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■ *Research Paper*

Moving from Disciplinarity to Transdisciplinarity in the Service of Thrivable Systems

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In 2011 Jennifer Wilby proposed a new framework for viewing the philosophy, principles and practice of systems thinking, in furtherance of research and practice into transdisciplinary forms of intervention. This new framework reveals the effect of the interactions between systems principles and system structure in producing complex systems behavior, demonstrates why such methodologies are classed as systemic and anticipates how these systemic methodologies can be used to support transdisciplinarity in exploration, design and management. In this light Alexander Laszlo's call for building a thrivable global system, presented at the 57th Conference of the ISSS, represents a concrete example of the problems and opportunities foreseen in the general call Wilby made in 2012 for developing and using transdisciplinary methods that can nurture complex systems to function effectively and harmoniously. Exploring the underpinning philosophy, principles and practice for a new era of systemic intervention that meets the challenges of the Anthropocene is the aim of the work presented in this paper, focused on linking the transdisciplinary nature of thrivable systems with the development of transdisciplinary systems research and practice. Copyright © 2014 John Wiley & Sons, Ltd.

Keywords General Systems Theory; Systems Philosophy; pathological systems; transdisciplinarity; thrivable systems

INTRODUCTION

In his *Incoming Presidential Address* setting the theme for the 57th annual conference of the *International Society for the Systems Sciences (ISSS)*, Alexander Laszlo set out a vision and a

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call to action: to curate the conditions for a thrivable planet by extending the range and scope of the systems sciences in a way that reinvigorates the systems movement and enables it to facilitate the emergence of a global eco-civilization (A. Laszlo, 2013).

The reason behind this call to action is the recognition that we have breached the carrying capacity of our planet, presenting us with an existential challenge that is both global and immediate. The reason for engaging the systems community in facing this challenge is the recognition that the problem is a systemic one: the problem is not merely a matter of overexploitation and the depletion of resources, but rather one of the global system having been destabilized, and the conditions for its stability being radically undermined by ongoing exploitive endeavours (A. Laszlo & Blachfellner, 2012). On our present trajectory, the threat is not one of scarcity but one of extinction—the system itself has been pathologized, and human activity now functions like a cancer within the planetary organism (E. Laszlo, 2014). The reason Alexander Laszlo's vision is so inspiring is that it beckons us not only to transform our discipline of systems science, taking it to new heights of holistic insight and integral intervention, but also to transform ourselves, evolving constructive and harmonious ways of being in and of the world. These evolutionary transformations are essential for overcoming the present ecological and social crises, but they also present an exciting opportunity to fulfil our potential on a scale not possible, or even foreseeable, in earlier times. As Alexander Laszlo says, 'There is perhaps no greater service calling at the systemic level of life on Earth, for it addresses the highest level of self-actualization on Maslow's hierarchy of needs' (A. Laszlo, 2012).

BACKGROUND: THE SYSTEMIC NATURE OF THE WORLD

As explained elsewhere (Wilby, 2011), the behavior of real-world systems arises within a dialectic between the structure of the system (e.g. kinds of parts, relationships and spatial organization) and the principles that govern systemic potentials (e.g. feedback, variety and equifinality). For complex systems, non-destabilizing interventions require the application of an integrated range of systemic methodologies, forming a 'system of systems methodologies', as shown in Figure 1, adapted from Wilby *et al*. (2011) and Wilby (2011).

This perspective is relatively new, as Systems Science only arose as a discipline in the 20th century, and the idea of a 'system of systems methodologies' only emerged in the 1980s (Jackson and Keys, 1984). Even now, the model described in Figure 1 is to some degree aspirational rather than actual, as 'there remains much debate on the definition(s) and use(s) of these principles in theory and practice' (Wilby, 2011, p. 440), and the different systemic methodologies are not consistent in terms of their ontological perspectives, casting some doubt on the coherence of present attempts to implement a 'system of systems methodologies' approach (Bowers, 2010). Despite these uncertainties in the details, however, the architecture of the overall *situation* is now clear, and we can use this to understand the historical roots of the present globally serious crisis, and the route towards its resolution.

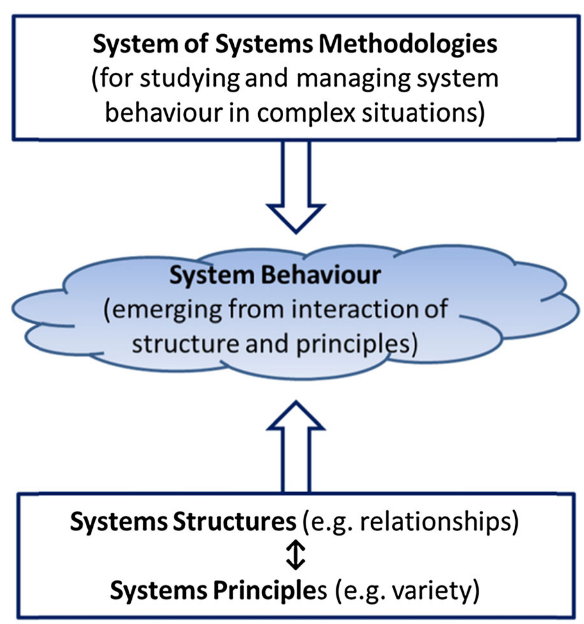

Figure 1 Studying and managing the behavior of complex systems

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THE ORIGINS OF THE PRESENT CRISIS

In the absence of a historical understanding of the need for systemic and holistic approaches, interventions in the natural and social worlds have, in many ways, often depended only on disciplinary knowledge and niche interests and proceeded without taking account of the wider or longer term consequences at a systemic level. In fact, for the major part of human history, no one realized that the natural system has vulnerabilities. Even as recently as the late 18th century highly educated statesmen could declare:

> Such is the economy of nature, that no instance can be produced of her having permitted any one race of her animals to become extinct; or her having formed any link in her great work so weak as to be broken (Jefferson, 1784/1999).

As we now understand only too well, this ignorance supported exploitation beyond the natural limits of ecological stability, resulting in the problematic situation we now face, as indicated in Figure 2. As we now know, overexploitation has resulted in an unstable system in which our very existence as a species is at risk, alongside a similar risk for the species with which we share the planet with.

From the beginning of the modern systems movement, it was evident not only that we have to care for the systemic integrity of the world but that this is an ethical as well as a technical matter:

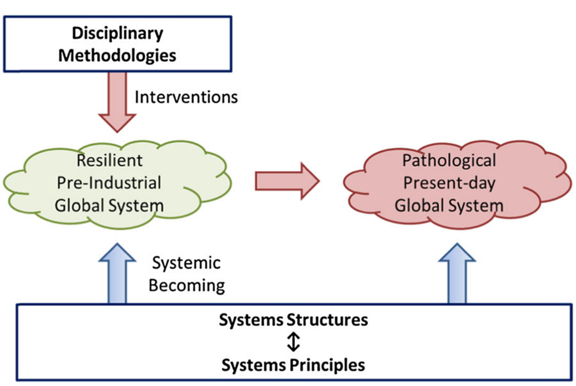

Figure 2 The historical evolution of global instability

> The systemic view of the world has the most profound ethical implications. For it emphasizes the interdependence of all life on this planet […] System thinking pursued to the full has the most far reaching ethical consequences in politics […] It views struggles for power in the context of the entire global system and from this vantage point sees it as a scandalous dissipation of resources, attention, commitment, and efforts (Rapoport, 1976) cited in (Pouvreau, 2011).

More recent systemists have continued to emphasize this point, for example,

> Living successfully in a world of complex systems means expanding not only time horizons and thought horizons; above all it means expanding the horizons of caring. There are moral reasons for doing that, of course. And if moral arguments are not sufficient, then systems thinking provides the practical reasons to back up the moral ones. The real system is interconnected. No part of the human race is separate either from other human beings or from the global ecosystem. […] As with everything else about systems, most people already know about the interconnections that make moral and practical rules turn out to be the same rules. They just have to bring themselves to believe that which they know (Meadows, 2008, p. 184).

However, Alexander Laszlo's vision goes further —he wants to see an eco-civilization that not only promotes human values and human thriving *per se* but one that *sustainably* promotes global thrivability *in all domains*—intra-personal, interpersonal, inter-species and trans-generational (A. Laszlo, 2013, p. 8). This, as he rightly points out, calls for a global shift in worldview, one in which

> We must no longer look out at the world through the eyes of exclusively individual interests. And above all, we must be ready to repudiate our gladiatorial existence and learn what it means to be a communal being (A. Laszlo, 2012).

However, to become and to live as communal beings, we have to evolve consilient methods of

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intervention and management that reflect the holistic and integral nature of the global system. For that, we have to overcome our disciplinary fragmentation, learn to see across the boundaries of disciplinary perspectives and become sensitive to the impact of local interventions on the neighbouring interests and the global system (Wilby, 2012).

FROM DISCIPLINARITY TO TRANSDISCIPLINARITY

The Nature of Systemic Transdisciplinarity

The only realistic basis for such a communal worldview and praxis is *systemic transdisciplinarity* (Wilby, 2013). Transdisciplinarity should be carefully distinguished from *multi-disciplinarity* (making use of several disciplines at once, acknowledging their different approaches but without attempting to bridge between them), *cross-disciplinarity* (coordinated effort involving two or more academic disciplines, trying to establish a kind of middle ground) and *interdisciplinarity* (the process of combining two or more disciplines or fields of study, attempting to synthesize them into something new). In contrast, *transdisciplinarity* 'transcends the boundaries of conventional approaches' (Salmons and Wilson, 2007).

> It concerns that which is at once between the disciplines, across the different disciplines and beyond each individual discipline. Its goal is the understanding of the present world, of which one of the imperatives is the overarching unity of knowledge (Hyun, 2011, p. 19).

'It does, in effect, require a completely different framework of working, unrecognizable to disciplinary organizations or their specific research methods' (Wilby, 2011, p. 438). These distinctions are illustrated in Figure 3, which is adapted from Salmons and Wilson (2007) and Petrişor (2013). In Figure 3 the orthodox disciplines are indicated by numbers D1–D3 and the meta-discipline representing transdisciplinarity by D*.

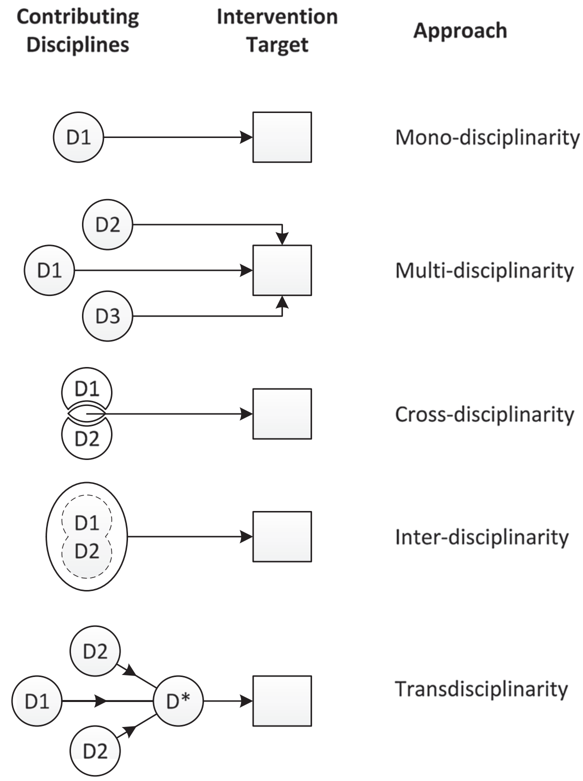

Figure 3 Kinds of disciplinarity

Transdisciplinarity is not grounded in a melding or intersection of the existing specialized disciplines but utilizes a new framework to which the specialized disciplines contribute, but from which perspective their boundaries become permeable. Such a framework can be established via Systems Science, for it encompasses and leverages the systemic principles that apply in all the specialized disciplines, ranging across the board from the physical sciences to life science to the social sciences and even into the humanities. The existence, in principle, of such a transdisciplinary framework of theories and associated methods was identified in the early days of the systems movement, especially through the work of Alexander Bogdanov,[1] Ludwig von Bertalanffy, Anatol Rapoport, Kenneth Boulding and Ervin Laszlo.

[1] In many ways, von Bertalanffy's work in Austria and America duplicated the earlier work of Bogdanov in Russia, but there is no evidence that von Bertalanffy ever knew about Bogdanov, and it was von Bertalanffy's work that proved influential in the West. For reviews of the sophistication of Bogdanov's work, see Gorelik (1983, 1987) and Dudley (1996).

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Ludwig Von Bertalanffy, General System Theory and the Unity of Knowledge

Everything that exists in a concrete way (has causal powers) is a system or part of one, and consequently, Systems Science is a meta-discipline, in that its concepts and models are relevant to a plurality of specialized disciplines. Systems Science includes a range of theories collectively known as 'Systemics', each capturing specific aspects of systemic patterns of behavior such as growth, feedback and dynamic equilibrium seen across multiple disciplines, (e.g. Cybernetics, which is to do with the effects of kinds of feedback; Hierarchy Theory, which is to do with the effects of kinds of organizational structure; and Chaos Theory, which is to do with kinds of stability). As pointed out by von Bertalanffy, there is also a 'General System Theory' ('GST'), which encapsulates the principles that recur across the Systemics, and hence represents the most general principles behind the kinds of order we find in the concrete world (Von Bertalanffy, 1956, p. 38).

We can represent this situation schematically as given in Figure 4. Here, the individual disciplines are represented as a series of niche disciplines D_i and the Systemics as a series of systems theories S_i. In the diagram, the foundational ontological models assumed or entailed by each discipline are indicated as a series of ontologies O_i. Some disciplines of course share ontologies, for example, Chemistry and Geology are both grounded in Physicalism, while others have differences between them, for example, to make provision for 'fundamental' factors such as 'wave functions', consciousness, information and values.

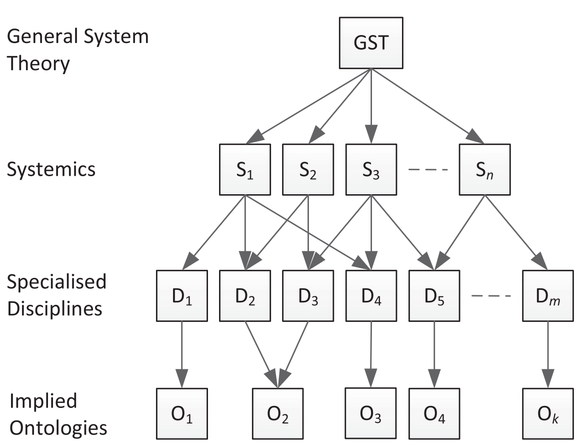

Figure 4 Relationships between Specialized Disciplines and Systems Theories (D. Rousseau, forthcoming b)

The specialized disciplines present a plurality of theory frameworks and a plurality of entailed ontologies, but the Systemics and GST provide overarching connections and hence present a kind of meta-theoretical unification, which nevertheless preserves the logical and methodological autonomy of the specialized sciences (Pouvreau and Drack, 2007, p. 287).

Ervin Laszlo, Systems Philosophy and the Unity of Nature

However, there is an argument to be made that this ontological pluralism is contingent and not fundamental, in the following way.

The Systemics and GST are *formal* theories, that is, they contain no information about how the systems they describe are implemented. For example, Communication Systems Theory describes the functions and limitations of a communication system (e.g. encoding, signal transmission, detection and noise mitigation) but does not tell us anything concrete about the many ways in which such components as signal transmitters and receivers might be realized (e.g. vocal cords, ears and TV antennas). This lack of ontological commitments guarantees the systems theories' general applicability, but it does raise a puzzle as to why they should be effective in describing real-world phenomena across multiple domains, because the domains to which they apply sometimes appear to have dissonant ontological assumptions. For example, both social systems and mechanical systems exhibit systemic properties such as emergence, synergy and dynamic stability, and yet, the mainstream macro-physical scientists assume the existence of an objective reality while most social scientists regard reality as a social construction.

The solution to this puzzle was given by Ervin Laszlo in his book *Introduction to Systems Philosophy: Toward a New Paradigm of Contemporary Thought* (E. Laszlo, 1972). Ervin

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Laszlo's argument can be summarized as follows (Figure 5).

The existence of specialized disciplines (Physics, Chemistry, Genetics, Sociology etc.) shows that the concrete world is *organized into intelligible domains*. The Systemics, by revealing principles and patterns that occur across these domains, cumulatively show that the concrete world is intelligibly organized *as a whole*. This global organization is reflected in the principles and models of GST. The existence of global organizing principles entails that the concrete world's special domains (as characterized by the specialized disciplines) are contingent expressions or arrangements or projections of a unified underlying intelligibly ordered reality (E. Laszlo, 1972, p.19). In this way Ervin Laszlo argued that the existence of GST implies that (i) there is an ordered reality *underlying* Nature and (ii) GST provides a formal model of some of the essential characteristics of this concrete Ultimate Reality.

In this light this 'underlying reality' is a universal ontology, and as the individual disciplines advance their ontological implications will increasingly become consistent with it. This conclusion entails that in the long run the ontological implications of the specialized disciplines cannot sustain mutually inconsistent claims about the nature of Ultimate Reality. The ontological pluralism that apparently exists at present across the disciplines is therefore merely an empirical phenomenon, reflecting multiple partial perspectives on a deeper ontological monism that is richer than current ontological models such as Physicalism or Radical Social Constructivism.

This outcome provides several additionally useful insights.

First, the *systemic* nature of the theories on which we based the extrapolation earlier affirms that Ultimate Reality is also systemic in nature. It is therefore the systemicity inherent in it that is the source of the systemic behaviors we encounter in the specialized disciplines and describe using Systemics and GST. In view of this ontology's systemicity and universality it has been characterized (D. Rousseau, forthcoming b) as "General Systems Ontology" (GSO), as shown in Figure 5.

Second, the Systemics and GST are *scientific* theories and hence assume that the subjects they characterize are *naturalistic* (the meaning and implications of this are discussed in the next section). The Systemics are highly successful theories and have become essential for the design of resilient complex technological and social systems. This success entails that the subjects they characterize really are naturalistic. Therefore, a finding in favour of ontological unity, extrapolated from such theories, affirms that Ultimate Reality is naturalistic too and hence reveals that

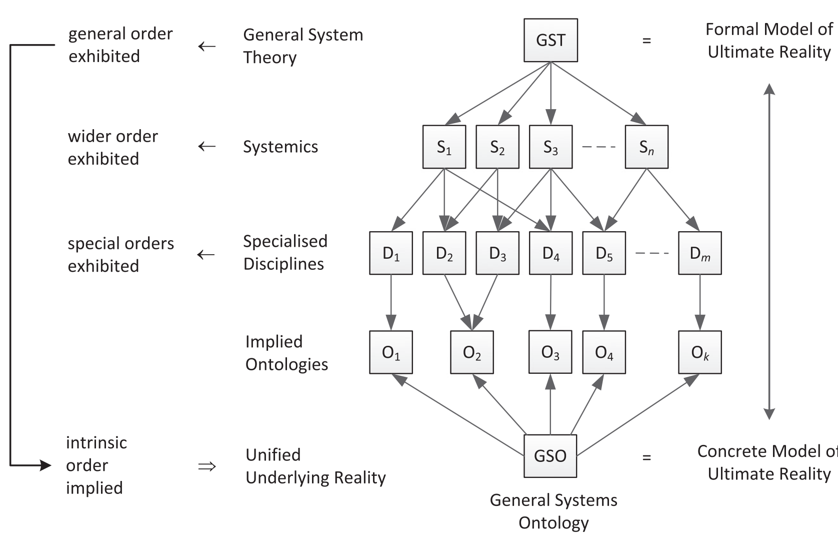

Figure 5 The unity of Ultimate Reality (D. Rousseau, forthcoming b)

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the possibility of a scientific understanding of the world originates in the naturalistic nature of Ultimate Reality.

Together, these findings mean the transdisciplinary methods grounded in GST, GSO and Systems Philosophy will be systemic, unified and scientific.

From Strict to Broad Naturalism

It is important to note that Naturalism does not equate to Physicalism or Determinism. Naturalism is the metaphysical view that everything that exists in a concrete way is (i.e. has causal powers) naturalistic, that is, it is located in space and time and only changes in proportionate ways or only cause proportionate changes. These characteristics make it possible for science to work out the mechanisms behind observed changes and postulate what exists most fundamentally. Science is therefore the epistemological counterpart of Naturalism (Danto, 1967). Naturalism has several important variants. Standard Naturalism denies the existence of supernatural particulars but is agnostic about the kinds of naturalistic particulars that exist. Strict Naturalism is a conservative version of Naturalism that corresponds to Physicalism, in that it denies both supernatural and non-physical particulars. Broad Naturalism is a liberal version of Naturalism that denies supernaturalism but accepts that fundamental particulars can have non-physicalistic properties, for example, mentalistic ones (Goetz and Taliaferro, 2008; D. Rousseau, forthcoming a).

Strict Naturalism has become a suspect view in contemporary philosophy, because there is now a strong case from cross-disciplinary and multidisciplinary studies such as Philosophy of Mind for there being more to reality than just physical aspects. The dominant view amongst these philosophers is that the objective reality and causal significance of consciousness, subjectivity and intentionality cannot coherently be doubted, but a rational account of such qualities cannot be constructed from only physical foundations (Gillett and Loewer, 2001; Chalmers, 2010). This challenge to Physicalism is very deep, for as Thomas Nagel and others have recently pointed out, an adequate ontology must also account for the possibility of reasoning, knowledge, judgement, morality, freedom, creativity, genius and so on (Antonietti *et al*., 2008; Tallis, 2011; Nagel, 2012, p. 106). These explanatory challenges suggest that *a coherent ontology grounding the whole of science* would have to involve a Naturalism more broadly conceived than Strict Naturalism. This is a coherent possibility, for so long as what exists ultimately can only change in constrained and proportionate ways, it would count as being naturalistic and scientifically investigable, even if it had properties other than physical ones (for a range of such arguments and proposals, see, e.g. De Caro and Macarthur, 2008; Goetz and Taliaferro, 2008; Burge, 2010; Koons and Bealer, 2010).[2]

Routes to Systemic Transdisciplinarity on the Basis of GST, GSO and Systems Philosophy

In 1954, the founding ambitions of the *Society for General Systems Research*, which since became the ISSS, already included developing a GST and a transdisciplinary language that could be used to facilitate communication between disciplines, help develop adequate models in fields that lack them, prevent duplication in research efforts and above all provide a means to bridge the gap between the physical sciences, social sciences and the humanities in a non-reductive and mutually appreciative way. This was a clear ambition relative to what was already at that time an urgent need, but until recent times, very little progress was made with establishing the envisioned GST and its associated tools and methods.

Several factors contributed to this lack of progress. The early systemists were not able to present a clear explanation of what a GST would look like (Hofkirchner and Schafranek, 2011, p. 178), and they had very limited ideas about how to actually develop it (Pouvreau and Drack, 2007, p. 332; Pouvreau, 2013, p. 859). Equally, they were unable to say anything convincing about

[2] It has long been noted that the systems sciences appear unable to deal with the apparent conflict between the scientific ideal of objectivity and the humanistic necessity of including norms in our worldview (Flood, 1990; Midgley, 2001). However, this problem may have been more perceived than real, and proposals have recently been put forward for making such a connection on systemic grounds (D. Rousseau, 2014b, forthcoming, b).

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how GST would bring science to bear on areas where it traditionally had little to say, such as the study of the nature of subjectivity, values and meanings (Pouvreau and Drack, 2007, p. 332).

However, despite these technical shortcomings and the historical lack of progress, some still believe that the early general systemists' vision was (and is) credible and that the subsequent lack of progress was largely due to limitations of context and period rather than deep-seated confusions or wishful thinking. Moreover, there has in recent times been a small revival of interest in these objectives, and several projects currently addressing these topics are showing promise or coming to fruition.

Of course, some researchers have been working on such projects all along, most notably Klir (2001) and Troncale (1978, 1985, 2009), although more researchers have joined the effort recently, especially since the founding in 2004 of the *Bertalanffy Centre for the Study of Systems Science* (www.bcsss.org) in Austria. Significant further developments have been the establishment in 2011 of the *Centre for Systems Philosophy* in the UK (www.systemsphilosophy.org), the establishment in 2012 of *Systema*, an open-access journal with an ambition to use systemic approaches to 'connect matter, life, culture and technology into a whole that nurtures flourishing at all scales and levels' (www.systema-journal.org), the creation in 2014 of a Symposium series within the *European Meetings on Cybernetics and Systems Research* to reflect on how to advance von Bertalanffy's work and vision (Denizan and D. Rousseau, 2014), the founding in 2014 of a Conversation strand within the *International Federation of Systems Research* on philosophical foundations for systems research (Wilby *et al*., in prep. a) and the creation in 2014 of a Special Integration Group within the ISSS on the subject of *Systems Philosophy* (http://projects.isss.org/sig_on_systems_philosophy). These developments have created new opportunities for researchers in this area to connect and collaborate, bringing new energy and enthusiasm to this work.

Different researchers are working on different aspects of this quest, or approaching the same aspect from different perspectives, but it is in the nature of the task that these projects will converge as they make progress, because they are all scientific endeavours and all have to find their grounding in the same unified, systemic and naturalistic ontology. The overall project of establishing a systemic framework for supporting transdisciplinarity has multiple aspects, including the development of

(i) an overarching and unifying GST;
(ii) an underlying Systems Philosophy model reflecting the unified ultimate ontology (GSO);
(iii) a transdisciplinary language;
(iv) a non-reductive means of bridging the gulf between the sciences and the humanities;
(v) a worldview that reflects these systemic insights;
(vi) a methodology for using these models and insights to make new discoveries on the nature of the world, ourselves and our place in the scheme of things, and to support our ongoing evolutionary development.

All of these areas are receiving significant attention at the moment, and some have recently made important progress as follows.

In the area of GST, the most developed project is probably Len Troncale's, as reflected in his 'System of Systems Processes Theory' (Friendshuh and Troncale, 2012). Interesting progress with GST is also being made in the systems engineering community, for example, by Kevin Adams and colleagues (Adams *et al*., 2014). Others working on a GST have been especially inspired by Kenneth Boulding, for example, Julie Rousseau has discovered a way to pursue Boulding's idea of GST yielding a kind of 'periodic table' of 'elemental' systems, opening up the prospect of discovering new kinds of systems from first principles (J. Rousseau, 2014), while Jennifer Wilby is using Hierarchy Theory to pursue Boulding's vision of a 'social science gravimeter' (Wilby, 2014).

In the area of Systems Philosophy, important progress is being made with understanding how philosophy relates to theorizing and practice in systems thinking (Wilby *et al*., in prep. a). John Mingers, following in the realistic tradition of the 'Bertalanffy Circle', has recently developed significant defences for ontological realism in systems thinking (Mingers, 2006, 2011), an area

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also defended (on sometimes very different grounds) by David Rousseau (D. Rousseau, 2013a, 2014c, in prep. a).

In the area of a transdisciplinary language, Len Troncale is making progress by pursuing von Bertalanffy's idea of basing it on isomorphies that are central to GST (Troncale, 1978; Friendshuh and Troncale, 2012), while David Rousseau is approaching it as a discourse domain for describing the unified ontology revealed by Systems Philosophy (D. Rousseau, 2011, 2013a, 2013b, forthcoming a, in prep. c).

In terms of addressing the rift between the physical sciences and the social sciences/humanities, systemic work is now gaining traction. Margaret Archer has led work towards a realistic ontology for social science while upholding the irreducibility of human qualities such as agency and identity, both via published work (e.g. Archer, 2000, 2012), and the founding in 2011 of the *Centre for Social Ontology*, now based in the University of Warwick. In similar vein, David Rousseau has laid groundwork for bringing values into science in a non-reductive way (D. Rousseau, 2014a, 2014b, forthcoming b).

On the worldviews front, important work is being carried out by researchers in the *Leo Apostel Center for Interdisciplinary Studies* at the Free University Brussels in Belgium, covering how systems thinking can contribute to overcoming worldview fragmentation (Aerts *et al*., 1994, 1995), and including international workshops and seminars, and a book series (e.g. Aerts *et al*., 2011, 2013). The possibilities in this area have been well illustrated by the recent publication of extensive overviews of systems thinking as applied in every aspect of life (Hooker, 2011; Capra and Luisi, 2014). Meanwhile, David Rousseau is developing models of the systemic architecture of worldviews and their relation to philosophical commitments (D. Rousseau, 2014c, in prep. b), while Rodney Scott has been investigating the mechanisms involved in how people change their worldviews (Scott, 2013).

On the basis of this spectrum of developments, new work has commenced towards developing methodologies that leverage these insights, for example, Wilby (2011), D. Rousseau (2013b, in prep. d) and Wilby *et al*. (in prep. b).

Some researchers are even claiming to have transcended GST and Systems Philosophy and opened up vistas beyond it (e.g. Kent Palmer with his 'Schemas Theory', and Gianfranco Minati with his 'Second Generation GST'). Whether these radical projects really take us beyond what others think are still works in progress is a subject for debate, but the energy and momentum in this whole area is very evident, and the prospects for GST, Systems Philosophy and systemic transdisciplinarity look brighter now than they have done at any time since the founding of the Society for General Systems Research/ISSS.

FROM TRANSDISCIPLINARITY TO THRIVABILITY

For perhaps the first time in 60 years, the realization of the vision of the founders of the ISSS looks as if it is within reach, and at last, we have clear and academically respectable ideas not only about how to get there but what these theories and methods might look like. The achievement of a framework of theories and methods that can support systemic transdisciplinarity is an urgent task, because the crisis on hand is an order of magnitude greater than the one which inspired the founding of the ISSS.

Important as multi-disciplinary, cross-disciplinary and inter-disciplinary approaches are, these approaches are not adequate for solving the complex crisis facing us. An effective solution can only come via the application of *systemic transdisciplinarity*. The unique value of systemic transdisciplinarity is that it can see across the boundaries between the disciplines and therefore reveal the impact of local interventions on the neighbouring and global system.

Without it, the challenges facing us are too complex to overcome, but with it, we have a real chance of working *with* the global system rather than just exploiting it, for the benefit of ourselves and the global system (Figure 6).

Most encouragingly, not only do we have this framework in prospect but also ISSS members and others have been working to establish an infrastructure for supporting our global

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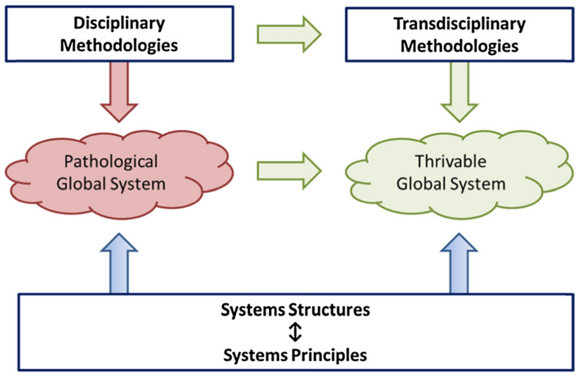

Figure 6 Evolution of thrivability via systemic transdisciplinarity

evolution as we learn, grow and integrate on our path towards a communal, holistic and thrivable future (Bosch *et al*., 2014; A. Laszlo and Delgado, 2014). In the light of all these developments, and the inspiration and energy generated by Alexander Laszlo's vision and call to action, we are more likely than not to achieve our evolutionary goal of establishing a thriving eco-civilization that nurtures flourishing at all scales, levels and aspects. These developments set the scene for the ISSS to take us forward, not only in 'learning across the boundaries' (Midgley, 2013) and developing shared foundations but also in using these learnings and frameworks to 'manage the Anthropocene' (Ison, 2014).

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