Embedding Systems Thinking

Christopher Gleadle

Introduction

Education is meant to enable us to act wisely, for ourselves and for society, today and tomorrow. Yet, outcomes of education generally show that specialisms are fragmented. Consequently, over time, this has propelled highly confident, and, often enough, self-interested individuals into decision-making positions who have legitimised the over-exploitation of resources and allowed a misbalance of equal opportunity to manifest. This is evidenced by a lack of diversity at decision-making level. For all the technological advance we have already made, we still observe that

- emissions are still rising
- services of the biosphere are shrinking,
- productivity is on the decline
- all global societies are fractured.

Indeed, education still promotes traditional linear thinking, analysis and problem solving that has led to this situation and has created the performance paradox[1]. Linear thinking means to think in one-dimensional terms of cause and effect. Clearly, it is time to change, as linearity by no means represents the reality that we live in accurately. Linear thinking has to be replaced with three-dimensional thinking, where multiple connections in a complex network of factual events are taken into account simultaneously. Complex connected events do not take place on a straight line. They go out into all directions; hence we have to imagine a three-dimensional space in which they take place. Mathematicians would use the image of a sphere to describe how the connection works. You can start on any point of the sphere and get the following result: an event spreads out its workings in multiple directions at the same time. Eventually, as they travel on and connect with other events happening simultaneously at different locations on the sphere, they come all the way around, activating even more connected events on their way. Using this image, the concept of "cause and effect" does no longer describe accurately what is happening here – what we see is that any point on the sphere can be connected to any other point through *feedback loops*. And this is especially what is happening with the complex connections between our societal development and climate change. To grasp the principle of feedback loops may feel unfamiliar at first, but at second glance it actually makes complex problems much easier to understand.

'Complexity is a core feature of most policy issues and in this context traditional analytical tools and problem-solving methods no longer work.' [2]

Sustainable Viability in Education

Let's look at spheres in a key example: our economy. Students are the employers and employees of the future. If they enter their future workspace with a thorough multidisciplined understanding of what today we call sustainability, with an inner compass – an empathy - resulting from increased awareness, understanding and visualisation of the interdependence of feedback loops of a *sphere economy* (Fig 1); then they will build future capacity in industry (SMEs and large corporations), government and third sector, into which sustainable viability is naturally embedded.

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[1] Gleadle, 2021, *Sustainability, ESG, and the Productivity Paradox*

[2] OECD, 2017, *Systems Approaches to Public Sector Challenges: Working with Change*

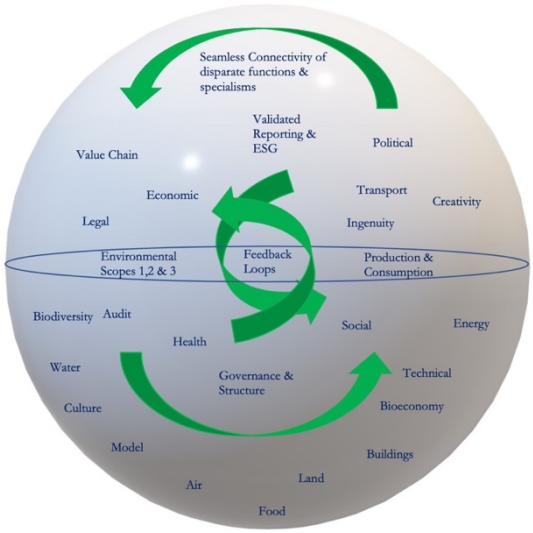

Fig 1: The Sphere Economy

A sphere economy tackles multiple issues simultaneously. As a result, it raises the bar on productivity that in turn accelerates action toward an equitable and authentic net-zero world. *What you measure badly you manage badly:* what tools, metrics, and analysis to use in measuring impact and opportunity is critical. It follows, how the use of these tools and metrics are applied in a systemic way that also broadens the decision space to raise the bar on modelling to aid not just better, more inclusive, more complete decisions, but also to help make them in the right order vital for optimisation.[3]

For example, to measure environmental return on investment in a manner like financial return on investment but expanded to understand the economic profit[4] (measuring all inputs and opportunities and the comparison on decisions foregone) would force open the decision space and measure decisions and actions collectively rather than in isolation. As a result, the efficiency and productivity of resource use and feedback will be maximised. Accordingly, decision makers would become accustomed not to look at single figures in isolation but focus on an outcome that the single figures point to understand against the outcome – such as the warming of the biosphere. Holistic measurements such as Global Warming Potential (GWP) help by allowing for equivalence across systems. Accordingly, GWP presents itself as a superior gauge to deliver comparability and support envirosocial return in the same rigorous manner as rates of return and economic profit.

Thus, embedding systems thinking into education is not just about sustainability, but it provides a more complete frame for students' developing problem-solving skills that makes decision-making assured and rigorous and promotes advanced practical action to tackle multiple issues simultaneously. It makes sustainability viable.

Empathy to raise performance and well-being

Often, due to budgeting and incentive plans, the systems and structures put into place within organisations cause conflict, mistrust, and resentment, leaving functional heads to orchestrate actions that are right for them personally - which works against supporting optimisation for the

[3] Gleadle, 2020, *Naïve Modelling and Covid-19*

[4] Economic profit - or loss – is calculated by taking account of the opportunity costs - alternative returns foregone by using the chosen inputs - which are then deducted from revenues earned. It means an entity or project can have an accounting profit but run at a loss. It follows, that until such a tool is used and follows the guide of sustainable viability and the sphere economy then validity of promoted environmental and social credentials will be suspect. See The 5 Essential Steps To Sustainable Viability

organisation as a whole - within the financial constraints placed upon them. Hence, mangers tend to build their own agendas, which may not be in-tune with the goals of the organisation. Therefore, spectrums of agendas across and within, for example, operational functions conspire to create waste and sub-optimized resource use through, for example, poor communication and lack of understanding of cross-functional impact. This can ultimately lead to lack of process ownership. Consequently, feedback loops that were once functioning holistically and in harmony, are broken and instead of optimisation (resulting from the accounting of all decisions made and those foregone as with economic profit – sustainable viability), what all of this results in, amongst others, is unseen waste, impact, risk, poor productivity, and health issues.

Curriculum design and organisation

Young people deserve an education that equips them to be successful students, accomplished professionals, effective parents, and productive leaders in our competitive, and increasingly cooperative, interconnected world. They need the knowledge, skills, and stamina to work both individually and collectively to solve current complex problems and to prevent new ones. They must learn to balance the often-conflicting requirements of society, economy, and the environment to contribute to increasing sustainable viability[5] performance. They need to be able to think differently than previous generations were.

Understandably, it is important to make the change to sustainably viable education simple as well as practical. This can be achieved by adding to the curriculum project-based learning and extracurricular activities, such as connecting the built environment, food services, facilities management, operations, amongst many others.

Systems Thinking is a science

Systems thinking – and the science of - can most often be found originating from computer engineering (the writer's path). It has revolutionised the way that problems, analysis and ultimately approaches to solutions are garnered in equal measure.

Systems thinking has thus been developed as a methodology and as a means to address complex issues that relate to multiple interacting investment, organisational, environmental, and social ecosystems. How actions of each affects the many. How feedback loops inform better decision-making to reduce impact between functions. How work on one Sustainable Development Goal (SDG) can impact on another – positively or negatively.

It follows that sustainable viability raises the bar on the culture of sustainability, environmental social governance (ESG) and the circular economy since it now accounts for the relationships between the parts that are influenced by the human elements. The sphere economy of sustainable viability accounts for the feedback loops of and between decisions that inform of waste, risk, and impact of and between decisions. As a result, sustainable viability and the sphere economy, inform of the missed opportunities from current decision making, decisions foregone, and analytical processes.

Wicked Problems

The notion of what we call "wicked problems" – social, cultural, economic, and environmental problems that are utterly difficult to solve - and their explicit connection with complexity and system-wide breadth now has a language and development path: we move from linear modes of analysing issues to more systemic approaches that allow for the relationships within and between both organisations and the external environment. As a result of understanding the feedback

[5] Gleadle, 2018, *The Five Essential Steps to Sustainable Viability*

loops, the inverse is also true – that we understand and can value the relationships of and between all ecosystems of the biosphere and their effect on organisations of humankind.

Sometimes it's not about things, but the relationship between things.

All fields of expertise now become transparently interdependent. Take, for example, those areas of healthcare where systems thinking enables multidimensional decision-making that tackles multiple issues simultaneously and changes behaviours in the general population. Systems thinking in healthcare also results in contextually specific strategies, such as tackling air quality, for strengthening healthcare around the world and shows how the provision of healthcare services can affect the biosphere negatively or positively in areas as diverse as transport or the built environment.

Complexity is a core feature of most policy issues today; their components are interrelated in multiple, hard-to-define ways. Yet, governments are ill-equipped to deal with complex problems.[6]

Systems thinking is key to overcoming just that complexity paradox in politics.

Systems Thinking in Policy Making

The application of systems thinking in policymaking discourages linear cause-and-effect thinking and encourages a more complex approach to understanding predictability and the relationship between actions and outcomes.

Consequently, policymakers and their advisors who take on an approach attached to the Sphere Economy of sustainable viability will allow for the adoption of systems thinking to tackle multiple challenges simultaneously. Such an approach will increase economic performance and productivity, while reducing emissions[7] ,ameliorate the services of the biosphere, as well as create harmonisation between policy areas. The effects will render empathy within societal changes that are fairer, more inclusive, and just. These outcomes are possible since systems thinking moves decision makers from being process-focussed to outcome-focussed. As a result of this shift in thinking, the interdependence – indeed relationships - between income and wealth inequalities, which are seen as causal to low productivity as well as poor performance against planetary goals, can be reversed.

Unless we adopt a systems approach, unless we employ systems thinking, we will fail to understand the world we are living in. This is a world made up of complex systems, systems of systems interacting with each other, and changing each other by that interaction and the links between them.[8]

Conclusion

Systems thinking must be at the heart of all we do from now on. We must use it to understand the nature of the multiple interconnected issues of climate change and how they affect economies, societies and nature in various ways and impact upon one another and how we should support the essential change needed to tackle the multiple issues simultaneously. An increased understanding of feedback loops informs better decision-making to reduce impact of and between decisions and the relationships between activities and the people of those activities.

Such radical shifts in the behaviour of decision-making will result in functional and structural harmonisation of organisations in the public, private, and third sectors, to create a low-waste,

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[6] OECD, 2017, *Systems Approaches to Public Sector Challenges: Working with Change*

[7] For further reading on significant evidence on these effects, cf. The 5 Essential Steps to Sustainable Viability

[8] OECD/IIASA, 2020, *New systemic approach needed to tackle global challenges*

zero-waste, carbon-negative economy that is still economically prosperous. Consequently, the bar is raised on productivity since a function of sustainably viable operations (private, public or third sector) is to enhance performance (from the effects) of multiple interacting ecosystems – investment as well as organisational, environmental, governance and social.[9] To rapidly advance climate action in a just, fair, and inclusive manner that affects all life of the biosphere.

First Published: Friedrich Naumann Foundation for Freedom/ The Paddy Ashdown Forum, 2022.

[9] Gleadle, 2018, *The Five Essential Steps to Sustainable Viability*