



Higher Education Curriculum on Disaster Resilient Infrastructures

About the Workshop

The workshop, jointly organised by the Bartlett Development Planning Unit at the University College London (UCL), the Urban Cluster at EPICentre (UCL) and the Indian Institution for Human Settlements (IIHS) and in consultation with the Coalition for Disaster Resilient Infrastructure (CDRI), is part of phase 2 of the British Council's Going Global Partnerships grants (Top-up Grant). In this workshop, we intended to identify how a curriculum focused on urban resilience and urban infrastructure resilience can be conceptualised in relation to its ability to respond to the knowledge and skill gaps identified in Phase I and what would be the most effective mode of delivering such a curriculum. Moving in this direction, we intend to build further on the baseline curriculum and develop a full-fledged curriculum for its potential uptake across a range of higher educational institutions (HEIs) in India, the UK and, potentially across other contexts.

Our aim is to deliberate on:

- **Structure of the curriculum:** to critically examine and build on the baseline curriculum and jointly arrive at learning objectives and pedagogical approaches
- **Teaching content:** to deliberate on content that is appropriately aligned to the identified objectives - if new content would need to be developed, how could we collaboratively co-produce such content, and how existing content could be adapted to the DRI theme
- **Delivery:** to co-develop a strategy and identify avenues for mainstreaming the curriculum (or parts of the curriculum) into existing HEIs and explore other alternate platforms
- **Consortium:** To bring together a group of UCL colleagues from different disciplines who could contribute to the curriculum and the teaching. To consider colleagues from other UK universities who might also participate.

Workshop attendees

Prof Caren Levy

Professor of Transformative Urban Planning
The Bartlett Development Planning Unit, UCL

Prof Julio D Davila

Professor of Urban Policy and International Development
The Bartlett Development Planning Unit, UCL

Prof Tiziana Rossetto

Professor of Earthquake Engineering
Department of Civil, Environment and Geomatic Engineering, UCL

Dr Carla Washbourne

Associate Professor in Environmental Science and Policy
Department of Science, Technology, Engineering and Public Policy, UCL

Dr Carina Fearnley

Associate Professor in Science and Technology Studies
Department of Science and Technology Studies, UCL

Dr Kaori Kitagawa

Associate Professor in Education
Department of Education, Practice and Society, Institute of Education, UCL

Dr Abdul-Majeed Mahamadu

Associate Professor of Innovative and Industrialised Construction
The Bartlett School of Sustainable Construction, UCL

Dr Emmanuel Ostuye

Lecturer in Urbanisation and Sustainable Development
The Bartlett Development Planning Unit, UCL

Dr Yasemin Didem Aktas

Lecturer in Applied Materials and Structures
Department of Civil, Environment and Geomatic Engineering, UCL

Dr Eytayo Ademola Opabola

Senior Research Fellow in Resilience Engineering
Department of Civil, Environment and Geomatic Engineering, UCL

Prof Cassidy Johnson

Professor of Urbanism and Disaster Risk Reduction
The Bartlett Development Planning Unit, UCL

Felipe Rivere Jofre

PhD Scholar
Department of Civil, Environment and Geomatic Engineering, UCL

Nihal Ranjit

Senior Associate
School of Environment and Sustainability, IIHS

Dr Amir Bashir Bazaz (online)

Associate Dean
School of Environment and Sustainability and School of Infrastructure and Systems, IIHS

Vineetha Nalla (online)

Senior Associate
School of Environment and Sustainability, IIHS

Gargi Sen (online)

Consultant
School of Systems and Infrastructure, IIHS

Workshop agenda

26 June 2023

Workshop chair: Prof Cassidy Johnson

XG01 Keeton Room, Faculty of Laws, Bentham
House, 4-8 Endsleigh Gardens, London, WC1H
0EG, University College London

12:00 - 13:00	Lunch
13:00 - 13:30	Introductions
13:30-14:00	Short presentation of the curriculum
14:00-15:00	Open discussion and feedback on the curriculum
15:00-15:20	Break
15:20-16:00	Open discussion on avenues for delivery and next steps
16:00	Workshop Close

Discussion Summaries

Introduction and setting the agenda:

Prof Cassidy Johnson welcomed the participants and introduced the research project and workshop on “Higher Education, Urban Resilience and Infrastructure: How do we reimagine curriculum, content and delivery?” After a round of introductions, Prof Johnson presented the findings from Phase 1 of the research.

The following findings from Phase 1 of the project were highlighted:

- Urban resilience in HEIs in India is currently being taught on a spectrum between ‘disaster resilience’ on one end and ‘infrastructure planning and design’ on the other.
- The context of urban is not uniformly taught.
- The focus in most HEIs thus far has been on imparting technical knowledge over socio-economic aspects.
- Lack of a strong practice or place-based learning component in existing programmes, thereby leading to a myopic view of the urban infrastructure challenge.
- Faculty at HEIs however, recognize the need for interdisciplinary teaching and learning.
- Early to mid-career faculty are gradually becoming more receptive to the idea of interdisciplinary teaching and learning.
- There is a recognition of the need to focus on understanding the ‘problem’ better than proposing ‘solutions.’

Dr Bazaz pointed out that one of the major goals of the collaboration between UK and Indian HEIs is to leverage expertise in the UK in disaster risk reduction to capacitate professionals and practitioners in India to work in the DRI field.

Following this, Prof Johnson briefly presented the baseline curriculum. She noted that the baseline curriculum in its current form, can be divided into four broad parts. The first part focuses on questions of urbanisation and disaster-resilient infrastructure (DRI); the second part focuses on understanding various facets of governance of DRI; the third part focuses on unpacking various mechanisms to finance DRI; and finally, the last part is a set of case studies that focus on specific infrastructure systems.

Session 1: Open discussion and feedback on curriculum

- Reflecting on the course curriculum that was circulated prior to the workshop, Prof Levy stressed the need to forefront and highlight questions of equity, diversity and justice, as conventional engineering and planning courses do not delve into these in detail. She pointed out that more often than not, planners and engineers tend to focus less on the impacts of infrastructure than on the urban residents themselves and therefore there is a need to ‘see people’ as the central object of investigation. This includes considerations of gender, class, caste, age, religion, disability, and more, and to explore how ‘place’ impacts these considerations, especially in cities. This, she noted should be well integrated into sessions 1-6.
- Prof Levy also noted that the sessions on governance can be more nuanced and can include topics such as community participation, co-production, and participatory decision-making across scales in the context of DRI to be included in the governance sessions.
- Prof Rossetto, in her intervention, discussed the potential of curating case studies in a manner that they cover a wide range of concepts discussed in the earlier parts of the curriculum (e.g., equity, diversity, governance and finance).
- Responding to Dr Aktas’ question on whether the curriculum can be transferable across different contexts, Prof Johnson noted that the curriculum has been developed in such a manner that sessions 1-6 focus on concepts, while sessions 7 onwards discuss case studies which could be from different contexts. This, Dr Bazaz, noted also fits well with the mandate of CDRI, wherein they wanted a curriculum that can be taught across their member countries.
- Dr Osuteye, in his reflections, suggested four things:
 - To limit the focus of urban to session 2, while keeping the focus of session 1 on concepts of risk, vulnerability, resilience etc.
 - In the session on financing, explore innovative financial mechanisms/alternatives and also the role of the private sector.
 - Sessions 4 and 5 on governance can potentially use deficits and failures as a starting point to discuss governance issues rather than policy and national/international frameworks. Echoing Prof Levy’s points, he noted that questions of inclusion/exclusion, equity, justice and participation can be covered in these sessions.
 - The title of the case study sessions could perhaps be edited to ‘Pathways to a solution space’ in order to make it more provocative and less prescriptive.
- Dr Fearnley echoes Dr Ostuye’s and Prof Levy’s point on forefronting themes of intersectionality, equity and justice. She noted that governance sessions can discuss co-production and participation (both bottom-up and top-down approaches). On pedagogy, Dr Fearnley suggested the possibility of employing a case study-led approach, wherein there exists a central case study chosen by each student that runs through the sessions that students must hang everything onto. This will form the basis of the assessment and has smaller supplementary case studies for specific topics.
- Dr Kitagawa noted that adapting a curriculum to different contexts does run the risk of missing out on nuances in a particular context. She also noted that this ongoing collaboration between UK and Indian HEIs is also an opportunity for UCL to reflect on questions of decolonisation of curriculums.

- Following on Dr Fearnley's suggestion of adopting a case study-led approach to teaching, Dr Aktas noted that the case study sessions are still sector-specific and thereby lend limited possibilities for exploring interconnections and interdependencies between different infrastructure systems. She noted that a potential workaround for this would be to curate case studies that are event specific. In addition to allowing for a more nuanced understanding of the interconnected nature of infrastructure systems, event-based case studies can also help understand cascading and compounding risks.
- Prof Davila stressed on the importance of including themes related to the urban economy and the interconnectedness between economy and infrastructure. He further noted that architects and engineers often have a limited understanding of (i) how systems in cities work, in particular the aspects of decision-making, and (ii) the notion of space and how the spatial dimension is involved in how cities operate. He also pointed out that discussions around planning systems and informality should be included in the curriculum which could potentially help learners navigate rigid planning systems in urban areas. He also cautioned that the curriculum in its current form (particularly sessions 1-6) is quite exhaustive and it should be tailored in a manner that it does not overwhelm learners, and echoed the point that a case study-led approach could be a potential way of navigating this. Prof Johnson also highlighted the potential of using films and other audio-visual content in addition to case studies to further deepen the understanding of the concepts in an easy-to-access manner.
- Building on earlier discussion points on equity and inclusivity, Dr Opabola noted that sessions on governance should also cover ideas of inclusive recovery. He agreed with Prof Levy and Dr Aktas' suggestion that case studies should not be limited to specific infrastructure systems and instead should focus on untangling nexus issues.
- Dr Opabola noted that material from UCL's EEFIT field missions can contribute to building out case studies. He also suggested that an Indonesian disaster might be a very good case.
- Adding to this, Dr Mahamadu suggested that further bilateral discussions can be held with faculty leading the MSc in Infrastructure Investment and Finance to build out the session on financing. He also discussed the importance of including aspects of project delivery in the curriculum and argued that the majority of the failure in infrastructure services can be traced to the project delivery phase.
- Dr Washbourne offered a few operational suggestions: In the first sessions, we should cover "What is infrastructure? Who it is for? Who should it be for?". She also suggested that for the governance sessions, they could be less focused on what exists and more focused on what does not exist, and how things are maintained. She added that we need to question, are we seeking for them to be literate in this subject, to pique their curiosity, or for them to be operationally competent. Adding to this, Dr Rossetto highlighted the need to include systems thinking within the core modules of the curriculum as it lies at the heart of questions of cascading risks and interdependencies. Prof Levy suggested that Ben Elton's [Great Railway Disaster](#) to show how transport systems in the UK are collapsing due to privatisation - interconnectedness Channel 4.
- Building on previous discussions of case studies, Prof Levy outlined the possibility of designing them to be hazard-based. Dr Aktas noted that case studies could also explore how governance mechanisms change as a disaster event progresses.

Session 2: Avenues for delivery and next steps

During the second session, the question of how to deliver the curriculum was addressed.

- Dr Bazaz mentioned that CDRI has established the IRAX network, Infrastructure REsilience Academic Exchange and this is an umbrella organisation to facilitate teaching on the topic.
- Prof Johnson noted that since it is not possible to jointly award degrees with IIHS, there was a need to explore other avenues to deliver the curriculum.
- The curriculum can be delivered as an elective in the Urban Fellows Programme (UFP) at IIHS.
- Prof Rossetto highlighted the possibility of replicating the international internship and semester abroad course that the Institute of Education at UCL is running in collaboration with the Indonesian government. Apart from this, she noted that CEGE runs a Master's in Earthquake Engineering and Disaster Management, and is a potential avenue to teach this. The curriculum can also be incorporated into the new MSc on Infrastructure Systems.
- Prof. Davila is teaching courses on infrastructure and transport at DPU. He can contribute to this endeavour with his experiences of teaching.
- Dr Washbourne, co-leads MPP on infrastructure on public policy
- Dr Mahamadu, MSc in Infrastructure Investment and Finance
- Prof Levy highlighted the importance of being realistic about current commitments and workload, suggesting starting small can be more beneficial to all. She suggested developing a module or workshop that could be delivered across the different current MSc programmes addressing DRI in UCL, led by a consortium of academics. For example, DPU has 7 different masters programmes and some share a few modules. However, at some point, all students are brought together in a scenario. Alternatively, Prof Levy proposed the idea of small modules on DRI that can be incorporated into and replicated across the current MSc programmes.
- Dr Kitawaga mentioned the alternative of Continuing Professional Development (CPD) courses, which target a professional audience and are also popular with Non-Governmental Organisations.
- Prof Levy mentioned that creating a new masters programme would be difficult as it must have a formal home, which makes interdepartmental delivery more complicated.
- Dr Osuteye asked about the timeline for delivery. Prof Johnson mentioned that the current grant finishes in August 2023, so the aim is to deliver during 2024
- Dr Washbourne mentioned that at STEaPP there is a fresh two-person CPD team working specifically in developing courses, so there is a chance to talk with them and have their input in how to deliver this course.
- Different connections of the workshop participants were mentioned as potential partners for advertising and delivery of the course. Dr Fearnley mentioned the connections at STS with the Red Cross and Manchester's Chief Resilience Officer. Prof Levy mentioned United Cities

and Local Governments (UCLG) and the Rockefeller Foundation, which is starting a new resilience programme. Also, Dr Aktas mentioned CEGE's Prof Francesca Medda who has been collaborating with resilience and disaster groups within and outside the department.

- Regarding Dr Bazaz's question about delivering training for academic staff, Prof Levy mentioned there are professional development programmes but are usually not in subject-specific areas, but instead on more general issues such as management of research or teaching. The proposed DRI course is more aligned with CPDs.
- Prof. Levy mentioned the "roof over our heads" campaign, led by Sheela Patel. Community-led, resilient options for housing in cities.
- Prof. Levy mentioned the PIDG - Private Investment Infrastructure Development Group, could be somewhere to explore, and CLIFF (Community-led Infrastructure Finance Facility).
- Dr Opabola offered the content and case studies developed in the context of his and his group's research regarding risk-informed decision making and the use of simulations to explore the potential outcomes of policies, and conducting stakeholder engagement to assess these results.
- Dr Osuteye mentioned the initiative '[Race and Space](#)' developed at DPU). A curriculum in race and space was published in 2020, and although it has not been carried forward as a course or graduate programme, it became a valuable open online resource, which can also be referred to. The curriculum on DRI could be published in this fashion.
- Prof Johnson also mentioned that UCL IRDR (Institute for Risk and Disaster Reduction) has a big and engaged network of people who take Professional Development short-courses (like one day), and perhaps the DRI course could be taught through them.
- Dr Aktas thought that it would be useful to see which organisations would want training for their staff? NGOs, governments, private sector organisations and that this would be a good option for starting out with teaching.
- Finally, Mr Ranjit commented on the possibility of delivering the course through IIHS. The idea is to offer the course to CDRI's partners and to the India consortium of architecture, planning, and social sciences schools (IRAX). This would be done by delivering modules or sessions within their existing programmes, like in the Urban Fellows programme.. Advanced Urban Fellowship programme would be one opportunity, these are for working professionals to come in for a short period of time. We could also develop this as new CPDs. Could collaborate on new modules with folks from other universities to incorporate this into their curriculums.
- We think core competencies should be included in the curriculum as it will be easier to be picked up by different groups.

Regarding next steps, Prof Johnson mentioned that further funding is needed to move forwards. There is funding available through USAID, in partnership with an institution in the US, to develop and deliver the DRI curriculum as a MOOC, which is an alternative to be explored.

In summary, there are four possible avenues for delivery on the UCL side, some of which will include partnering with IIHS and Indian consortium partners (see also Appendices with summary of programmes, courses, and avenues for delivery):

- Holding a workshop (1-day or residential) for existing UCL students at graduate or undergraduate levels. This could garner inputs from UCL staff across disciplines.
- Adding the curriculum to existing or new MSc programmes in UCL, either through adding a new module or integrating content into existing modules. Could be taught by the module tutor, and/or with guest lecturers/presenters from across the university.
- Doing a short-course/masterclass/CPD and delivering through UCL departments. These also count as professional development credit courses for some organisations (like ICE and other accreditation bodies). This could draw on existing networks of learners to establish the clientele, such as the UNESCO Chair seminars, IRDR professional networks, DPU alumni, EPICentre members, EEFIT members, etc. We could reach out to ICE, Royal Academy of Engineers, Association of Project Management.
- We could seek out organisations who might be interested in DRI training, and we can design a bespoke course/curriculum for them. This could be face-to-face, online (MOOC) or hybrid. It could be paid for directly by the organisation, or financed indirectly from a donor.
- We could seek other outlets for the curriculum, like the Race and Space publication, instead of actually teaching anything.

Appendices

UCL Masters' programmes mentioned in the workshop

Programme / Department	Programme lead/contact
MSc in Earthquake Engineering and Disaster Management <i>Civil, environmental & geomatic engineering</i> CEGE	Dr Fabio Freddi f.freddi@ucl.ac.uk
MSc in Infrastructure Systems <i>Civil, environmental & geomatic engineering</i> CEGE	Prof Liz Varga l.varga@ucl.ac.uk
MPA in Climate, Innovation and Sustainability Policy <i>Science, technology, engineering & public policy</i> STeAPP	Dr Carla Washbourne c.washbourne@ucl.ac.uk
MSc in Infrastructure Investment and Finance <i>The Bartlett School of Sustainable Construction</i>	Dr Yiming Wang yiming.wang@ucl.ac.uk
MSc in Building and Urban Design in Development <i>The Bartlett Development Planning Unit DPU</i>	Dr Giovanna Astolfo giovanna.astolfo.13@ucl.ac.uk
MSc in Environment and Sustainable Development <i>The Bartlett Development Planning Unit DPU</i>	Dr Pascale Hofmann p.hofmann@ucl.ac.uk
MSc in Urban Development Planning <i>The Bartlett Development Planning Unit DPU</i>	Dr Jordana Ramalho j.ramalho@ucl.ac.uk

UCL taught modules mentioned in the workshop

BARC0019: Spatial Justice

Prof Laura Vaughan
The Bartlett School of Architecture

DEVP0014: Industrialisation and Infrastructure

Prof Julio Davila
DPU

EDPS0245: Reimagining disaster education: perspectives and methodologies

Dr Kaori Kitagawa
Education, Practice and Society (IOE)

HPSC0011: STS Perspectives on Big Problems

Dr Carina Fearnley
Science and Technology Studies

List of connections to follow up for CPD

UCL STEaPP CPD team

Dr Carla Washbourne
c.washbourne@ucl.ac.uk

UCL IRDR

Prof Cassidy Johnson
cassidy.johnson@ucl.ac.uk

Red Cross
Manchester Chief Resilience Officer

Dr Carina Fearnley
c.fearnley@ucl.ac.uk

United Cities and Local Governments
Rockefeller Foundation
'Roof over our heads' campaign, led by Sheela Patel
PIDG (Private Investment Infrastructure Development Group)
CLIFF (Community-led Infrastructure Finance Facility)

Prof Caren Levy
c.fearnley@ucl.ac.uk

IIHS' Infrastructure REsilience Academic Exchange IRAX network

Mr Nihal Ranjit
nranjit@ihs.ac.in

List of potentially interested professional bodies to follow up with

The Institution of Structural Engineers IStructE
The Earthquake Engineering Field Investigation
Team EEFIT (part of IStructE)
Institution of Civil Engineers ICE
Royal Academy of Engineering RAEng
Chartered Institution of Water and Environmen-
tal Management CIWEM
Royal Town Planning Institute RTPI
Association of Project Management