
The Role of Systems Thinking in the Practice of Implementing Sustainable Development Goals

Martin Reynolds, Christine Blackmore, Ray Ison, Rupesh Shah
and Elaine Wedlock

Abstract

Implementing the sustainable development goals (SDGs) adopted at the UN Summit in September 2015 specifically invites the creation of “an integrated, holistic, multi-stakeholder approach”. This implies the need for systems thinking in practice, a tradition that draws on systems theories, tools and techniques able to facilitate better conversation and cooperation between agencies. As an approach it goes beyond development of competencies through formal education programmes. This paper focuses on SDG 17—the means of implementation—and the role of systems thinking in practice for supporting both competence and SDG implementation capability. Two inter-linked initiatives led by systems thinking practitioners in the field of sustainability science are reported; one is an action research inquiry exploring the praxis (theory-informed-action) challenges of applying systems thinking in practice in contemporary workplaces ranging from in-field development projects to government administrations and business ventures, and another which built on the findings from this inquiry—a proposal for developing an action-learning platform for SDG implementation. Experience suggests that implementing SDGs requires not only competence in systems

M. Reynolds (✉) · C. Blackmore · R. Ison · R. Shah · E. Wedlock

Applied Systems Thinking in Practice (ASTiP) Group, School of Engineering and Innovation,
Faculty of Science, Technology, Engineering and Mathematics (STEM), The Open University,
Walton Hall, Milton Keynes MK7 6AA, UK

e-mail: martin.reynolds@open.ac.uk

R. Ison

Centre for Policy Development, Sydney, Australia

R. Ison

Institute for Sustainable Futures, University of Technology Australia, Sydney, Australia

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thinking but a capability of putting systems thinking into practice in a dynamic way, as praxis. The proposed action-learning platform can also be regarded as a learning laboratory in the sense that it will offer learning support and a chance to collaborate and experiment. This platform aims to be co-designed with multi-agency practitioners from international development, government planning, business/social enterprise and NGOs. The proposed platform draws on open-source resources, and ideas of social learning, developmental evaluation and systems thinking in practice traditions.

Keywords

Competency framework · Capability approach · Developmental evaluation · Integration · Learning laboratory · Praxis · Sustainable development goals · Systemic sensibility · Systems thinking · Systems thinking in practice

1 Introduction

Well before the launch of the (2015–2030) sustainable development goals (SDGs) at the UN Summit in September 2015 there have been concerted international efforts towards establishing sustainability science in higher education institutions as a means of nurturing requisite competency in managing sustainability (cf. Kajikawa 2008; Lang et al. 2012; Yarime et al. 2012). A core focus in these endeavours has been transitioning sustainability science from an interdisciplinary pursuit—speaking to and integrating with other relevant academic disciplines—to a transdisciplinary pursuit—enabling active collaboration with stakeholders comprising wider civil society. Agreement on the 17 goals and 169 targets at the UN, now focusses attention on the implementation of the Goals. Goal 17 specifically addresses the challenge of implementation. The key word for effective implementation is *integration*—developing the capacity for reaching beyond the silo-thinking and fragmented practices that arguably impoverished progress in implementing the preceding (2000–2015) millennium development goals (MDGs). ‘Integration’ is a slippery concept; some call for ‘a systems view’ in the better supporting implementation of SDGs and strengthening sustainability science (Le Blanc 2015; Oldekop et al. 2016; Stafford-Smith et al. 2016; Abson et al. 2017). Moreover, the need for a system’s thinking competency in the context of Higher Education for Sustainable Development (HESD) has been established though variously expressed (Barth et al. 2016).¹ But what is the nature of a systems view and how might it

¹For particular references see for example the following chapters: Chapter 2, Learning for Walking the Change: Eco-Social Innovation through Sustainability-oriented Higher Education Arjen E. J. Wals, Valentina C. Tassone, Gary P. Hampson and Jonathan Reams; Chapter 6. Understanding Approaches to ESD Research on Teaching and Learning in Higher Education Stephen Sterling, Paul Warwick and Lynne Wyness; Chapter 16, Operationalising Competencies in Higher

grapple with the messy task of actually implementing SDGs? How might systems thinking *in practice* be mobilised for supporting SDGs?

Systems thinking and systems thinking in practice (STiP)² pedagogy in relation to sustainable development has a long tradition at The Open University (UK), beginning with programmes of undergraduate systems education in the 1970s (Blackmore and Ison 1995). More recently in relation to the postgraduate programme in systems thinking in practice (STiP), the relationship and relevance of STiP to sustainability science have been highlighted (Blackmore et al. 2014, 2015). The focus of this paper is not so much on issues of competency generated through *learning* about systems thinking in practice, but rather the wider real-world issues of capability—*enacting* the learning. Whereas ‘competency’ refers more to acquiring a literacy about practice, the notion of ‘capability’ is used here with reference to ideas of praxis (theory-informed-action)—applying competencies to particular situations. Praxis captures the actual experiences of mature-age part-time students having undertaken core modules of the OU STiP programme and encountering the challenges of enacting STiP with stakeholders from different organisational backgrounds.

The paper first summarises the context of core competences associated with the postgraduate STiP programme, before going on to describe an action research project involving OU STiP alumni and employers which aimed to track the problems associated with applying STiP in the workplace. Two strands of work-in-progress emerging from this project are then briefly summarised in relation to challenges of implementing SDGs. One strand focuses on competency, and the need for developing some variant of a competency framework for STiP practitioners and their employers, in order to have some mutual benchmark reference as a move towards more institutionalised professional recognition of STiP. Having wider professional recognition of STiP can enhance the relevance of STiP for SDG implementation, and can make it possible for improved investment towards promoting STiP capabilities. A second strand focuses on capability, and specifically on moves towards piloting new platforms of pedagogic design and engagement. The term ‘platforms’ is used here to refer to an interactive space, either physical, virtual or both, that would enhance the conversations to be had between STiP practitioners and workplace colleagues in order to enhance the concerted action, especially in SDG-enactment-related contexts. Such platforms might be referred to as ‘learning’ or ‘systemic innovation’ laboratories. The preliminary contours of this second strand of development—nurturing a platform of action learning—are outlined, as praxis support is needed for those engaging on the front line of implementing SDGs.

Education for Sustainable Development Arnim Wiek, Michael J. Bernstein, Rider Foley, Matthew Cohen, Nigel Forrest, Christopher Kuzdas, Braden Kay and Lauren Withycombe Keeler; and Chapter 17, Individual Change: Researching Educational Outcomes Achieved by Higher Education for Sustainable Development Kerry Shephard.

²STiP is the namesake of a Postgraduate suite of qualifications (Certificate, Diploma, and Masters) offered to part-time students at the UK-based Open University. The acronym as used in this manuscript refers to both the postgraduate programme and the wider praxis notion of systems thinking.

2 Systems Thinking ‘Competency’ for Sustainability

There is a compelling and intuitive notion that children generally have good systemic sensibilities. Through their early year’s education and/or perhaps more inherently, children are able to appreciate the interconnectedness of all things. Children are generally competent in asking purposeful questions—“why?”... and “why?”, “but why?”—and so on, at successive levels of recursion and open-ended inquiry. The notion is disturbing when we consider how often such inquiries are met with irritation from adults. It is even more disturbing when considering how mainstream post-early years education actively diminishes such competences through rigidly dividing up curricula into disciplines, coupled with a focus on summative assessments to test retention of bits of knowledge at the expense of providing space for open inquiry and conversation. Education for sustainability might be ideally seen as a means of readjusting the emphasis towards fostering systemic sensibilities.

Ray Ison uses the idea of systemic sensibilities as a baseline transition point for envisioning the role of a ‘systems thinking in practice’ curriculum for enabling a better response to the sustainability challenges of the Anthropocene (Ison and Shelley 2016). Ison and Shelly make a useful distinction between systemic sensibility, systems literacy, and systems thinking in practice capability; regarding STiP capability as a sub-system of systems literacy, which itself is a sub-system of systemic sensibility. In commenting on the challenge of retrieving and building on systemic sensibilities, Ison and Shelly state:

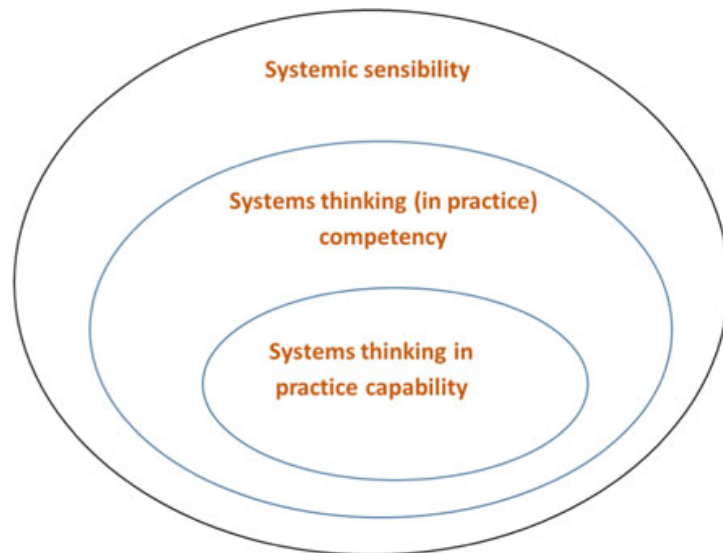
What is missing ... are the contexts for a systemic sensibility to flourish, to be recovered and/or fostered. Investment in systems literacy and then systems thinking in practice capability is missing in education as well as organizational life. The shift from sensibility to capability is needed if purposeful action is to be pursued with some prospect of altering the current and anticipated human condition, our co-evolutionary trajectory with the bio-physical world, with other species, and with each other. This is the challenge of ‘Governing the Anthropocene’ which, as a profoundly existential crisis, is also the greatest challenge for systems thinking in practice... (*ibid* p. 589)

Figure 1 is an adaptation of a systems map image of transition from systemic sensibility to systems thinking in practice capability. For the purpose of this paper, the term ‘systems literacy’ is substituted with ‘systems thinking (in practice) competency’.

Formal curricula in higher education institutions (HEIs) have a good record of encouraging a range of different competencies to support sustainable development (Leal Filho 2011; Disterheft et al. 2013; Barth et al. 2016), including a range of interdisciplinary and transdisciplinary skills. Competencies associated with systems thinking are particularly relevant to education for sustainability (Sterling 2004; Martin et al. 2005; Stibbe 2009).

STiP competency might be summarised in terms of fulfilling three key activities (Reynolds and Holwell 2010; Reynolds 2011, 2013, 2014):

Fig. 1 The nested (systemic) relationship between systemic sensibility, systems thinking (in practice) competency (or systems literacy) and systems thinking in practice capability. *Source* Adapted from Ison and Shelley (2016, Fig. 1, p. 589)



1. Understanding inter-relationships
2. Engaging with multiple perspectives
3. Reflecting on boundary judgements.

Although competency is something that HEIs may teach formally in the curriculum as a means of encouraging praxis, a curriculum in itself cannot guarantee capability of praxis. Hence, Fig. 1 retains parentheses with ‘systems thinking (in practice) competency’. Being competent in appreciating systems thinking in practice is different from being capable of actually applying systems thinking in practice, for example, in particular circumstances of supporting sustainability.

Since 2010, postgraduate STiP studies at the OU have focussed on developing competency skills in systems thinking in practice (Blackmore et al. 2015). Two core 30 credit modules (each requiring 6 months part-time study) are associated with the programme:

- Thinking strategically: system tools for managing change (TU811) and
- Managing systemic change: inquiry, action, and interaction (TU812).³

The following three key features of pedagogy roughly correspond with each of the competencies above, and are shared by the two core STiP modules (Blackmore et al. 2014).

- (i) Epistemic understanding. ‘Systems’ are used as conceptual models, as epistemological devices rather than ontological realities (understanding inter-relationships).
- (ii) Active pedagogy. Students use their learning context in creative combination with tutors and module designers (engaging with multiple perspectives).

³Content details of the two modules (OU codes TU811 and TU812, respectively) can be found on The Open University website <http://www.open.ac.uk/choose/ou/systemsthinking>.

- (iii) Design praxis. Students develop projects using systems concepts in a constructive, reflexive, design-mode manner favouring formative over summative evaluation (reflecting on boundary judgements).

All three features offer pedagogic opportunities and challenges in fostering systems literacy and enhancing systems thinking competence relevant to SDG implementation. So, firstly, appreciating epistemic understanding of ‘systems’ prompts an opportunity of using systems of interest innovatively but remains a major challenge given the prevailing ontological understanding and use of systems as being direct representations of the reality; for example, in reference to ‘ecosystems’, or ‘the’ health system, ‘the’ economic system, and so on. One liberating example of this challenge is in viewing interventions (projects, programmes, policies, etc.) associated with, say, implementing SDGs, as themselves ‘systems of interest’. This is different from, though complementary to, seeing such interventions as serving particular formalised ‘systems’ (as perceived in the real world—for example, the health system or the economic system, etc.).

Secondly, active pedagogy provides the opportunity to actually practice ideas of STiP in the workplace as a learning context thereby bringing out the relevance of teaching material. The traditional divide between learning and practice is challenged in the core modules through carefully orchestrated activities that enable students to engage purposefully with their own contexts of practice—often, though not exclusively, contexts associated with students’ own workplaces. STiP students actively working in areas of SDG implementation, for example, are thus required to grapple with their own particular roles with implementing SDGs using STiP ideas during their studies.

Thirdly, in relation to design praxis, STiP students generally appreciate the opportunity of an end-of-module project assessment where they can develop their own ‘systems of interest’ as a means of either proposing strategic improvements (TU811) or constructing a briefing paper relevant to a systemic change situation (TU812). In viewing and appreciating systems as designed constructs for learning and implementation, there is a deeper appreciation of challenges associated with (i) the provisional nature of ‘systems’ (systems as fallible constructs), (ii) the interchangeable use of systems as both ontological and epistemological devices, and (iii) the overall essential transformative drive of STiP—systems *for* sustainability and systems *for education* as against, for example, ‘sustainable systems’ or ‘education systems’.

Moving from teaching and learning ‘competencies’ towards nurturing ‘capabilities’ requires more attention to the context in which (for example, systems thinking in) practice is actually practiced. For example, enabling an ‘integrated, holistic, multi-stakeholder approach’ towards implementing SDGs (as expressed in SDG 17) requires not just being equipped with tools and ideas from, say, systems thinking traditions, but an awareness of, and an ability to work constructively with, constraints and opportunities presented by institutional and cultural contexts in which practitioners involved with SDG implementation actually work. Ray Ison describes the usefulness of systems thinking in making such transitions in terms of

taking a ‘design turn’: “...ways to improve practice at the same time as striving to transform their contexts of practice through systemic design” (Ison 2016, p. 47). The following section reports briefly on an action research inquiry undertaken by members of the Applied Systems Thinking in Practice group at the OU which explored some of the challenges amongst STiP alumni in making this design turn, challenges that will have to be met in the implementation of SDG 17 in a given context.

3 Systems Thinking in Practice ‘Capability’ for Sustainability

The STiP core modules at the OU attracts students from a wide range of public and private sector professional backgrounds including public health, countryside planning, landscape design, project management, engineering, energy industries, community development, and social work. Students have worked for councils, business, industry, and non-governmental organisations. Academic backgrounds range from information systems to engineering to health and social care to environmental sciences to development studies. There is perhaps an assumption in a postgraduate provision that PG qualified students have the capabilities of applying their PG skills to their workplace. The assumption can sometimes be reinforced at HEIs where PG learners might tend to be mature-age and part-time and considered more adept at transferring competencies into capabilities. From the standpoint of many PG students who are work-based whilst studying, the divide between the two worlds can, however, often be experienced as an ‘either/or’ dualism—*either* they are studying *or* they are working—with there being a clear perceived boundary between the two worlds. For others, the two worlds might more helpfully be experienced as an interactive duality. Here, the learning activities are in continual interaction with workplace activities, where changes emerging in one world inform changes to the other world through a virtuous feedback pathway. Such interactive processes might be regarded as constituting praxis (theory-informed-action, or thinking-in-practice).

Pedagogic models of design and delivery of learning often reinforce a dualism rather than promoting the duality of praxis. Since the first presentation of core modules in 2010, the STiP programme has endeavoured to address this pedagogic dilemma through enabling students to practice their learning through workplace-oriented activities and assessments, and through reflective conversations amongst students sharing experiences of using module materials in their activities and assessments through vibrant student forums. The STiP programme has registered significant success in achieving praxis during core module presentations, but there remain challenges in bridging the divide between STiP study experiences and post-study workplace experiences.

Competencies associated with developing epistemic understandings, encouraging active pedagogy, and promoting design praxis, need translating into capabilities.

Evidence from past students of their experiences of the STiP modules was gathered as part of an 18-month action research inquiry—*Enhancing Systems Thinking in Practice at the Workplace*—initiated by the OU STiP team in 2014 with the active involvement of OU STiP alumni (Reynolds et al. 2016a). The inquiry was funded by eSTEEeM—the OU Centre for promoting STEM (science, technology, engineering, and maths) pedagogy.

The primary aim of the eSTEEeM inquiry was to seek ways of bridging the gap between the largely ‘conceptual’ world of distance teaching and learning at post-graduate level, and the more ‘practical’ world of applying learning experiences in the workplace. In short, the inquiry was aimed towards shifting attention from enhancing levels of *competence* in systems thinking (in practice) to enabling *capability* for systems thinking in practice. The overall approach was to evaluate experiences of students, alumni, OU tutors—Associate Lecturers (ALs)—and employers, all associated with the STiP programme in order to support systems thinking in practice at the workplace (Fig. 2).

The research was carried out using the principle of a co-inquiry platform—researching *with* people rather than *on* people—through a series of structured conversations including interviews, follow-up online discussion and a workshop event. The research was done in three phases involving the appointment of two experienced ALs from the STiP programme (Rupesh Shah and Elaine Wedlock).

Phase 1 semi-structured interviews with (i) existing STiP students and (ii) ALs associated with core modules of the STiP programme. The results of this first phase were used to inform the second phase.

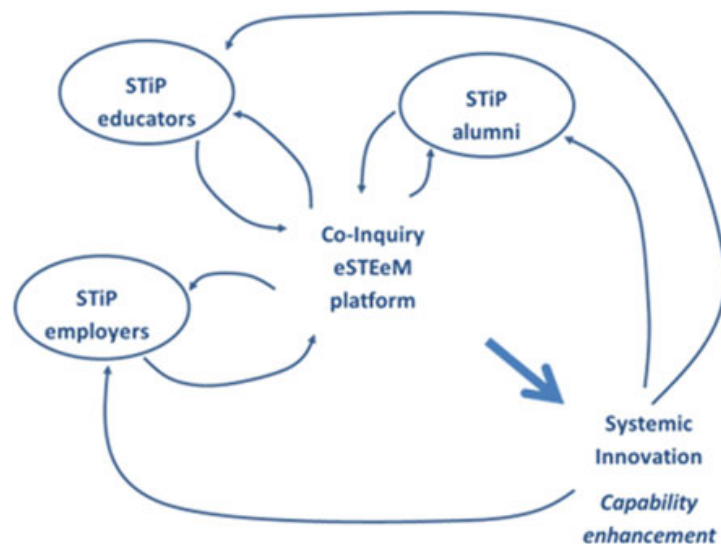


Fig. 2 eSTEEeM—The Open University Centre for promoting science, technology, engineering and maths (STEM) pedagogy—project approach to enhance capacity for systems thinking in practice (STiP) in the workplace. *Source* Reynolds et al. (2016a). © 2016 The Open University

Phase 2 semi-structured interviews involving: 16 interviews conducted by the two AL consultants with STiP alumni active in the OU alumni LinkedIn community and an employer and/or manager they nominated (i.e. eight interviews with alumni and eight interviews with employer-partners of alumni).

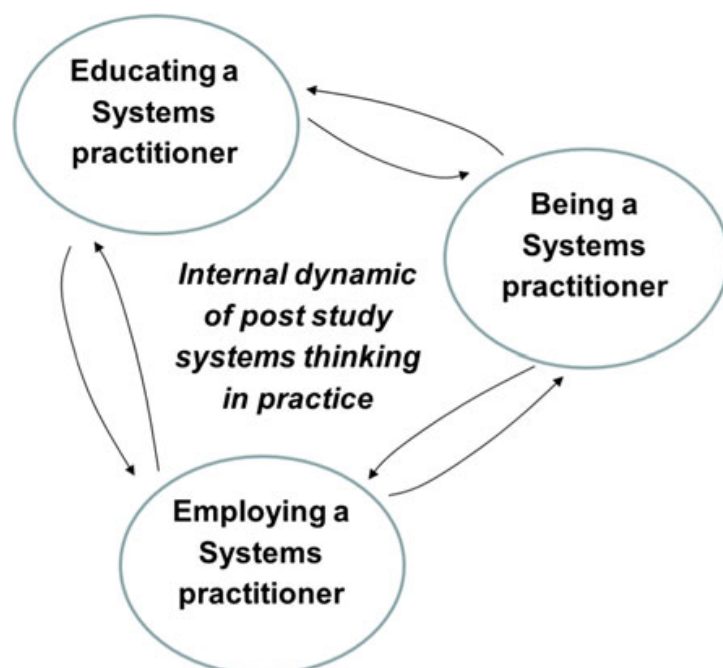
Both phases 1 and 2 involved writing summary reports in order to; (a) feedback to interviewees and elicit further conversation and stakeholding engagement, and (b) provide the basis for a working paper, to be developed as a refereed journal article.

Phase 3 seminar and workshop events: Central to this phase was the preparation and delivery of a 1-day workshop in London. The workshop involved representatives from all stakeholder groups including all interviewees from phases 1 and 2, other employer representatives and specially invited alumni. The workshop brought together STiP alumni, educators and employers to engage in a short collaborative inquiry designed as a system of collaborative inquiry around the dynamic of ‘post-study systems thinking in the workplace’ (Fig. 3).

After an initial cycle of inquiry around the general experience of being a systems practitioner, the inquiry was structured around a further three cycles each focusing on the experience from a particular perspective (doing systems practice—as part of being a practitioner, educating systems practice, and employing systems practice—Fig. 3).

STiP alumni registered challenges in applying learning experiences from the core modules to post-study workplace situations. Some core challenges can be briefly summarised. First, in using epistemic understandings of systems, the capability challenge is recognising where the ontological and epistemological use of systems is appropriate or relevant. This includes working with particular

Fig. 3 Systems thinking in the workplace dynamics: May 2015 workshop collaborative inquiry framed around three sets of conversations. *Source* adapted from Reynolds et al. (2016a)



stakeholders—colleagues and employers—many of whom are likely to be less appreciative of the epistemological use of systems.

Second, whilst individually valuing and appreciating the relevance of systems ideas and tools for the workplace, some STiP alumni in their workplace situations have difficulties relaying the usefulness of these ideas to colleagues. Often, ideas associated with STiP are introduced by alumni ‘under the radar’ as a form of silent practice in order to avoid the risk of seemingly threatening entrenched ways of thinking and practicing in the workplace, or seemingly introducing language which might be regarded as alien or foreign, or worse, simply shallow and ‘faddish’.

Third, applying the craft skill of ‘design praxis’—using systems as experimental (ontological and epistemological) devices for transforming situations—requires creative space. Such ‘space’ in many workplaces is limited by a culture that is sometimes fixed on rigid performance measures and standards that do not allow for adaptability. For enabling STiP endeavours to thrive, a culture of safe-fail (spaces of ‘caring’, for failing safely with imperatives towards learning...) needs to replace prevailing cultures of fail-safe (spaces of ‘accountability’, with imperatives towards taking—often punitive—corrective action).⁴

The challenges associated with developing STiP capability are thus more associated with cultivating cultures that enable STiP competencies to flourish. Some of these were articulated at the eSTeEM workshop and bear relevance to supporting institutional practices of SDG implementation.

4 Praxis Support for Implementing SDGs

The implementation challenges summarised below are phrased in terms of the necessary praxis support needed to counter prevailing dualisms associated with affecting each of the three sources of STiP competence:

- (i) Dualisms of systemic versus systematic (understanding inter-relationships),
 - (ii) Practice versus understanding (engaging with multiple perspectives), and
 - (iii) Formative versus summative evaluation (reflecting on boundary judgements).
- *Systemic and Systematic* (understanding inter-relationships and developing epistemic understanding). Having some systemic sensibility about the integral nature of the SDGs is one thing. Actually integrating SDGs is something quite

⁴‘You Can’t Grow Roses in Concrete’ is the title of an action research report using systems thinking ideas on organisational reform to support high quality safe practice for child care services in UK (Munro et al. 2016). The title epitomises the need for focussing on developing appropriate institutional creative space. In my reading of the report, the ‘roses’ can refer immediately to the Children of child care services and to the multitude of professionals responsible in different ways to support the children. Nurturing a culture of care is as relevant for professionals as those for whom professionals may serve.

different. Whereas the former may involve a *systemic* understanding, the latter inevitable involves some *systematic* engagement. The challenge is not to dismiss one for the other but rather to keep both in conversation with each other through continual creative tension. The tension here is one that is replicated in any intervention, including pedagogic design. Course design and all associated institutional processes and practices are inherently systematic. The challenge for developing a postgraduate course on STiP involves translating a systemic subject matter into a pedagogy which is largely and necessarily systematic (with formal linear progression through materials, cut-of-dates for assessments, within a fixed time period of six months per module, etc.). In the design of the two core STiP modules, the tension is in-part retained through recurring reference in the course to particular metaphors. Metaphors of bricolage (for TU811; see Reynolds 2015) and juggling (for TU812; see Ison 2010) are helpful devices for capturing the praxis tension between being systemic and being systematic. In the realities of implementing SDGs, notions of being ‘systemic’ (holistic, ‘getting the bigger picture’, ‘seeing the forest for the trees’...) are often regarded as being good in theory but difficult to translate into (necessarily systematic) practice. Support is needed for enabling appropriate translation at appropriate times from one to the other; from being systemically aware to doing practice systematically.

- *Practice and Understanding* (engaging with multiple perspectives and developing active pedagogy). The second challenge involves using the workplace as a resource for developing systemic practice. Stakeholders involved with implementing SDGs supported by systems thinking may feel a sense of despair with yet more additional demands on learning new tools and techniques. However, much of the learning experienced through STiP is undertaken by actively practicing ideas using existing techniques but in an adaptable manner. Conventionally, formalised learning is framed in terms of first ‘understanding’ followed then by ‘practice’, with the premium given to ‘understanding’. Retaining the tension and actually privileging practice over understanding (cf. Cook and Wagenaar 2012) provides a means of enabling praxis support. The capability to do this may be undermined by conventional prevailing practices that reinforce formal certification (proof of ‘learning’) associated with existing professional practices. STiP pedagogy can help to counter such practices. For example, TU812 uses the notions of social learning, landscapes of practice and communities of practice (Blackmore 2010), whereas TU811 emphasises the notion of reflective practice in relation to learning from the application of systems ideas in a work context (Reynolds and Holwell 2010; Reynolds 2011). However, as evidenced through the eSTEEem inquiry, learning from the work experiences may have unintended consequences on work relations. Practicing new ideas without due concern for the cultural context can have an alienating effect with work colleagues. Is there perhaps an ethical imperative in providing health warnings of potential disruptive consequences around performing new practices in work situations, particularly workplace situations associated with implementing SDGs where there is already likely to be considerable tensions

given the tasks at hand? What wider professional guidance might be offered to nurture better understanding amongst work colleagues?

- *Formative and Summative evaluation* (reflecting on boundary judgements and developing design praxis). The third challenge constitutes the evaluation of learning in relation to what Ison refers to as ‘the design turn’ (Ison 2010, 2016). Traditionally, evaluation is regarded as an activity to do after implementation of an intervention—summative evaluation. A conventional systems-based approach to implementing SDGs might use ‘systems’ as an ontological device—a benchmark—for measuring the performance of an intervention. The ‘Goals’ associated with SDGs would be seen as providing the measurable outputs or outcomes from existing ‘systems’. So for example, SDGs associated with healthcare may be associated simply with national health systems, or SDGs associated with food security may be similarly associated with national agriculture systems, etc. Whilst this is often a helpful (systematic) use of systems thinking, it may also lead to frustration. Practitioners can often despair with what regularly comes over as free-thinking, open inquiry initiatives proffered by external advisors/consultants/educators, only to be frustrated by the realities of having to address existing agendas, targets, ‘goals’, fixed by prevailing institutions (norms, rules) in the workplace.

The praxis challenge here is in shifting the use of the systems idea to one of formative ‘design’ mode rather than purely summative ‘diagnostic’ mode. An alternative might be to regard the SDGs not as fixed measures of some pre-existing system of either UN global intervention or existing national ‘systems’, but rather as one set of components in the continual flux of events, people, and ideas (cf. Geoffrey Vickers, in Ramage and Shipp 2009a) that makes up the mess (cf. Russell Ackoff in Ramage and Shipp 2009b) or (super) wicked problems (cf. Lazarus 2008) to which SDG interventions are addressed. It may then be possible to utilise the systems idea in design mode; as a purposeful means of structuring SDG interventions in order to address systemic sensibilities associated with the need for integrating SDGs. Such a ‘design’ shift involves moving from using systems for summative to more formative forms of evaluation and, moreover, appreciating the integral play of both types of evaluation throughout an intervention. Drawing on ideas from developmental evaluation (Patton 2011), ideas for using STiP to integrate formative and summative evaluation have been described in terms of systemic evaluation (Reynolds et al. 2016b). Navigating the tension between formative and summative evaluation is likewise evident in any intervention, including pedagogic design for the STiP modules at OU. Developmental evaluation requires some form of formative evaluation in a way which benefits students as well as their employers. This raises some issues in relation to the institutional validity (at the University and in other workplaces) of formative evaluation compared with mainstream demands for summative evaluation (e.g. performance indicators).⁵

⁵An example of a design turn was evident at the eSTEEeM workshop in London, 2015. At one stage the conversation was reframed by participants from one which focuses on how the OU could improve its offering for students to instead focus on the question of how the OU can support alumni and employers to develop systems practice in their own context, building self-sustaining communities of practice.

Two strands of further inquiry evolved from the eSTEEeM project; each regarded as endeavours towards promoting purposeful systemic design—design praxis. One strand focuses on developing a competency framework for STiP and another strand focuses on generating multi-stakeholder spaces for STiP explorations. These are both works in progress and are briefly described below in relation to their potential relevance to supporting SDG implementation.

5 Emergent Inquiries in Developing STiP Capabilities

Figure 4 illustrates two emergent strands of inquiry associated with the STiP eSTEEeM project. Both strands of inquiry support capability enhancement. Both strands also provide feedback loops to the improvement of STiP competency and the ongoing development of the OU STiP postgraduate curriculum. Core to this development is the wider involvement of STiP alumni, employers, along with academics (Associate Lecturers and central academics).

One strand of inquiry is exploring the task of formulating some kind of competency framework for STiP; one that serves the professional interest in promoting STiP in Higher Education Institutions as well as professional bodies and employers. A core challenge of such a framework is to remain true to STiP as praxis; a framework continually adaptive to changing circumstances (events) as well as responsive to diverse and changing users (people) and associated systems of interest (ideas). Such a framework can potentially offer more security amongst practitioners in the field of sustainable development to experiment safely with systems ideas in their workplaces. An appropriate STiP ‘competency framework’ provides a step towards offering professional legitimacy to practice systems thinking, thus generating a more enabling context for STiP.

The second strand of post-eSTEEeM activity is one that has more direct potential for supporting SDG implementation. The general endeavour here is one of action research and outreach; an endeavour that builds on OU ‘third mission’ traditions in more directly serving wider social and community development (in addition to traditional ‘missions’ of research and teaching associated with conventional HEIs). A series of interventions are underway involving ASTiP⁶ colleagues at the OU in facilitating the framing of public policy issues regarded as being wicked problems (in areas of health, education, agriculture, and environment) with participants from relevant sectors. These ASTiP activities have been ongoing outside of the eSTEEeM project, particularly in areas of water governance (Foster et al. 2016), environmental governance (Ison et al. 2015), and indigenous community development (Berardi et al. 2015). The eSTEEeM inquiry has given impetus to a more concerted strategy of mobilising STiP expertise, including STiP alumni, alongside colleagues at the workplace.

⁶Applied Systems Thinking in Practice Group.

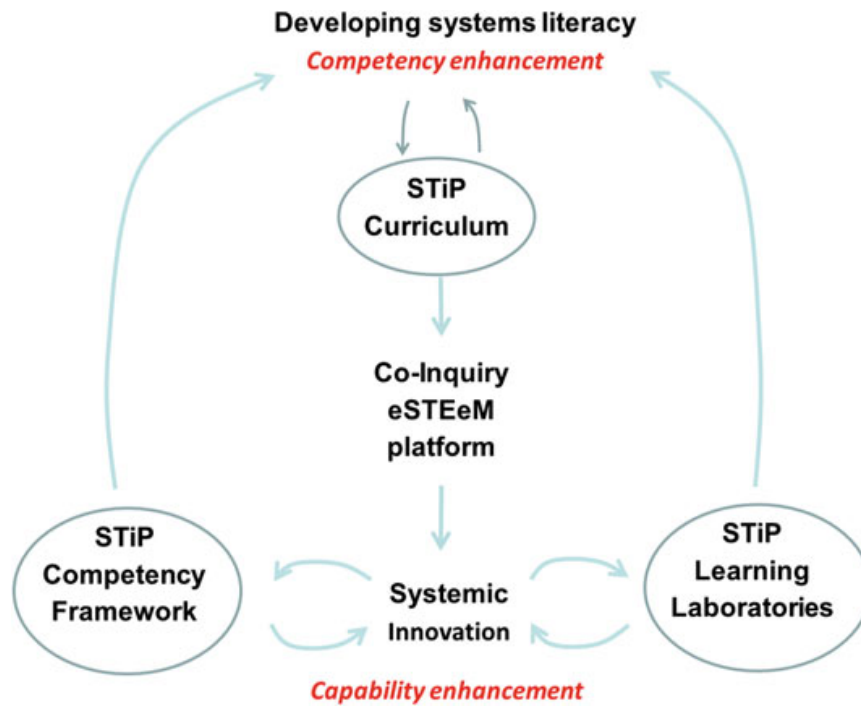


Fig. 4 Two strands of inquiry—competency framework and learning laboratories—emerging from an initial co-inquiry exploring capability enhancement of systems thinking in practice (STiP) sponsored by eSTEEeM—The Open University Centre for promoting science, technology, engineering and maths (STEM) pedagogy.

Drawing on ideas of co-learning initiatives from Ha et al. (2016) third mission endeavours based on mobilising STiP competencies with multiple stakeholders might collectively be termed as constituting learning laboratories. Ison et al. (2016) at Monash University in Australia used the notion of a learning laboratory to envisage a transformation of the University to meet the challenges of SDGs.⁷ The purpose of the learning laboratory is seen as providing “support (tools, concepts, methods, experiences) and facilitation in framing public policy issues and devising action strategies for research, education and decision-making... [helping] participants experience a transformation from the current situation of policy inertia to one where learning through complex situations result in practical action” (*ibid*).

The learning laboratory as envisioned by Ison and colleagues provides a site for transformational change. Figure 5 depicts the change in terms of two simple systems; one a system as it is currently perceived, and another as an idealised system. Both systems of interest are delineated by three generic questions regarding; (i) what the system does (purpose), (ii) why the system works as it does (worldview or rationale underpinning the system) and (iii) how the system operates (core system activities).

⁷The proposal was to view the University as constituting three pillars of activity—(i) designing and implementing inter- and transdisciplinary research with academics, (ii) building capacity of Monash students in addressing sustainability challenges, and (iii) support for the public and private sectors in ‘silo busting’ for improved governance (Ison et al. 2016).

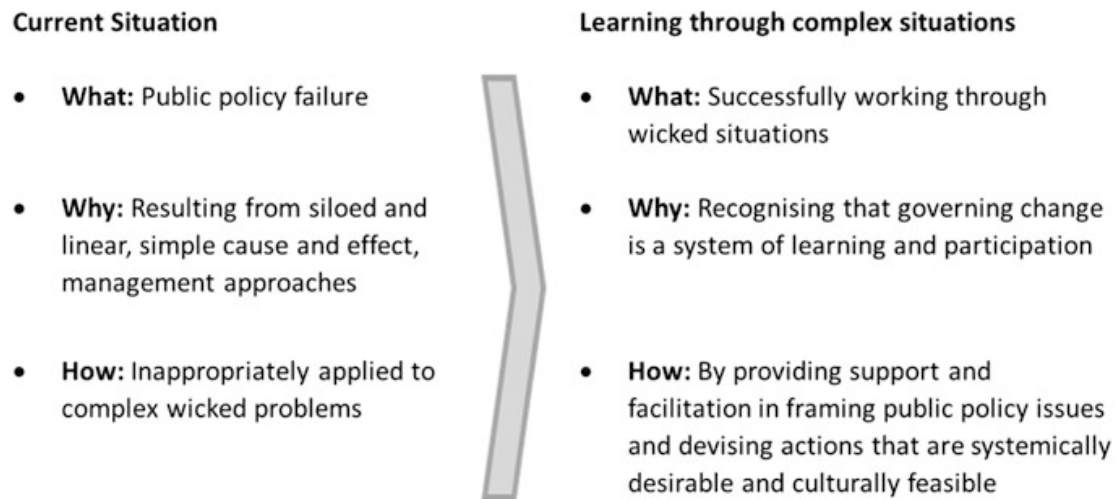


Fig. 5 Transformational change that could be supported by the design of ‘systemic learning laboratories’ combining both material and virtual elements. *Source* Ison et al. (2016)

The purpose of a learning laboratory is to engage stakeholders associated with particular wicked problems in different domains, through processes of systemic co-inquiry based on principles of STiP. Such initiatives are currently being explored and developed with ASTiP colleagues in areas of, for example, systems for Health, systems for evaluating Social Enterprise Impact Hubs, systems for Conservation, systems for Food Security, and systems for implementing SDGs. The remainder of this section briefly describes this latter initiative—a proposed learning laboratory developing a multi-stakeholder platform for integrated SDG implementation based on STiP.

Developing STiP capability—praxis support—for integrated implementation of SDGs is a particular concern for the United Nations Development Programme (UNDP). In response to alumni contacts with UN personnel, enquiries with ASTiP are being progressed with the view of setting up a learning platform utilising OU expertise from the Development Policy and Practice (DPP) research group, along with ASTiP group members and associates, including ALs and STiP alumni. The working title for this initiative is ‘Facilitating effective implementation of Global Goals for Sustainable Development through Applied Systems Thinking’. In addition to support from UNDP, ASTiP and DPP colleagues, and the International Development Office at The Open University, the OU is also able to provide technical support for enabling a learning laboratory through its online platforms of FutureLearn and OpenLearn Works, with the in-house Open Media Unit (Scanlon et al. 2015; Law and Jelfs 2016).

The proposed learning laboratory initiative is built around praxis principles of ‘conversation’; a conversation between thinking and practice. Three orders of conversation underpinning systems thinking in practice (Reynolds 2014) dovetail with the three competencies of STiP—understanding inter-relationships (1st order), engaging with perspectives (second-order) and reflecting on boundary judgements (third-order). The three orders of conversation are mediated through the lens of

developmental evaluation—a practice orientated means of coupling formative with summative evaluation drawing on ideas from complexity science and systems thinking. Drawing on a recent expression of developmental evaluation in terms of systemic evaluation (Reynolds et al. 2016b), three principals of capability are used to guide systemic interventions based on implementing SDGs—humility in appreciating that systems of interest inevitably exclude factors and actors, empathy in appreciating the need to engage with perspectives that may not conform with existing value judgements, and inevitable fallibility, in appreciating that systems design around interventions are never fail-safe given the prevailing uncertainties, and hence need a safe-fail context of ongoing experimentation.

The overall objective of this initiative is to develop an ongoing learning system as a platform to promote and enable more effective implementation of SDGs. The aim is to enhance the governance and effectiveness of inter-sectoral development initiatives at local, national and international levels. This will be achieved by means of facilitated purposeful inquiry and interaction amongst key stakeholder groups (representatives from government, business, expert bodies, and civil society) based on systems thinking in practice. The proposed learning system will be co-designed amongst stakeholders with the core project team, particularly drawing on existing Open University open learning platforms (FutureLearn and OpenLearnWorks), existing open-source resources associated with OU STiP pedagogy, and sources of expertise including distance learning support and media development, in addition to externally sourced internationally acclaimed academic expertise in systems thinking and development management theory and practice. Specific components are outlined below.

A core objective is to initiate new institutional arrangements for coordinating the implementation of the SDGs. Two component parts of the initiative are outlined below and can be collectively referred to as a “MOOC-plus” intervention, where a MOOC is a Massive Open Online Course.

Component 1: MOOC-core: Co-design and development of an initial MOOC specific for the needs of UNDP and other key stakeholders/sponsors, with the provisional title ‘Implementing SDGs through Systems Thinking’. The MOOC will be designed around core principles of STiP and systemic evaluation and will reach a geographically dispersed group of stakeholders with an interest in the integrated implementation of SDGs. FutureLearn is the platform to be used for the delivery of the MOOC.⁸

Component 2: MOOC-wrap around: Several pilot additional and more specific (‘closed’) learning supported journeys will be co-designed and developed for more bespoke variations of the FutureLearn MOOC. These MOOC-wrap around products will enable engagement of perspectives amongst representatives from specified stakeholder groups (including government policy and analytics professions, business sector partners, independent expert consultants, NGOs and INGOs)

⁸Owned by The Open University and launched in December 2012, FutureLearn is an internationally recognised social learning platform, designed to deliver academic courses with conversation between learners core to the experience. It delivers courses with over 50 partner universities.

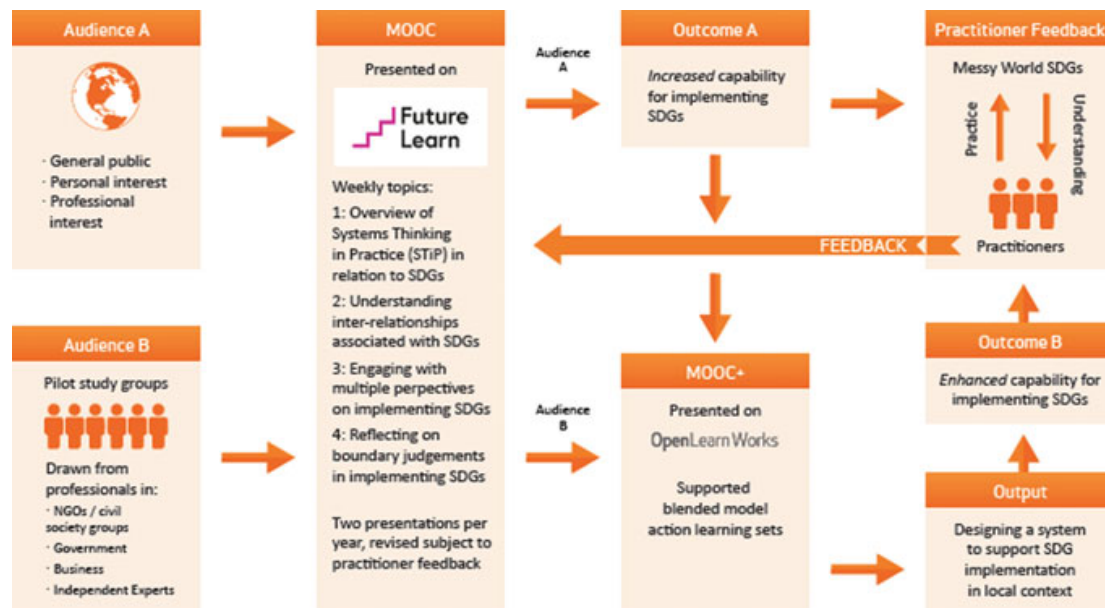


Fig. 6 Praxis support for implementing sustainable development goals (SDGs) based on systems thinking in practice at The Open University. *Source* Reynolds et al. (2017). © 2017 The Open University

responsible for implementing SDGs. These will foster ‘multi-stakeholder partnerships’ (in line with SDG 17) and will be enacted both online and through face-to-face workshops facilitated by experienced ASTiP practitioners. The MOOC-wrap around will be based on the more interactive OpenLearnWorks platform provided by the OU.

Other objectives associated with the proposal include, firstly, encouraging the application of systems thinking (ST) among SDG stakeholders, and secondly, encouraging the application of institutional development approaches, focused on the creation of new frameworks for policy and practice and on the building of the inter-organisational relationships through which those new frameworks are created. An integral aspect of this is the development of the ‘critically reflective practitioner’ with the capability to examine ‘how we do things’ and explore ‘how we might do things differently’—a capacity crucial for the effective implementation of the SDGs.

MOOC-core involves individual sense making of SDG interventions, and so is aligned more with first-order conversation in STiP. MOOC-wrap around involves active collaborative partnerships facilitated by experienced STiP practitioners and is more aligned with second-order STiP conversations. Third-order conversations—reflection on learning—is encouraged throughout the two components of the proposed initiative. Figure 6 provides a sketch of the proposed intervention.

A supplementary objective is to raise awareness and offer opportunities amongst participants for further more formal individual study for further professional development on associated and accredited postgraduate qualifications—particularly associated with STiP and/or DPP—at the OU.⁹

6 Conclusion

“...[H]umanity remains on largely unsustainable development trajectories. Partly, this is due to the failure of sustainability science to engage with the root causes of unsustainability [...] We propose a research agenda inspired by systems thinking that focuses on transformational ‘sustainability interventions’” (Abson et al. 2017 p. 30). The ‘learning laboratory’ initiative outlined in the preceding section provides a contribution towards such an agenda. There is no quick-fix to the challenge of integrating SDGs—the particular concern of SDG 17. Acknowledging the need for developing ‘an integrated, holistic, multi-stakeholder’ approach is an expression of systemic sensibility; an appreciation that implementing any one of the SDGs will have effects on other SDGs. Traditions of systems thinking are particularly relevant to the task given the intuitive ideas relating to ‘getting the bigger picture’ (holistic thinking) and encouraging ‘joined-up practice’ (pluralistic thinking). But is it enough for higher education institutions to help develop systems thinking in practice (STiP) skills and competencies? As evidenced by the eSTeEM project, outcomes reported in this paper, Introducing and cultivating STiP competencies in (i) understanding inter-relationships, (ii) engaging with multiple perspectives, and (iii) reflecting on boundary judgements, are not in themselves guarantors for enabling capability.

The challenges in moving from developing competencies in a curriculum to nurturing capabilities in work situations require grappling with issues of praxis. For cultivating STiP capability, these challenges can be understood in terms of enabling ‘conversations’ of praxis—conversations that bring into play the dualities (as against either/or dualisms) between systemic and systematic endeavours, between practice with understanding, and evaluating formatively alongside making summative judgements.

More specifically, cultivating STiP capability for implementing SDGs requires developing a constructive safe space in which practitioners from different sectors may ‘experiment’ with other stakeholders in creatively applying ideas of STiP with a praxis sense of humility, empathy, and inevitable fallibility. The proposed creation of a learning platform laboratory reported here is one example of the type of

⁹Participants can join existing cohorts of OU students for assessed 30 credit modules, each lasting 6 months of part-time study (approx. 10 h/week). It may also be possible to make specified groupings of students in tutor groups so that they can share particular conversations around SDG implementation on a virtual basis during the module presentation. The 30 postgraduate credits of each module can count towards accredited UK postgraduate qualifications at Certificate (60 credit), Diploma (120 credit) or Masters (180 credit) levels.

praxis that might be envisioned. Such endeavours more generally require HEIs to refocus investment strategies from traditional ‘teaching’ and ‘research’ towards a process—intrinsically political—of building new relationships, new understandings and new institutions: in short, a process of learning to do things differently.

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Author Biographies

Martin Reynolds (Ph.D.) is a Senior Lecturer in Systems Thinking in Practice at The Open University, UK and Qualifications Director (with Chris Blackmore) for the OU postgraduate programme—Systems Thinking in Practice. Martin was lead editor of both *The Environmental Responsibility Reader* (2009), Zed Publications, and *Systems Approaches to Managing Change: A Practical Guide* (2010), Springer. Martin specialises in applying critical systems thinking in practice with evaluation in different areas of professional development and intervention including international development, public sector management, business development, education, health and environmental management. In addition to teaching and researching in the field of systems inquiry, Martin provides professional training workshops on systems thinking in practice.

Christine Blackmore (Ph.D.) is a Senior Lecturer in Environmental & Development Systems at The Open University, UK and Qualifications Director (with Martin Reynolds) for the OU postgraduate programme—Systems Thinking in Practice. In both teaching and researching, Chris focuses on learning systems, environmental decision-making, environmental ethics and responsibility, sustainable development, managing systemic change and communities of practice. Chris has been involved with a range of international EU and private sector funded research projects that have focused on learning, systems, sustainability, managing and governance in contexts of water and/or farming. These projects include SLIM (Social Learning for the Integrated Management and sustainable use of water at catchment scale), LEARNing (Learning in Agricultural and Rural Networks: institutions, networks and governance) and CADWAGO (Climate change adaptation and water governance—reconciling food security, renewable energy and the provision of multiple ecosystem services).

Ray Ison (Ph.D.) is a Professor of Systems at The Open University (OU), UK since 1994, and is part of the group responsible for a successful M.Sc. in Systems Thinking in Practice (see <http://www.open.ac.uk/choose/ou/systemsthinking>). From 2008 to 2015 Ray was also Professor at the Monash Sustainability Institute, Monash University, Australia where he developed and led the Systemic Governance Research Program, an interdisciplinary, systems-based research programme focusing on water governance, climate change adaptation and social learning. At The Open University he has through various commissioned projects and initiatives, entailing collaborative research, demonstrated how social learning, including systemic inquiry, can be employed as an alternative governance mechanism for managing in complex situations such as water governance, programme and project governance, climate change adaptation, food security research, social learning and the purposeful creation of communities of practice. He is the author of the book (2010): *Systems Practice: How to Act in a Climate Change World* (Springer & OU). In 2015–2016 he was President of the ISSS (International Society for Systems Sciences).

Rupesh Shah (Ph.D.) is an independent researcher, educator and facilitator. Rupesh has worked in people's participation and development for the last 20 years, most recently as an operational director of a community health organisation. He is an Associate Lecturer at The Open University, and also teaches for Glasgow Caledonian University and Middlesex University. He specialises in using creative, reflective and systemic methods to develop the power of citizens to influence professional practice.

Elaine Wedlock (Ph.D.) completed her doctorate studies in Systems Science at City University CASS Business School London. She currently teaches Systems Thinking and research methods to international postgraduate students at The Open University where she supports students in carrying out original research and implementing Systems Thinking tools and concepts in a range of public sector, third sector and commercial organisational settings.