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Health System Sustainability
NHMRC Partnership Centre

Public lecture

Trish Greenhalgh and Anne Kelso

Measuring the impact of research

Monday 19 March 2018

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Professor Sally Redman

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Measuring the impact of research: tensions, paradoxes and lessons from the UK

Professor Trish Greenhalgh

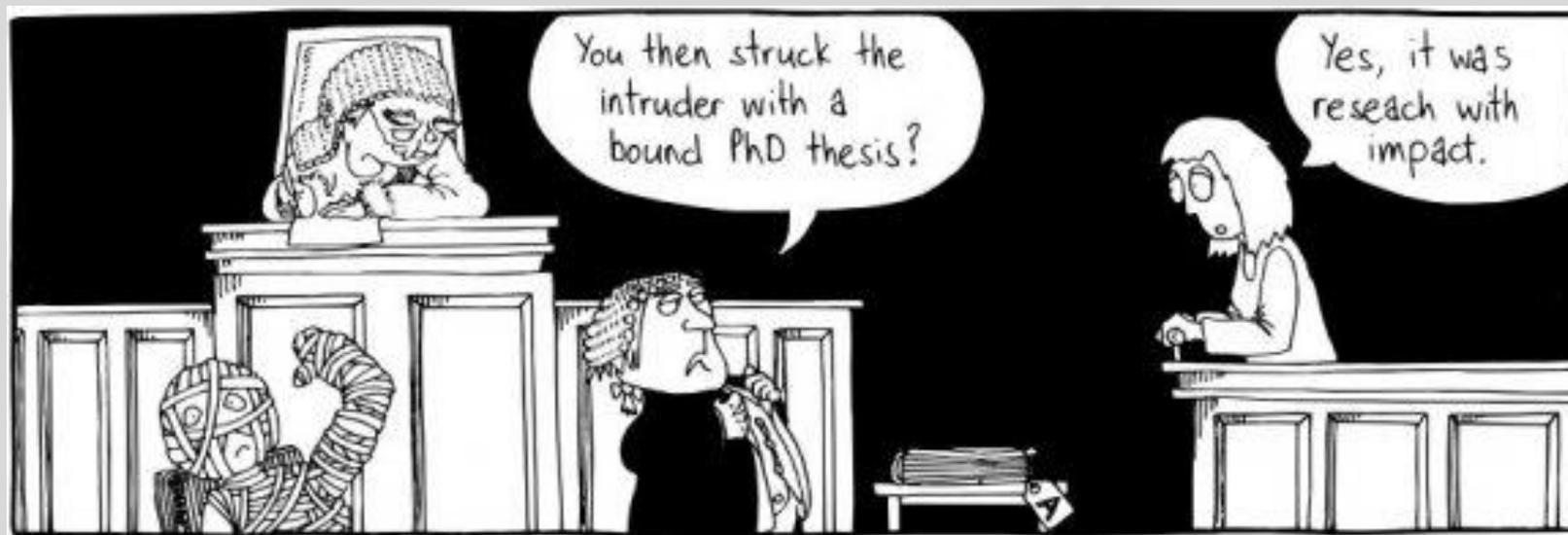
Measuring the impact of research: tensions, paradoxes and lessons from the UK

Professor Trish Greenhalgh
University of Oxford

Acknowledging Wilfred Mijnhardt



“Impact” is a loaded metaphor



Why all the fuss about research impact?

UK Research Excellence Framework (REF): 25% impact

UK Research Councils: 'Pathways to Impact' for all grants

Europe: Horizon 2020 prioritising 'societal impact'

International: World University Rankings

Individual academics: performance management

Moral purpose: academia serves society

Impact has been theorized in many different ways

1. Payback framework
2. Monetization of research (bangs per research buck)
3. Instrumental v enlightenment use of evidence
4. Context of discovery v context of application
5. Mode 1 (knowledge translation) v mode 2 (knowledge production)
6. Academic v societal impact
7. Triple helix (university / government / industry)
8. Supply chains v knowledge networks

Greenhalgh *et al.* *BMC Medicine* (2016) 14:78
DOI 10.1186/s12916-016-0620-8

BMC Medicine

REVIEW

Open Access

Research impact: a narrative review



Trisha Greenhalgh^{1*}, James Raftery², Steve Hanney³ and Matthew Glover³

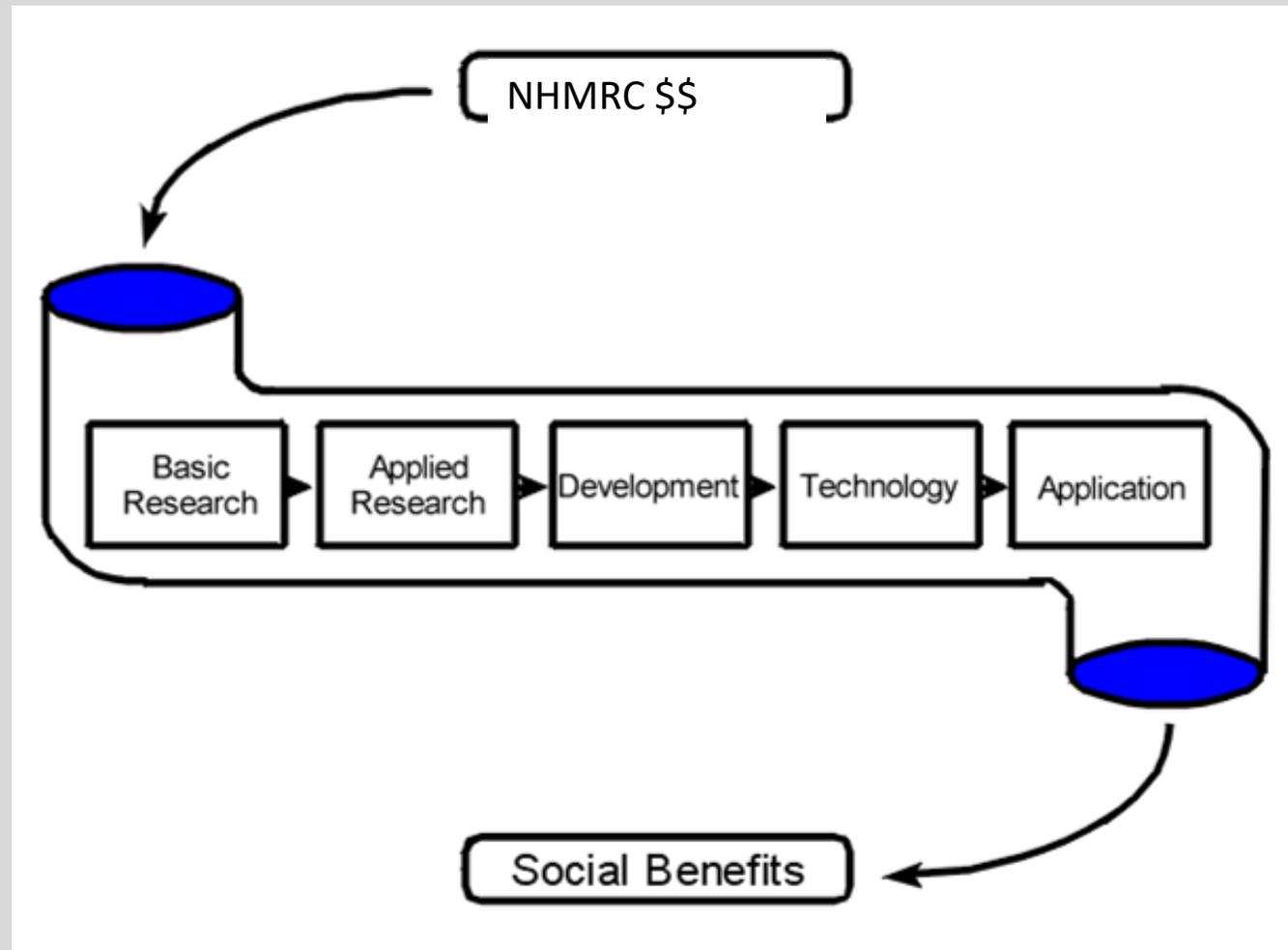
Abstract

Impact occurs when research generates benefits (health, economic, cultural) in addition to building the academic knowledge base. Its mechanisms are complex and reflect the multiple ways in which knowledge is generated and utilised. Much progress has been made in measuring both the outcomes of research and the processes and activities through which these are achieved, though the measurement of impact is not without its critics. We review the strengths and limitations of six established approaches (Payback, Research Impact Framework, Canadian Academy of Health Sciences, monetisation, societal impact assessment, UK Research Excellence Framework) plus recently developed and largely untested ones (including metrics and electronic databases). We conclude that (1) different approaches to impact assessment are appropriate in different circumstances; (2) the most robust and sophisticated approaches are labour-intensive and not always feasible or affordable; (3) whilst most metrics tend to capture direct and proximate impacts, more indirect and diffuse elements of the research-impact link can and should be measured; and (4) research on research impact is a rapidly developing field with new methodologies on the horizon.

In sum, all models of research impact embody three linked tensions:

- Newtonian logic (linear, cause-and-effect, input-output) v complex system logic (non-linear, emergent, adaptive)
- Impact metrics v impact narratives
- Outcomes v processes/relationships

Newtonian logic e.g.



Newtonian logic - examples

Payback framework: 5 categories of impact

- Knowledge (= academic outputs e.g. journal articles, books)
- Future research (e.g. training new researchers)
- Policy and product development (e.g. guidelines)
- Health benefits (e.g. better health, cost savings)
- Broader economic benefits (IPR, lower welfare bill)

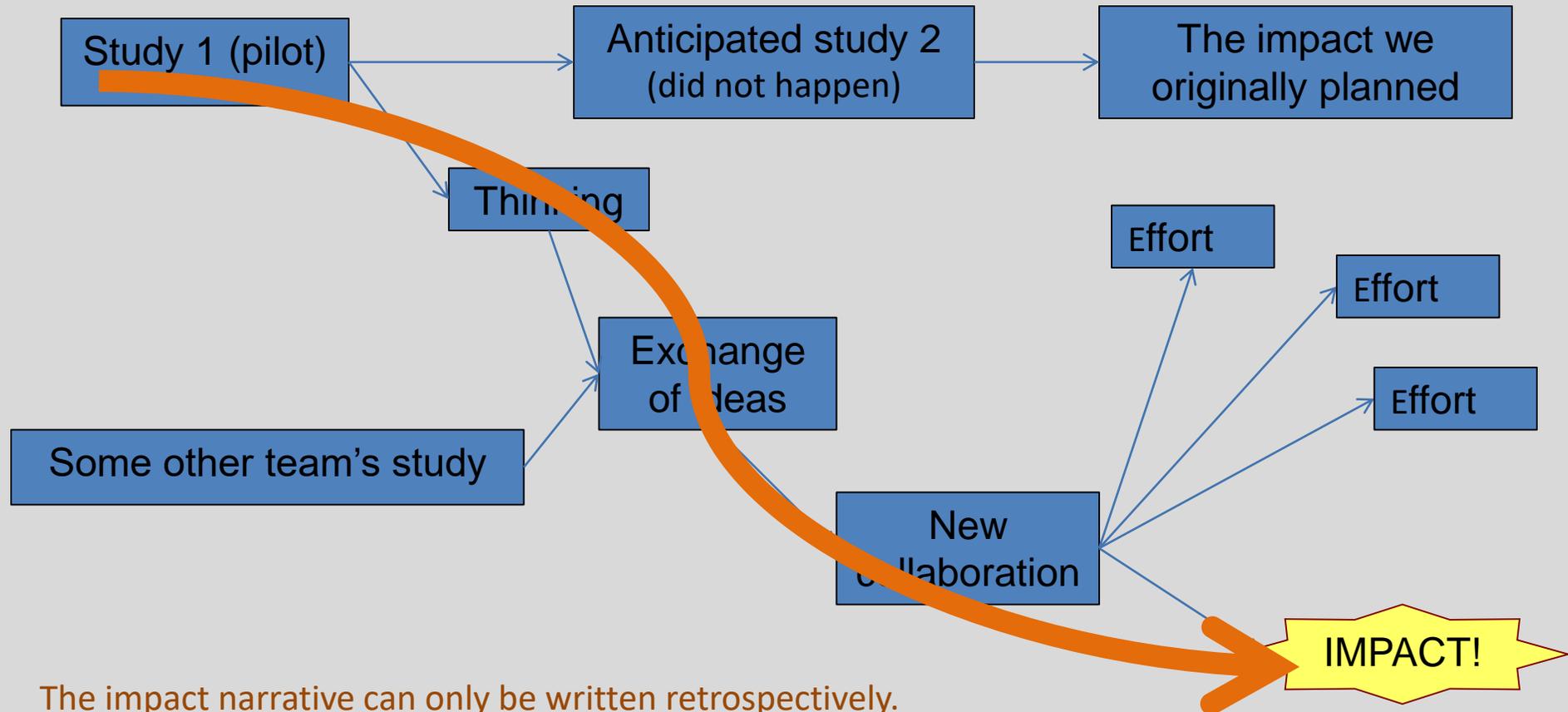


Newtonian logic - critics

“Science, like the Mississippi, begins in a tiny rivulet in the distant forest. Gradually other streams swell its volume. And the roaring river that bursts the dikes is formed from countless sources.”

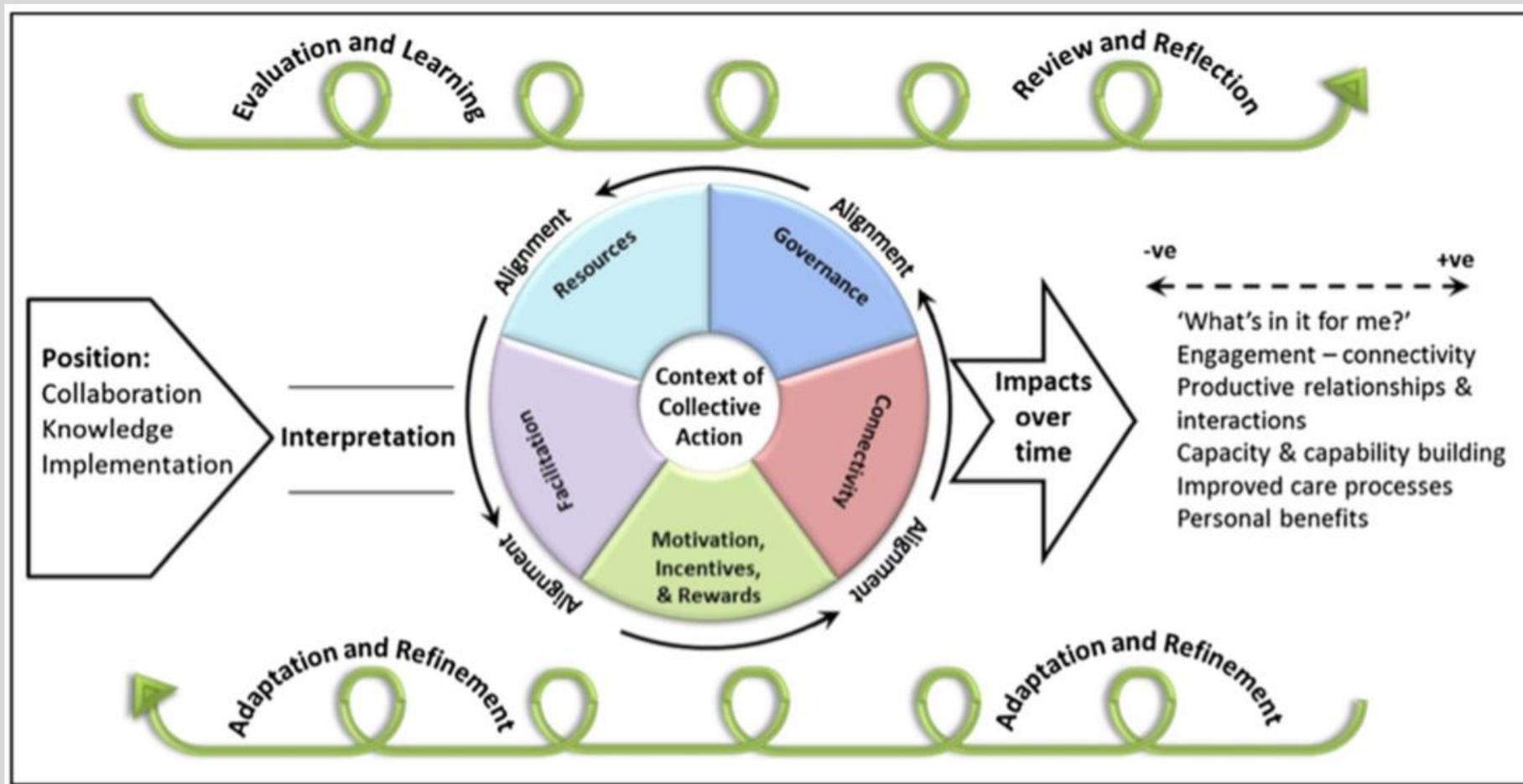
Abraham Flexner, 1939

Science builds meanderingly



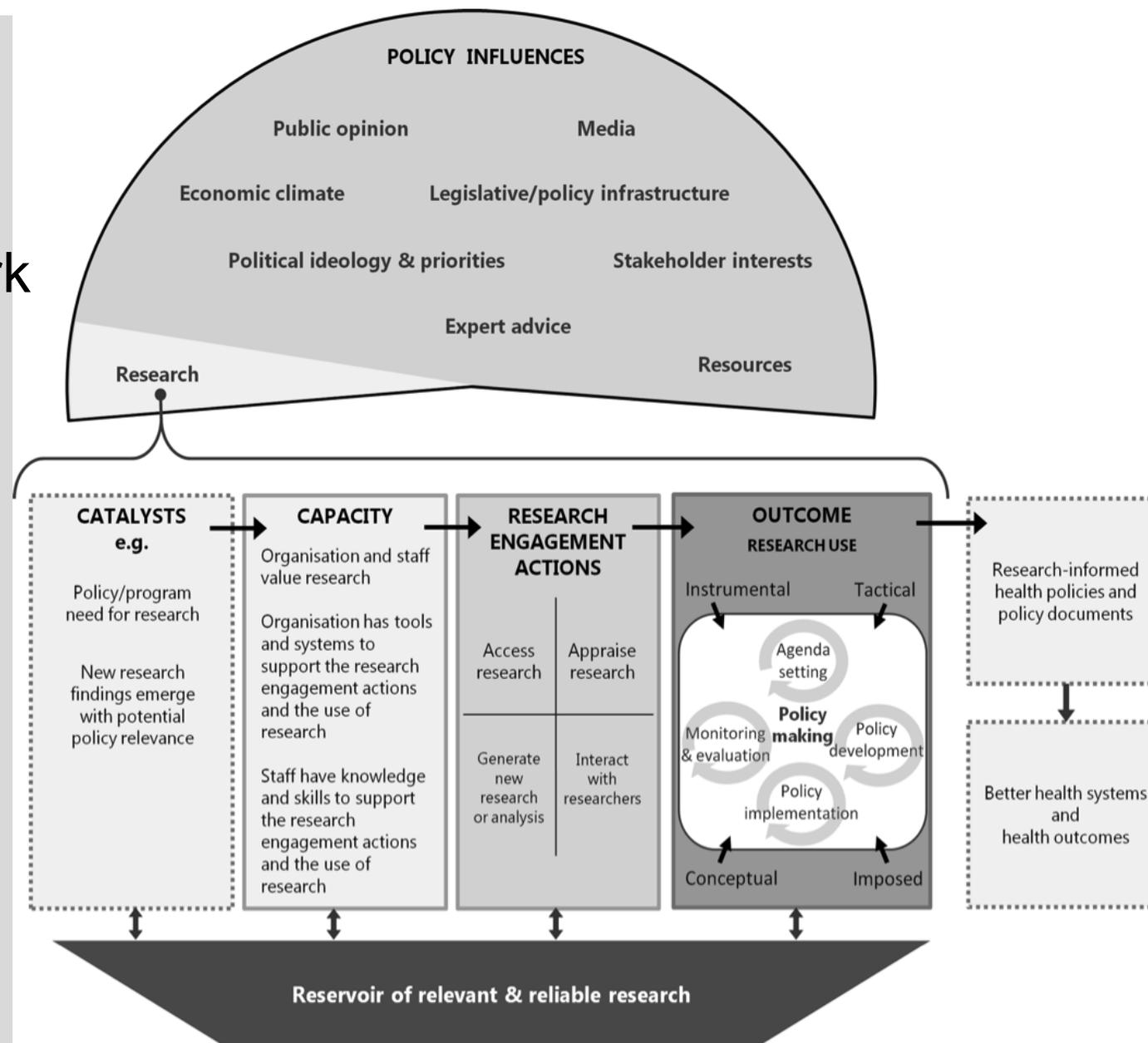
The impact narrative can only be written retrospectively.
It makes impact *seem* linear!

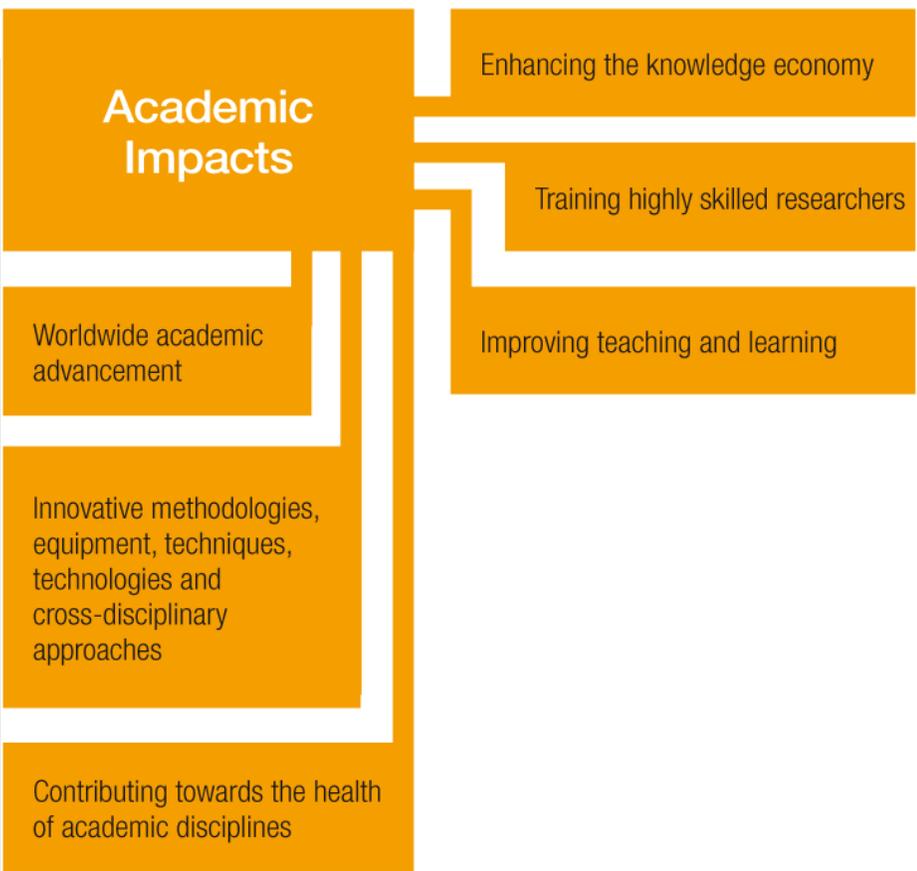
Complex system logic e.g. realist model



Complex
 system logic
 e.g. SPIRIT
 action framework

Redman et al. Social
 Science & Medicine
 2015; 136-137c: 147-55





Universities UK: 9 kinds of societal impact

<http://russellgroup.ac.uk/media/5324/engines-of-growth.pdf>



Complex system logic e.g.

*“A research impact is a recorded or otherwise auditable **occasion of influence** from academic research on another actor or organization. [...] It is not the same thing as a change in outputs or activities as a result of that influence. Changes in organizational outputs and social outcomes are always attributable to multiple forces and influences.”*

London School of Economics Impact Handbook for Social Scientists

Measuring societal impact (EU Horizon 2020):

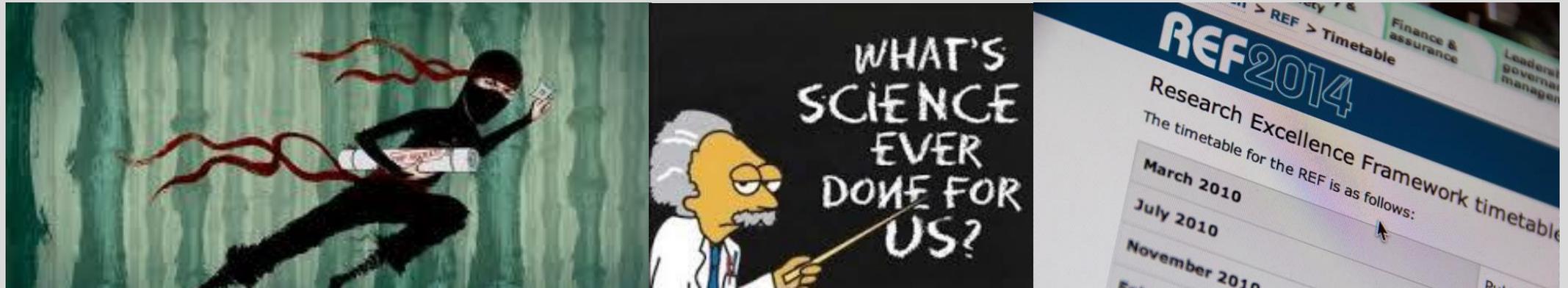
- Ex post: after research has happened
- Ex ante: indicators of future success e.g.
 - Track record of researchers (previous impact)
 - Well-constructed dissemination plans
 - Embeddedness of project in existing stakeholder networks
 - Early involvement of policy makers

Example: Checklist for teams applying for funding from CHSRF:
“Are relevant decision-makers part of the research team as investigators or with a significant advisory role?”

Impact narratives – e.g. REF impact case study

REF impact case study: A story in 4 pages:

1. There was a [big] problem
2. Research HERE aimed to solve the problem
3. The problem was solved ('significance')
4. The benefit spread nationally and internationally ('reach')



Impact narratives – e.g. REF impact case study



1. Pre-1993, most Downs babies were a surprise
2. Our research produced tests that increased accuracy of prediction
3. Now most Downs babies are born out of choice
4. They now use our tests in China

Significance..... Reach..... Attribution.... Timescale.....

Greenhalgh and Fahy *BMC Medicine* (2015) 13:232
DOI 10.1186/s12916-015-0467-4



RESEARCH ARTICLE

Open Access

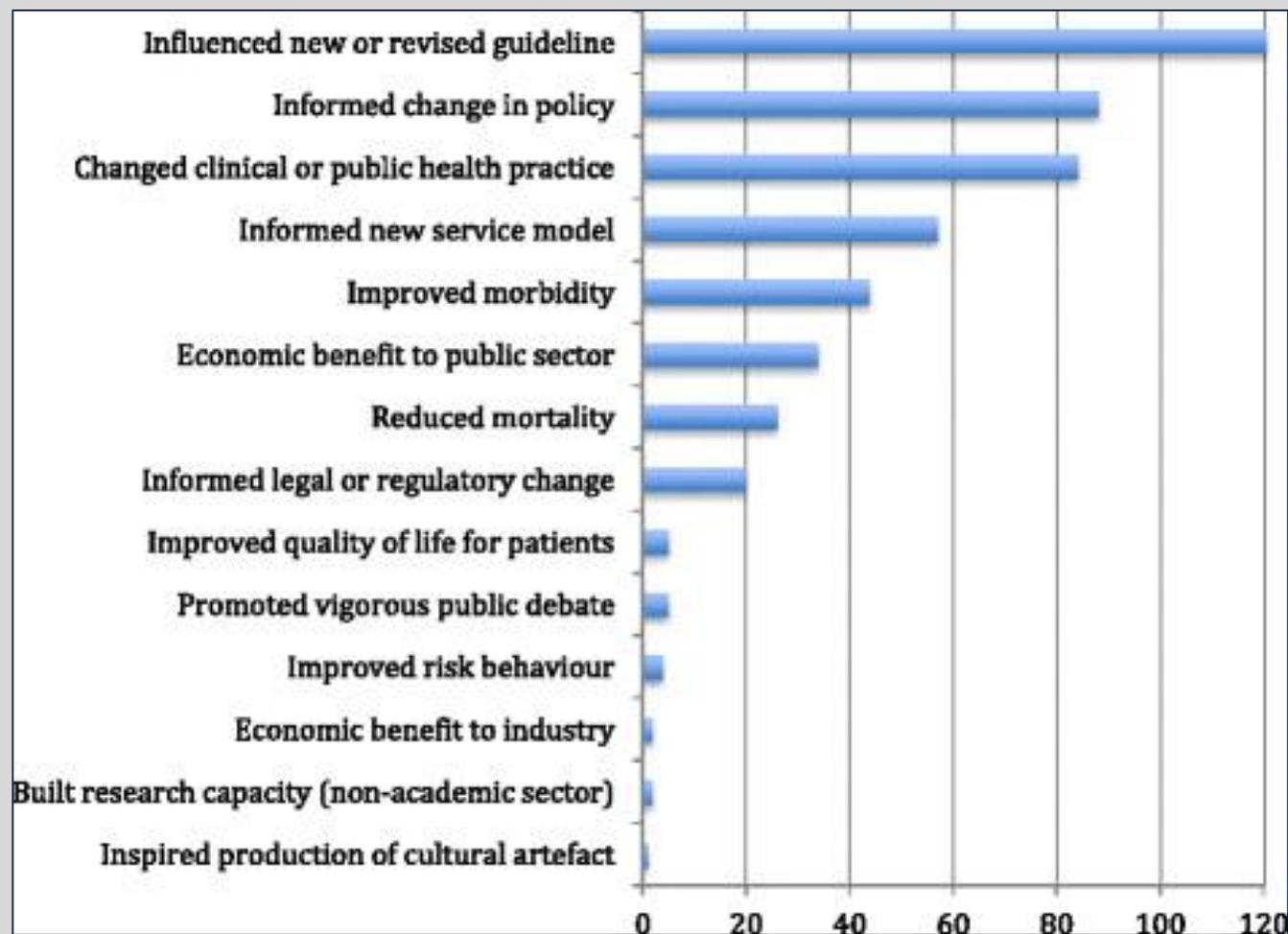
Research impact in the community-based health sciences: an analysis of 162 case studies from the 2014 UK Research Excellence Framework

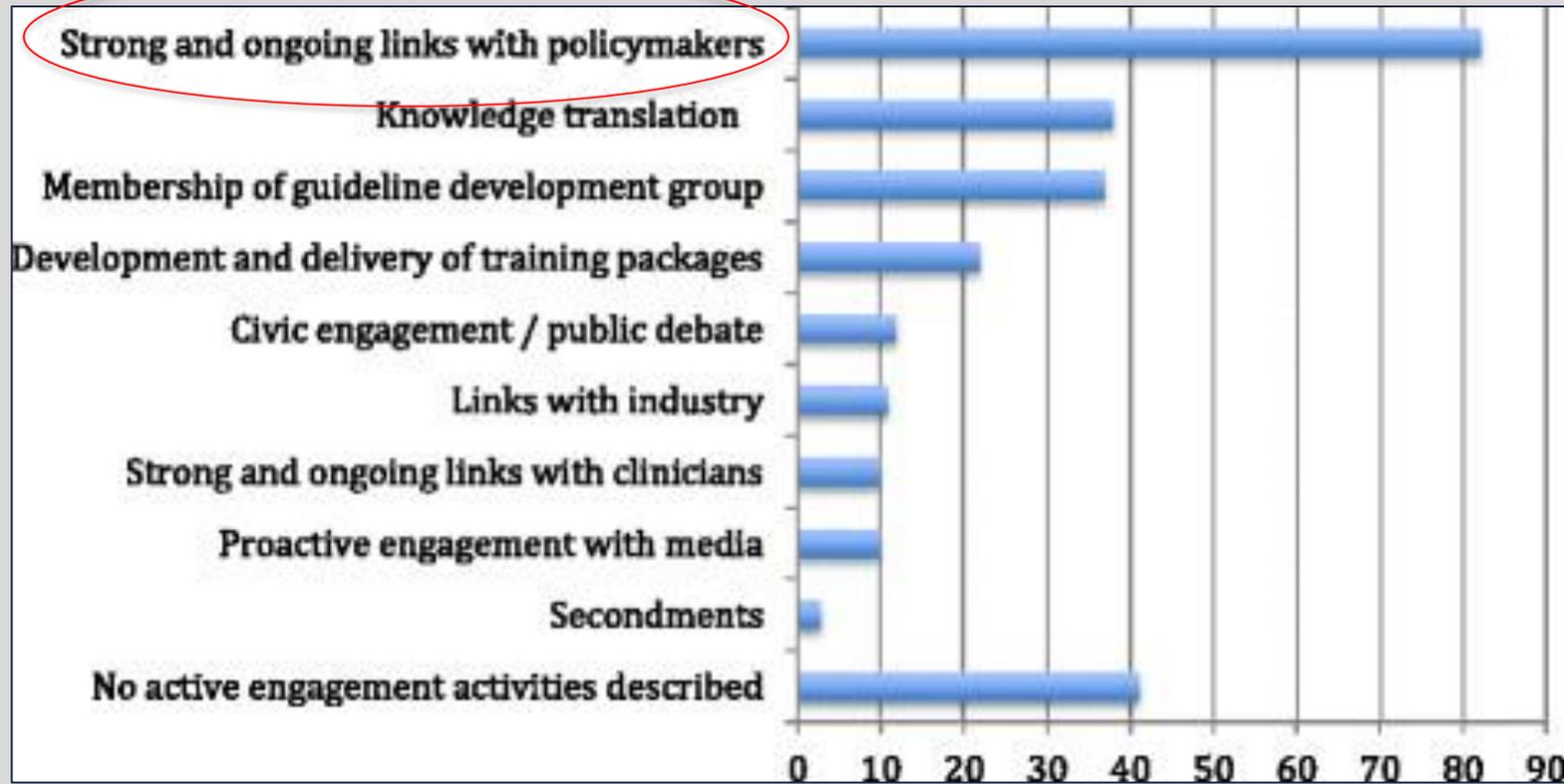


Trisha Greenhalgh*  and Nick Fahy

Abstract

Background: The 2014 UK Research Excellence Framework (REF2014) generated a unique database of impact case studies, each describing a body of research and impact beyond academia. We sought to explore the nature and

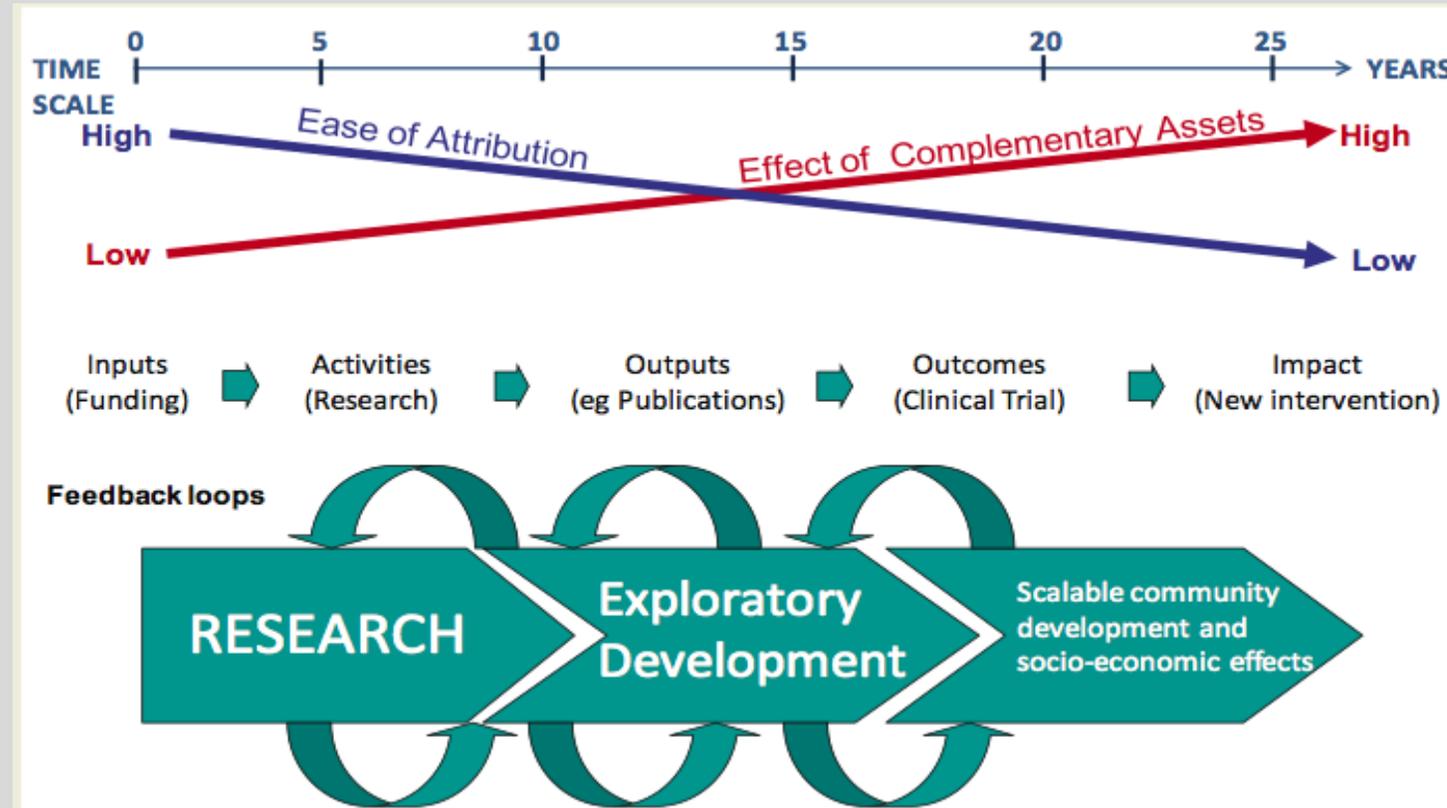




What did REF impact case studies actually measure?

- Mostly short-term, direct and ‘surrogate’ impacts (e.g. a sentence in a guideline) mostly from RCTs
- A tiny proportion captured impact on patient-relevant outcomes (morbidity or mortality)
- Complex system research e.g. community-based public health interventions, policy analysis, qualitative work hardly featured

Why short-term impacts are easier to capture



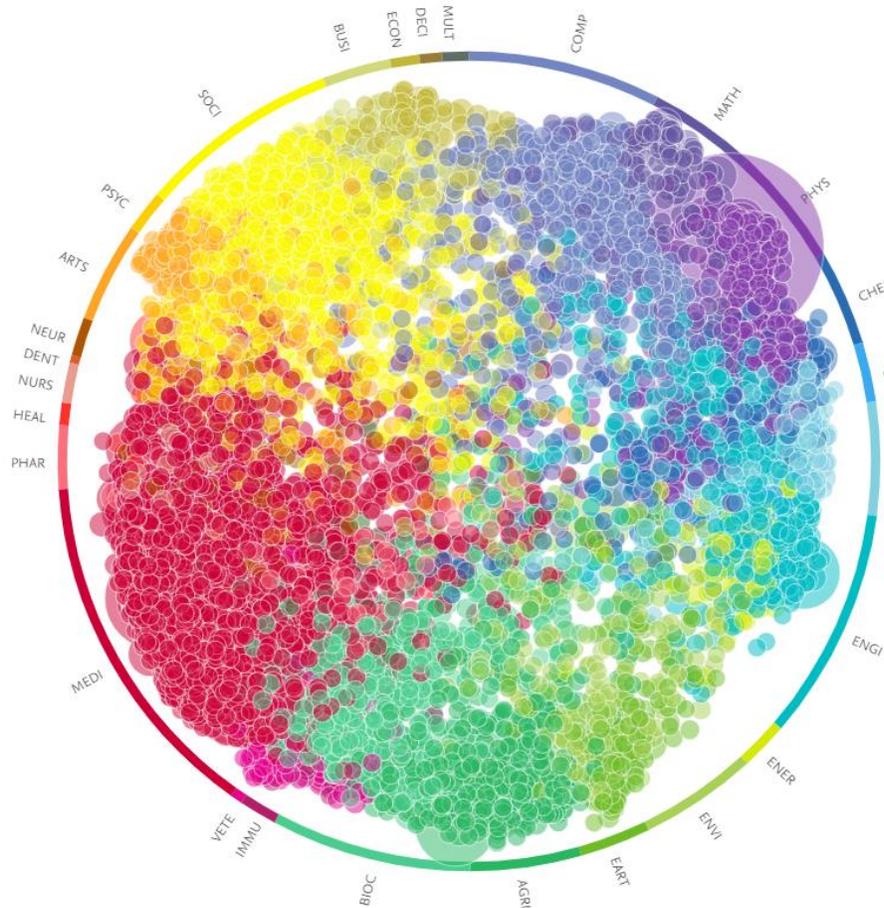
Impact metrics – two principles

1. Garbage in, garbage out
2. When a measure becomes a target, it ceases to be a measure (= Goodhardt's Law, leads to gaming)

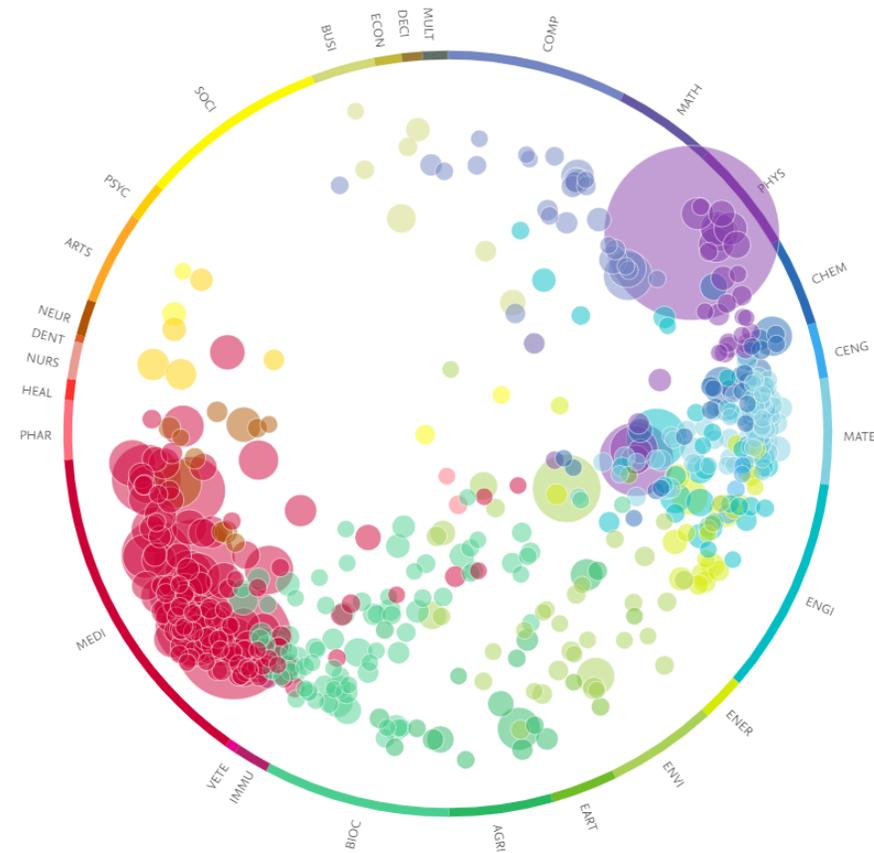


Researchers at the **University of Sydney** have contributed to 13,602 topics between 2014 to 2017 (SciVal)

All topics

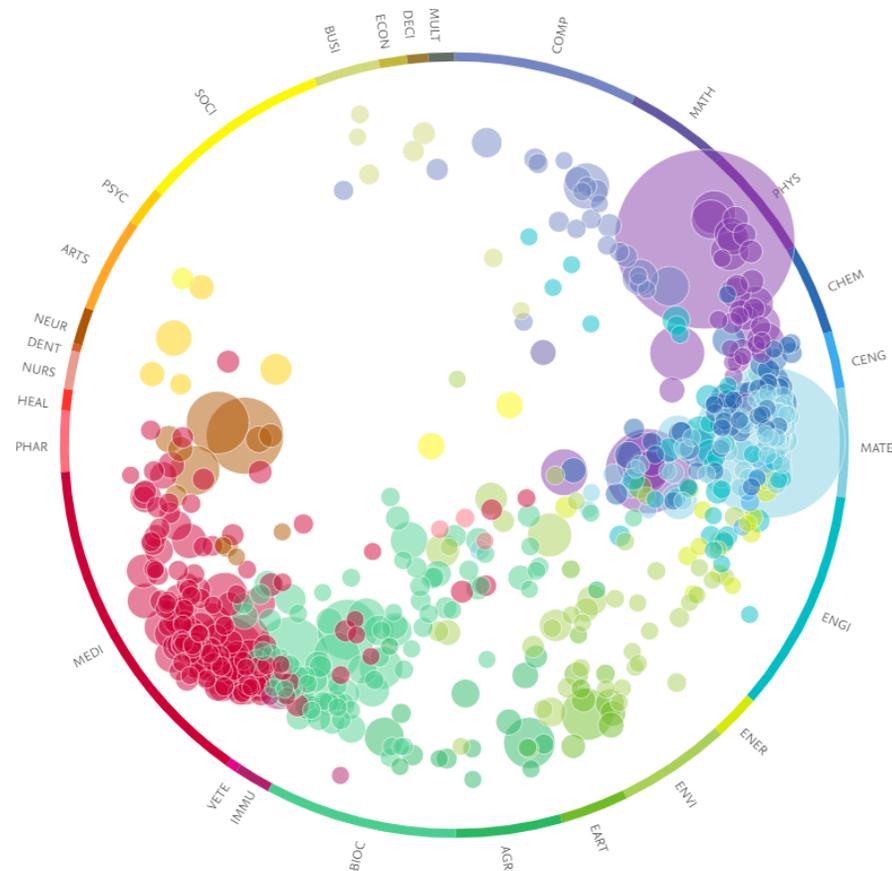


Topics in the top 1% of worldwide Topics by Prominence

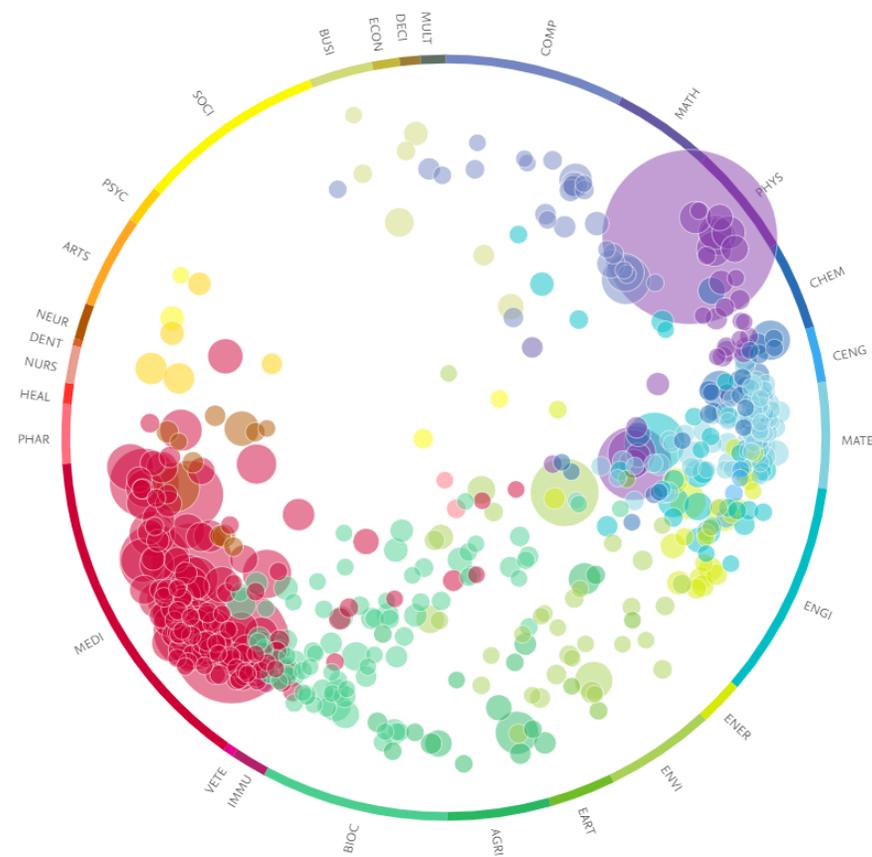


Researchers at the **University of Sydney** have contributed to 13,602 topics between 2014 to 2017

University of Oxford
(top 1%)

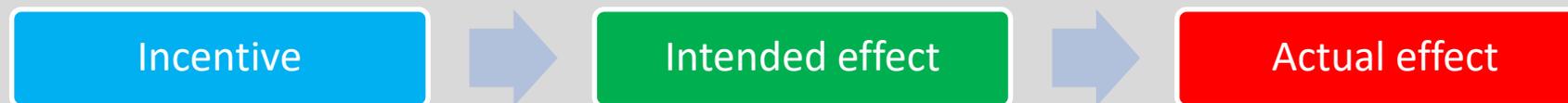


University of Sydney
(top 1%)



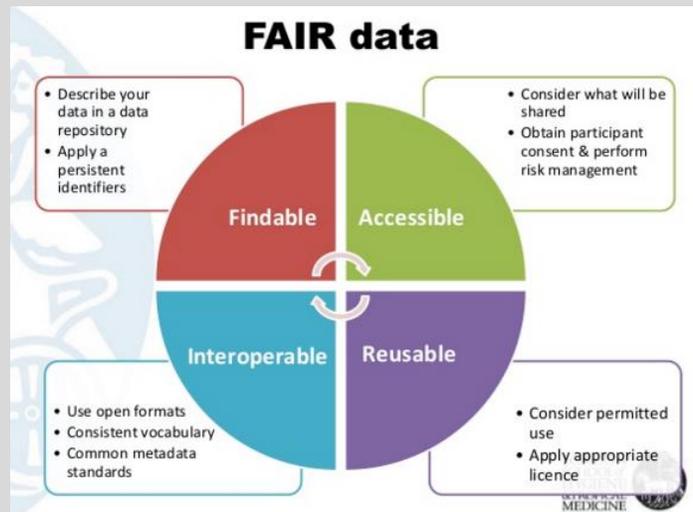
Impact metrics – spin-outs and start-ups (UK)

Name	Region	Spinouts (University IP)	Start-ups (no university IP)
University of Oxford	South East	111	20
Imperial College London	London	95	8
University of Cambridge	East	95	78
University of Edinburgh	Scotland	78	186
University of Manchester	North West	71	6
University College London	London	68	2
University of Strathclyde	Scotland	59	36
Queen's University Belfast	Northern Ireland	46	0
University of Bristol	South West	46	1
Newcastle University	North East	44	12
University of Warwick	West Midlands	40	1
University of Nottingham	East Midlands	39	0
University of Leeds	Yorks & Humber	34	5
University of Southampton	South East	34	6
Heriot Watt University	Scotland	33	6
University of Sheffield	Yorks & Humber	33	1
University of Aberdeen	Scotland	31	9
King's College London	London	30	1



Publications	Higher productivity	<ul style="list-style-type: none"> • ‘Salami’ publications • Poor methods • Reduced quality peer review
Citations	Reward quality work that influences others	<ul style="list-style-type: none"> • Inflated citations lists • Reviewers/editors enforce their work
Grant funding	Viable research	<ul style="list-style-type: none"> • Too much time writing proposals • Overselling positive results • Downplay of negative results
PhD productivity + Placement	Prestige PhD programme	<ul style="list-style-type: none"> • Oversupply of PhDs

The 'responsible turn' in research



nature
human behaviour

PERSPECTIVE

PUBLISHED: 10 JANUARY 2017 | VOLUME: 1 | ARTICLE NUMBER: 0021

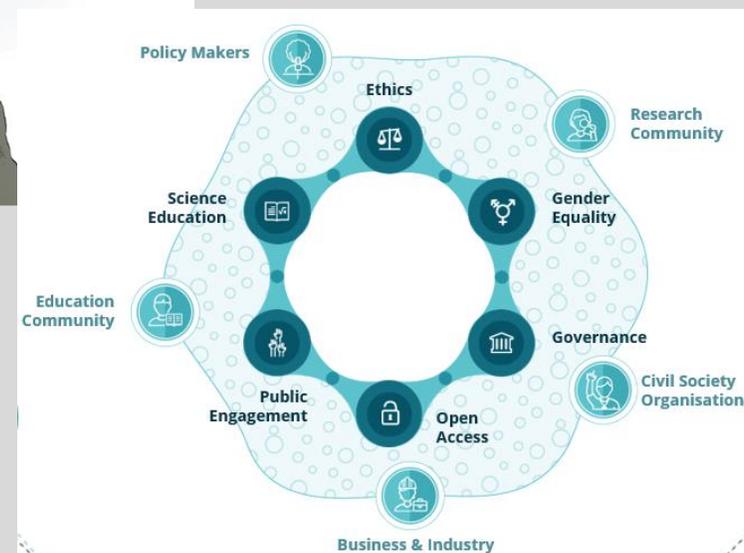
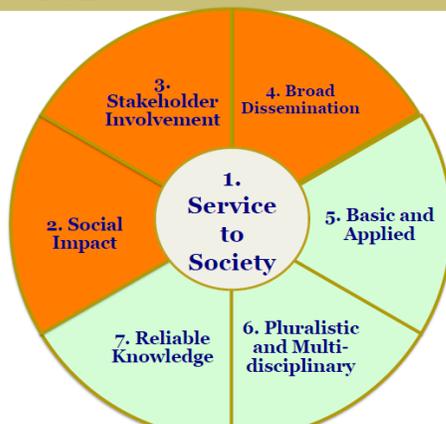
OPEN

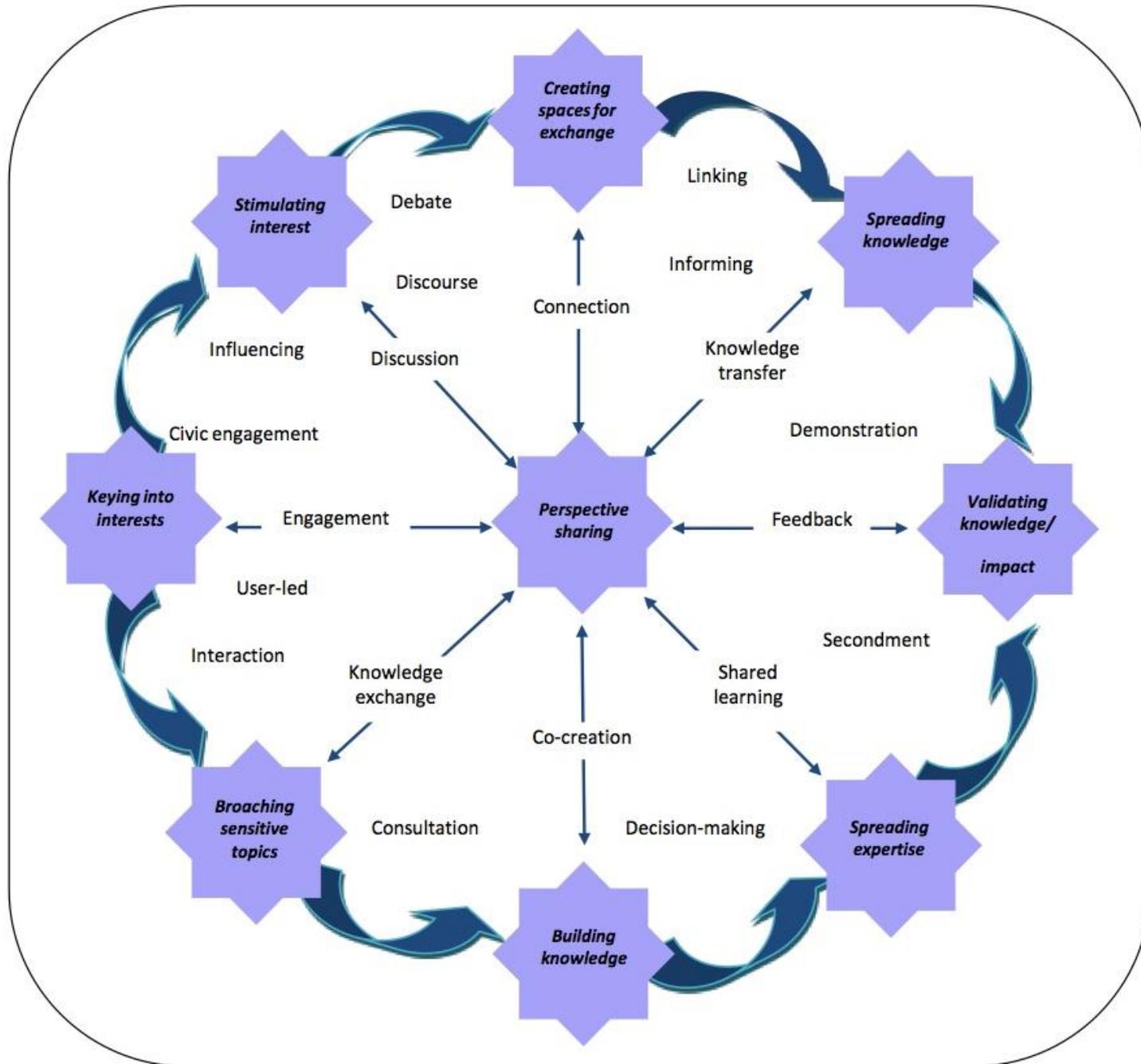
A manifesto for reproducible science

Marcus R. Munafò^{1,2*}, Brian A. Nosek^{3,4}, Dorothy V. M. Bishop⁵, Katherine S. Button⁶, Christopher D. Chambers⁷, Nathalie Percie du Sert⁸, Uri Simonsohn⁹, Eric-Jan Wagenmakers¹⁰, Jennifer J. Ware¹¹ and John P. A. Ioannidis^{12,13,14}



Principles of Responsible Research



Research impact: beyond the metrics game

- Take a **strategic** approach to impact
- What is our institution's mission (our **moral narrative**)?
- What kind of impact resonates with this mission? e.g.
 - Academic v societal? ... and what kinds of societal impact?
 - Short v long term?
 - Individual v institutional?
 - Developing individuals or bringing in money?
- Which metrics will we prioritise and work towards – and which will we deliberately reject?



Lego Academics

@LegoAcademics



Following

Cheers everyone! The @LegoAcademics are totally listing this twitter acct as "Impact" on their next grant proposal.

← Reply ↻ Retweeted ★ Favorite *** More



Thank you for your attention

Trish Greenhalgh

Professor of Primary Care Health Sciences



@trishgreenhalgh

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NHMRC's perspectives and work in measuring research impact

Professor Anne Kelso



Australian Government
National Health and Medical Research Council

N|H|M|R|C

University of Sydney, 19 March 2018

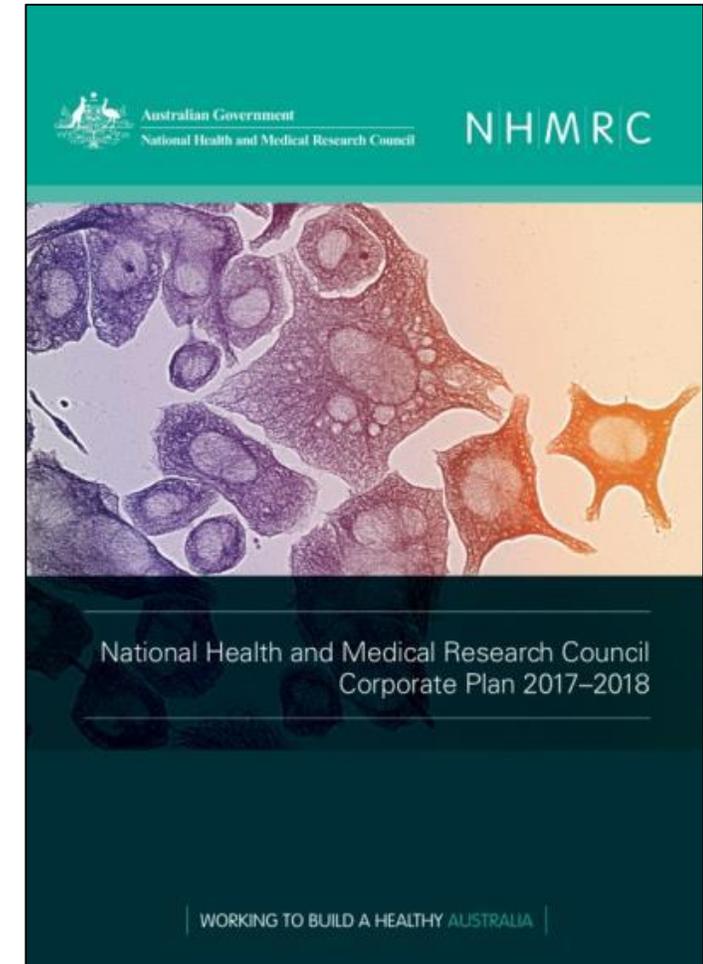
NHMRC's perspective on measuring research impact

Professor Anne Kelso AO
CEO, National Health and Medical Research Council

| WORKING TO BUILD A HEALTHY AUSTRALIA |

NHMRC's role

- Mission: *Working to build a healthy Australia*
- Themes: investment, translation and integrity
- NHMRC generates, analyses and applies evidence:
 - Research funding
 - Clinical, public health and environmental health guidelines
 - Codes of research conduct and ethics
 - Other policies and statements



NHMRC's role: meeting public expectations

- Community and consumers
 - Health problems solved
 - Taxpayers' money used well
 - Government
 - Economic growth: innovation, new businesses, jobs and exports
 - Budget control: reduced health care costs
- Both expect a return on public investment in research.
- We must show positive impact if we want their continued support.

NHMRC's perspective on research impact

- Impact of NHMRC-funded research
- Impact as a criterion in track record assessment
- Impact of NHMRC health guidelines

Impact = the demonstrable benefits emerging from research adoption, adaption or use to inform further research

NHMRC's perspective on research impact

- Impact of NHMRC-funded research
- Impact as a criterion in track record assessment
- Impact of NHMRC health guidelines

NHMRC's perspective on research impact

- Impact of NHMRC-funded research
 - Measurement:
 - bibliometrics
 - data analytics
 - development of impact measurement framework (HTAC)
 - Communication:
 - Media: case studies/stories and announcements
 - Public presentations

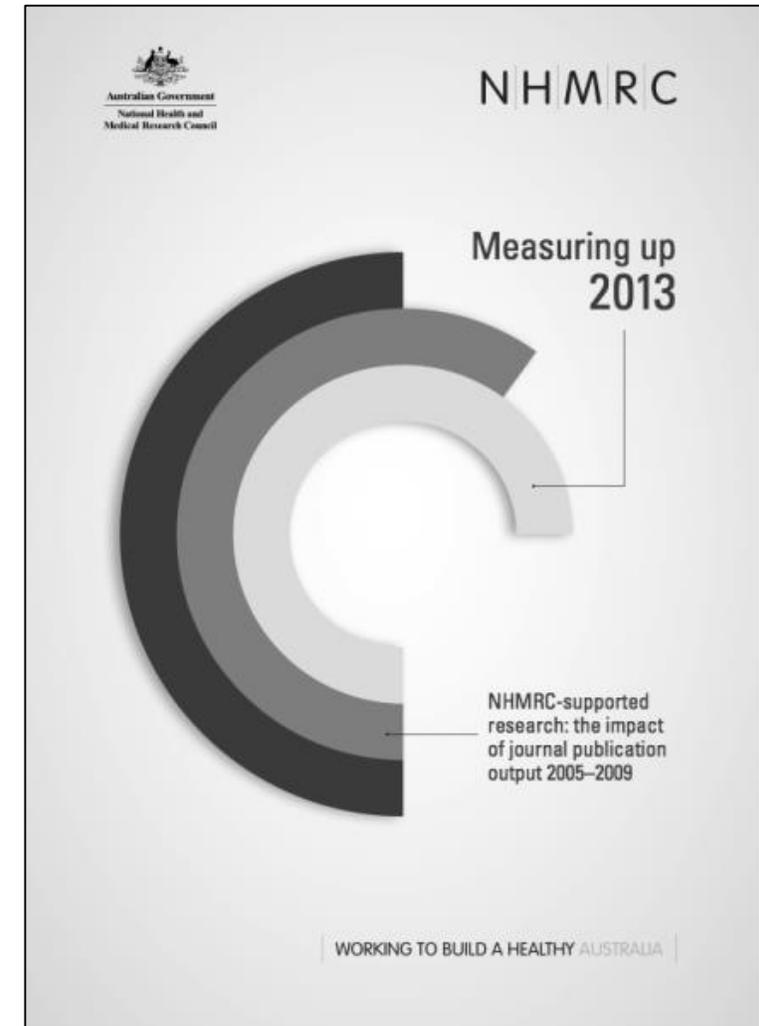
Impact of NHMRC-funded research: bibliometrics

Measuring Up: Multi-year bibliometric analysis of publications citing NHMRC funding vs. the rest:

- numbers of publications
- relative citation impact
- level of collaboration

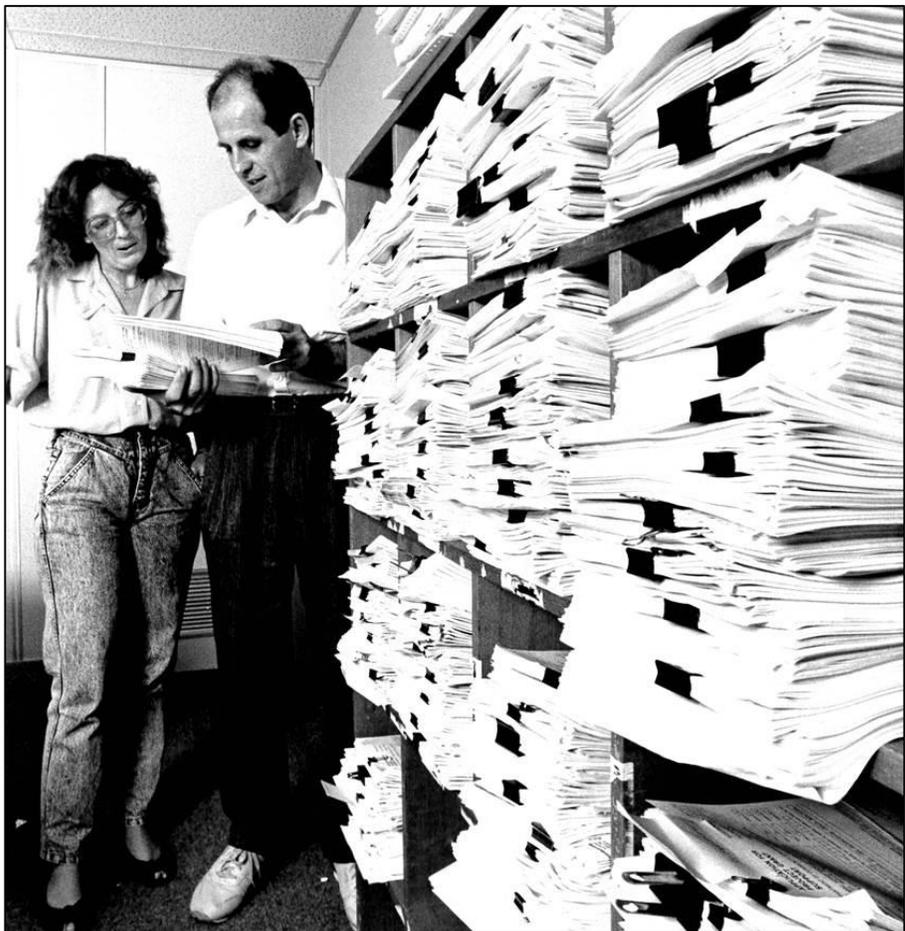
by funding scheme, sector and research field:

- rising numbers of papers
- relative citation impact 1.68 cf. world average
- 42% involve international collaboration



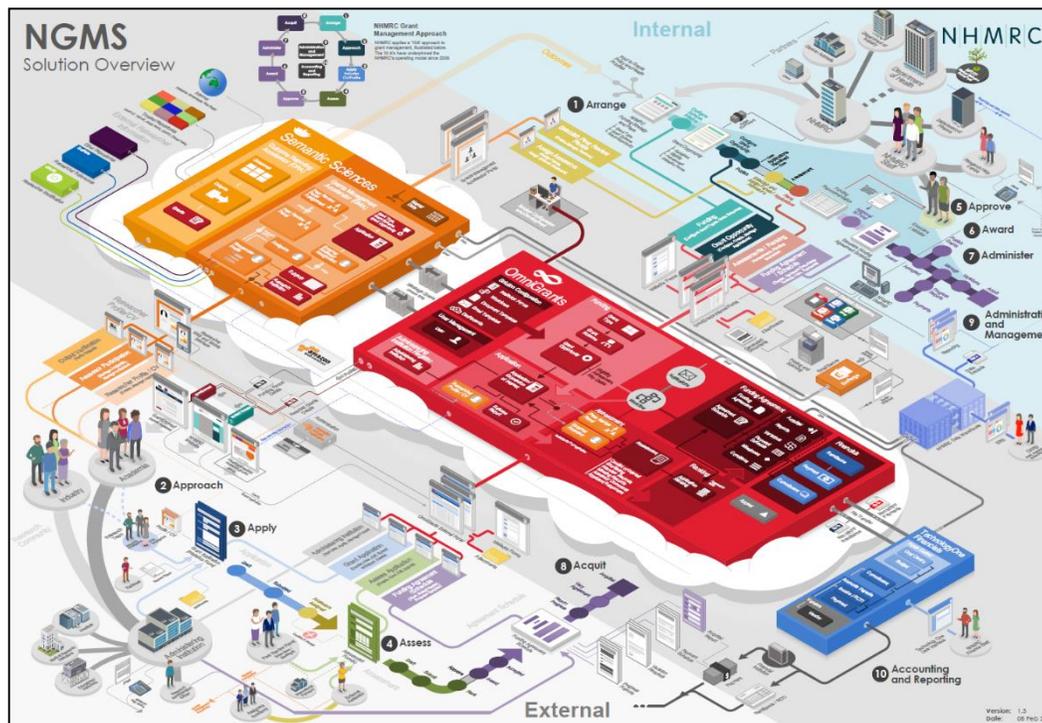
Impact of NHMRC-funded research: data analytics

Before RGMS



With RGMS

“You know you've been working too long on NHMRC grants when you know how to use RGMS.”



After RGMS

Impact of NHMRC-funded research: data analytics

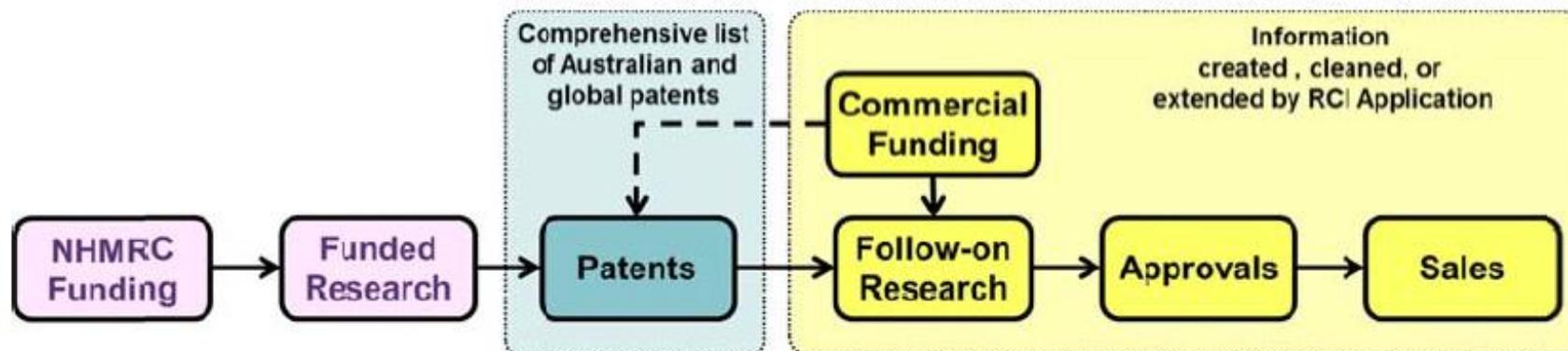
NHMRC's new grants management system:

- replacing RGMS in 2018 in time for new grant program
 - iterative development in consultation with external reference group
 - intuitive new user interface
 - RGMS data to be transferred
 - linkage to other apps and external data sources (publications, IP etc)
- enhanced ability to measure outcomes of NHMRC-funded research
- proof of principle: linkage to international patent databases

Impact of NHMRC-funded research: data analytics

Proof of principle: Identifying patents derived from NHMRC grants using worldwide patent data – contract with Semantic Sciences (2016):

- patent records from RGMS (~1300)
- discovery of unknown patents linked to NHMRC grants (>1100)
- value of commercialisation of 10 randomly chosen patents: \$862 million



Impact of NHMRC-funded research: communication

- Website *In Focus*
- Social media
- “Ten of the Best”
- Research Excellence Awards
- Grants announcements
- Public presentations



ANU, 6 December 2017

NHMRC's perspective on research impact

- Impact of NHMRC-funded research
- **Impact as a criterion in track record assessment**
- Impact of NHMRC health guidelines

Impact as a criterion in track record assessment

- Goal of all NHMRC research funding is improvement of human health
 - This is the ultimate impact measure
- NHMRC supports research across the spectrum from discovery to clinical care and public health policy
 - Impact may be indirect, difficult to attribute and take time
- Most NHMRC schemes support investigator-initiated research; some support priority-driven research
 - NHMRC does not usually dictate the expected impact

NHMRC's new grant program

Investigator Grants	Synergy Grants	Ideas Grants	Strategic and leveraging grants
<p>Support the research program of outstanding investigators at all career stages</p> <p><u>Assessment criteria:</u></p> <p>Track record Knowledge gain</p>	<p>Support outstanding multidisciplinary teams to work together to answer major questions that cannot be answered by a single investigator</p> <p>Track record Knowledge gain Synergy</p>	<p>Support innovative research projects addressing a specific question</p> <p>Knowledge gain Innovation and creativity Significance Feasibility</p>	<p>Research that responds to national priorities:</p> <ul style="list-style-type: none"> • Centres of Research Excellence • Partnerships • Development Grants • Targeted Calls • International schemes • Clinical trials and cohort studies
<p>Salary + research support package</p>	<p>Research costs (\$5 million)</p>	<p>Research costs</p>	<p>Research costs</p>
<p>One per investigator</p>	<p>One per investigator</p>	<p>Two per investigator</p>	<p>No caps</p>

Proposed framework for track record assessment

Track Record Assessment Working Group, 2017–18

1. Publications

Recognition and outcomes (bibliometric indicators?)

Best publications?

2. Research Impact

Knowledge

Health

Economic

Social

3. Leadership

Research programs and team leadership

Institutional leadership

Research policy and professional leadership

Research mentoring

Note: This framework is under discussion and has not yet been accepted by NHMRC.

Proposed framework for track record assessment

Track Record Assessment Working Group, 2017–18

2. Research Impact – possible indicators

Knowledge	Health	Economic	Social
Significance	Engagement	Healthcare cost savings	End-user/public engagement
Recognition	Participation in clinical research	IP development	Community health benefit
Reach and influence	Policy leadership	Industry collaboration	Wellbeing of end-user and community
	Clinical guidelines	Start-up company	Reducing inequalities
	Standards	Product to market	
	Development of product/intervention	Employment	

Proposed framework for track record assessment

- Framework is under consideration for Investigator and Synergy Grants
- It shifts focus away from inputs (e.g. grants received) towards outcomes
- Research impact criterion would be addressed through case studies
- Issues to be considered:
 - Relative weightings of publications, impact and leadership criteria
 - Time period for each criterion, e.g. 5 years, 10 years, whole of career
 - Trial to assess use of metrics for publications before implementation
 - Guidance for peer reviewers

NHMRC's perspective on research impact

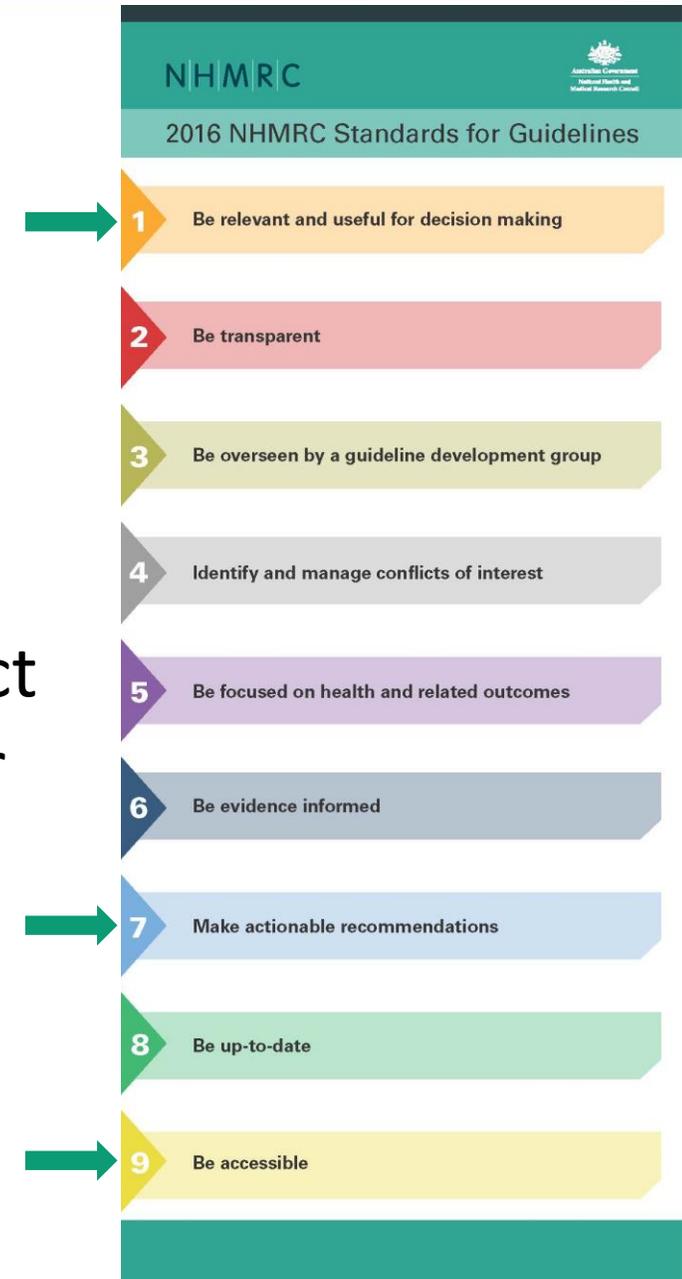
- Impact of NHMRC-funded research
- Impact as a criterion in track record assessment
- **Impact of NHMRC health guidelines**

Impact of NHMRC health guidelines

- Guidelines are an important pathway for the translation of evidence into better clinical practice and public health.
- They represent a significant investment of public funds and volunteer labour in Australia.
- Between 2005 and 2013, 1046 guidelines were produced by more than 130 Australian guideline developers.
- In 2017, NHMRC approved six evidence-based clinical practice guidelines and updated evidence for three public health guidelines.

Impact of NHMRC health guidelines

- NHMRC promotes guideline implementation and dissemination.
 - In 2016, we launched new Standards for Guidelines
- Little attention has been paid to evaluating the impact of guidelines on patient and population outcomes, or on waste and variation in clinical practice.
- NHMRC is planning a project to measure the long-term impact of evidence-based clinical guidelines and learn how to improve their uptake.



NHMRC's perspective: summary

- The community and Government expect a return on public investment in research – it is important to show its impact.
- NHMRC is building data analytic capability and increasing its use of media to measure and communicate the impact of NHMRC-funded research.
- Research impact is likely to become a more important criterion in track record assessment for NHMRC funding decisions.
- NHMRC plans to measure, in order to improve, the impact of its health guidelines.



Australian Government
National Health and Medical Research Council

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Thank you

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Discussion

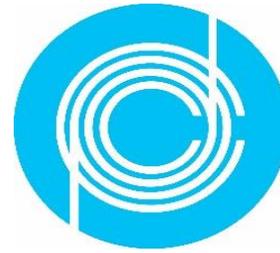
Facilitated by Professor Sally Redman

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