NUCLEUS FIELD TRIP REPORT: UNIVERSITIES AND RESEARCH INSTITUTIONS (EDINBURGH)

Deliverable 4.2

NUCLEUS

DELIVERABLE DESCRIPTION

Report on a Field Trip to Edinburgh (UK) undertaken by members of the NUCLEUS consortium in December 2015. The purpose was to look at the practice of Responsible Research and Innovation ('RRI'; Von Schomberg, 2011) in universities and research institutions.

DELIVERABLE

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PROJECT

NUCLEUS is a four-year, Horizon 2020 project bringing Responsible Research and Innovation (RRI) to life in universities and research institutions. The project is coordinated by Rhine-Waal University of Applied Sciences. For more information, please visit the NUCLEUS website, follow our social media, or contact the project management team at info@nucleus-project.eu.

NUCLEUS ONLINE

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EXECUTIVE SUMMARY

Fourteen partners of the NUCLEUS project visited Edinburgh, UK, in December 2015 to undertake the second project Field Trip. The purpose of the trip was to explore how we can ensure that the responsible practice of research and innovation ('RRI'; Von Schomberg, 2011) is embedded in the cultures of universities and research institutions. We were particularly interested in the rules, regulations and organisation of universities and research institutions that supported this practice. What we learned during the Trip has been formulated into recommendations for institutions who will be trying to embed responsible practice of research and innovation during the second half of the NUCLEUS project.

The Field Trip participants met with key staff from three different universities in Edinburgh, plus a researcher from a major European project. The participants identified that external, UK-wide pressures were forcing researchers in Edinburgh to think more about RRI, but practical constraints of time and money, plus conflicting criteria for career progression, meant that primarily researchers who persevered in spite of substantial obstacles were able to develop a strong practice of RRI. Some mechanisms had been put in place to address barriers to RRI and had been largely successful, but most of these needed to be further refined. Universities in Edinburgh had been supported by an RRI culture change project (the Beltane Public Engagement Network) since 2008, showing that change and embedding of RRI does not happen quickly.

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1 OVERVIEW OF THE EDINBURGH (CELL ONE) FIELD TRIP

The NUCLEUS Field Trip to the city of Edinburgh (UK) took place on Friday 4th and Saturday the 5th December 2015. It was the second NUCLEUS Field Trip, following Budapest (cell four - Media) in November 2015.

The Edinburgh Field Trip was undertaken by NUCLEUS partners who are, in most cases, classed as universities or research institutions (cell one):

- Beltane Public Engagement Network (Heather Rea; Sarah Anderson; Elizabeth Scanlon)
- Bielefeld University (Ellen Hannemann)
- Delft University of Technology (Steven Flipse)
- Dublin City University (Padraig Murphy) – participated via Skype
- Mathematics Institute SANU (Zoran Markovic)
- Nottingham City Council (Jon Rea)
- Nottingham Trent University (Karen Moss; Sarah Kettley)
- Rhine-Waal University (Alexander Gerber; Annette Klinkert)
- Ruhr-Universität Bochum (Annika Döring)
- Science View (Menelaos Sotiriou)
- University of Aberdeen (Heather Doran; Susan Hastings; Marlis Barraclough)
- University of Malta (Edward Duca)
- Université de Lyon (Florence Belaen)
- University of Twente (Anne Dijkstra; Mirjam Schuijff)

The purpose of this Field Trip was to examine RRI in the university and research institution context. Specifically, it explored innovative governance models and structural approaches to embedding RRI in the culture of academic institutions.

1.1 A NOTE ON RRI AND PUBLIC ENGAGEMENT WITH RESEARCH

The Edinburgh Field Trip, like the NUCLEUS project as a whole, looked at RRI. In practice, during this Field Trip, much of the conversation tended to be about public engagement with research. Moreover, the term 'public engagement' was often used interchangeably with 'RRI'. The two concepts are very closely linked: arguably, RRI is an ethos ('research should be responsible'), and public engagement (with the notion of 'public' broadly conceived) is the means by which this ethos can be implemented. For the remainder of this report, the term 'public engagement' will predominate, as this was the term most often used during the Edinburgh Trip.

1.2 WHY EDINBURGH?

Edinburgh is home to the Beltane Public Engagement Network (www.beltanenetwork.org). This is a culture change project which supports Edinburgh's four universities in improving the quality and quantity of their researchers' public engagement. The four universities who support and are supported by the Beltane Network are:

- The University of Edinburgh
- Heriot-Watt University
- Edinburgh Napier University
- Queen Margaret University

The Beltane project was originally one of six pioneering initiatives (the UK's 'Beacons for Public Engagement') established in 2008 to bridge the gap between researchers working at the cutting edge of knowledge and the people their research will affect. The Beltane Network has extensive relevant expertise and contacts that could be used for the Trip's organisation.

Three of the universities that Beltane supports – The University of Edinburgh, Heriot-Watt and Edinburgh Napier – were visited during the Field Trip. Although located within a few kilometres of one another, these institutions have diverse profiles in terms of their research and innovation strengths, external engagement track records and physical locations. By not only involving members of three of these institutions in the afternoon exploration sessions of day one, but visiting them on-site, the city of Edinburgh acted as a 'living lab' for the Field Trip participants, giving an insight into some of the physical barriers and opportunities for RRI in the city.

1.3 PROGRAMME

The Edinburgh Field Trip followed the standard NUCLEUS Field Trip structure. A summary of the Edinburgh programme is given in table 3. (The full programme is given in appendix 1.)

Programme: Field Trip Cell One (Edinburgh, UK)	
3rd December, 7pm	Optional, informal drink at a local bar  *Welcome drink at Usher's of Edinburgh!*
Friday 4th December - Setting the Scene and Exploration	Scene Setting: 9am-1pm, Boardroom (L.05), Main (Architecture) Building, Edinburgh College of Art, The University of Edinburgh, 74 Lauriston Place, Edinburgh, EH3 9DF • Framing of the fieldtrip theme (NUCLEUS management team) • Icebreaker and organisation (Beltane Public Engagement Network) • Keynote address • Principles of dialogue and the EDGE analysis (Beltane Network)  *View from the Boardroom at Edinburgh College of Art* Case studies of RRI governance and culture change in research institutions: 1-5pm, various locations in Edinburgh • Fieldtrip participants will divide into groups and each research one case study
Saturday 5th December - Reflection and Synthesis	All takes place in Meeting Room 3, Grassmarket Community Project, 86 Candlemaker Row, Edinburgh EH1 2QA • Reflection on day 1 case studies and own institutions (9am-12.30pm) • Synthesis of recommendations for own institutions and for RRI implementation more generally (1.30-5pm)

Table 3: Programme for Edinburgh Field Trip

The Edinburgh Field Trip took place in two main venues: Edinburgh College of Art and the Grassmarket Community Project; the latter is a civic venue which runs social inclusion projects. The Grassmarket Project acted solely as a venue for the Field Trip,

but the hope was that, by being in a setting that promoted engagement and – importantly – by being away from all universities, Field Trip participants would feel inclined to think expansively.

Working at the Grassmarket Community Project

1.4 DAY ONE CASE STUDY SESSIONS WITH EXPERT WITNESSES

The local Field Trip organisers (Beltane Public Engagement Network) devised a programme of four case studies and invited local colleagues to contribute them as expert witnesses:

Governance model 1: A central office for public engagement with research (The University of Aberdeen and Heriot-Watt University)

- *Expert witnesses:* Laura Wicks, Public Engagement Coordinator, Heriot-Watt Engage, Heriot-Watt University; Heather Doran, Project Officer, Public Engagement with Research; Susan Hastings, European Business Development Officer, Research and Innovation; Marlis Barraclough, Senior Policy Adviser, Research and Innovation; all University of Aberdeen.
- *Venue:* Postgraduate Centre, Heriot-Watt University, Edinburgh EH14 4AS

Governance model 2: A central person for public engagement with research (Edinburgh Napier University)

- *Expert witnesses:* Clare Taylor, Convenor of Public Engagement Forum and Senior Lecturer in Microbiology; Dawn Smith, Public Engagement Officer; both Edinburgh Napier University.
- *Venue:* Edinburgh Napier University, 10 Colinton Road, Edinburgh EH10 5DT

Governance model 3: Devolved support for public engagement with research (The University of Edinburgh)

- *Expert witnesses:* Lesley McAra, Assistant Principal Community Relations and Chair of Penology Anne Sofie Laegran, Knowledge Exchange Manager, College of Humanities and Social Science; both The University of Edinburgh
- *Venue:* Minto House, Chambers Street, Edinburgh EH1 1JZ

Culture change case study: EuroStemCell, http://www.eurostemcell.org/

- *Expert witness:* Clare Blackburn, Personal Chair in Tissue Stem Cell Biology and Coordinator and Director of Training and Outreach for the original EuroStemCell project.
- *Venue:* Breakout space, MRC Centre for Regenerative Medicine, SCRM Building, Edinburgh Bioquarter, 5 Little France Drive, Edinburgh EH16 4UU

These people were chosen because they hold responsibilities related to the RRI agenda. The sample was designed to reflect a range of organisations and levels and types of responsibility. (The sample is not at all gender-balanced – all witnesses are women. This is arguably representative, to a degree, of the wider UK situation when it comes to those who work on RRI, especially in non-academic roles.)

The Beltane Network, as local organisers, proposed five questions for the participants to ask their expert witnesses during the day one case study sessions:

- What barriers to culture change have you encountered?
- What has worked well?
- How has your job changed over the last few years?
- Have external pressures like the REF and Open Access been helpful or not?
- What do you feel still needs to change in your institution? Do you feel optimistic about this happening?

However, the participants were encouraged to ask any questions they felt appropriate and, in practice, the questions were more diverse and wide-ranging.

1.5 COMMENTS ON THE PROCEEDINGS

Not all of the partners who had originally hoped to attend the Edinburgh Field Trip in person were able to. The China Research Institute for Science Popularization had problems obtaining a visa in good time for the Field Trip; instead, members of the Institute will meet separately with the Field Trip work package lead and the NUCLEUS management team in London (UK) during 2016. Dublin City University participated via Skype as severe weather meant flights from Dublin to Edinburgh were grounded. Ilia State University (Georgia) did not attend because the participant could not obtain a visa to come to the UK. A couple of other of the Field Trip participants were only able to attend

part of the Trip due to family or work commitments or national holidays in their home country.

The morning programme of day 1 ran behind schedule and, consequently, we were unable to introduce the principles of dialogue and the EDGE analysis. Instead, we visited this briefly on the second day of the Trip.

2 OBSERVATIONS AND INTERPRETATION

This section summarises the observations made by our Field Trip participants (primarily during the case study sessions) and their interpretation of these. Several Field Trip participants have assisted with this section by providing written summaries of their observations and conclusions. Much of this section is also based on the discussions which took place as part of the day 2 reflection and synthesis session.

Some of the observations presented here are moderately sensitive, so the organisations involved are not identified.

2.1 ONGOING RRI ACTIVITIES IN THE UK

There are, or have been, UK-wide schemes and structures that have had an impact on the practice of RRI in Edinburgh's universities. Those mentioned repeatedly by expert witnesses are summarised here.

2.1.1 RESEARCH EXCELLENT FRAMEWORK ('REF')

The Research Excellence Framework ('REF') is the means by which the quality of the research done by UK higher education institutions is assessed. It took place in 2008 and again in 2014; the next is expected to be in 2020. The REF is a UK Government exercise; it is organised for the whole of the UK by the Higher Education Funding Council for England (HEFCE). Institutions are rated on: (i) the quality and quality of publications produced by its researchers; (ii) the 'vitality and sustainability' of the research environment (e.g. research grants, PhD students); (iii) the impact of the institution's research in wider society. The REF replaced the UK's Research Assessment Exercise ('RAE').

The REF has been the subject of controversy and criticism, including:

- The considerable workload it generates for institutions.
- Some types of research publication are – seemingly arbitrarily – given more status than others.
- Some institutions have learned to 'play' the system, employing large numbers of excellent researchers just in time for REF assessment.
- The assessment of the impact of an institution's research was perceived by some researchers as impinging on academic freedom, and the criteria for inclusion

meant many examples of excellent public engagement received no recognition in the REF.

How the REF has both supported and acted as a barrier to RRI is discussed in more detail later in the rest of this section.

2.1.2 RCUK BEACONS AND CATALYSTS FOR PUBLIC ENGAGEMENT

Since 2008, there have been two substantial, UK-wide initiatives to embed a culture of public engagement in research institution. These were both funded and administrated by Research Councils UK ('RCUK'), the umbrella organisation for the UK's national research funders. The two schemes are:

1. The Beacons for Public Engagement: RCUK funded six projects from 2008 until 2012. Each project was run by a group of research institutions working in partnership. The Beltane Public Engagement Network is a former Beacon that is a partnership between the four universities in Edinburgh. These universities now fund the Beltane Network themselves.
2. The Public Engagement with Research Catalysts: This scheme was the successor to the Beacons scheme and ran from 2012 until 2015. Catalysts were like the Beacons, but on a smaller scale: each only involved one research institution, not several. The University of Aberdeen hosted a Catalyst project; the legacy of the Catalyst is the University's permanent Public Engagement with Research Unit ('PERU').

2.1.3 RRI RESEARCH TAKING PLACE AT EDINBURGH'S UNIVERSITIES

Research on RRI is taking place at some of Edinburgh's universities. In many, cases, this is internationally recognised for its excellence.

Notably, at the University of Edinburgh, researchers based in Science, Technology and Innovation Studies conduct research on the social and ethical implications of emerging technologies and scientific disciplines such as synthetic biology, environmental monitoring, regenerative medicine, implantable technologies and biofuels.

Our aim for the Field Trips, as distinct from the academic research component of the NUCLEUS project, was to observe RRI in practice in the location in question – in this case, Edinburgh's universities – rather than to document academic research on the topic of RRI. Researchers looking at RRI in their work were, instead, put forward as a potential interviewee for the Bielefeld-led academic research component of NUCLEUS phase one. Additionally a synopsis of the findings from Professor Joyce Tait's recent paper 'Responsible Research (RR) to Responsible Innovation (RI): Challenges in implementation' (Tait, 2017, 2) is given in Appendix 2, shows that the challenges of RRI and upstream engagement are critiqued within the academic community.

2.2 OBSERVATION 1: IT'S ALL ABOUT THE INDIVIDUAL RESEARCHER – OR IS IT?

It was clear in our interviews that a small number of highly motivated 'champion' researchers will consistently undertake public engagement in the absence of any support, and often in the face of obstacles. However, it was also clear that accepting this as the status quo can be detrimental to the researchers in question, and risky for their institution's progress with respect to RRI.

2.2.1 THE POWER OF THE ENTREPRENEUR

Something which is evident in the various case study interviews is the importance – and reliance upon – people. Positive change often happens because an entrepreneurial person has championed it, not because of sanctions or incentives within or beyond the institution. The same people also tend to overcome the institutional subject 'silo' mentality with their personal relationships with colleagues. However, unless there are many supporters, there is a risk that progress made on advancing the RRI agenda will be lost if staff move on to other positions. There is also a risk of relying on the same people all the time, leading to demand fatigue or simply 'strengthening the strong'.

2.2.2 THE ISSUE OF SUSTAINABILITY

It was clear from all the case studies that goodwill alone has sustained much of the public engagement that happens. Researchers have not traditionally had public engagement recognised as part of their formal workload; nor have they received any money to cover the costs associated with public engagement activities. The sustainability of this situation is an ongoing concern in all the case study institutions – an individual's enthusiasm can carry them for only so long.

However, positive change is happening. One of the universities in Edinburgh is currently amending its staff workload model to formally recognise public engagement as part of it. This same university no longer charges staff to use rooms for public engagement activities, putting public engagement on an equivalent standing to teaching.

2.2.3 ONLY THE RESEARCHER CAN SUPPLY THE MOTIVATION

While time and money is needed to make public engagement sustainable, it is not enough to ensure it will happen. Researchers won't undertake public engagement just because the support is there; what drives them is something else. These can be positive, intrinsic motivations: the potential for a positive effect on society or personal enjoyment. Motivation can also be a reaction to external, sometimes negative pressures: the need to provide evidence of potential or past research 'impact' in applications for research funding or the REF.

2.2.4 WHAT IF RESEARCHERS JUST AREN'T INTERESTED?

What do we do with researchers who have no interest in in public engagement?

- Do some researchers truly have no aptitude for public engagement, or does everyone have relevant skills they can develop?

- Should we be training these individuals in public engagement skills, and should it be mandatory? Or should we be allowing them to focus their energies where they (feel they) are best?
- Should every researcher at least appreciate the value of public engagement with research?

These points lead to related issues:

- Should we spend much time trying to support and influence researchers who are about to retire, or should we focus on PhD students – the research leaders of the future?
- If every researcher in our organisations started delivering public engagement activities then, no matter how good the activities were, would the potential audiences become overwhelmed by the offering?

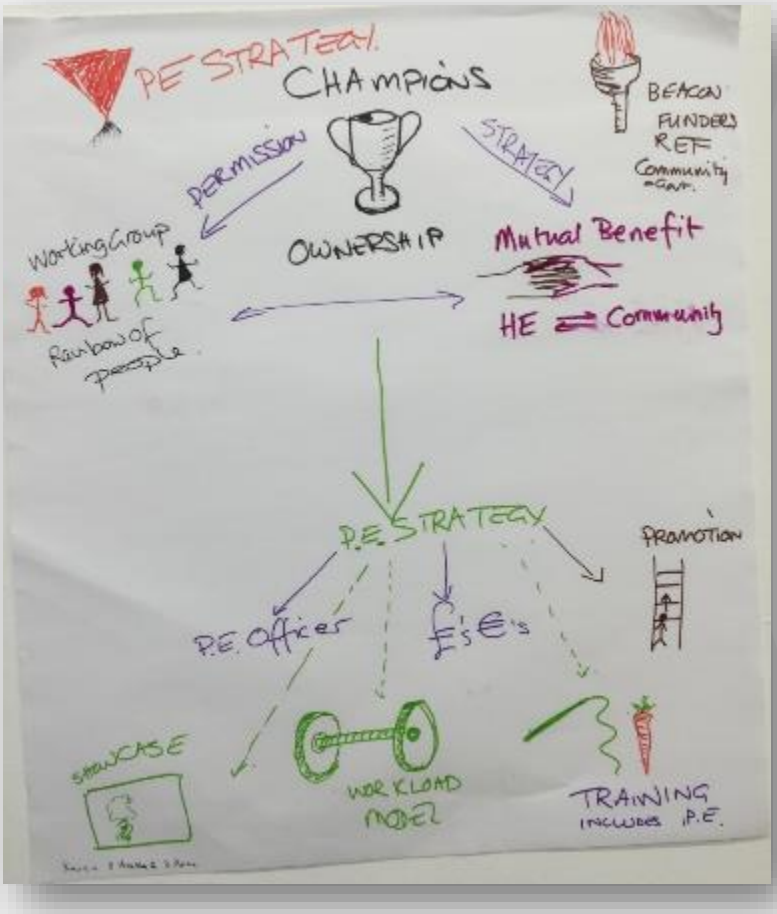

Figure 1: The role of 'champion' researchers in one scenario of a university public engagement strategy

2.2.5 SUMMARY OF SUPPORT FOR AND BARRIERS TO RRI | INDIVIDUAL RESEARCHERS

With respect to the role individual champion researchers play in embedding RRI in institutions, we can summarise our key findings as follows:

Ongoing RRI Support for Individual Researchers

- Formally recognising public engagement as part of a researcher's workload, and allocating time to it
- External motivators such as the REF or research funders who require the potential 'impact' of research be realised

Barriers to RRI at the Level of the Individual Researcher

- The traditional university organisation of researchers by academic discipline can make it harder for them to form useful public engagement relationships with others
- Lack of succession planning for when 'champion' public engagers leave the university
- Lack of formal recognition of the time and money that public engagement requires, and the toll this can take on those undertaking the activity

2.3 OBSERVATION 2: BIGGER THAN THE INDIVIDUAL

All of the expert witnesses in all four case studies were part of some formal institutional structure – a dedicated job, an office or special leadership position – that supported public engagement with research. It was clear that these structures could support but also unintentionally undermine RRI.

2.3.1 ADVANTAGES AND DISADVANTAGES OF A CENTRALISED MODEL

It was clear that having dedicated staff who are responsible for public engagement generally – not allied to a particular project – help ensure that knowledge is not lost at an institutional level. Conversely, however, such staff can be contrary to the very mission of RRI: RRI integrates public engagement into the research project; by having separate staff responsible specifically for public engagement, often also sitting in an administrative rather than research department, the **engagement is separated out again**.

Another danger of centralising the support for public engagement with research is that individual researchers will become disenfranchised: rather than being able to shape their own public engagement profile, they may feel pressure to fall in line with a **central message** about what public engagement is. For example, if there is a lot of central support for public lectures and talks, researchers who are not comfortable doing this may feel that public engagement is not for them. In fact, they could be engaging successfully through written media like blogs.

With respect to training, those organising it need to be aware that ways of engaging that might be cutting-edge in one discipline could be mainstream in another: for example, co-creation is radical for a criminologist, but not for a designer. Centralised training opportunities need, therefore, to somehow be targeted, and **not assume that all researchers are operating with the same knowledge and experience**, even within the same institution.

2.3.2 MISUSE OF CENTRALISED SUPPORT

At an operational level, there is a risk that the staff providing central support for public engagement will be drawn into activities already established at their institution. The **confusion** of a public engagement team with a PR, events, community engagement or traditional science communication office was not uncommon among our case studies. This happened most often when the public engagement staff positions were relatively new. And simply having an office, whether just one person or a team, was not enough; the office or person needed to be successfully **integrated** into institutional structures. There was at least one case of a new department 'floating', meaning the necessary synergies were not happening as much as they could be and, when they were, it was with a deliberate steer from senior university management.

2.3.3 SENIOR MANAGERS MUST BE WELL-INFORMED

Important in every case study seemed to be support for public engagement, and the formal structures that support it, by senior university management. Where centralised committees for public engagement existed, they conferred status on the activity. However, where the senior staff in question **did not have the requisite knowledge** about public engagement, the work of the operational staff could be more difficult than if no senior figurehead was present at all.

It was observed that senior university management usually did not have any formal means – budget or staff who officially worked for them – to help them, so their success in supporting the public engagement agenda usually relied entirely on their (albeit impressive) **influencing skills**. In this respect, while beneficial, support from senior university management was not as influential as might be expected.

2.3.4 THE HARD-TO-REACH HEAD OF DEPARTMENT

The individuals who had the greatest means – both people and money – to ensure things happened were actually the university 'middle management'. These heads of subject departments were usually in a position of extremely high stress, with responsibility for a very diverse range of academic administration and management, so were typically **difficult to engage with**. Our Field Trip participants noted that none of the senior managers they spoke to seemed to be outspoken against organising public engagement activities; it would be interesting to see if the sentiment was the same had we interviewed those in a middle management position.

2.3.5 SUMMARY OF SUPPORT FOR AND BARRIERS TO RRI | INSTITUTIONAL STRUCTURES

With respect to the role institutional structures play in embedding RRI in institutions, we can summarise our key findings as follows:

Institutional Structures Which Support RRI Activities in Universities

- A central person with responsibility for supporting public engagement can help ensure knowledge is not lost as individual researchers come and go
- University senior managers (e.g. Vice Principal in Scotland) can have considerable influence and are able to give public engagement and RRI serious attention

Institutional Structures Which Are Barriers to RRI

- Having a central public engagement person can give the impression that public engagement is separate from research – the exact opposite of our working definition of RRI!
- Strong central support for certain types of public engagement activity can discourage researchers who might prefer to engage in other ways
- Centralised training cannot always cater to the diverse needs of the many researchers in an institution
- In institutions where there has not previously been centralised support for public engagement, the roles of newly-appointed staff may not be understood, and there may be pressure for them undertake non-RRI activities
- If an institution appoints a central person or team without connecting them to the necessary university departments, committees and leaders, it will be extremely hard for them to do their job well
- Senior managers who have leadership responsibility for RRI may not have any money to support it
- The individuals who are potentially the most influential in a university – middle managers with responsibility for other researchers in a specific subject area – tend to be very overworked and probably the least likely to want to take on something new and additional like public engagement

2.4 OBSERVATION 3: CAREER PROGRESSION AND ESTEEM

Something observed by the Field Trip participants, which was perhaps a weakness of the organisation, was that the expert witnesses were individuals who were highly motivated to undertake public engagement and who had persevered in the face of obstacles. They are unlikely to be representative of all the researchers or management at their institutions. Many researchers are – quite understandably – likely to be discouraged by factors that could impact on their career progression and esteem from their peers. Indeed, one of our expert witnesses had been warned that getting involved in public engagement would be "career sabotage". This perception seems to be diminishing as

university awareness of the UK research impact agenda becomes ever-stronger, but still persists in some areas.

2.4.1 PERCEIVED RISKS TO RESEARCHERS' CAREER PROGRESSION AND ESTEEM

- The **outcomes of the public engagement activities** are not often clear at the outset. This can make it difficult for researchers to commit to the activities in a results-orientated environment, especially if it takes time away from those activities.
- **Public engagement is a new activity** for many researchers, and sometimes it will go wrong. The experience of (perceived) failure can be difficult for individuals who are used to being among the best in their field.
- Public engagement activity can sometimes be perceived as **making light of research** by making it 'fun', too simple, or lacking in research content.
- Some researchers were concerned about **being perceived to lose political neutrality** if their research connected with NGOs, politicians or activists.

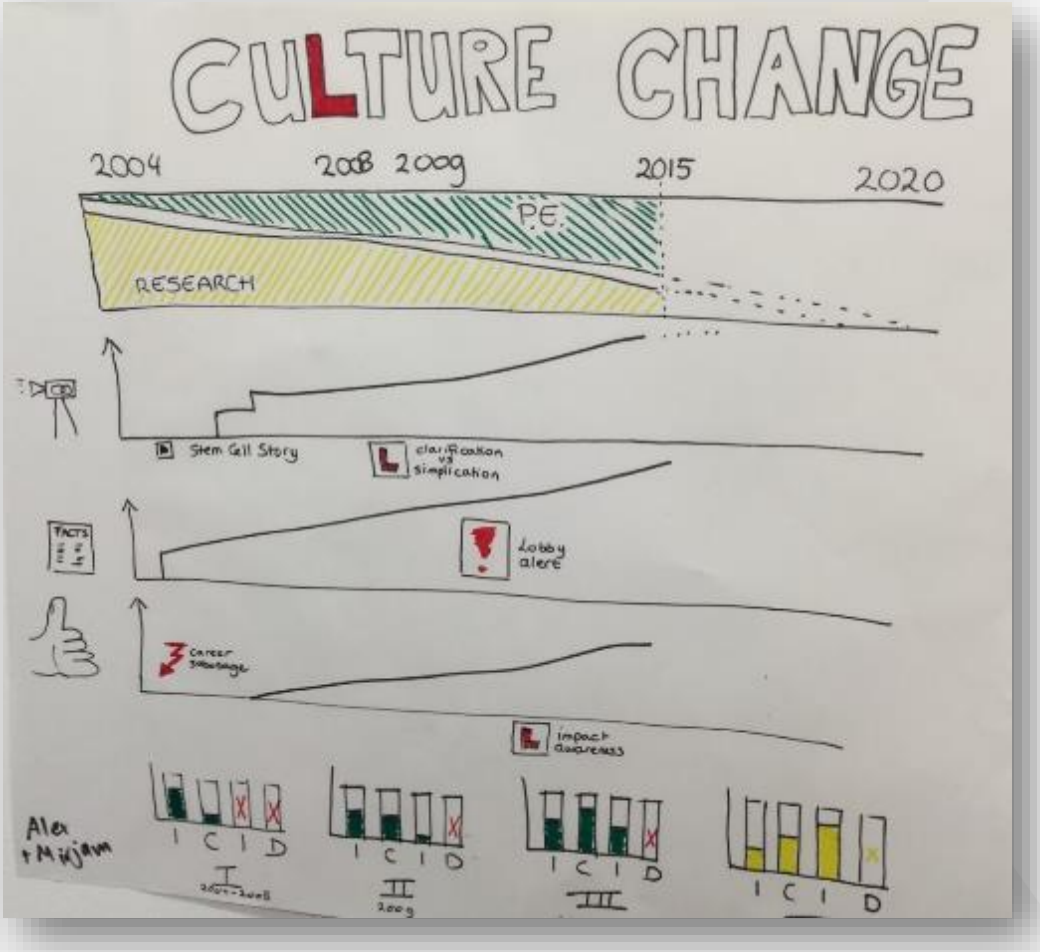

Figure 2: Public engagement culture change and its effect on a research career

- What is of interest to an audience may relate more to a **researcher's general subject area** than their own specific current research. This may not only make engagement less satisfying for a researcher, but also less attractive to an external funder who requires impact to be realised from the research it actually funds.
- The official measure of UK university research quality – **the REF – has a very narrow definition of research 'impact'** which excludes most of the public engagement done in universities. It can be discouraging for researchers if they feel their engagement work doesn't 'count'.

There was an indication, however, that a public engagement profile is becoming ever-increasingly important for researchers' employability, driven by external pressure on universities from research funders and the REF to demonstrate research impact. This instrumental career benefit could appeal to researchers who are not motivated by the 'feel-good' effect of good quality public engagement with research.

2.4.2 SUMMARY OF SUPPORT FOR AND BARRIERS TO RRI | CAREER PROGRESSION AND ESTEEM

With respect to the role institutional structures play in embedding RRI in institutions, we can summarise our key findings as follows:

Local schemes and structures that support RRI:

- Academic employers increasingly require researchers to have a public engagement profile (to ensure the institution is competitive in the REF and in securing research funding).
- The Beltane Public Engagement Fellowship scheme has enabled permanent academic staff at universities in Edinburgh to spend one day a week for six months on public engagement activities. The scheme paid the academic's department salary equivalent to the one day a week, which was intended to pay for someone to cover the Fellow's duties for the one day. In this way, the researcher could undertake engagement as part of their core work instead of squeezing it in, and his/her academic department would not feel a negative impact.
- Some of the research institutions in Edinburgh have included public engagement in their promotions criteria. This means that public engagement could, in theory, help a researcher to get promoted.

Barriers to RRI:

- Researchers are usually over-committed and work in a results-orientated environment. Trying something new which may go wrong (and, even it goes right, may not be recognised by the career-determining REF) can have an impact

on their self-esteem, and can seem like a poor investment of time compared to the guaranteed return of academic publications.
- Researchers are concerned they may lose integrity if they get involved with anything too fun or political – they fear that they and their research could appear less, not more, responsible.
- The researcher's interest may not match an audience's, and deviating from their interests may make engagement less satisfying for a researcher.
- Academic departments did not always use the money they received for replacement staff. As a result, the Fellows would sometimes not see any reduction in their other workload.
- While public engagement may now be in some promotions criteria, the promotions committee may not pay attention to it – and almost definitely not as much attention as they pay to research publications.

2.5 OBSERVATION 4: WHAT'S IMPORTANT TO UNIVERSITIES? STUDENTS!

Involving students in public engagement activities has been a gateway to institutionalising a culture of public engagement with research.

While research was important to all of the universities examined in the case studies, at least as important again were students. Students were an area where institutions were happy to spend money ('money follows the students'), and students demand the opportunity to get involved with public engagement and have this formally recognised: they need to develop their CV for an increasingly competitive job market.

Speculating as to student public engagement encourages engagement by researchers, it may be because researchers have a chance to learn and build relationships in a 'safe' setting where it will have clear benefits. Additionally, as time passes, students who have done this engagement as undergraduates are now becoming PhD students and postdoctoral researchers – the research leaders of the future

Local schemes and structures that support RRI:

- Awarding undergraduate students academic credits for undertaking engagement activity
- Formally recognising student volunteering with an awards ceremony
- Introducing student-led, community-focused academic courses
- Providing funding for student-led social enterprise start-ups

2.6 OBSERVATION 5: DRIVERS FROM BEYOND EDINBURGH

In all the case studies, the changes that had happened within the universities could not be divorced from the major changes happening outside.

2.6.1 EFFECT OF THE 2008 FINANCIAL CRISIS! REF AND PATHWAYS TO IMPACT

The 2008 financial crisis affected UK public spending profoundly and subjected spending on universities to much greater scrutiny. The need for universities to be accountable to the tax payer has been a major, albeit often negative, driver of the public engagement agenda within universities. The introduction of an impact criterion into the Research Excellence Framework has raised the profile of public engagement within universities; so has the introduction of a 'Pathways to Impact' section as an obligatory part of any application for UK government-funded research funding.

2.6.2 ACADEMIC FREEDOM, FEAR AND NEGATIVITY

The requirement to articulate the potential impact of one's research, and to provide evidence for the impact it has already had, was initially received negatively within universities. This explicit accountability was a culture shock to many researchers and often perceived as conflicting with the fundamental notion of 'academic freedom'. Researchers were concerned about how much of an impact their research could be expected to have on the wider world. Does their research need to change policy? If the policy isn't implemented, should the researcher be held accountable? Does research need to have commercial potential? Is it enough for someone to just be interested in what research is being done?

Perceived infringement of academic freedom has meant that the rising profile of public engagement has been feared. The anxiety felt within universities meant that newly-appointed staff charged with supporting public engagement with research were sometimes viewed as 'the enemy' by researchers and treated with a degree of hostility.

2.6.3 EMBEDDING

With the passing of time, and with positive experiences of actually undertaking engagement replacing the negative fears forcing the initial involvement, the atmosphere within our case study institutions is feeling more positive. Nevertheless, the process of culture change is still far from complete.

3 RECOMMENDATION FOR NUCLEUS' IMPLEMENTATION ROADMAP

In what follows, we map observations about barriers made during the Edinburgh Field Trip to the local schemes and structures we observed that might help overcome them. The barriers and proposed solutions presented below are largely drawn from the detailed notes collected during the Field Trip interviews, from which we have isolated overarching themes. We have also expanded upon the original Field Trip data by utilising our own research into the Edinburgh and UK context, and by our further exploration into the issues and examples raised by the interviewees.

In some cases, we observed barriers which were not yet addressed by a scheme or structure. In these instances, we have suggested schemes and structures that could help. The ideas for these were developed during our Field Trip group discussions.

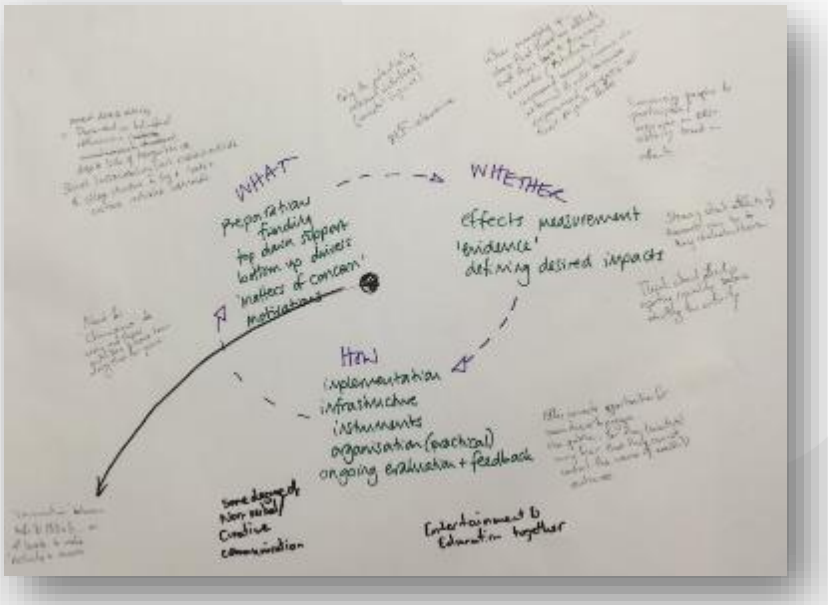

Figure 3: A suggested process for RRI culture change

What →	**Whether** →	**How**
Preparations	Effects measurement	Implementation
Top-down support	'Evidence'	Infrastructure
Bottom up drivers	Defining desired impact	Instruments
'Matters of concern'		Organisation (practical)
Motivations ←		Ongoing evaluation and feedback

As illustrated by figure 3, an organisation that is considering embedding a culture of RRI, such as NUCLEUS' phase 2 pilot 'nuclei', needs to think carefully about what it already has, what change it wants to happen, what things will look like if the change happens, and how the change will be measured. The EDGE tool (http://www.publicengagement.ac.uk/support-it/self-assess-with-edge-tool), already recommended to the Edinburgh Field Trip participants, can be used both to identify areas where change is needed and to track progress.

3.1 OVERCOMING BARRIERS TO RRI | INDIVIDUAL RESEARCHERS

Barrier: The traditional university organisation of researchers by academic discipline can make it harder for them to form useful public engagement relationships with others

- Suggested solution: Is there someone or something who can act as an intermediary, such as (but not necessarily) a central office for public engagement? (See Institutional Structures, above)
    - Can they find out who is already practising public engagement /RRI?

Barrier: Lack of succession planning for when 'champion' public engagers leave the university

- Suggested solution: Is there a way that this knowledge can be retained at an institutional level?
    - Again, this could be a central person or office, but this may not necessarily be the most appropriate (See Institutional Structures, above)

Barrier: Lack of formal recognition of the time and money that public engagement requires, and the toll this can take on those undertaking the activity

- Suggested solution: Can you formally recognising public engagement as part of a researcher's workload, and allocate time to it? (See the Individual Researcher, above)

3.2 OVERCOMING BARRIERS TO RRI | BIGGER THAN THE INDIVIDUAL

Many of the barriers regarding institutional structures are ongoing concerns for the universities we observed in Edinburgh that still need to be adequately addressed. Here, we present the factors that must be considered in finding solutions. It is possible that the second phase of the NUCLEUS project will yield relevant best practice that can then be applied in the Edinburgh universities.

Barrier: Having a central public engagement person can give the impression that public engagement is separate from research – the exact opposite of our working definition of RRI!

- Can engagement be fully integrated into research without the researcher having to do it (all)? If not, can we find a way to give researchers the time, money and confidence to do it?
- Is there still a role for a central point of contact with engagement fully integrated into research?
- Could there be an intermediary between central support and the researchers, or instead of central support? Would this be useful? What problems would it present?

Barrier: Strong central support for certain types of public engagement activity can discourage researchers who might prefer to engage in other ways

- Is there a way to raise awareness of the wide range of techniques that can be used to engage publics?
- Should an institution avoid centrally organising any public engagement activities?

Barrier: Centralised training cannot always cater to the diverse needs of the many researchers in an institution

- Is it possible to deliver more bespoke training to some groups?
- Could bespoke training still be organised by a central person?

Barrier: In institutions where there has not previously been centralised support for public engagement, the roles of newly-appointed staff may not be understood, and there may be pressure for them undertake non-RRI activities

- Can the actual role of the new staff member be advocated by a line manager and university leadership?
- Can the new staff member be empowered to advocate for him- or herself through, for example, influencing training?

Barrier: If an institution appoints a central person or team without connecting them to the necessary university departments, committees and leaders, it will be extremely hard for them to do their job well

- Does the new appointee have clear and appropriate line management, leadership (by someone effective) and departmental affiliation?
- Is the institution ready to support a central person, or do other structures need to evolve first?

Barrier: Senior managers who have leadership responsibility for RRI may not have any money to support it

- Are university funding models fixed, or is it possible to redirect funds?
- Does the senior manager have the ability and opportunity to influence those who do have funds, such as middle managers?

Barrier: The individuals who are potentially the most influential in a university – middle managers with responsibility for other researchers in a specific subject area – tend to be very overworked and probably the least likely to want to take on something new and additional like public engagement

- Are there any external motivators that are non-negotiable, such as the REF, the requirement to secure research funding or demands of undergraduate students (see What's Important to Universities, above) that would make supporting public engagement with research non-negotiable for middle managers?
- Are there also positive ways to motivate and/or enable middle managers?

3.3 OVERCOMING BARRIERS TO RRI | CAREER PROGRESSION AND ESTEEM

Again, many barriers are ongoing concerns and the solutions were not clear.

Barrier: Researchers are usually over-committed and work in a results-orientated environment. Trying something new which may go wrong (and, even it goes right, may not be recognised by the career-determining REF) can have an impact on their self-esteem, and can seem like a poor investment of time compared to the guaranteed return of academic publications

- Would researchers be motivated by employers who are looking for someone with a public engagement profile? (See Career Progression and Esteem)
- Can the risk be removed by giving researchers time to publish and do engagement, and receiving esteem for it, as with the Beltane Public Engagement Fellowships and changes to some universities' promotions criteria or workload allocations? (See Career Progression and Esteem and Individual Researchers)
- Can researchers be given support to ensure quality, e.g. working with professionals who have skills they do not?

Barrier: Researchers are concerned they may lose integrity if they get involved with anything too fun or political – they fear that they and their research could appear less, not more, responsible

- Can awareness be raised of the full range of public engagement activities that are possible?
- Is it possible to convey a difference between making fun and having fun?
- Can training be given to make researchers more confident in how to handle themselves in a political context?
- Will universities support their staff should engagement on political issues turn sour – and do researchers know this if they will

Barrier: The researcher's interest may not match an audience's, and deviating from their interests may make engagement less satisfying for a researcher

- If this is the issue, does it need to be the researcher him-/herself that is doing the engagement?
- Has the researcher in question tried engagement and had a chance to feel the 'feel-good factor', or is there a way to incentivise them with, for example, funding?

Barrier: Academic departments did not always use the money they received for replacement staff. As a consequence, the Fellows would sometimes not see any reduction in their other workload.

- Would it be possible to make this a condition of receiving the Fellowship money?

- Is there any reason (e.g. the funding is not enough, slow HR processes) why funding has not been used for replacement staff?

Barrier: While public engagement may now be in some promotions criteria, the promotions committee may not pay attention to it – and almost definitely not as much attention as they pay to research publications.

- Could work be done with university Human Resources departments to improve this?

4 RECOMMENDATIONS FOR FUTURE NUCLEUS FIELD TRIPS

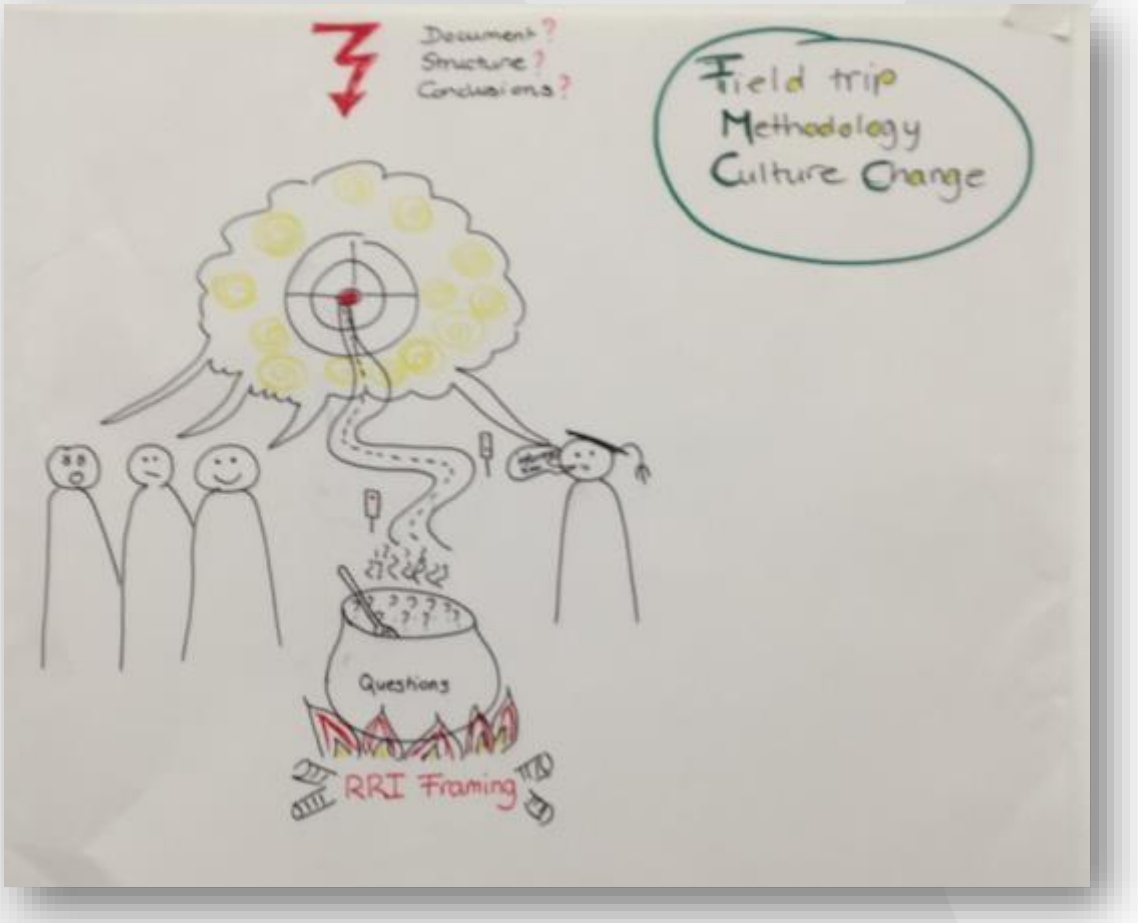

Figure 4: Cementing the NUCLEUS Field Trip methodology

As well as recommendations for nuclei, the Edinburgh Field Trip also produced recommendations for the process of future NUCLEUS Field Trips. These were primarily for the case study/expert witness sessions on the afternoon of day 2, and were:

- Ask the expert witnesses more about how research is conducted (and is responsible) rather than focusing on public engagement

- Give the expert witnesses time and opportunity to ask the interviewers questions, and value the responses
- Allow Field Trip participants to collectively formulate the interview questions
- Ensure that interviewers who are working in their non-native language are given full opportunity to contribute (i.e. if they are silent, ensure it is by choice)
- Articulate the rationale for the interviews themselves and for inviting specific expert witnesses
- Ensure a breadth of perspectives is represented by the expert witnesses – not only the 'good news' stories!
- Share the CVs of the expert witnesses in advance
- Give clear guidance (even a specific format template) on how interviewers should report back on what they found
- Assign a note taker at the start

5 OTHER ACTIONS RESULTING FROM THE EDINBURGH FIELD TRIP

Specific actions resulting from the Edinburgh Field Trip were:

Field Trip work package leaders or NUCLEUS management team:

- Set up cloud storage for sharing of presentations

Nuclei organisations:

- Conduct EDGE analysis of institution as pre-work
- Speak to organisations about starting nuclei staff 6 months earlier than currently planned

Beltane Public Engagement Network:

- Share example of promotions criteria from Edinburgh institutions that recognise public engagement
- Share University of Edinburgh research impact flyer, slides by Ian Pirrie and course by Andy Cross

APPENDIX 1: FIELD TRIP SCHEDULE

Thursday 3rd December, 7pm onwards
Optional, informal drink at Usher's of Edinburgh (http://andrewushers.co.uk/find-us/). (Table is in the name 'Sarah Anderson'. Food can be ordered if you need dinner. Usher's is a three-minute walk from the Kenneth Mackenzie Suite – see http://tinyurl.com/jh7aaw6.)

Friday 4th December - Setting the Scene and Exploration

Scene Setting: 9am-1pm, Boardroom (L.05), Main (Architecture) Building, Edinburgh College of Art, The University of Edinburgh, 74 Lauriston Place, Edinburgh, EH3 9DF (map - http://www.ed.ac.uk/maps?building=eca-main-building).

- 9.00am: Framing of the fieldtrip theme (NUCLEUS management team)
- 9.45am: Icebreaker and organisation (Beltane Public Engagement Network)
    - Allocation of participants to afternoon case studies
    - Plans for Friday evening social activity
- 10.15am: Tea and coffee
- 10.30am: Keynote address by Mary Bownes, Vice Principal Community Development at the University of Edinburgh and founder of the Beltane Public Engagement Network
    - Institutional barriers to RRI and the external UK funding and policy environment
- 11.00am: Principles of dialogue and the EDGE analysis (Dr Heather Rea, Beltane Public Engagement Network)
- Midday: Lunch

Case studies of RRI governance and culture change in research institutions: 1-5pm, various locations in Edinburgh (transport will be provided by the fieldtrip organisers).

Fieldtrip participants will divide into groups and each research one case study.

Participants are free to ask the 'witnesses' any questions they wish. Prompts for discussion could be:

- What barriers to culture change have you encountered?
- What has worked well?
- How has your job changed over the last few years?
- Have external pressures like the REF and Open Access been helpful or not?
- What do you feel still needs to change in your institution? Do you feel optimistic about this happening?

Governance model 1: A central office for public engagement with research (The University of Aberdeen and, subject to confirmation, Heriot-Watt University). Confirmed witnesses are: Dr Heather Doran

Governance model 2: A central person for public engagement with research (Edinburgh Napier University). Confirmed witnesses are: Dr Clare Taylor

Governance model 3: Devolved support for public engagement with research (The University of Edinburgh). Confirmed witnesses are: Professor Lesley McAra; Dr Anne Sofie Laegran

Culture change case study: EuroStemCell. Confirmed witnesses are: Professor Clare Blackburn; Dr Jan Barfoot

Saturday 5th December - Reflection and Synthesis
All takes place in Meeting Room 3, Grassmarket Community Project, 86 Candlemaker Row, Edinburgh EH1 2QA.

Reflection (9am-12.30pm)

- Each group will present the findings of its case study to the rest of the fieldtrip participants
- Revisiting and sharing of EDGE analyses of participants own institutions, identifying specific institutional barriers

Lunch will be served 12.30-1.30pm.

Synthesis (1.30-5pm)

- Formulate recommendations to overcome institutional barriers and take advantage of opportunities at own research institutions
- Synthesise these recommendations into more general recommendations for the RRI implementation roadmap

APPENDIX 2: ONGOING RRI RESEARCH IN EDINBURGH

The Centre for Social and Economic Research on Innovation in Genomics (Innogen), Centre for Synthetic and Systems Biology (SynthSys) and the UK Centre for Mammalian Synthetic Biology have all carried out work in the area of RRI, at the University of Edinburgh. Innogen was formed in 2002 to 'study the evolution of genomics and life sciences and their far-reaching social and economic implications'[1]. Director, Professor Joyce Tait, is particularly interested in "responsible innovation" and the triangular relationship between scientists and innovators, regulators, standard bodies and policy makers, and stakeholders, such as patient groups, the general public, and NGOs.

Tait noted that the majority of research funded in the area of RRI has focused on "responsible research" as opposed to "responsible innovation". Speaking in terms of "Technology Readiness Levels", she defined responsible research as relevant to the early research stages (TRL 1-4) and responsible innovation as relevant to the later technology development stages up to marketing (TRL 5-9). At an institutional level, she felt RRI had largely taken the form of "upstream engagement" initiatives. For Tait this is problematic. Firstly, consultation, with stakeholders at a responsible research stage, necessitates speculative discussions about the impact of a product/technology that is likely to undergo considerable transformation before it reaches a market, thus invalidating consultations held in the early stages of the research. Secondly, Tait considers such engagement as politically driven. In her article, *'Responsible Research (RR) to Responsible Innovation (RI): Challenges in implementation'*, Tait points to the politicised nature of RRI initiatives which are used 'as a socially coercive tool for the political control of science' (2017, 2)[2]. In this way, social scientists, NGOs and activists etc. that are ideologically opposed to innovations, for example, GM crops, can hold an overbearing influence on the direction of stakeholder consultations and resulting actions.

For Tait, the justifications for undertaking upstream engagement are negated by several factors (see Table 1), including the prominence of focus groups as a method of consultation. Tait drew attention to research in social psychology that suggests that focus groups are easy to bias, thus creating opportunities for focus group facilitators to frame a new technology according to their own ideological beliefs (as happened with the GM crops public dialogue). What may seem undesirable in the early research stages, and in the context of politically influenced consultation, may become desirable at an innovation level in which the nature of the eventual products and public opinion about the desirability of particular outcomes may have changes dramatically.

[1] Innogen. *About Us.* Available: http://www.innogen.ac.uk/about/. Last accessed 13th July 2017.
[2] Tait, E. (2017). From Responsible Research (RR) to Responsible Innovation (RI): Challenges in implementation. *Engineering Biology*. 1 (1), p1-5.

Table 1: Problems with upstream stakeholder engagement

Group think	The views of small groups, e.g. focus groups, are easily swayed by participants with strong opinions or by those leading the engagement.
Issue framing	Given our ignorance about the future, upstream engagement can be a process of fictitiously framing new science and technology in the minds of the public.
Recruitment bias	It is difficult to persuade uncommitted citizens to participate in hypothetical discussions about future science and innovation —recruitment is likely to be biased towards those who have a specific agenda.
Consensus and conflict	Even in a small group discussion there is unlikely to be agreement on any issue related to innovative technologies, and where there is polarisation of views, upstream engagement can lead to increased levels of conflict and more extreme polarisation.
Engagement focus	Some topics, for example nanotechnology or synthetic biology, are too broad and multifaceted to allow meaningful engagement, particularly at the upstream stage.
Engagement fatigue	There will be insufficient time and resources to engage on every relevant issue and people will become cynical about the process
Labile public opinion	Most people who do not already have strong opinions will change their minds over relatively short timescales, and much more so over the 10 – 15 years that will elapse before a disruptively innovative research initiative delivers tangible outcomes in a market place.

Note. From 'Responsible Research (RR) to Responsible Innovation (RI): Challenges in implementation' (Tait, 2017, 2).

In spite of the challenges posed by upstream engagement, Tait points out that many science funders embrace such initiatives if they 'improve public acceptance of new technologies and would not bring an end to any area of research' (2017, 2). Tait remains cautious, however, given there has been little evidence to suggest better public acceptance as a result of such engagements. Rather, Tait has witnessed reductions in funding, particularly in nanotechnology, as a direct result of upstream engagement initiatives.

For Tait, therefore, it is important that:

1) engagement about responsible research is conducted at early TRLs with all relevant stakeholders, including industry and those who will develop the innovation, regulators, those who may be interested to make use of a particular innovation, the public in general and advocacy groups that may, in principle, be opposed to specific technologies;

2) none of these stakeholders is empowered to determine the future innovation path taken by an innovative technology; and

3) engagement conducted in later innovation development stages, in which a more meaningful dialogue can take place about the product under development, includes dialogue about innovation and regulation processes as well as the innovation itself.