Building Comprehensive Networks to Address the Sustainable Energy Challenge with Focus on Rural India

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A Newton Workshop on "*Translating Clean Energy Research to Rural India"* was recently held at the Indian Institute of Science Education and Research (IISER Pune), Pune, India, Sept. 4-8, 2017, which was jointly organized by the University of Edinburgh, UK and IISER Pune, with funding support from the British Council under the Researcher Links scheme of its Newton Fund program and the Royal Society of Chemistry, UK. It brought together physical scientists and social scientists alongside practitioners and innovators in an ambitious event to build networks and projects across the broad spectrum of disciplines required to address global challenges such as sustainable energy. This article describes the concept, ambitions, implementation and outcomes of the workshop.

The UN Sustainable Development Goals [1] define a context in which science and technology can deliver transformative improvements to people's lives across the globe. Goal 7, *ensuring access to affordable, reliable, sustainable and modern energy for all* is set to be a defining challenge of this century, and also feeds into other Goals relating to clean water, sustainable communities, zero hunger, climate action and more. Externally developed technology however, does not always meet the real needs of potential beneficiaries, and questions can arise around cost, usage, maintenance, repair and end-of-life of technology. Addressing these challenges with an external technology push often falls short of expectations and a clearer understanding of the basic needs being addressed is essential for technology to effectively provide solutions. Such understanding lies within the domain of social scientists, NGOs, social enterprises and similar ventures. However, links between social scientists and physical scientists who develop new technology are often weak and poorly supported.

The UK Newton Fund provides support for science and innovation partnerships to promote economic development and social welfare in partner countries [2]. Within this, Newton Workshops can be used to build partnerships between UK and overseas scientists to address pressing global challenges. The workshop held at IISER Pune on 4th – 8th September 2017 was under this initiative (Figure 1). The aim of the workshop was to bring together physical scientists/engineers working in energy technologies, with social scientists working in delivery and study of the use of technology in the rural Indian context.

We set out with several inter-related aims:
-To introduce physical scientists to the real-world use of energy technologies in rural India and thereby help them see opportunities for their existing research and/or help provide a context to direct their future research.
-To introduce social scientists to the latest progress in emerging technologies to raise their awareness of both immediate and future possibilities.
-To facilitate communication and network building between physical and social scientists.
-To use facilitated group-work problem-solving to identify ambitious sustainable-energy targets, and also short-term projects for immediate impact and to consolidate the partnerships that form.

A crucial aspect of the workshop was a site visit to selected villages in Maharashtra to inform all the subsequent presentation, discussion and problem-solving activities that took place. The visit to selected villages and discussion with the local people was essential to set the context and understand the needs that were to be addressed. The impact of this exposure was sustained throughout the workshop through the presence and interventions of invited research leaders and NGO staff with a record of success in delivering technology based development to rural villages.

The workshop was aimed at early-career researchers in a range of overlapping disciplines to achieve a breadth of experience within the group. The expertise of the 25 participants covered not only relevant technologies: optoelectronics, nanomaterials, fuel cells, sensors, catalysis, water monitoring, water treatment, heat storage, electricity network integration, photovoltaics, water splitting, biofuels, effluent treatment and materials chemistry, but also social science considerations: economic modelling, local community resilience, policy development, environmental geography, sociology, energy-food-water nexus, life-cycle analysis, intellectual property, environment law, community based conservation, renewable energy governance and more. We achieved an approximately even split between physical scientists and social scientists in approximately equal numbers from India and from the UK.

As well as the academic leads (NR, SO) and social enterprise lead (PK), we found it essential that one of us (SS) has the academic development background to act as facilitator to ensure that the workshop could be delivered flexibly and respond to communication, networking and project development challenges as they emerged. During the workshop SS produced a daily blog with insights into the programme delivery. These are now being developed into a comprehensive guide to designing and delivering international development research workshops [3].

Before the workshop, participants were asked to summarise their research and interests for a mixed audience using two power-point slides to present at the start of the programme. The introductions provided an overview of skills and experience written without jargon to accelerate initial networking and highlight potential connections. Pre-selected groups ensured that social scientists mixed with physical scientists and Indian attendees mixed with those from the UK during four structured discussions.

We also invited five expert guest speakers and in briefing them we made the aims and approach of the workshop clear, emphasising that the attendees would spend a significant

proportion of their time building links, exploring ideas and developing projects. Given that these projects would be both interdisciplinary, involve far distant collaborators and have an international development focus, the invited speakers were asked to focus on sharing advice on how to manage these kinds of projects, as well as providing inspiration to the group. The speakers were also asked to remain with the group for a whole day and provide mentoring during the initial idea generation stage.

Throughout the workshop there was a clear structure and approach, built around a simple principle of divergent and convergent thinking (Figure 2) [4]. The first half of the week was designed to stimulate divergent thinking as participants were exposed to new experiences, perspectives and opinions. They were given space to share and develop ideas and then in the second half of the week, the convergent thinking was encouraged with a focus on funding, review and planning. We were aware that the shift from divergent to convergent [5] could be challenging and warned the participants of this in advance. Those running similar workshops should be prepared to intervene during idea development to ensure the sustainable development focus is embedded. Our advice is to "shine a light" onto the idea generation and development process regularly in the early stages to spot any relaxation into disciplinary norms.

The latter stages of the workshop focused on planning. Attendees were reminded of the principles of official development assistance (ODA) as compliance with these is compulsory for many of the funding schemes available. The final day was spent building ownership of potential projects and individual plans to ensure the momentum built during the workshop was maintained. A number of funding schemes for initial project development (seed funding and short visits) were highlighted by participants and a number of proposals are now being initiated. The organisers and participants produced a funding landscape map to cover all stages of project development, to enable short visits, workshops, networks, proof of concept and full projects.

Whilst it is too early to judge the full impact of the week, the immediate objectives of workshop were achieved. There is more familiarity across the disciplinary boundaries and of the needs of rural India. The initial projects demonstrate a shift of thinking from expertise-led projects to needs-led. The workshop closed with comments from the organisers about how to maximise the value of the workshop and to emphasise that research conducted in collaboration across a broad spectrum of disciplines is the future of research. We hope that the insights gained by these researchers can be cascaded to other groups through the blog and workshop guide [3] and that the potential for clean energy to transform lives in rural India and elsewhere is realised.

Acknowledgements

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References

[1] http://www.un.org/sustainabledevelopment/sustainable-development-goals/

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Figure Captions:

Figure 1: The workshop participants and scenes from the village visits.

Figure 2: Workshop structure showing divergent and convergent phases over five days.