- BOOK OF ABSTRACTS -

Roma, 5-7 June 2019

Abstract 152

SOCIETAL IMPACT OF RESEARCH INFRASTRUCTURES IN CONTEXT

Van Drooge L.*, Van Elzakker I.

Rathenau Instituut ~ Den Haag ~ Netherlands

Aim of the proposal:

This paper is dedicated to societal impact of research infrastructures (RIs). In particular those that operate in a complex context that include multiple members/funders, members/partners and other stakeholders; academic as well as non-academic and at regional, national and supranational level, such as the European Research Infrastructure Consortiums (ERICs) Every RI, and every ERIC in particular, operates in its own unique network. In Europe, supranational policy organizations call for harmonized operation and unified governance approaches of RIs and ERICs. This includes societal impact and its assessment. Existing practices regarding societal impact assessment of research organizations do not fit the perceptions and expectations of RIs, ERICs and their stakeholders. Even commonly used methods to assess the societal impact of a specific RI, does not cater to the needs of the RIs and ERICs to develop and apply a common or joint approach.

This paper is dedicated to the development of such a joint approach for the organisation and assessment of RIs, in the field of materials research. Based on an analysis of the specific characteristics of RIs and ERICs, and based on current trends in societal impact assessment, we have developed a common approach for use by a variety of different RIs and ERICs. The approach is currently tested by 5 RIs and ERICs. The test-phase will result into 5 societal impact reports in June 2019

Background:

RIs come in many different forms and sizes, and there are several definitions. They share the reference to facilities, resources and services for (that enable) top level or excellent research (ESFRI, 2006; ESFRI, 2018; EC 2010b, EC, 2018a). Moreover, something is usually understood in policy terms as an RI, when its use as well as its governance transcends a single research organisation.

RIs are an objective of policies in Europe since the last two decades. The memorandum 'Towards a European Research Area' (ERA) (EC, 2000) positions RIs as policy objective and argues that a European approach is necessary. Given the importance of RIs for the progress and application of knowledge in Europe, more coordination is necessary. This coordination includes the creation of new RIs and the operation of existing RIs. RIs are also included as one of the ERA priorities. The objective of priority 2b is that "high-quality, accessible Research Infrastructures are at the heart of the knowledge triangle and key to Europe's ambition to lead the global movement towards Open Science".

A policy organisation specially dedicated to RIs is established in 2002: the European Strategy Forum for Research Infrastructures (ESFRI). It will support a coherent and strategy-led approach to policy-making on research infrastructures in Europe. ESFRI provides national

authorities the opportunity to explore common and integrated activities for the development and use of RIs (ESFRI, 2010), which is necessary, given that national policies for RIs differ considerably and are fragmented. The notion of a European strategy for RIs, offers individual member states the prospect of reducing costs, by sharing the capital and operational investments accompanying the establishment of RIs (Papon, 2004).

The introduction of the European Research Infrastructure Consortium (ERIC) legal framework (EC, 2009) is another development in the creation of a unified European RI policy landscape. The framework provides consortia the possibility to act as a European legal entity. A consortium consists of – and is funded and governed by – states (EU member states, associated countries, third countries) and intergovernmental organisations. The framework provides a structure for an intergovernmental organisation for research infrastructures. It provides guidelines on such issues as what RIs are and what they do, their goals, their governance and the expected contributions. An ERIC needs to represent added-value in the development of the European Research Area (ERA), it needs to contribute to the mobility of knowledge and/or researchers within the ERA and to the dissemination and optimisation of results (EC, 2018b). The ERICs have introduced their own policy body, the ERIC forum. It represents the ERIC members and its goal is to iprove the operation of its members, to contribute to high-level policy discussions, to identify common challenges for ERICs and respond collectively to these shared challenges (ERICforum, 2019).

So, there is no lack of RI policy in Europe. Definitions are very inclusive (ESFRI, 2006; EC, 2018a) and allow for a large variety. Differences between the RIs and ERICs are substantive, including regarding the phase. Some of them are not yet in operation, but in the building phase. Yet they are characterised as RI. Regarding the expectations, these reach far beyond enabling (excellent) research. ESFRI mentions the important role of RIs regarding outreach (in addition to research and education), aiming at reducing barriers between science and citizens; it positions RIs as impacting on the European society and economy, because they are innovation drivers in a competitive knowledge-based economy; providers of know-how, methods and standards to national and international stakeholders; and advisers on policies; and it presents RIs as drivers for regional development, affecting scientific production and culture, higher education, industry (including supplying industry, as well as innovative start-ups) (ESFRI, 2018). To name but a few.

Several policy organisations have articulated concerns regarding the sustainable development and operation of RIs and ERICs (for instance EC, 2017). One of the challenges is the societal impact of RIs, and its evaluation. Some RIs require substantive public investments. The expectations driving these investments have resulted into a situation that even RIs that do not require substantive investments, are now expected to contribute to the needs of contemporary society (Hallonsten, 2017). But clear articulation of expectations regarding societal impact, or regular monitoring, are not yet common practice, neither among funders, members and stakeholders, nor at RIs (ESFRI, 2017). Still, the need to develop a standard methodology for assessing the societal impact of RIs is widely shared (cf. European Commission (2017), OECD (2017), ESFRI (2017)).

Yet there is no lack of societal impact studies dedicated to RIs, often grey reports. Most focus on a specific RI (Simmonds, 2016; (Kolarz, 2017; Van Belle et al, 2018), There have been attempts to develop a more generic frameworks (Greniece et al, 2015; Roschow et al, 2014;

OECD, 2017; OECD, 2018; RI-PATHS). There are similarities, such as the use of a model or of elements of a log frame (inputs, activities, outputs, outcome). The studies differ in how they analytically "pull apart" impact and RIs. The questions "impact of what?" and "impact on what?" are addressed in different ways.

But neither of these studies provided a basic framework that was useful for the five RIs in the ACCELERATE project. The studies and methods do not respond to their needs. The differences between the RIs, including each network, and the perceptions of the actors in the network, require a flexible and responsive approach. There are uncertainties regarding societal impact, both on the side of the RI, as well as on the side of the members/funders. There are no standard evaluations or protocols in use, there are no practices yet. Some of the funders are not academic, and have a different evaluation tradition. Some of the societal impacts of RIs do not relate at all to academic activities, such as for the majority of impacts of the RIs that are in the building phase.

Methodology and empirical base:

The context of this paper is the ACCELERATE project, dedicated to the long term sustainability of RIs in the field of materials research. The RIs have articulated the need for a proactive governance of societal impact. The ACCELERATE consortium consists of five RIs: CERIC (Central European Research Infrastructure Consortium), ESS (the European Spallation Source ERIC), FRM II, HZG-GEMS (Helmholtz Gesellschaft) and ELI (Extreme Light Infrastructure). They are all dedicated to enabling materials research: the characterisation of matter, from subatomic to supramolecular scale. The research that the RIs enable is done with equipment called beamlines or instruments. These are connected to a powerful source, an accelerator, spallation source, or laser.

We have used desk research to study the evolving policy context of RIs. We focused on policy documents concerning RIs, including societal impact (assessment) of RIs. We studied literature on RI impact, including consultancy reports and case studies. Through our project, we had access to official as well as internal documents of the member RIs, including Statutes and Annual Reports, as well as monitoring documents.

We interviewed representatives of the RIs and organised joint workshops to identify questions, interests and needs regarding impact, to identify relevant stakeholders that are involved in the evaluation of societal impact, as well as to discuss expectations and practices. We observed a meeting of the management of one of the RIs with one of their members/funders.

The societal impact approach is based on a conceptual understanding of what an RI is, and on the real world needs of the five RIs. The societal impact approach is based on current developments in the academic as well as the grey literature. It is written down in a protocol, that currently is tested by the five members. The test-phase will result into 5 societal impact reports in June 2019.

The approach is based on Theories of Change (ToC) (see for instance Taplin, 2013; Van Drooge and Deuten, 2017). There are similarities with logic models and impact pathways, yet a ToC articulates and includes preconditions that are thought necessary and assumptions that are

thought to play a role. Developing an ToC can be understood as negotiating what impacts to expect, at what moment in time, by whom and under what preconditions (Vogel, 2012). It can be regarded as a horizontal form of governance. From the ToC, a number of evaluation or monitoring questions can be identified (Van Drooge and Spaapen, 2017).

The protocol does not describe impact categories. It states that what relevant impacts are, depends on and can be negotiated by, the RI and it stakeholders. So the first step is to identify or negotiate relevant impacts. Next is to understand how an impact will become manifest. In other words: develop a theory of change. Here the protocol draws also on literature that focuses on processes and contributions, instead of attributions (Spaapen & van Drooge, 2011). Another issue that the protocol addresses, is to what extent the RI is accountable, or can be held accountable, for a change or impact to become manifest. ToC uses the notion of "accountability ceiling". This refers to the change for which an RI can be held accountable (Taplin et al., 2013); and the other way around, it limits the extent to which an RI can be held accountable.

During the testing phase, we are in regular contact with each of the five RIs (biweekly-monthly), through skype, email and one site visit per RI.

Results:

The members of ACCELERATE are all dedicated to enabling materials research, but that apart from that, they mainly differ, in size, scope, phase and governance. To mention two: (1) a building project estimated to cost 1.8 billion euro, leading to a state of the art facility that will not be operational until 2024, and (2) a coordinating and networking organisation with an annual budget of 3 million euro and members that contribute their up and running, and sometimes aging, facilities. It is evident that the impacts will differ given these characteristics, and that different impacts are expected given the different stakeholder communities. At the same time, supranational European initiatives call for coherent policies regarding (assessment of) societal impact of RIs. There is an inherent tension here, given the different characteristics and contexts.

The ACCELERATE members report that there is more to impact than is formally agreed in statutes and communicated in strategic objectives. Different stakeholder groups have different perspectives of what an RI is. And there are differences within stakeholder groups as well. For example, for one member/funder (a science ministry) of one of the ERICs, the membership provides them with a networking opportunity regarding EU policies. For the partner facility of that same member state, the membership contributes to developing improved and internationally recognized standards. This is seen as a positive and empowering signal for their junior researchers: the domestic facilities are competitive. Another example is the potential membership of one member state of another ERIC, where the same ERIC is an opportunity for high tech industry (ministry of economic affairs) as well as an opportunity for domestic researchers to use state of the art facilities abroad (ministry of science). And a third example is the RI that is funded by science ministries. The RI perceives its spill over effects as relevant, such as providing medical companies access so they can make radio-isotopes for cancer treatment. However, the RI is not perceived, nor evaluated, as an entity that enables cancer treatment.

Every stakeholder has a different perception of an RI. And each perception relates to a

different impact or contribution. On top of that, at least in the case of ERICs, come the requirements that relate to the EU, such as the contribution to the ERA. These perceptions of what an RI is, and what impact to expect, can be discussed and negotiated between the RI and its stakeholders, and among different stakeholders. An RI is in that sense a boundary object (Star and Griesemer, 1989). It is adaptable to viewpoints of a wide variety of stakeholders. This includes stakeholders that are not commonly involved in science and innovation, such as local communities and regional employers. What a Research Infrastructure is, is influenced by the perception and expectations of the stakeholder, the activities and strategy of the RI as well as the negotiations, or the lack thereof, between these actors.

In impact methods and societal impact reports of specific RIs, we identify two major shortcomings for our purposes. We have tried to overcome these with our method. The first is that it is often unclear why certain impacts or impact pathways are chosen. Economic impact, innovation, capacity building are some of the impacts that are often mentioned, yet every method and study presents a slightly different set. The rationale for the choices is often implicit. This leaves the question: why this collection of impacts? The other shortcoming is that although many projects and reports mention that there should be a relation between an impact, the RI and the indicator, this relationship is not articulated. This leaves the question: what does a specific indicator tell?

Conclusions:

Studying reports and methods, and relating that to the practice of a number of RIs, aids in understanding the challenge regarding societal impact. The diversity of RIs, the large variety of stakeholders of an RI and the different views they have about an RI, suggests that a standard set of impacts or indicators doesn't do justice. We have developed an approach that tries to take this into account. It starts from the observation that an RI operates in a complex context, and that it is perceived differently by different stakeholders. Both RIs as well as stakeholders search for points of reference. This searching provides the opportunity to develop a joint view on what the RI is, and what can be expected of it.

The case of RIs and ERICs provide an example of a complex actor network or constellation, in which academic and non-academic partners collaborate, negotiate and deliberate. The societal impact approach is aimed to enable this process and manage expectations. The first results of the testing phase suggest that all partners can use the open approach indeed. They each develop a societal impact report for their unique context, in response to, and sometimes in discussion with, their funders.