

# “This large research infrastructure will benefit our region” But how?

## Keywords

impact assessment, narratives, theory of change, research infrastructures

Evidence relating to social returns is of vital importance to the sustainability of a large Research Infrastructure (RI). For scientists/users the value of an RI is generally self-evident. However, funders, politicians and policy makers need to justify their decision to spend substantive amounts of public funding on a single RI, knowing that the impact or return of investment will only be achieved in the far future. An indication of social return is increasingly requested, including for allocations of funds for fundamental research, as is the case with the large RIs. Examples include a bill of the House of Representative requesting to the National Science Foundation (USA) that every one of its research grants must advance “the national interest.” Similarly, a cost benefit analysis was needed in order to be allowed to allocate EU structural funds to the construction of the EU international laser research infrastructure ELI. (ACCELERATE 2016).

RIs promise a wide range of impacts. They promise to contribute to the scientific knowledge base. The increased stock of fundamental knowledge can be used by firms as a source for innovation. They promise to contribute technical solutions. Hardware and software developed for use in the RI can be used outside of the RI. They promise to build capacity by training staff that works for the RIs: highly skilled technicians, scientists. They promise to have a positive effect on the employment opportunities in the region by creating jobs. Construction, maintenance and administrative staff is hired by the RI. They promise to have a positive influence on the economy in the region in general, due to the relocation of highly specialized staff and to visiting users. Etc.

In recent years, a number of studies have been published that describe a variety of impacts of large RIs (Mahieu et al 2014, Koopmans et al 2014, Van Lieshout et al 2013). These studies were performed by professional organisations, that use more or less sophisticated techniques and measures to capture actual and future impacts and effects: Technopolis, TNO, OECD.

However, management of RIs have indicated the urgent need to understand, monitor and actively contribute to impact *ad itinere*. This is required for the sustainable maintenance of the RIs. RIs typically use a variety of financial sources, with different requirements and interests: regional governments, national research councils, the European Union. Also, besides the formal rules of the financiers, several of their stakeholders have brought the issue of social impact on the table. We are involved in the ACCELERATE<sup>1</sup> project in order to develop a socially robust social impact monitoring approach for the RIs involved. Socially robust in this particular case implies that it can be used by the RIs themselves and that it responds to the needs of the RIs, their financial sources and other relevant stakeholders. The intention is to bring the responsibility for impact creation and monitoring back to the RIs themselves. To enable them to take ownership. Impact creation and monitoring

<sup>1</sup> ACCELERATE is funded by the European Union Framework Programme for Research and Innovation Horizon 2020, under grant agreement 731112

thus becomes an integral part of the governance of the RI. After all, social impact was a promise from the beginning. This differs considerably from the more common situation at present, where impact assessment or reporting on impact has become either symbolic and rather meaningless, or is taken out of the hands of the responsible organisation and performed by professional organisations.

We build on concepts and ideas introduced in recent decades. They seem to refer to far more complex modes of science, such as Mode 2 (Nowotny et al, 2001), innovation journeys (Van de Ven et al, 2008) challenge oriented research (Kuhlmann and Rip, 2015) or Responsible Research and Innovation (European Commission, 2013). An RI is at first sight a far simpler mode or situation of research. However, given the multitude of promises and impacts that go above and beyond the science of the RI, it makes sense to use these concepts and ideas. Moreover, the goal is to enable RIs to develop a realistic and substantiated view on their impacts and to enable or empower them to be responsible for the impact - not just accountable.

Key element is the theory of change. A theory of change (Rogers, 2014) explains how an impact is understood to come about. It is a shared narrative or a joint understanding of the causal relations between inputs, activities, outputs and impact. (Van Drooge and Deuten, 2016). Developing and using a theory of change can be regarded as a horizontal form of governance. From the theory of change, a number of evaluation or monitoring questions can be identified (Spaapen and Van Drooge, 2015).

Douthwaite (2007a, 2007b) has used the theory of change for planning and monitoring the impact of research for development projects. He introduces the idea of a limited number of “storylines” or “plot types” when it comes to impact narratives. In other words: there is but a limited number of impact journeys. When it comes to RIs, the most obvious one is the plot of developing a technology and adopting that technology. Another is that of capacity building, the plot with scientists and stakeholders learning to collaborate and developing the capacity to work together. (Douthwaite 2016)

Our approach is as follows:

- Identify a limited number of typical impact plots or storylines, based on
  - Academic literature on impact (such as Matt et al, 2017; Meagher and Martin, 2017)
  - Studies reporting on impact of RIs (Mahieu et al 2014, Koopmans et al 2014, Van Lieshout et al 2013)
  - Mission statements and other policy documents by the RIs (to identify promises made and impacts foreseen)
  - Requirements of the funders of the RIs
- Develop theories of change, together with the RIs and some of their stakeholders (i.e. funders) concerning each of the impact plots
  - Identify the promise of each of the plots – or the ultimate goal (such as “innovations”, “more employment in the region” or “improved scientific capacity”)
  - Understand and unpack the impact journey that leads towards these promises
  - Identify who and what contribute to the realisation of the goal, and decide on whether this is within the influence of the RI, or not – and with whom to collaborate or share the responsibility
  - Understand how impact can be organised and embedded in the RI

- Identify relevant indicators of progress
  - Understand what serves as an indication of progress toward the goal or promise
  - Select a number of indicators, quantitative as well as qualitative for monitoring purposes
  - Organize the indicators and understand their order: whether they refer to structural properties of the RI, or to anecdotal evidence.

The result is a limited number of narratives, each relating to a specific storyline or impact journey. Each narrative provides insight into assumptions, causes and actors. And each is developed and will be enriched with quantitative and/or qualitative evidence. For instance, the “innovations” narrative can be enriched by specific anecdotes of specific innovations resulting from work done at the RI. The anecdotal evidence is thus embedded and can be understood as part of a bigger narrative.

This is a further development and is in contrast with the present situation, where anecdotal evidence or case studies are required as evidence of impact (REF2014, SEP 2015-2021), but the bigger story remains untold. Or with the evaluation of RIs where successful impacts are presented, that are then used to illustrate the importance of the RI (OECD 2014), but not used to understand how the RI has contributed to this specific impact.

## References

### **ACCELERATE (2016)**

proposal 731112

### **Douthwaite, B. et al (2007a)**

'Participatory Impact Pathways Analysis: A Practical Application of Program Theory in Research-for- Development', *Canadian Journal of Program Evaluation* 22 (2) 127-159

### **Douthwaite, B., Schulz, S., Adetunji, S. O., and Ellis-Jones, J. (2007b)**

"Impact pathway evaluation of an integrated Striga hermonthica control project in Northern Nigeria" *Agricultural Systems* 92: 201-222

### **Douthwaite, B. (2016)**

*THEORY OF CHANGE | Using theory of change and impact pathways to leverage sults.* <https://www.youtube.com/watch?v=YcyhrlZxo7Y>, assessed 21 Feb 2017

### **European Commission (2013)**

*Options for Strengthening Responsible Research and Innovation.* EUR 25766. Luxembourg: Publications Office of the European Union

### **Koopmans, C., J. van Barneveld, D. Regeczi, T. Smits, G. van der Veen and J. van der Voort (2014)**

*Astronomische welvaart? Effecten van Nederlandse deelname aan de Square Kilometre Array radiotelescoop.* Amsterdam: SEO

### **Kuhlmann, S. & Rip, A. (2015)**

The challenge of addressing Grand Challenges. In: von Schomberg, R. (ed.): *The Future of Research and Innovation.* European Commission (in press)

### **Mahieu, Bea, E. Arnold, X. Poteau, R. Hammerschmidt, K. Stroetman (2014)**

*Evaluation of Pertinence and Impact of Research Infrastructure Activity in FP7-EPIRIA.* Technopolis

### **Matt, M., A. Gaunand, P-B. Joly, L. Colinet (2017)**

Opening the black box of impact – Ideal-type impact pathways in a public agricultural research organization. *Research Policy* 46: 207–218

### **Meagher, Laura R. and Martin, Ursula (2017)**

Slightly dirty maths: The richly textured mechanisms of impact. *Research Evaluation*, 26(1): 15–27

### **Nowotny, Helga, Peter Scott and Michael T. Gibbons (2001)**

*Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty.* London, Wiley

### **OECD (2014)**

*The Impacts of Large research Infrastructure on Economic Innovation and on Society: Case Studies at CERN.* OECD

### **Rogers, P. (2014)**

*Theory of Change, Methodological Briefs: Impact Evaluation 2.* UNICEF Office of Research, Florence.

### **Spaapen, J. B. and L. van Drooge (2015)**

"Towards a network approach of research evaluation" in INRA: *Impacts of agricultural research - an approach of societal values.* Paris, Nov 2015

### **Van de Ven, Andrew, Douglas Polley, Raghu Garud, Sankaran Venkataraman (2008)**

*The Innovation Journey* Oxford: Oxford University Press

### **Van Drooge, Leonie and Jasper Deuten (2016)**

Joint evaluation for joint governance of challenge-oriented research. *Open Evaluation 2016* Vienna

### **Van Lieshout, Marc et al (2013)**

*Impact of FET Research Initiatives (IFETRI)* Brussels; European Commission, Ref. Ares(2013)259278 - 27/02/2013

## **Author(s)**

**Leonie van Drooge**

[l.vandrooge@rathenau.nl](mailto:l.vandrooge@rathenau.nl)

**Rathenau Institute**

Anna van Saksenlaan 51, 2593 HW The Hague, the Netherlands

Phone: ++31703421542

**Website:** [www.rathenau.org](http://www.rathenau.org)

**Jasper Deuten**

[j.deuten@rathenau.nl](mailto:j.deuten@rathenau.nl)

**Rathenau Institute**

Anna van Saksenlaan 51, 2593 HW The Hague, the Netherlands

Phone: +31703421542

**Website:** [www.rathenau.org](http://www.rathenau.org)