Engineering Exchange: the democratic imperative for researchers to engage with local communities.

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Engineering knowledge is more important than ever, but it needs to be responsive and accessible to a wider range of democratic actors if it is to solve societies' most challenging problems. Typically framed by the interests of large institutional and industrial actors, engineering research has been much less successful in directly engaging with local communities. **Sarah Bell** *outlines the core purpose of the Engineering Exchange (EngEx), recently established at UCL to expand the impact of engineering research and redress the balance for democracy in technological societies.*

Engineering research is vital to the future of British society and the economy. It is a well-worn argument – engineering research fuels innovation that enhances economic competiveness and creates technologies that transform lives. From healthcare to motorsports, engineering research is at the centre of technological and social change. The 'Impact Agenda' in UK research funding works in favour of engineering research. Engineering research by definition solves problems and creates new technologies in the service of industry and society. If you are an engineering researcher who can't articulate the direct benefits of your work to non-academic stakeholders then you should seriously consider a career change.

The taken-for-granted 'engineering is good for society' storyline is problematic on two accounts – firstly it overlooks the role of engineering in causing, rather than solving, many of the most complex problems societies are now facing; and secondly it fails to acknowledge that engineering most often serves particular interests in society, to the exclusion of others. The 'impact' of engineering research is usually delivered through partnership with large industrial and technological corporations, or by demonstrating pathways to commercialisation. Engineering researchers also engage with policy makers and government agencies, particularly in relation to infrastructure planning and delivery. Engineering research has been much less successful in directly engaging with civil society and local communities, posing significant challenges for democracy in technological societies.

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In modern technological societies engineering knowledge is central to some of the most important debates and decisions facing democracies, such as climate change, biotechnology, infrastructure renewal, international development, aging populations, surveillance, crime prevention, urban regeneration and food, water and energy security. The large institutions that engineering traditionally serves, such as the state, the military and industrial corporations have struggled to respond to the increasing complexity and inter-connectivity of many of these issues. Engineering solutions are constrained by the definitions of these problems, framed by the interests of large institutional and industrial actors. Rising levels of education in the general population and unprecedented access to data and information have changed the way that knowledge is distributed throughout society, but have not reduced the need for professional judgement and reliable research on technical issues. Engineering knowledge, formalised through professional institutions and universities, is more important than ever, but it needs to be responsive and accessible to a wider range of democratic actors if it is to redefine and solve societies' most challenging problems.

This brings a new urgency to expanding the impact of engineering research, and it is the core purpose of the Engineering Exchange (EngEx), recently established at UCL. The EngEx enhances two-way engagement between engineering research and local communities. It aims to:

1. make engineering expertise more accessible to local community groups;
2. help engineering researchers to develop research projects that build on community-based knowledge and are aligned to local community needs;
3. influence engineering research strategies to better reflect community needs and priorities; and
4. raise the profile of community-engaged engineering research to a similar standing as industrial and policy engagement.

The first major project of the EngEx, a review of the evidence for demolition or refurbishment of social housing, demonstrates the benefits of working with local communities to provide wider access to engineering knowledge.

London's housing crisis is well documented. The problems in social housing are particularly acute, with high demand, long waiting lists, lack of investment in new building and the challenges of regenerating housing estates that suffer from decades of neglect, poor maintenance and associated environmental and social problems. In urban

regeneration residents are often presented with plans to demolish particular homes and refurbish others. The rationale for these decisions is not always clear and can be difficult to challenge, particularly if the justification is made partly or entirely on technical grounds such as energy efficiency or structural stability. In such cases developers, local authorities and housing associations often employ consulting engineers to design and analyse proposals that do not always take full account of residents' needs and values, and residents rarely have the resources or capacity to critically evaluate the technical case for demolition or refurbishment of their homes.

Just Space, a network of grassroots organisations in London, and the London Tenants Federation commissioned the UCL EngEx to undertake a review of the technical evidence for demolition or refurbishment of social housing in London. The review showed that refurbishment is almost always preferable to demolition of housing in terms of energy and resource efficiency, and can often be achieved cost effectively. The report was submitted as evidence to the Housing Committee of the Greater London Assembly, who addressed these issues during 2014, leading to the release of their own report in 2015. Along with various factsheets and videos, the report has also been widely circulated amongst residents groups, and provides a starting point for understanding how engineering knowledge is used in decision-making about social housing. A follow-on project is underway to help residents translate these findings into their own particular circumstances, to enhance their ability to engage with the technical factors that contribute to decisions about regeneration and housing in London.

Engineering research is vital to the future of British society and the economy. It is therefore important that engineering research is accessible and responsive to a broad range of actors, beyond the large institutions and corporations that it has traditionally served. Opening up engineering research to local communities provide opportunities for more positive impacts, and can reframe the questions that engineering researchers ask and the problems they solve. This provides a new source of inspiration for research projects and innovation, and more importantly confirms the importance of engineering knowledge to democracy in modern, technological societies.

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About the Author

Sarah Bell is Director of the Engineering Exchange and Senior Lecturer in Environmental Engineering at UCL. Her research focuses on the relationship between engineering and society, particularly as they relate to urban water systems.