Generating a Systems Thinking Process Framework for Equitable and Sustainable One Health

Guildford, UK.

4 April 2025

Internal Workshop Report

One Health aspires to sustainably balance and optimize the health of people, animals, plants, and ecosystems. It has been used successfully to strengthen communication and collaboration between the animal health and human health sectors in addressing zoonotic diseases and other health challenges at the human-animal interface. However, to effectively address the complexities inherent in many of these challenges, there is a need to evolve and expand the scope and methodologies of One Health.[1]

With the support of the Institute for Advanced Studies and the Institute for Sustainability at the University of Surrey, we convened a one-day workshop, *Generating a Systems Thinking Process Framework for Equitable and Sustainable One Health*.[2] The objective of the workshop was to forward action on building systems thinking as well as qualitative social science and participatory methods into applied One Health contexts. The workshop was based on and aimed to progress the continuing activities of our cross-disciplinary consortium,[3] and was co-convened by Liz Mumford and Gianni Lo Iacono from the Department of Comparative Biomedical Sciences in the School of Veterinary Medicine.

Box 1: Participants' Institutions

- Animal & Plant Health Agency, UK
- Bangor University, UK
- Cambridge Conservation Initiative, UK
- Ifakara Health Institute, Tanzania
- Indiana University, USA
- Institute for Development Studies, UK
- Johns Hopkins Bloomberg School of Public Health, USA
- Mujika ltd., UK
- One Health Bangladesh, Bangladesh
- Royal Veterinary College, UK
- The Royal Botanic Gardens, Kew, UK
- University of Cambridge, UK
- University of Glasgow, UK
- University of Liège, BE
- University of Surrey, UK
- University of Sussex, UK
- University of Washington, USA
- United States Geological Survey, USA

The 39 participants comprised members of the existing consortium and new colleagues. Participants were from institutions in Bangladesh (1), Belgium (1), the USA (4), Tanzania (1) and the UK (33) (Box 1). Nine participated online. Expertise,

[1] Mumford EL, Martinez DJ, Tyance-Hassell K, Cook A, Hansen GR, Labonté R, Mazet JAK, Mumford EC, Rizzo DM, Togami E, Vreedzaam A and Parrish-Sprowl J (2023) Evolution and expansion of the One Health approach to promote sustainable and resilient health and well-being: A call to action. doi: 10.3389/fpubh.2022.1056459

[2] https://www.ias.surrey.ac.uk/event/generating-a-systems-thinking-process-framework-for-equitable-and-sustainable-one-health/

[3] https://openresearch.surrey.ac.uk/esploro/project/research/Enhancing-One-Health-Through-Systems-Thinking/12834656450002346?institution=44SUR_INST

perspectives, and experience of the participants spanned diverse sectors and disciplines and a broad scope of topics and methodologies across the natural and social sciences. Many individual participants were experienced in multiple disciplines and in working interdisciplinarily in a variety of contexts (Figure 1).

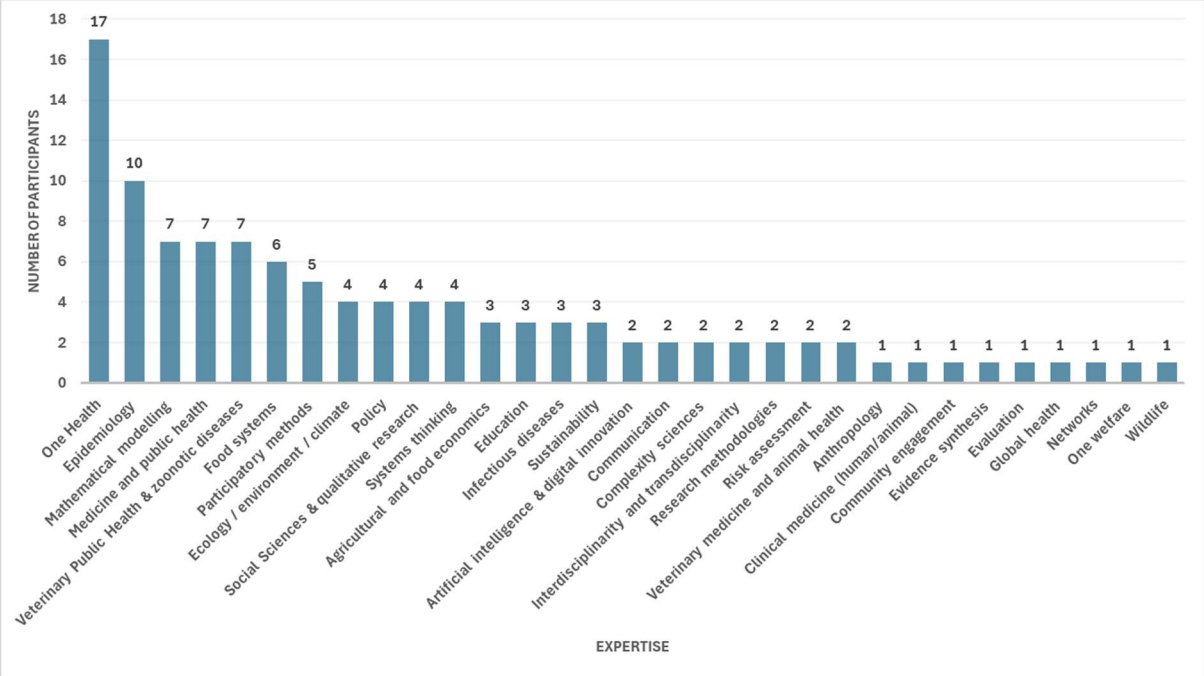


Figure 1: Topic and methodological expertise of workshop participants. Many participants had multiple areas of expertise.

The workshop was opened by Monique Raats, co-director of the Institute for Sustainability, who welcomed participants and described the Institute's goals and activities in research, education, and training. A round of introductions, facilitated by the photos and bios included in the Workshop Brochure, was followed by an overview from Liz Mumford describing what the workshop was trying to achieve and how we aimed to get there. To lay the groundwork and provide a baseline of knowledge and understanding for participants coming from diverse disciplines, James Wood reviewed the history and principles of One Health and Alex Penn reviewed the principles of systems thinking and complexity, emphasizing that One Health systems tend to be complex. Liz then proposed some challenges in the application of One Health in complex socioeconomic contexts and the potential opportunities offered by systems thinking and other methods which address complexity, but which are not routinely applied in One Health contexts. The consortium's work to date and discussion of the draft 'Schema,' our proposed operational process framework to support integrating

The workshop programme and short biographies of the invited participants are available in the Workshop Brochure, here: www.ias.surrey.ac.uk/wp-content/uploads/2025/01/Workshop-Brochure-One-Health-

systems thinking and complexity into One Health research, field work, and programmatic work, was provided.

The second half of the morning was dedicated to a series of short talks, listed below. These aimed to provide participants with an overview of selected frameworks, methods, tools, and approaches currently being applied in health contexts.

- Epidemiological outbreak approach (Joaquin Prada)
- Developmental evaluation (Nai Rui Chng)
- Potential methods for evaluating complex public health system level interventions (Jane Noyes)
- Participatory research and community knowledge in epidemics and pandemics (Catherine Grant)
- Participatory systems mapping and actionable complexity (Alex Penn)
- Steering the dynamics of complex networks (Sotiris Moschoyiannis)
- Qual-quant integration: modelling disease dynamics (Olivier Restif & Gianni Lo Iacono)
- Community engagement: Making the university relevant (Dominic Mahon)

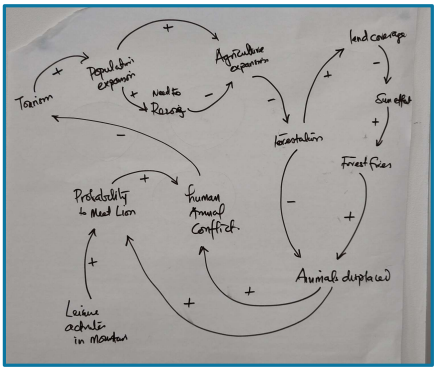
The talks provoked discussion about not only the methods themselves, but also the challenges and opportunities they provided. Themes (Box 2) began to emerge, which re-surfaced throughout the rest of the day's discussion.

Box 2: Themes emerging during the workshop

- Defining complex systems and systems boundaries
- Framing and approaching complex systems conversations
- Capturing nuance across knowledges and epistemologies
- Balancing benefits
- Accounting for change
- Constraints in research environments

In the afternoon, the participants were divided into three breakout groups, roughly balanced so that each group included one or more participants with expertise in mathematical modelling, systems thinking, participatory approaches, and epidemiology. The online participants joined one of the three groups together. Each group worked with a different complex system scenario created specifically for the workshop. The scenarios each described a system which included diverse communities of people, wild and domestic animal populations, changing ecosystems, and economic, social, and policy challenges which impacted health, welfare, wellbeing, and livelihoods. Each system had the potential for or were already developing into conflicts among stakeholders.

The groups, facilitated by Alex Penn, Catherine Grant, and Liz Mumford, were tasked with working through the steps of the draft Schema based on their specific scenario. For each step, the groups identified necessary characteristics and criteria (such as aspects of scope or outcome) for a potential method to be applied at that step, as well as other needs, challenges and considerations for working through that step. It was not necessary to name specific method(s) for the step, only to identify the characteristics of an appropriate method. A matrix of the steps and the information to be identified for each step was provided to support the work.



Group work was followed by a plenary discussion of the groups' findings and perspectives on the challenges faced by the groups during the task.

Discussion, themes, and outcomes

The workshop inspired rich discussion about the challenges and opportunities in applying systems thinking in One Health contexts. Overall, participants agreed in principle that applying and integrating complexity science and systems thinking methodologies, including social science and participatory approaches, with the mainstream epidemiological and computational modelling approaches currently applied in One Health contexts, would help to balance diverse health and wellbeing objectives, interventions, and impacts across multi-scalar systems stakeholders, including impacted communities.

The interconnected themes that had begun to emerge during morning discussions (Box 2) continued to recur and evolve in different contexts throughout the day. Participants recognized that the themes were not new but rather were common in complexity contexts and systems conversations. It was clear to participants that there were not necessarily 'solutions' to the challenges raised within these themes, but recognition and consideration of the challenges was nonetheless important, especially when bringing systems thinking to new stakeholders.

The six main themes were:

Defining complex systems and systems boundaries

As boundaries are drawn further out, additional connected variables are captured into the system, increasing complexity and requiring a different level of analysis for the system to be understood.

Framing and approaching complex systems conversations

When and whether a ‘problem/solution’ mindset is appropriate to addressing a complex system.

Capturing nuance across knowledges and epistemologies

How to appropriately consider different types of information, including qualitative and quantitative data, lived experience, policy, values, etc. without losing the nuance of qualitative data and existing pluralities.

Balancing benefits and recognizing positionality and bias

The impact of personal and professional positionality and bias was identified in multiple contexts, including in any initial intention to problem solve and in how solution options were framed.

Accounting for change

Much conversation during the workshop reflected the challenges in capturing potential change (including historical influences), how to account for potential change when considering systems, and how to manage inevitable transitions.

Constraints in research environments

Conversations recognized the pervasive backdrop of disciplinarity, including in research infrastructure and funding priorities, even when funding agencies wish to support interdisciplinary research.

In addition to these six themes, some practical challenges were identified during plenary discussions. Some are common in interdisciplinary contexts, such as the importance of clarity in using terminology that might convey different meanings in common usage and in usage within different disciplines.

Practical considerations for further development of the draft Schema to best guide and support the systematic application of

systems thinking and participatory methods in One Health contexts included whether the Schema should be presented as a *de novo* operational process or be constituted from existing frameworks and methodologies. There was recognition of the overlaying objective of generating 'conscious systems thinkers' by building understanding of the foundational principles of complexity and systems thinking in parallel with the implementation of approaches, and how that could be facilitated through application of the Schema.

Next steps

The participants agreed that, given the richness of thinking that had been achieved since the consortium began to explore the role of systems thinking in One Health in 2022, it was time for concrete action. The following next steps were proposed:

- Co-develop a positioning paper to formally lay out these ideas
- Focus on testing the application of principles in diverse field contexts
- Submission of additional bids for necessary research

Acknowledgements

Enormous thanks to all the participants who gave generously of their time and contributed thoughtful and thought provoking - and sometimes challenging – ideas and perspectives.

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