impact system and framework conditions

Some aspects of the ESS impact system cannot readily be changed, or will only change slowly over time (e.g. an overall more qualitative or theory-driven social science tradition in a given country, where survey-based research is rare in the first place). These factors can help explain and contextualise lower levels of ESS-use or fewer clusters of ESS-based teaching or research activity. However, others can be affected, such as the consistent involvement of a country in the ESS, or the level of outreach and publicity conducted by the national coordinating team or the inclusion of major potential data users in the coordination (or funding) itself.

KEY POINTS ON IMPACT SYSTEMS

The notion of impact systems contains two related implications for the impact assessment of Research Infrastructures (RIs): the importance of contextual understanding (system comprehension), which needs to form a critical part of any standardised approach to RI impact assessment and, secondly, the consequent importance of mixed methods, where system comprehension shapes indicator selection and informs scope for comparability – both between countries and, potentially, between different RIs.

The impact system can be mapped for an RI as a whole, as was done for the ESS ERIC. For each participating country (or indeed, for each relevant field of research or practice), particular system components and systemic strengths or weaknesses can be highlighted. In the first instance, this helps the formulation of recommendations for future optimisation. It also contextualises the measurable impacts and prevalence (or lack) of certain impact types, reducing the risk of meaningless and un-qualified comparison on impact indicators between different member countries or fields.

In the ESS impact study specifically, this approach helped generate several findings that affected the feasibility of comparative performance assessment between individual member countries. For example, low teaching use and few teaching impacts in certain countries are a reflection of existing, nationally long-established teaching resources, rather than a failure of those countries to appropriately harness the ESS for such purposes. Likewise, ESS use in countries with predominantly qualitative traditions in the social sciences cannot readily be compared with ESS use in countries where quantitative traditions dominate: in the former, the ESS must be assessed in terms of whether it has brought around cultural shifts, whilst in the latter an expectation of widespread, high-impact academic work is more appropriate. The same principle applies to countries with sophisticated vs. embryonic cultures of evidence-based policymaking.

Mapping impact systems likewise holds some promise for comparison between different pan-European RIs. The notion of impact systems foremost helps to highlight country-, topic- and RI-specific particularities and as such acts as a warning against benchmarking all member countries of an RI, or even different RIs, uniformly and with identical indicators. However, where benefits and framework conditions are similar, meaningful comparisons may become possible. Figure 4 shows how, in the hypothetical scenario of two RIs being assessed with the same system-oriented framework, some 'common ground' may be identified, allowing for comparisons on certain indicators to take place. The systemic perspective can highlight whether a certain indicator is relevant to both cases, and whether system components mean that the indicator can be interpreted in the same way for both or whether adjustments need to be made (e.g. if RI1 has a much larger user base than RI2 due to a broader thematic coverage).

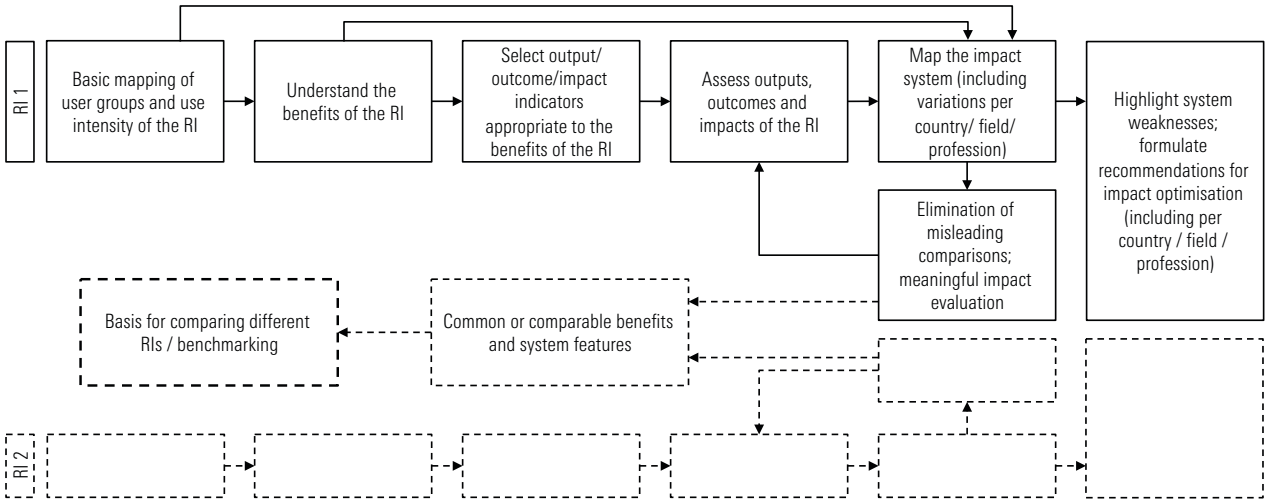

Fig. 4: Using Impact system mapping for RI impact assessment and comparison

Methodologically, the notion of impact systems also highlights the importance of mixed methods: quantifiable indicators are critical in order to demonstrate the value of RIs, and indeed to consider the comparative value of different RIs. However, to make meaningful judgements of this kind, The identification of output, outcome and impact indicators must be underpinned by qualitative investigation. Understanding the benefits of an RI (to all identifiable user groups) at the early stages of the impact assessment, and working in the later stages towards mapping the impact system has been shown in the ESS ERIC impact study as a helpful way of directing these qualitative method components. When impact systems have been understood, even modest impacts can be suitably highlighted if they are known to occur under adverse system conditions, while the scope for meaningful benchmarking in the pan-European RI-landscape is strengthened.

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