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WHAT IS IMPACT?

If a tree falls in the woods, does it make a sound?

- Scientists: pressure waves are sound, so yes, a sound is made.
- General public: ooh, firewood.

97% of climate scientists agree the earth is warming and man is contributing.

Why, therefore, is man's use of fossil fuels changing so slowly?

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WHAT IS RESEARCH IMPACT?

- Effects (or potential effects) on the quality of life
 - Economic
 - Environmental
 - Social
 - Health and well-being
 - Culture
 - Public policy or services
 - Ethical and legal implications
- Answers “Who should care and why should they care?”

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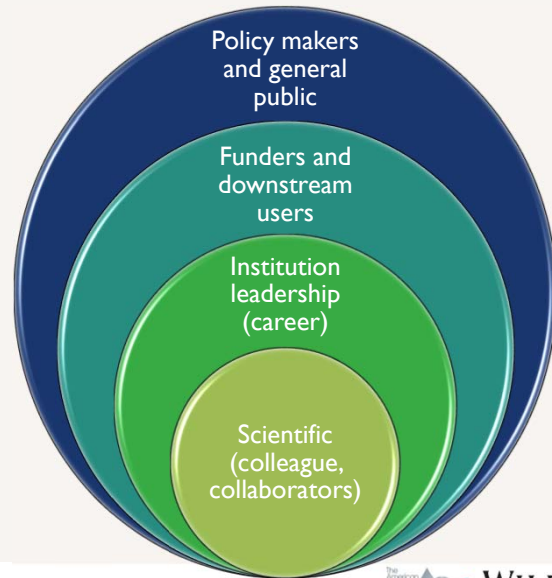
ELEMENTS OF IMPACT

- Target audience(s) or user(s)
- Changes interesting and valuable to audience(s)
- Credible outcomes
- Communication/engagement at all stages
- Measures of changes to behavior

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LEVELS OF IMPACT (AUDIENCE)

- Scientific/academic
 - Knowledge and skills
 - And tools: technology and models
 - Quality difficult to define, citations are proxy
- Broader/societal
 - Improving the quality of life
 - Economic, environmental, social...



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SCIENTIFIC IMPACT

- A pre-requisite and subset of societal impact
- You can affect discovery and reading
 - Search engine optimization
 - Tweeting (social media)
 - Sharing with colleagues
- Citations?
 - Content is king – useful and interesting
 - Self-cite wisely – build on your own work

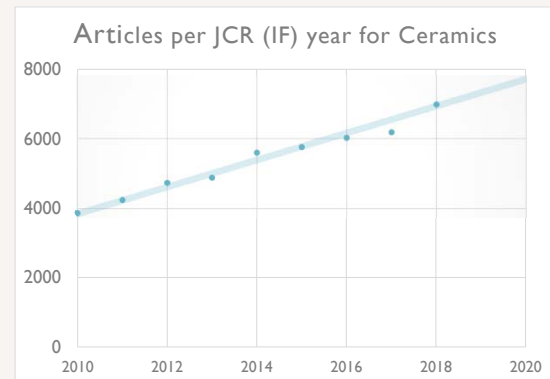


→ H-index: personal measure of scientific impact (citations)

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ARTICLE SELF-PROMOTION

- Number of articles growing
 - Doubling from 2010 to 2020
- You need the right people to read your papers
- You can make the connections
 - Don't rely on indexing/AI alone



Source: 2019 Clarivate
Journal Citation Reports

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ARTICLE SELF-PROMOTION

- Article sharing paths
 - Gold Open Access
 - Author sends to colleagues
 - Wiley sharing mechanisms - Website: wileyauthors.com/maximize
 - “Article share” – 10 colleagues, full access
 - “Content share” – create a “free to read” link
 - Green Open Access
 - Pre-prints
- Post links to your articles everywhere
 - ResearchGate, Academia.edu: post ONLY links or gold OA articles

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BROADER/SOCIETAL IMPACT



And what is your broader impact?

I also create fertilizer

The American Chemical Society WILEY

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BROADER/SOCIETAL IMPACT

- Impacts beyond academia
 - End use
 - Building capacity and capability
 - Engaging society in specific project or science in general

Consider this statement

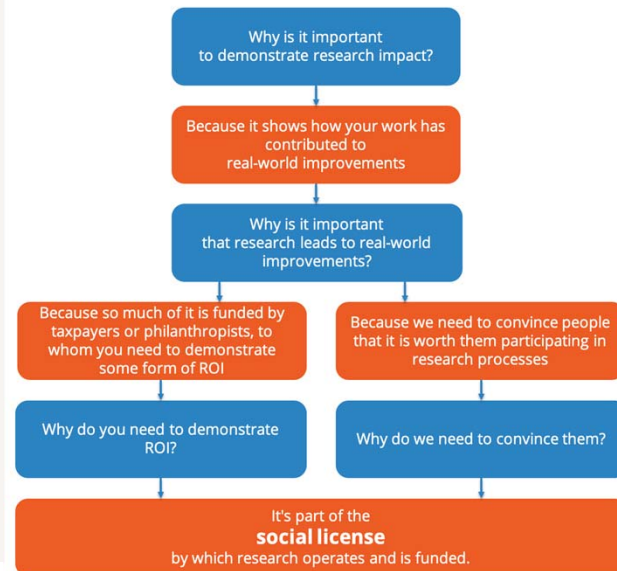
- *As long as researchers are free to pursue the truth wherever it may lead, there will be a flow of new scientific knowledge to those who can apply it to practical problems in Government, in industry, or elsewhere.*

How does statement address broader/societal impacts?

The American Chemical Society WILEY

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WHY BROADER/SOCIETAL IMPACT



The relationship between research, impact and social license, by Charlie Rappley

<https://scholarlykitchen.sspnet.org/2019/11/12/researchers-social-license-in-need-of-renewal/?informz=1>

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BENEFITS OF STATING SOCIETAL IMPACTS

- Stronger case for funding
- Department and school program justification
- Visibility in the broader community
- More people understanding contributions of science
- Attract more students to science disciplines

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IMPACT STATEMENTS INCLUDE

- What you did
- Why you did it
 - Broad area of impact
- How it addresses a specific need and for whom
 - Targeted audience and their issues
- Evidence of success or potential payoffs
 - Connect research outcome to social outcome



THE AUDIENCE AND THE MESSAGE

- Specify audience
 - “manufacturers of vibration energy harvesters” versus “advanced energy”
- Build trust: address audience needs, not yours
 - Authentic and specific needs – realistic, valuable
 - Specific - just enough detail to be understood
 - Time horizons - where possible and appropriate
 - “data and analysis to enable decision making” versus “educate the _____”
- Provide more than data
 - Shape information and interpretation towards meeting the need
 - Acknowledge and build up audience preconceptions

MESSAGING BY RESEARCH STAGE

- Basic research impacts
 - Difficult to measure
 - Long time to impact
 - Unpredictable and often unintentional
 - Must not be overstated
- Use-driven research is easier to explain



Example basic research impacts (NSF proposals)

- Teaching tools
- “Other” (including downstream development)
- Research infrastructure/partnering
- Diversity of participation
- Public awareness



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OUR EXERCISE TODAY – IMPACT FROM YOUR REPORT

- Purpose: Help you start connecting your research to societal impact
- Goal: Craft 2-3 sentences for societal impact of your next manuscript
- Procedure
 - Identify a specific audience not directly within your discipline
 - Estimate the audience needs (in the future you discuss needs with them)
 - List benefits or potential benefits of your work
 - Does not have to be a direct-use (especially for a basic research paper)
 - Evaluate the list for
 - Authenticity, believability, additional actions needed, time horizon
 - Value to audience
 - Write 2-3 sentences that summarize your audience, the need(s) your “best” benefit will address and how this benefit will affect the need(s)/audience.



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American Ceramic Society/Wiley Journal Workshop:
Expand Your Impact

Worksheet for crafting a Social Impact statement for your research report

Title of your work and short description	
Audience(s) for your statement (list as many as you want, but choose only one for next steps)	
Needs of chosen audience (be specific)	How your work meets those needs (benefits)
Notes, thoughts etc.	
Your statement (choose one need/benefit and write 2-3 sentences ideally, but more is okay)	

Things to keep in mind for your statement

- Specific audience
 - “manufacturers of vibration energy harvesters” versus “advanced energy”
- Value to the audience, not to researcher
 - “data and analysis to enable decision making” versus “educate the _____”

Words matter – Audience-oriented words have higher impact on evaluators

Low impact	High impact	Moderate impact
Users	Market	Practitioners
Science	Technology	Role
Research	Underpinning	Community
Knowledge	Led/Leading	Collaboration
Application/Applied	Director	Committee
Developed/Development	Global/worldwide	Service
Activity	Design	Performance
Approach	Products	Future
Strategy	Environment	Sustainable
Project	Major	Learning
Conference	Millions/Billions	

Source: <http://dx.doi.org/10.1038/518150a> Paul Ginsparg analysis of the most used words in UK REF Case Studies categorized by the impact rating for the case studies.

Hints for Basic Research Impact

- **NSF Criteria** (<https://www.nsf.gov/pubs/2002/nsf022/bicexamples.pdf>)
 - Teaching/training – develop materials for classrooms
 - Broaden participation – engage underrepresented groups
 - Dissemination – publish/present/share data in public forums
 - “Other societal benefits” – outside use, economic benefit, etc.
 - Enhance infrastructure – facilities, instrumentation, networks, partnerships
- **REF Criteria (assessment of research and impact)**
 - Case studies connecting “underpinning research” at institution level
 - Influence on public awareness, attitudes, understanding, or behavior
 - Direct exploitation (down-stream use)
 - “Reach and Significance”