

New Models of Technology Assessment for Development

From STEPS Working Paper 45:
New Models of Technology Assessment for Development

STEPS briefing

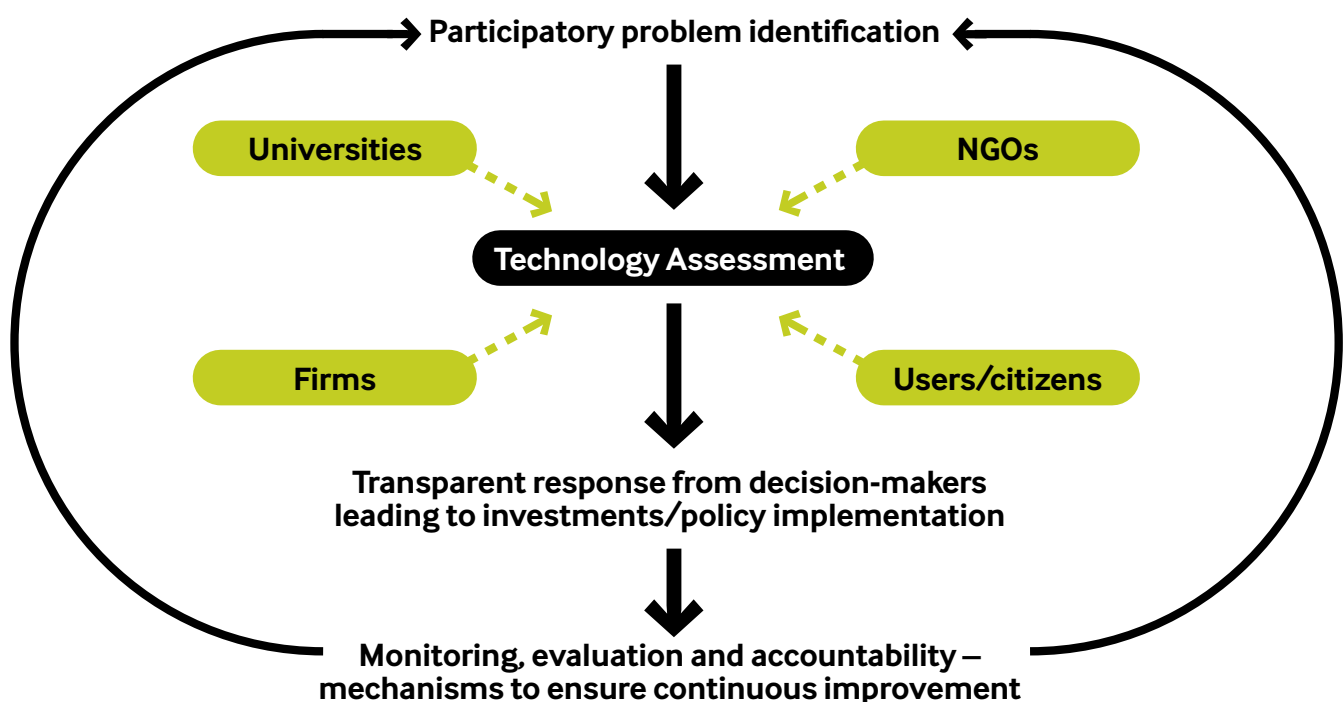
Technology assessment (TA) is a term for processes that collect, interpret and evaluate information and perspectives about different technological options, in order to inform investments, strategies or policies (see Figure 1). It can play an important part in steering science, technology and innovation towards achieving the Millennium Development Goals and addressing the sustainability objectives at the centre of the Rio+20 summit in June 2012. This briefing outlines work conducted at the STEPS Centre that investigates how 'new models' of technology assessment may support these development aims.

What are the 'new models' of technology assessment?

The new models of technology assessment

- combine citizen and decision-maker **participation** with technical expertise
- can be conducted '**virtually**' using new information and communication technologies
- are **networked** rather than being based in a single office of technology assessment
- are **flexible** enough to address issues across disciplines and
- are increasingly **transnational** or global in their reach and scope.

Figure 1. Positioning technology assessment within the policy-making/ technology development process



The STEPS Centre report associated with this briefing, produced with financial support from the Rockefeller Foundation, examines the utility of these 'new models' of technology assessment in a broad range of geographical contexts, asking to what extent they can be applied to improving the lives of poor and vulnerable populations in the developing world.

Assessing the effectiveness of new approaches to technology assessment requires a long-term view, and would need to recognise multiple criteria for success. Quantitative assessment of their efficacy is especially challenging. However, there are some examples of new TAs which have had tangible impacts: for example, for the provision of drinking water (see Box 1), for agriculture (see Box 2), and for energy and emerging technologies (Worldwide Views on Climate Change; citizens' juries on genetically modified crops such as Prajateerpu – see the full report for more details).

Drawing on lessons from the past 40 years of TA - especially recent experience in developing countries - our recommendations highlight how new models of technology assessment can contribute to development goals. They suggest how particular components of the new methods and processes might work especially well in developing countries.

How can the 'new models' contribute to development?

'Broadening out' inputs. These models enable the 'broadening out' of the knowledges and values that are fed as inputs to technology assessment. They do this by involving diverse stakeholders and citizens. This makes it more likely that the assessment includes priorities and questions that matter to people, and relevant knowledge that would otherwise be ignored. Involving diverse stakeholders and citizens can also facilitate continuous learning and discussion throughout society as a whole (rather than only within a small group of experts). This in itself can act as a spur to more effective innovation.

'Opening up' outputs. Rather than producing a single recommendation around the 'best' technology or policy, the multiple priorities and preferences of different groups within society are communicated more effectively and transparently to decision-makers. This helps to foster accountability and democratic legitimacy in subsequent decision-making. Without compromising on quality, the relaxing of pressure to deliver a single 'definitive' recommendation means that these new forms of technology assessment can be less onerous than conventional approaches. They may also be less costly than centralised, technical approaches – an important consideration in many developing countries.

How can technology assessment processes be improved?

There are many processes and methodologies involved in 'new models' of TA. They can be improved by following a number of simple principles:

- **Focus on the problem, not the technology.** TA processes should focus on divergent views of pros and cons across alternative dynamic directions for technological and associated institutional change – rather than on the attributes of some particular selected technology treated in an essentially static fashion. This is often easier if exercises are focused around well-defined problems / problem fields, rather than on specific technologies. For example, an assessment might look at different strategies for insect pest control on cotton and their future potential, or more general agriculture and livelihood options, rather than confining assessment to, say, first-generation transgenic Bt crops.
- **Participation helps in defining the problem.** Participatory methods are best focused on deliberation and decision-making about the nature of the problems, the questions to be asked, and the criteria by which technologies are to be assessed. The outputs of these processes can then usefully inform more traditional analytical expert-based elements of the new models. For example, the assumptions that the central problem is simply about the volume of water provision, can miss important issues around water access, quality and gender relations in water provision.
- **Allow plural criteria for assessment.** Criteria for assessment should be selected on the basis of multi-stakeholder deliberation. They should however aim to take into account the immediate distribution of costs, benefits and risks from technological change, rather than just the post-hoc redistribution following inequitable impacts. For instance, innovative crop strategies that require new forms of land tenure should be appraised on their direct consequences - not according to a presumed 'trickle down' of the profits from more productive land to poor people.
- **Diversity is key.** Technology assessments should focus on maintaining and enhancing the diversity of social and technological approaches to addressing specified challenges. Potentially negative impacts of technologies that particularly threaten diverse solutions should be especially guarded against. For example, a disproportionate focus on proprietary pharmaceuticals to treat diseases may draw resources and attention away from existing public health measures and lifestyle choices, so 'crowding out' a variety of effective approaches that contribute to disease prevention.

Box 1: Stakeholder dialogues around the role for new technologies in potable water provision

The NGO Practical Action has conducted a number of stakeholder workshops to investigate the question "Can Nanotechnologies help achieve the millennium development target of halving the number of people without access to clean water by 2015?" Engaging experts, government decision-makers and, importantly, community members in Zimbabwe, they focused on identifying and understanding the various sources of the problem of water provision, and discussing possible technological and non-technological solutions. By broadening out the inputs to discussion and opening up the options under consideration, the exercise helped the

participants understand more about the social concerns at the heart of the issue. It pointed to a range of potential solutions, including some that involved nanotechnologies.

Similar processes in Peru and Nepal have led to useful information previously unavailable to nanotechnology experts and to the formation of regional networks between researchers and users. Unfortunately, the international networking of these isolated events and their impact on research, design and development has so far been hampered by the absence of long-term funding for co-ordination and follow-up about the outcomes.

Considerations for developing countries

Technology assessment methods should be carefully designed and implemented, based on the options under discussion, the resources available and the socio-political context in which they are undertaken. Many lessons for technology assessment gleaned in OECD countries, are less practically applicable in many developing country contexts. For example:

- Though internet infrastructures are improving in many of these contexts, a reliance on Web 2.0 or other 'virtual' models is not realistic where the necessary infrastructures do not exist.
- Capacity in the methodologies of new models of technology assessment is often lacking in many developing countries. In these cases, pooling resources between countries may help.
- Data and statistics that can inform technology assessments in OECD contexts, as well as levels of understanding and language required for meaningful citizen engagement in debates about some technologies, are less often present in developing countries.
- Resources and capacity may not be available to act on TA outputs and subsequent political decisions. Still, in these circumstances, new models of technology assessment can help generate tacit learning within the innovation system, even if their outputs do not go on to guide concrete investments.

The effectiveness of technology assessment rests not only on the process and outcomes, and the availability of resources to act on the outputs of a TA. It also relies on responsiveness and openness on the part of government and others who hold and allocate resources. Governments, funders and other audiences for TA exercises should commit in advance to responding in detail to the outputs of technology assessment. This does not mean that they always have to act in accordance with these outputs, but simply justify their response in a transparent and reasoned way. New models of technology assessment can thus place the responsibility for decision-making more firmly on democratically accountable leaders, and enhance political debate around scientific and technological investments and policies.

Box 2: Assessing technological options for food and livelihood security

Agricultural technologies and alternative options for food and livelihood security have been assessed at local, national and global levels. Broadening out to include different perspectives highlighted the multiple functions that agriculture plays and pointed to the importance of a combination of technological and other (non-technological) options.

At a local level, the STEPS Centre conducted a multicriteria mapping (MCM) exercise with various stakeholders and poor, semi-literate farmers in Kenya in 2009 to explore innovation pathways in and out of maize. The exercise (sometimes challenging to administer) allowed interviewees to assess the pros and cons of 9 pathways against their own chosen criteria, rather than those of the researchers. The MCM exercise recorded not only their quantitative scores for each pathway but also the reasons behind each interviewee's assessment. (For briefings, working papers and videos, see <http://www.steps-centre.org/ourresearch/crops,%20kenya.html>)

At the international level, a networked approach to TA was attempted by the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) – a \$15M initiative supported by several international agencies that ran from 2005-2007. Like the MCM exercise above, the IAASTD broadened out participation by involving a wide range of stakeholders (although not, in this case, farmers) - one consequence of which was that it did not consider agriculture in isolation, but looked at its contribution to broader livelihood and environmental goals. The process did not deliver a global 'roadmap' for agriculture (and has been criticised for failing to prioritise specific options), but it built understanding across varied constituencies and opened up previously neglected perspectives for discussion – all of which contributed to a more informed and plural debate in the future.

Box 3: Important criteria for new models of technology assessment

The findings of the report point to fifteen criteria under which technology assessments may be appraised, grouped into thematic sub-headings:

Broadening out inputs to technology assessment – participation and expertise

1. Is the method equally conducive, without inherent bias, to eliciting all relevant perspectives?
2. Are different perspectives afforded a role in design as well as implementation of appraisal?
3. Is there due attention, not just to technological, but also social and institutional aspects?
4. Are all relevant technology and policy options compared in inclusive and symmetrical ways?
5. Are there any inherent or circumstantial limits on the kinds of issue admissible in appraisal?
6. Does the method allow balanced attention to positive as well as negative consequences?
7. Is there flexibility for different actors themselves to define their own key options and issues?
8. Are certain kinds of issue unduly privileged over others (eg. quantitative over qualitative)?

Dynamic social-technological-environmental pathways

9. Are different options addressed in a dynamic way, eg. attending to contrasting scenarios?
10. Are issues around diversity and interactions between options also fully considered?
11. Is there consideration of issues of flexibility and reversibility, to allow learning from surprise?

Opening up outputs to technology assessment – promoting accountable decisions

12. Are conditions made clear under which contrasting assumptions yield different conclusions?
13. Is full attention given to uncertainty ranges, without artificial reduction to probabilistic risk?
14. Is it explained how this individual exercise relates to others and to wider political debate?
15. Have sponsors committed to respond in detail to findings, even if these are not agreed?

The future of new models of technology assessment for development

Rather than being isolated experiments, new models of technology assessment should be further networked and co-ordinated in order to provide more robust inputs to policy at national, regional and international levels. This requires technology assessment tools and methodologies which can be scaled up in diverse, developing country contexts. It also requires investment in 1) capacity building amongst the organisations responsible for co-ordinating them, 2) facilitated network-building and 3) commitment to supporting research that responds to the outcomes of the technology assessments.

Increasing interest in these kinds of processes, and the politicisation of debates over science, technology and innovation in recent years, are themselves a sign that more inclusive decision-making around technology is now expected by a range of constituencies. The adoption of new models of TA addresses this cultural and political change. Along with other approaches, they can contribute to more democratic governance – not only of science, technology and innovation, but also more widely. It is in this way that new models of TA offer a crucial means towards meeting the challenges of international development.

References and further reading

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About this briefing

This briefing summarises the findings of a report 'New Models of Technology Assessment for Development', produced by the STEPS Centre with the financial support of the Rockefeller Foundation. The report builds on work previously conducted as part of the STEPS Centre's project 'Innovation, Sustainability, Development: A New Manifesto' and research carried out during the first phase of the Centre, which is funded by the UK Economic and Social Research Council.

About the STEPS Centre

The STEPS Centre (Social, Technological and Environmental Pathways to Sustainability) is an interdisciplinary global research and policy engagement hub uniting development studies with science and technology studies. We aim to develop a new approach to understanding, action and communication on sustainability and development in an era of unprecedented dynamic change. The STEPS Centre is based at the Institute of Development Studies and SPRU Science and Technology Policy Research at the University of Sussex with a network of partners in Asia, Africa and Latin America and is funded by the Economic and Social Research Council.

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