



Pathways from Science into Public Decision Making: Theory, Synthesis, Case Study, and Practical Points for Implementation

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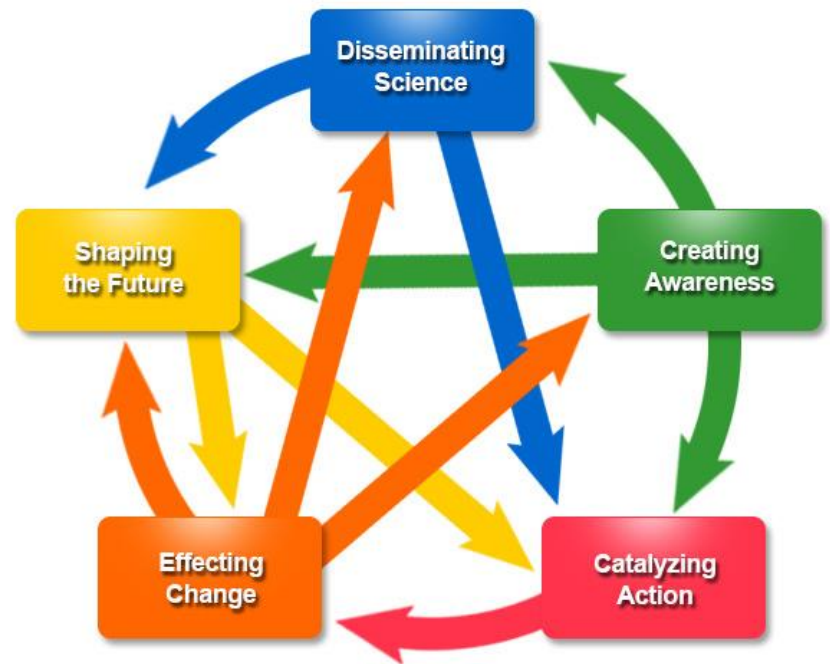
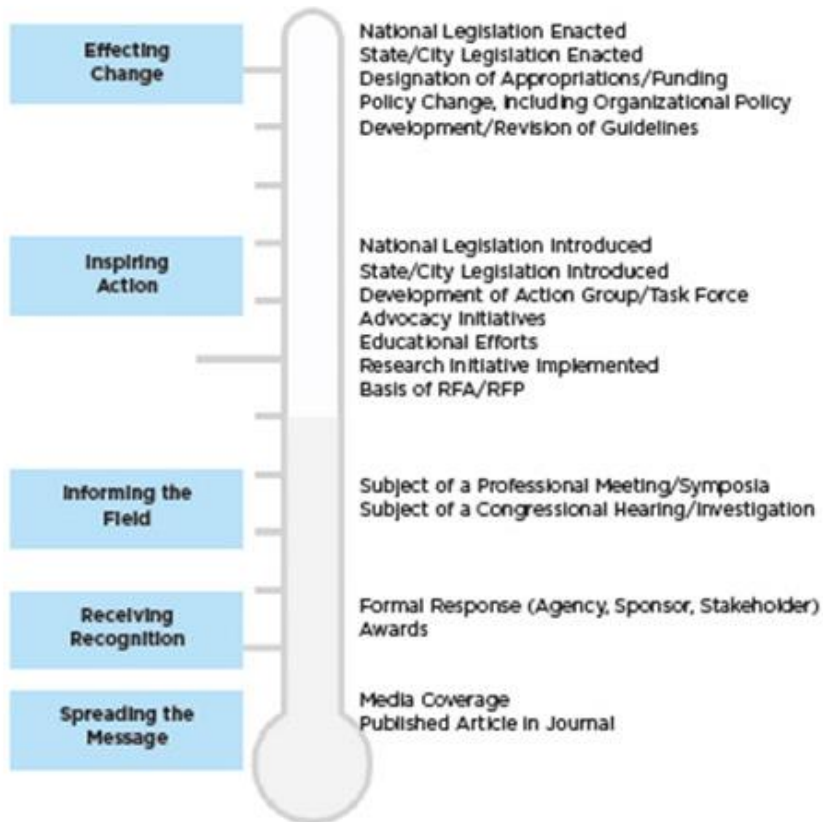
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Workshop on Government Decision-Making to
Allocate Scientific Resources
National Academies Keck Center



Seeking Impact

Institute of Medicine Degrees of Impact



Intellectual roots

- Theory: public affairs and organization theory
 - Agenda Setting
 - Decision making
- Grounded Approaches
 - Health as best developed substantive domain
 - Snowball approach yielded 32 articles
 - Cochrane guidelines

Synthesized Framework

	Content Salience	Effective Communication	Quality	Parameters of Use
	Qualitative	Summarized transparently	Effect size/ effectiveness	Technical solution exists
	Emotional hook	Uncomplicated, jargon free language	Messenger credibility	Consistent with operational realities and constraints
	Intuitive appeal	Eliminate irrelevant content	Evidence credibility	Reversibility
	Quantitative	Appropriate timing		Interaction/legitimacy
	Descriptive statistics	Benefits unambiguously presented		Solution not problem identification
	Cost/Benefit and impact Analysis	Audience segmentation		
	Disparities and distribution of burden			
	Projections of reduced burden			
	Cost of inaction & distribution			
	Distribution of benefit			
	Multiple time horizons of benefits			
	Geography			
	Local relevance			
	Comparisons			

4 cases of science policy research that had policy impact

- Mansfield
 - 28% rate of return on R&D expenditure
- Narin
 - US company patents cite US public research
- Martin & Irvine
 - Crisis in British science
- Butler
 - Deleterious effects of Australian evaluation system

Mansfield

- Mansfield, E. (1991). Academic research and industrial innovation. *Research Policy*, 20(1), 1-12.
- Mansfield, E. (1998). Academic research and industrial innovation: An update of empirical findings. *Research policy*, 26(7), 773-776.
- Academic credibility
 - University of Pennsylvania economist
 - Published in *Research Policy*
 - Cited 1600 times (Google Scholar)
- Use
 - Alsalam, N., Beider, P., Gramp, K., & Webre, P. (1998). *The Economic Effects of Federal Spending on Infrastructure and Other Investments*. Washington DC: Congressional Budget Office.
 - Webre, P. (1993). *A Review of Edwin Mansfield's estimate of the rate of return from academic research and its relevance to the federal budget process*. Washington DC: CBO Staff Memorandum.
 - Powell, J. (2006). *Toward a Standard Benefit-Cost Methodology for Publicly Funded Science and Technology Programs*. (NIST IR 7319).
 - *Science*. (1992). Policy Forum: Interview with Goerge W. Bush, President of the United States and Republican candidate for President. *Science*, 258.
 - The Task force on the future of American Innovation. (2006). *Measuring the moment, Benchmarks of our Innovation Future II*.
 - Drake, M, (2007) *Testimony to the House Committee on Fnancial Services*, United States House of Representatives, House Committee on Fnancial Services.

Narin

- Narin, F., Hamilton, K. S., & Olivastro, D. (1997). The increasing linkage between US technology and public science. *Research Policy*, 26(3), 317-330.
- Academic Credibility
 - Published in *Research Policy*
 - Cited 1500 times (Google Scholar)
- Use
 - Broad, B. (1997) Study finds public science is pillar of industry. *New York Times*.
 - Alsalam, N., Beider, P., Gramp, K., & Webre, P. (1998). *The Economic Effects of Federal Spending on Infrastructure and Other Investments*. Washington DC: Congressional Budget Office.
 - Committee on Science, US HoR, One Hundred and Fifth Congress. (1998). *Unlocking our Future: Towards a New National Science Policy*.
 - National Science Board. (1998). *Industry Trends in Research Support and Links to Public Research*.
 - National Science Board. (2003). *Fulfilling the Promise: A Report to Congress on the Budgetary and Programmatic Expansion of the National Science Foundation*.
 - National Science Board. (2005). *2020 Vision for the National Science Foundation* (NSB 05-142).

Martin & Irvine

- Irvine, J., Martin, B., Peacock, T., & Turner, R. (1985). Charting the decline in British science. *Nature*, 316, 587-590.
- Irvine, J., & Martin, B. R. (1986). Is Britain spending enough on science? *Nature*, 323, 591-594.
- Martin, B. R., Irvine, J., Narin, F., & Sterritt, C. (1987). The continuing decline of British science. *Nature*, 330(6144), 123-126.
- Academic Credibility
 - SPRU, University of Sussex
 - Published in *Nature*, 3 times
 - Cited 177 times (*Google Scholar*)

Butler

- Butler, L. (2003). Explaining Australia's increased share of ISI publications—the effects of a funding formula based on publication counts. *Research Policy*, 32(1), 143-155.
- Academic Credibility
 - Australian National University
 - Published in Research Policy
 - Cited 376 times (Google Scholar)
- Use
 - Australia Department of Education Science and Training (2002). *Varieties of excellence: diversity, specialisation and regional engagement*. (DEST issues paper, DEST). Canberra, Australia: Department of Education, Science and Training.
 - Australia Department of Education Science and Training. (2003a). *Evaluation of knowledge and innovation reforms: issues paper*. Canberra, Australia: DEST, Canberra.
 - Australia Department of Education Science and Training. (2003b). *Mapping Australian Science & Innovation: Main Report*. Retrieved from Canberra, Australia:
 - Australia Department of Education Science and Training. (2003c). *National report on higher education in Australia: 1991-2001*. Retrieved from Canberra, Australia:
 - Australia Department of Education Science and Training. (2004). *Evaluation of knowledge and innovation reforms consultation report*. Retrieved from Canberra, Australia:

Content Salience

Framework elements	description	Mansfield	Narin	Martin & Irvine	Butler
Qualitative					
Emotional hook	Protagonists are important constituency that can benefit	firms	firms	scientists	universities
Intuitive appeal	Benefits to group are a “good” e.g. safety or quality of life	Innovation and science are broadly considered good			
Quantitative					
Descriptive statistics	Provides a basic understanding of what the problem looks like		✓	✓	✓
Cost/Benefit and impact Analysis	The ratio of costs and benefits for a policy and how it will be distributed	✓			
Disparities and distribution of burden	Provides understanding of how burdens are distributed, with particular focus on unevenness among important groups	✓	✓	✓	✓
Projections of reduced burden	To what extent will the issue be mitigated?			✓	
Cost of inaction & distribution	What is the impact of not implementing policy and who bears that cost?				✓
Distribution of benefit	Which groups benefit and by how much from new policy/program	✓	✓		
Multiple time horizons of benefits	Short, medium, and long term costs and benefits of the action		✓		
Geography					
Local relevance	Does the general phenomena present itself in the local jurisdiction?		✓	✓	✓
Comparisons	How does status quo compare to peers?			✓	✓

Effective Communication

Framework elements	description	Mansfield	Narin	Martin & Irvine	Butler
Summarized transparently	Methods and approach to synthesis is explicitly described and can be evaluated	✓	✓	✓	✓
Uncomplicated, jargon free language	Use of language that is understandable by general public				
Eliminate irrelevant content	Only information relevant to decision is included, with no extra elements	Intermediaries focused results			
Appropriate timing	Information is presented when relevant decisions are being made	✓	✓	✓	✓
Benefits are unambiguously presented	Bottom line is presented explicitly and clearly with simple and clear explanation of results	✓			
Audience segmentation	Message is tailored to decision makers	Intermediaries produced targeted documents			

Quality

Framework elements	description	Mansfield	Narin	Martin & Irvine	Butler
Effect size/effectiveness	Extent to which policy/program will influence outcomes	✓	✓	✓	✓
Messenger credibility	Scientist/broker is a recognized scholar	✓	✓	✓	✓
Evidence credibility	Scientific adequacy of the technical evidence and arguments	examined by CRS, highly cited, published in Research Policy	examined by NSF, highly cited published in Research Policy	Published in Nature	Highly cited, published in Research Policy

Parameters of Use

Framework elements	description	Mansfield	Narin	Martin & Irvine	Butler
Technical solution exists	There is the means to address the problem/issue from a technical standpoint	n/a	n/a	✓	✓
Consistent with operational realities and constraints	Resources, authority, and scope is appropriate and feasible for agent	✓	✓	✓	✓
Reversibility	Position can be reversed without loss of credibility				
Interaction/legitimacy	Getting feedback or providing mechanism to assess important elements with decision maker to improve consensus	✓		✓	
Solution not problem identification	Finding a new way to address an existing problem is more actionable than identifying a new problem	n/a	n/a	✓	✓

Policy as a socio-technical system

- Over-emphasizes technical aspects of evidence
- Under-emphasizes the social of the socio-technical system
 - Ambiguity as a cornerstone to policy passage
 - Evidence as one input
 - Usually poorly communicated
- Intermediaries are the linchpin that links technical with social

Revised and Reorganized Framework

	Technical	Jurisdictional	Social	Scientific Context
	Analysis	Constituents affected	Problem recognition	Synthesis
	Solutions	Administrative feasibility	Solution acceptability	Gaps
		Authority	Government intervention	Best available solution

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R1: Make knowledge discoverable

- Create 1 page briefs of all sponsored research outputs that highlight policy implications and relevance.
- Create a continuously maintained database that makes the policy briefs searchable, with links to the original research outputs on demand.
- Scan for issues of public importance and debate and bundle relevant issue briefs with a summative narrative for dissemination to relevant potential users.

R2: Bolster the role of intermediaries

- Facilitate interaction between researchers and intermediaries so that each actor can maximize their role more effectively.
- Create a pipeline of results from sponsored research for intermediaries.
- Foster capacity building through intermediaries of both researchers and decision makers.