Principles and Structures of Science Advice

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The science – policy nexus

»Presumption: That governments are more likely to make better choices when they use well-developed evidence wisely.

»Virtually every challenge that all governments face has a scientific dimension (which may or may not be recognised).

»But science alone does not make policy; many values and political considerations are involved in policy making.

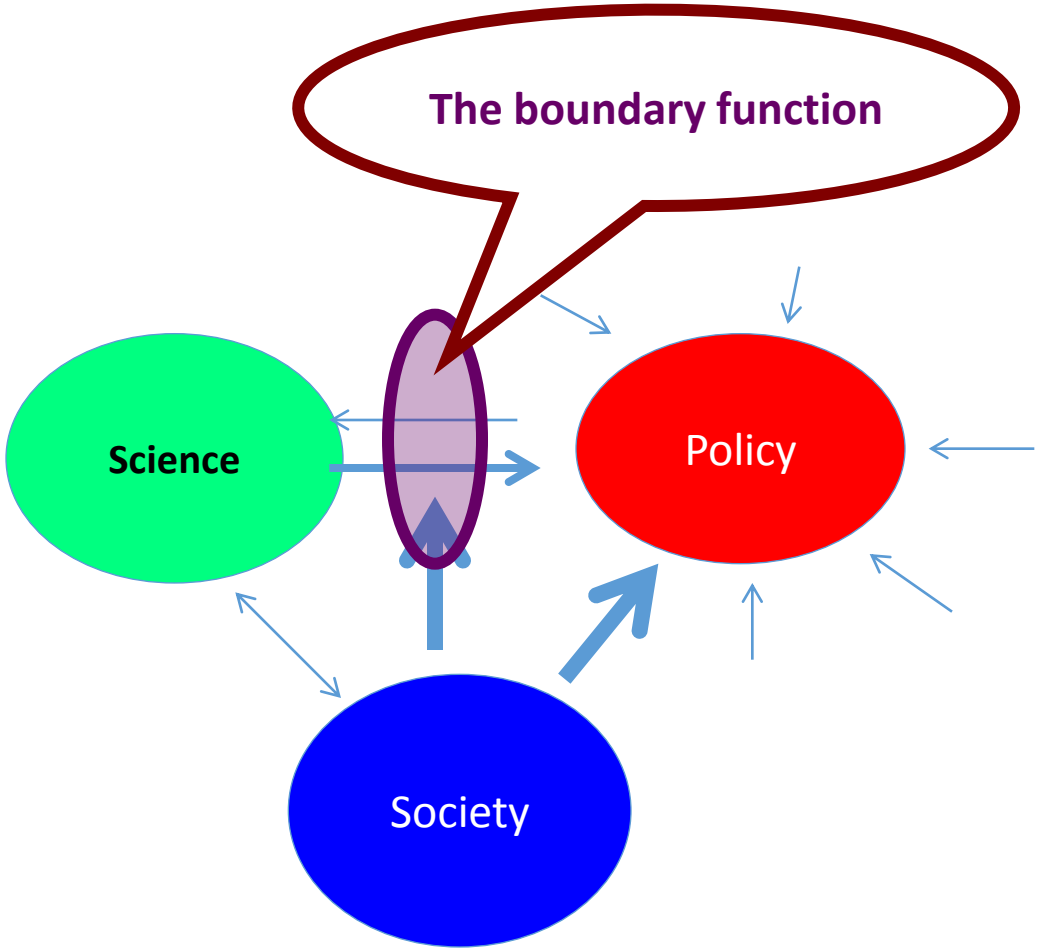
»The value of evidence to policy making is not assured.

»But we also face the challenge of a post-expert, post-elite, post-truth world. What is a fact, what is data? Is robust science available? Who defines it as 'robust/reliable'? Will it be used, misused, manipulated or ignored?

Science and policy making

- Science and policy making are very distinct cultures, methods and epistemologies
- The nature of the interaction is influenced by context, culture and history and by the relationship between science and society
- The place of societal values is very different in science and policy making
- How these interactions operate will on the framings of intent by different parties

- There is increasing recognition of the value of boundary structures to link these cultures.



Many possible elements in a science advisory ecosystem

What needs to be national, what can be regional?

- Individual academics, universities, research institutes
- Academic societies/professional bodies
- Government employed practicing scientists
- Scientists within policy agencies
- Scientists within regulatory agencies
- What works units
- Scientific Academies
- Government advisory boards/science councils
- Science advisors to executive of government
- Parliamentary libraries, parliamentary advice units

The science – policy nexus

- Policy making: it is about making choices
    - between different options
    - which affect different stakeholders in different ways
    - with different consequences,
    - many of which are not certain
- Virtually all policy making carries complexity risk and uncertainty :
    - But perceptions of complexity, risk, cost and benefit vary between stakeholders
- The political perspectives of stakeholder effects, interests, electoral positioning and electoral risk are always present

What is evidence ?

- Politicians and policy makers have many sources of evidence
  - Tradition
  - Prior belief
  - Anecdote and observation
  - Science

- Science is defined by its processes which are designed to reduce bias and enhance objectivity.
  - But important value judgments lie within science especially over what question and how to study it.
  - But the most important in the context of policy is the sufficiency and quality of evidence.

The evolving science-policy nexus

- The nature of science is changing
- The relationship between science and society is changing
- The nature of policy making is evolving
- The relationship between society and the policy elite is changing
- Evidence informed policy making sits at the nexus of science, policy and society
- It is evolving into a distinct set of skills

Changing nature of science

- From linear to non-linear
- From singular to multidisciplinary to systems- based
- Accepting complexity
- From certainty to probabilistic
- The impact of big data and AI applied to big data

- From normal to post-normal…
  - The science is complex
  - Facts uncertain
  - There is much which is unknown
  - Stakes are high
  - Decision making is urgent
  - There is a high values component and values are in dispute

Science and values

- Science is not values-free: scientists make values-based decisions all the time:
  - what to study; what methodology; what is considered sufficient evidence for conclusions…
- But the scientific method is designed to limit (or identify and mitigate) the influence of human values on the collection and analysis of data
- But the biggest value judgments in science are the quality and sufficiency of data on which to reach a conclusion.
- And there is nearly always an inferential gap between what scientists know and what conclusions they reach

- How science is *used* by society is intimately and inherently values-rich
- And policy is inherently values-rich

The challenge of science being used as a proxy for values debates

- Societal values discussions are difficult
- Politicians often avoid them
- Science has frequently been misused as a proxy for what are primarily values debates:
  - Climate change
  - GMOs
  - Reproductive technologies
  - Stem cells
  - Water fluoridation
  - Harm reduction strategies
- Science cannot usually resolve irreconcilable worldviews

The challenge of science at the policy-societal nexus

- Too much science, much of which is in disciplinary silos
- Often incomplete and ambiguous at the time policy choices are needed
- The changed and post-normal nature of much science
- The challenge of values within and beyond science
- The different perceptions of risk
- Different perceptions of expertise
- The reciprocal perceptions of scientists and policy makers

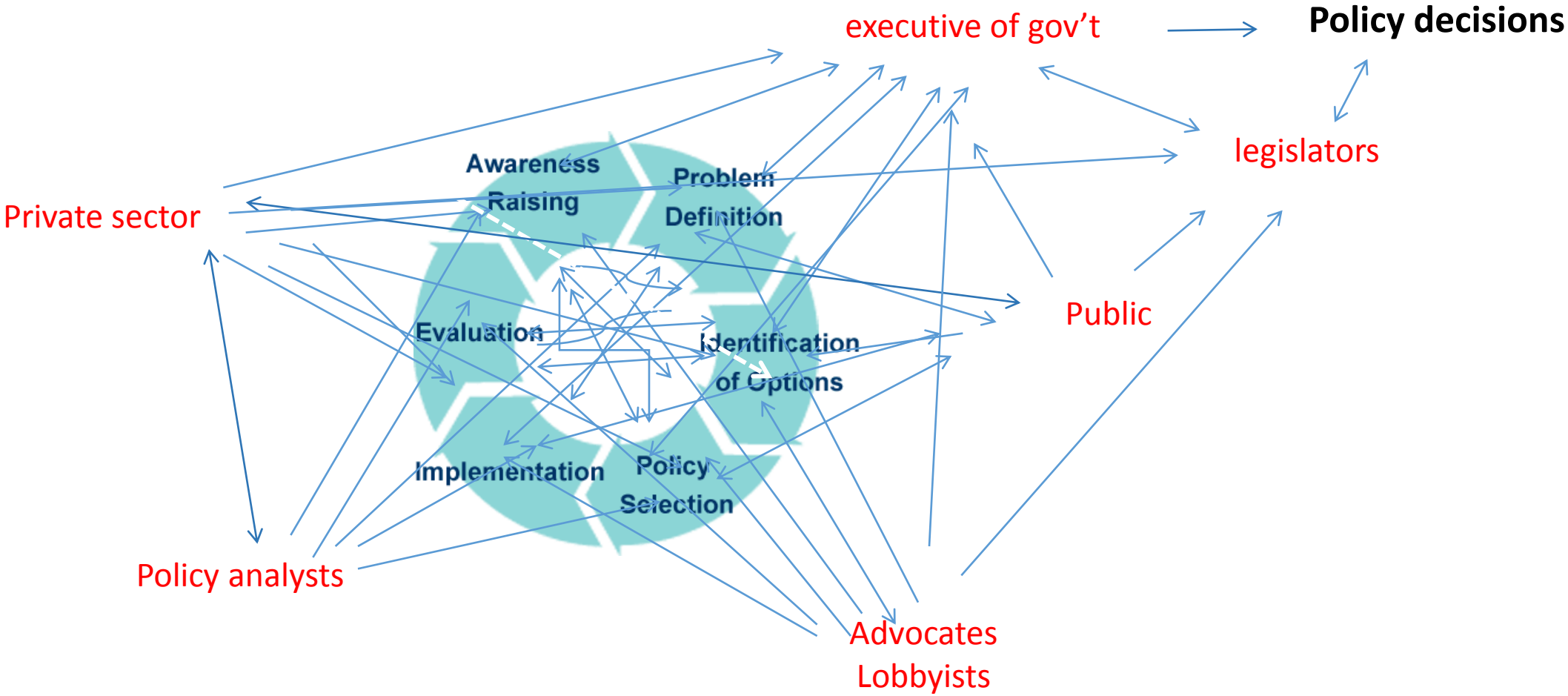
The understanding of risk

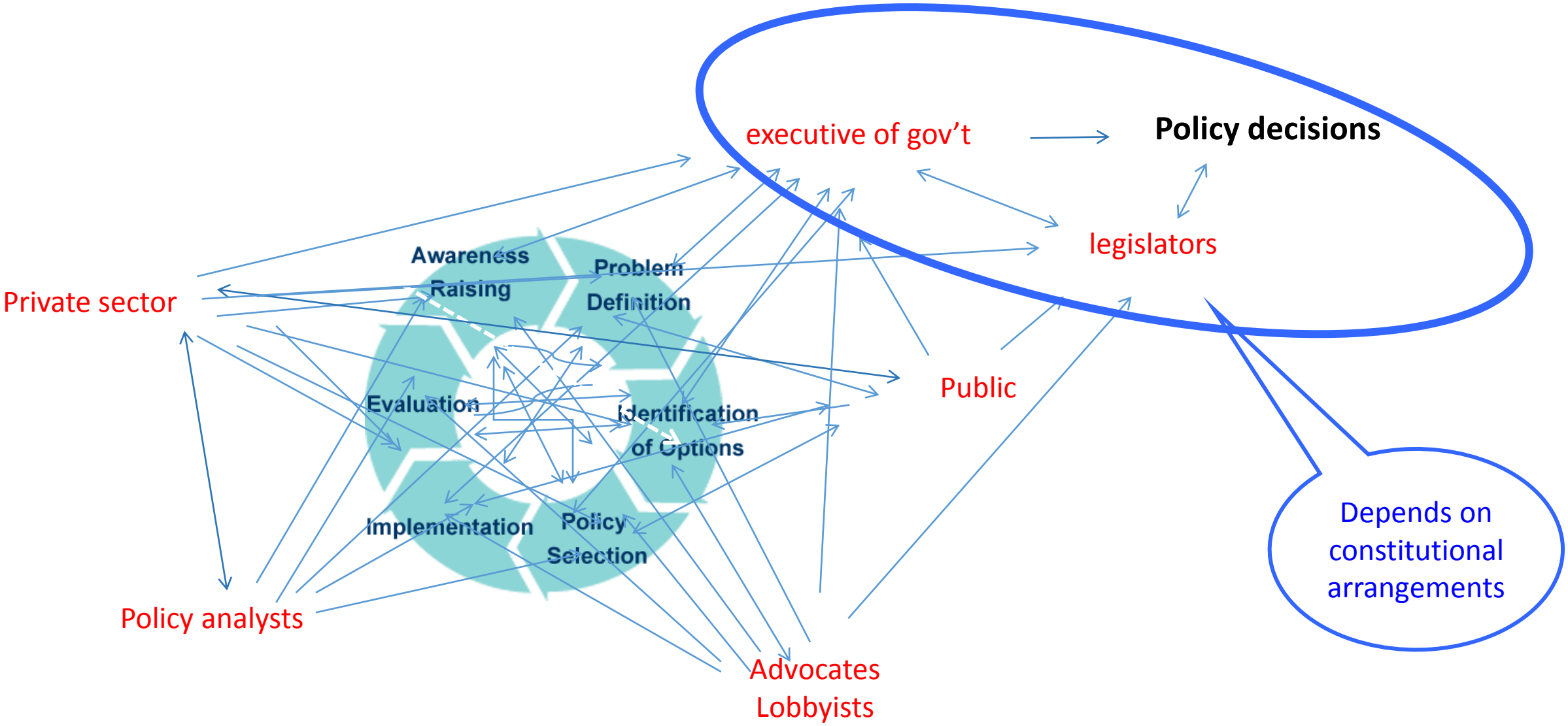
- Actuarial/probabilistic
- Perceptional
  - The role of cognitive biases
    - Availability
    - Representational
    - Confirmational
    - Anchoring
    - Asymmetry
  - Perception of gains and losses, benefits and burdens
- Reputational and political

- The misuse of the precautionary principle


Awareness Raising
Problem Definition
Identification of Options
Policy Selection
Implementation
Evaluation

Policy making is messy




executive of gov't
Policy decisions
legislators
Private sector
Awareness Raising
Problem Definition
Evaluation
Identification of Options
Implementation
Policy Selection
Public
Depends on constitutional arrangements
Policy analysts
Advocates
Lobbyists

Policy makers

- Have limited bandwidth and often limited manouvrability
- They lurch to problems
- The policy cycle is generally very short and getting shorter
- Most relevant science is incomplete and much is ambiguous
- They cannot be expected to be scientific referees
    - The need for translation and brokerage
- Policy makers see evidence is one of a number of inputs
    - In what sense is it privileged and how is that privilege maintained? The role of the broker.

Scientists and policy making

- Scientists are
  - Very good at problem definition
  - Less so at finding workable, scalable and meaningful solutions
  - They often approach the policy maker with considerable hubris.
  - They often fail to consider the multiple domains that go into policy formation
- But they have a critical role in the policy process through the science advisory ecosystem

Science and policy making

- Policy is rarely *determined* by evidence but policy can be and should be informed by evidence

- Inputs into policy
  - The science

    Evidence of need, possible solutions, impact
  - Public opinion
  - Political ideology
  - Electoral contract
  - Fiscal objectives and obligations
  - Diplomatic issues and any international obligations

Types of advice

- Unsolicited
  - Advocacy or brokerage
  - Policy brief or long report (academies)

- Solicited
  - Informal or formal
  - Brokerage
  - Policy brief, report, specific advice

The construct of science advice: the concept of brokerage

- What is known, what is the consensus
  (need, impact, alternatives, monitoring etc)
- What is not known
- Other caveats
- The inferential gap, risk management
- How it relates to other considerations
- Options and tradeoffs

The primary functions of science advice

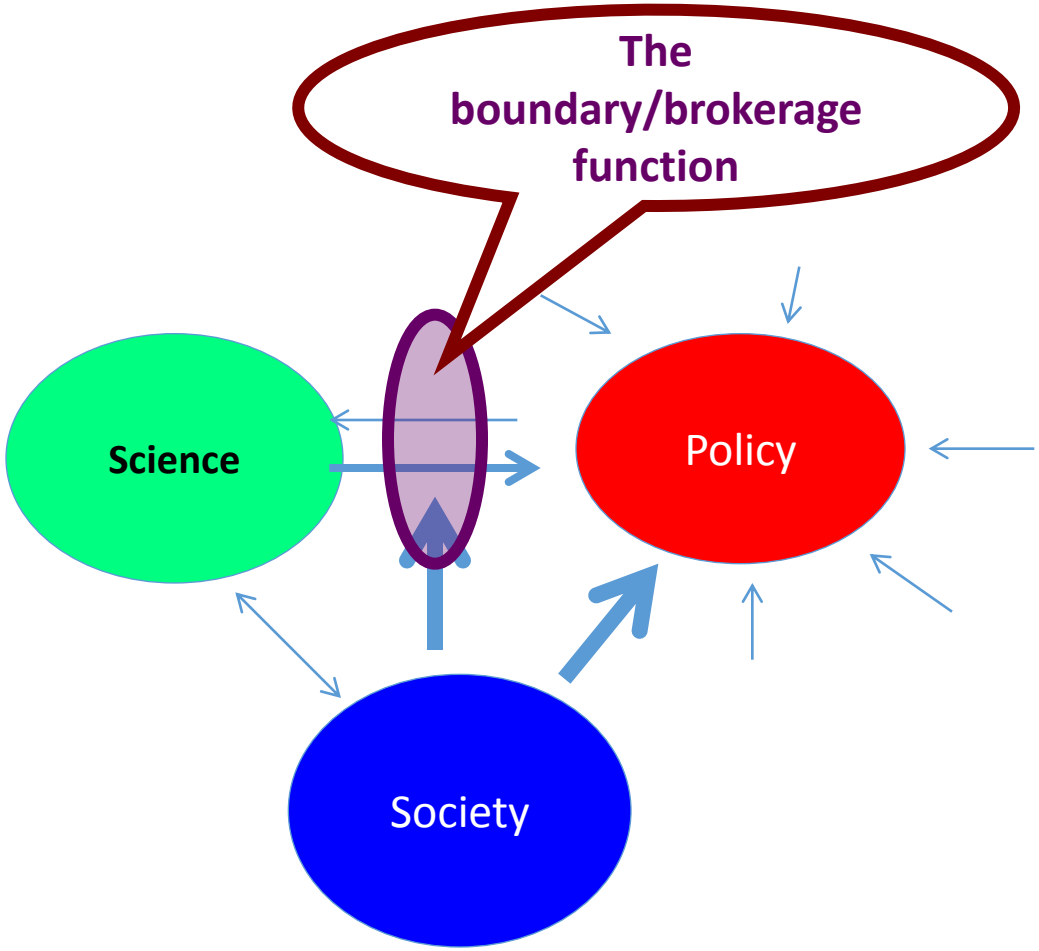
- **Ensuring understanding of complex systems by the policy community**
- **Assisting in defining policy options and implications**
- Evaluating policies that have been implemented

- Advice in emergencies
- Forecasting/technology assessment

- Science diplomacy

Five overlapping dimensions of science advice

- From technical advice to regulatory advice to policy advice
- Time scales from immediate (crisis) to deliberative to foresighting
- Informal/formal
- Internal to the policy system (eg science advisors) to external to the policy system (most academies)
- From local to national to international



Informal mechanisms

- Is a key need of leaders and governments
- Brain storming
- Critical challenge to the policy maker
- Instant and responsive
- Can impact very early in policy cycle and repeatedly
- Requires a high level of integrity and trust
- Relies on individuals
- But is not unaccountable
- Is a conduit to deliberative science advice

Formal mechanisms

- Much depends how the question is framed and by whom (supply side or demand side)
- Agenda can be compromised by committee dynamics and interests
- Can usually only input at a single point in policy process (not sufficiently supple and iterative)
- Hard to be timely or responsive
- Offers key opportunity for inclusiveness and legitimacy = trust

Internal versus external inputs

- Internal
  - That close to the executive of government
    - Informal
    - Instant in crises
    - Repeated and iterative
    - Identify opportunity and need
    - Conduit to science community

- External
  - The broader academy
    - Expert committees, professional bodies, national scientific academies
    - Generally deliberative and formal
    - Single point intervention

Academies and science advice

- A source of deliberative advice (solicited or unsolicited)

- Many academy reports have had little impact on policy – why?
  - Not timely, not requested, not needed
  - Do not answering policy relevant questions directly
  - Often not well equipped to deal with post-normal issues
  - Do not always appreciate the policy space and assume a linear model from evidence to policy
  - Do not understand the nature of brokerage
  - Language not accessible
  - Focused on showing academic standing

Different roles in a science advisory ecosystem

	Knowledge generators	Knowledge synthesizers	Knowledge brokers	Policy Evaluation
Individual academics	+++	++		+
Academic societies/professional bodies		+		
Government employed practicing scientists	+++	+		++
Scientist within regulatory agency		++	++	
Think tanks		**++**		**+**
What works units etc		+++	+	++
National academies		+++	+	
Government advisory boards/science councils		++	+	
Science advisors to executive of government		+	+++	
Science advice to legislators		+	++	±

THE SCIENTIST:

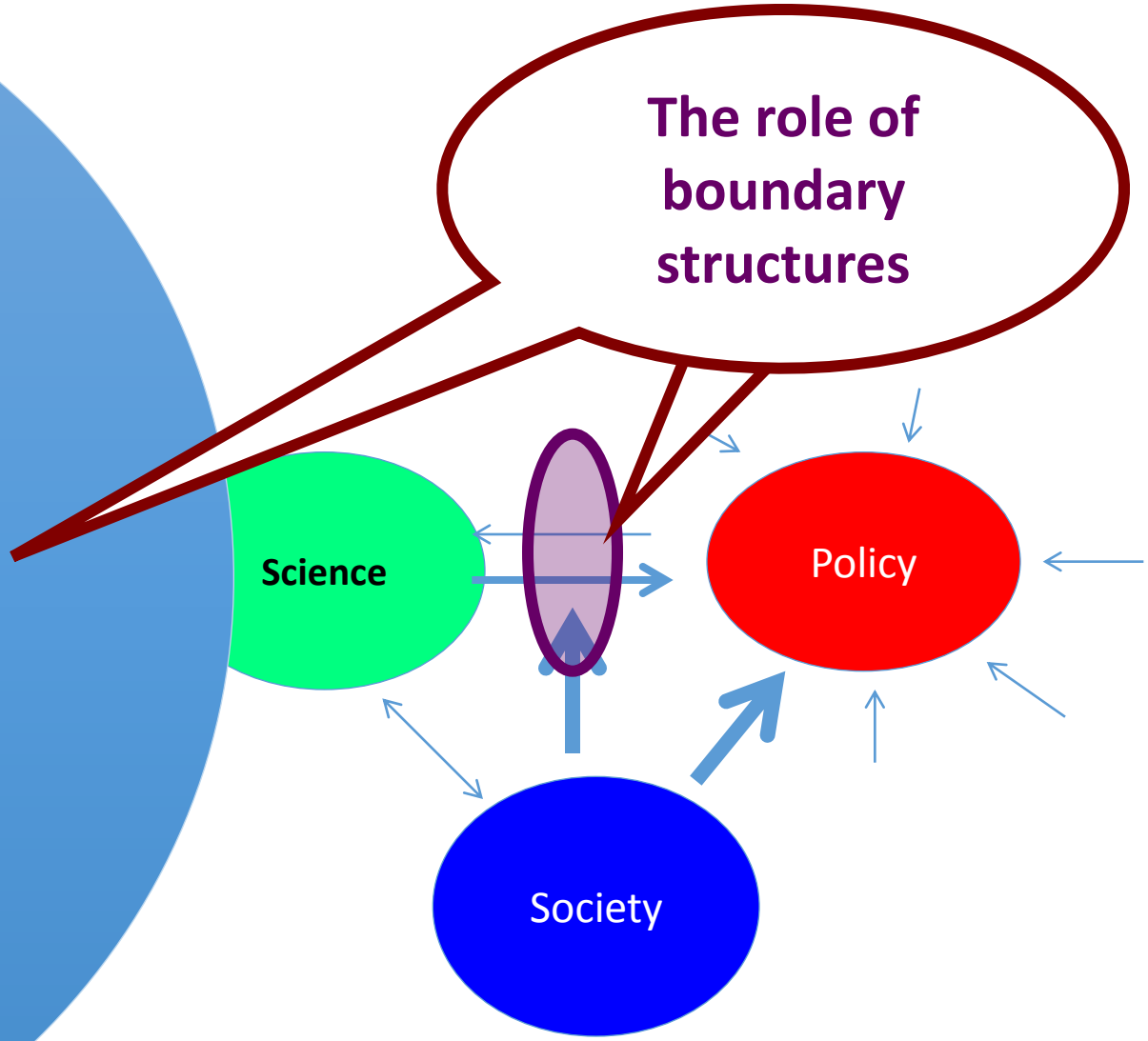
Brokerage
or advocacy?

THE POLICY MAKER

Pragmatic policy options
or politically driven policy options

THE POLITICIAN

Evidence informed policy
or policy informed evidence



The scientific framing

- Individual scientists, scientists in professional organizations, NGOs, private sector legitimately engage in advocacy
- But advocacy is often associated with reduced trust in the message and can be seen as no different from other forms of lobbying

- Academies, advisory systems need to practice brokerage to be trusted. Trust and respect must be sustained with politicians, policy makers, publics and the science community.
- Trust is assisted by brokerage approaches (leaving the values to the policy makers and politicians), providing options (leaving choices to policy makers and politicians), and by avoiding hubris.
- Leaving the values to the policy maker and politicians is not easy but this does not mean that the conflation cannot be pointed out, indeed it must be.

Key considerations in preparing advice

- Understanding the audience, context and timeline
- Are the question and the answer aligned
  - key role for the broker
  - Does the demand side understand what science can and cannot answer
  - Does the supply side understand clearly what the policy maker wants
  - Systems analysis, policy options, solution
- Brokerage versus advocacy
- Balanced and multidimensional evidence synthesis
- Stakeholder analysis (and engagement)
- Clarity of question, language, conclusions
- Consideration of other dimensions of policy input
- Clarity of presentation
  - Policy brief, report, visualisation

Principles for science advising

- **Trust**
  - Politician
  - Policy maker
  - Public/media
  - Scientist
- **Humility/Avoidance of hubris**
- Distinguish *science for policy* from *policy for science*
- Understand science informs and does not make policy
- Recognize the limits of science
- **Brokerage not advocacy**

The art of science advice to government

Peter Gluckman, New Zealand's chief science adviser, offers his ten principles for building trust, influence, engagement and independence.

In 2009, I was appointed as the first science adviser to the Prime Minister of New Zealand. The week I was appointed coincided with the government announcement that the New Zealand food industry would not be required to add folate to flour-based products to help to prevent neural-tube defects in newborns, despite an earlier agreement to do so. As it happens, this is an area of my own scientific expertise and, before my appointment, I had advised the government that folate supplementation should occur. But various groups had stirred considerable public concern on the matter, about health risks and about medicalizing the food supply.

Thus, in my first media interview as science adviser I was asked how I felt about my advice not being heeded. I pointed out that despite strong scientific evidence to support folate supplementation, a democratic government could not easily ignore overwhelming public concern about the food supply. The failure here was not political; rather, it was the lack of sustained and effective public engagement by the medical-science community on the role of folate in the diet. As a result, the intervention did not get the social licence necessary to proceed.

Five years on, I am still in the post. I have come to understand that the primary functions and greatest challenges for a science adviser are providing advice not on straightforward scientific matters, but instead on issues that have the hallmarks of what has been called post-normal science[1]. These issues are urgent and of high public and political concern; the people involved hold strong positions based on their values, and the science is complex, incomplete and uncertain. Diverse meanings and understandings of risks and trade-offs dominate.

Examples include the eradication of exogenous pests in New Zealand's unique ecosystems, offshore oil prospecting, legalization of recreational psychotropic drugs, water quality, family violence, obesity, teenage morbidity and suicide, the ageing

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Peter Gluckman
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The skillset

- Remember the 4 audiences (scientists, public, policy makers, politicians)
- Understanding of the complexities of science
- Get beyond single disciplines (natural and social sciences)

- Understanding the policy ‘cycle’

- **Employing brokerage, avoiding advocacy**

- Diplomatic skills
- Policy entrepreneurship without advocacy
- Good communication skills to the four audiences
- Understanding of the post-trust environment
- Avoiding hubris
- Maintaining integrity and trust

International Network of Government Science Advice (INGSA)

Operates under the aegis of ICSU.

Concerned with all dimensions and levels of science advice to policy makers

- Networking
- Research and academic network
- Capacity building workshops (individuals, academies, institutions on both supply and demand side)
- Thematic workshops
- Partnerships (eg with JRC, UNESCO)
- Hosts Foreign Ministries Science and Technology Advisors Network (FMSTAN)

Membership : academics, practitioners, policy makers (>2800 members, >75 countries)

- African, Latin American, Asian chapters
- Science Diplomacy division.

Manifesto of principles of science advice in relation to SDGS prepared at request of WSF

www.ingsa.org

INGSA's role

www.ingsa.org

- Developing skills in evidence brokerage by developing competent people and institutions operating at local, regional, national and transnational levels
- Developing networks of practitioners, policy makers, institutions and academics at the interface between evidence and policy;
- Being a knowledge resource for enhanced practice at the evidence-policy interface;
- Being a forum for discussing specific questions and challenges that arise at the evidence-policy interface;
- Partnering with other bodies at national, international, regional and local levels
- Creating an infrastructure and platform for sustaining and developing this community of expertise and interest.