



# Manifesto for General Systems Transdisciplinarity

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**ABSTRACT** In August 2015 the authors launched their *Manifesto for General Systems Transdisciplinarity* at the annual conference of the International Society for the Systems Sciences. In this paper we discuss our motivation for undertaking this project, give an overview of key research we conducted to assure the possibility and importance of establishing such a transdiscipline, and reproduce the Manifesto in full.

**KEYWORDS** General Systemology, General Systems Transdisciplinarity, GSTD, exploratory science, General Systems Theory, GST, GST\*, Manifesto for GSTD

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## 1. Introduction

On the 4th August 2015 the authors launched their Manifesto for General Systems Transdisciplinarity at the 59th international conference and meeting of the International Society for the Systems Sciences (ISSS), held on that occasion in Berlin, Germany. This event marked for us a key milestone in our work toward rekindling the vision of the founders of the ISSS for establishing a transdiscipline grounded in a general systems theory (GST). Historical progress towards establishing such a transdiscipline has been slow (Flood & Robinson, 1989; Francois, 2006), and in the intervening years the very meaning of the term “GST” has become a subject of controversy (Francois, 2007).

We the present authors were of the view that the project of establishing a general systems transdiscipline is feasible, and that general systems transdisciplinarity (GSTD) would be a valuable

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addition to the means we have for addressing the challenges of our time. However, the task is not small and the workers are not many, and we therefore thought it important to prepare the ground for our call to action by developing arguments and models that address some of the widespread doubts about the possibility, potential and scope of GSTD. This paper presents a brief overview of the questions and issues we worked on, and the results of this inquiry, as a preamble to us here reiterating our Manifesto.

We worked on this project as a diverse team. We are all systems researchers, but we also have specialized interests and perspectives relevant to this project:

- David Rousseau is focused on the modelling of worldviews and the development of systems methodologies for exploratory science;
- Jennifer Wilby is an expert on transdisciplinarity, critical reflection and Hierarchy Theory;
- Julie Billingham is our scientific advisor and a modelling expert, and focused on helping us find pathways to developing a GST, and
- Stefan Blachfellner has expertise in social systems design and socio-ecological systems, and has deep experience in developing effective team-based research programmes, project planning, management, teambuilding and cross-disciplinary mediation.

We were supported in this work by many individuals and organizations, but we would like to especially highlight and acknowledge the valuable support and encouragement we received from the Centre for Systems Philosophy, the International Society for the Systems Sciences, the Bertalanffy Center for the Study of Systems Science, the International Federation for Systems Research, the Systems Science Working Group in the International Council on Systems Engineering, and the Centre for Systems Studies in the University of Hull.

## 2. The challenges, viability and potential of GSTD

### 2.1. The founding vision of general systems research

To appreciate the challenge and opportunity of GSTD, it is worth briefly revisiting the problematique and vision of “General Systems Research” in the founding days of the ISSS (then called the Society for General Systems Research (SGSR), ca. 1955.

As recounted in many sources, e.g. (Drack & Pouvreau, 2015; Hammond, 2003, 2005; Hofkirchner & Schafraneck, 2011; Pouvreau, 2014; Pouvreau & Drack, 2007), the founders of the SGSR/ISSS were deeply concerned by two significant problems, namely existential risks to human civilization (e.g. due to the proliferation of nuclear weapons, lack of peace efforts, and environmental degradation) and the loss of meaning, value and purpose in personal life (e.g. due to the rise of positivism, behaviorism and relativism in science, society and industry). Their diagnosis was that science and philosophy were relying unrealistically on overly simplistic models of reductionism, Physicalism and the machine paradigm. Their proposal was a call for the development of a GST than could support the development of a more appropriate and more enabling paradigm by:

- advancing the unity of knowledge
- contributing to a transdisciplinary language
- supporting scientific modelling where it is lacking
- bridging the gap between the object-oriented and subject-oriented disciplines without reducing either to the other

...and leveraging all this to build a “better world”.

Sadly, only limited progress has been made so far, and presently there is a diversity of perspectives about the project’s viability and value in the systems community. Typical questions for a new programme towards establishing a GSTD include:

- What is “GST”?
- How might it fit into the “systems field”?
- What would it look like?
- Does it exist in principle? Under what perspective(s)?
- How might we discover/develop it?
- What might its potential be? Would it have any distinctive powers?
- How can we support progress towards establishing it?

In the following section we will present a brief guide to our explorations into these questions.

## 2.2. Explorations towards a general systems transdiscipline

### 2.2.1. *What is “GST”?*

The meaning of the term “GST” has over time become highly ambiguous. In our paper “A Typology for the Systems Field” (Rousseau, Wilby, Billingham, & Blachfellner, 2016a), we present our analysis of this diversity, and propose ways to disambiguate the spectrum of meanings with a refined terminology. Our principal proposals are the term **GST\*** (pronounced g-s-t-star) to designate the foundational general theory of systems, **General Systemology** for the transdiscipline it would enable, and **Systemology** for the systems field as a whole.

### 2.2.2. *How does GST\* fit into the system field?*

In our just-mentioned “Typology” paper, we also present our “map” of the systems field, showing the components of the field and discussing the role of a general theory in that context. This work produced two important outcomes. First, in order to develop this map we had first to develop a generic systemic model of the structure of a discipline, which we call the “AKG Model” (Rousseau, Wilby, et al., 2016a, p. 23). This model may have wider value for reflections on the completeness and structure of other disciplines. This structure was useful for assessing the developmental status of General Systemology (Rousseau, Wilby, et al., 2016a, p. 34) and in working out the research agenda which we proposed in our paper “A Research Agenda for General Systems Transdisciplinarity” (Rousseau, Blachfellner, Wilby, & Billingham, 2016).

### 2.2.3. *What would a GST\* look like?*

We have looked extensively at clues in the works of the founders of the SGSR for what a GST\* might look like. A particular inspiration has been Kenneth Boulding’s classic paper “General Systems Theory – The Skeleton of Science” (Boulding, 1956). Although that paper contains many ambiguities (Billingham, 2014a; Wilby, 2006, 2014), one of us (Billingham) has shown how his metaphors can be usefully expanded to give practical advice about the structure of a GST\* (Billingham, 2014a, 2014b, 2015). By combining these insights with others from the history of the evolution of general theories in other disciplines we were able to propose both a more detailed model of what a GST\* might look like and also to make suggestions about the developmental phases of GST\* (Rousseau, Billingham, Wilby, & Blachfellner, 2016a). These models and guidelines may be valuable for planning the foundational work towards developing a GST\* as described in our paper “A Research Agenda for General Systems Transdisciplinarity” (Rousseau, Blachfellner, et al., 2016).

### 2.2.4. *Could a GST\* exist in principle?*

Many have doubted, or even argued against, the possibility and value of a GST. In our paper “The synergy between General Systems Theory and the General Systems Worldview” (Rousseau, Billingham, Wilby, & Blachfellner, 2016b) we discuss the philosophical assumptions of the founders of the SGSR, and show that these assumptions collectively entail not only the existence of a GST\* but

also that if one existed it would have “the same ubiquity and utility as general ‘Laws of Nature’ such as Conservation of Energy and the General Theory of Relativity” (ibid p.66). Not only that, but (if these assumptions were upheld) than GST\* could indeed, as the founders supposed, help us bridge the gap between the physical and social sciences, and we would be able to leverage it towards building a “better world”(ibid p.67).<sup>1</sup> GST\* would thus not only exist but have the kind of value the founders supposed. In our cited paper we mention the increasing contemporary support for these assumptions and reasons for optimism that they will be upheld. In our view, the founders were ‘ahead of their time’ in terms of their worldview, and the historical lack in progress towards a GST\*, and the potential to develop it now, may be significantly due to how the philosophical milieu was then and have changed since.

### ***2.2.5. How could a GST\* be discovered?***

The historical lack of progress towards the developments of a GST\* casts a shadow over new calls for its development. However, we have been able to propose two constructive approaches to the discovery of a GST\*:

- On the basis of our analysis into the generic structure of general theories (Billingham, 2014a, 2015; Rousseau, Billingham, et al., 2016a) we have been able to propose a detailed vision of the structure of GST\*, which provides a principled framework for assessing the developmental status of GST\*, planning work to complete it in a systematic way, and defend its intrinsic utility (Rousseau, Billingham, et al., 2016a, p. 98).
- By analysing the relationship between the General Systems Worldview (GSW) and the GST\*, we have been able to suggest how work towards articulating the GSW could incidentally provide advances in GST\*, and how such advances would facilitate the development of a more comprehensive GSW, in a virtuous cycle (Rousseau, Billingham, et al., 2016b).

### ***2.2.6. What special value would GSTD have?***

Many kinds of disciplinarity are now known, and we discuss their natures and relationships in our paper “The Scope and Range of General Systems Transdisciplinarity” (Rousseau, Wilby, Billingham, & Blachfellner, 2016b). By taking note of our analysis of the structure of a GST\* and its role in Systemology (as discussed earlier), we suggest in our referenced paper that GSTD might potentially be the most powerful of the transdisciplines, and that progress towards a GST\* would open up several routes to new scientific discoveries and developments, including:

- the discovery of novel systemic processes and mechanisms in nature (just as gaps in the early Periodic Table heralded discovery of novel chemical elements), and the development of new Systemics<sup>2</sup> corresponding to these new processes and mechanisms;
- the discovery of new methodologies for systemic intervention, management, engineering or control based on the above-mentioned new Systemics;
- the development of new methodologies for exploratory science based on the combination of the general principles of GST\* and the general insights of the GSW;

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<sup>1</sup> No conventional standard exists for the notion of a “better world”. For a proposal towards an objective model of a “better world” grounded in the General Systems Worldview, see (Rousseau, 2015).

<sup>2</sup> Mario Bunge (Bunge, 1979, p. 1) introduced the term “Systemics” for theories characterising specific systemic phenomena, e.g. Hierarchy Theory or Cybernetics.

- advances in translational systems science based on the emerging vocabulary and models of GSTD;
- advances in diverse sciences and philosophies based on the incorporation of insights from General Systemology research, and the employment of the methodologies in interdisciplinary and transdisciplinary work .

These potential developments would make GSTD even more valuable and powerful than foreseen by the founders of GSR.

### ***2.2.7. What will it take to establish GSTD?***

As our analysis of the structure of a discipline has shown, a viable discipline involves much more than just set of theories and methodologies. Developing a successful and effective transdiscipline on the basis of GST\* will require action on abroad front. In our paper “A Research Agenda for General systems Transdisciplinarity” (Rousseau, Blachfellner, et al., 2016) we use the structure of a discipline as captured in our “AKG Model” to identify the strategic questions and issues that have to be addressed as GSTD develops into a competent and valued transdiscipline.

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Based on these explorations into the meaning, possibility, function and potential of GSTD we are confident in presenting to the systems community our Manifesto advocating the importance of GSTD and calling for action to develop and employ it towards the greater good of a thriving humanity in a thriving socio-ecological system.

## **3. Manifesto for General Systems Transdisciplinarity**

### **3.1. A World on the edge**

Our world and our society are in trouble. Nature’s systems are complex and interconnected, yet our knowledge resides in disciplinary silos. As a result, our human activities tend to originate from within these siloed domains, and as they become increasingly impactful, the risk of unforeseen consequences becomes ever stronger. The interdependent systems we rely on for our survival and our welfare are in danger, sometimes even due to the actions we take to try to protect ourselves and our planet.

This looming crisis was foreseen and forewarned a half-century ago by the founders of General Systems Research (GSR): Ludwig von Bertalanffy, Kenneth Boulding, Anatol Rapoport and Ralph Gerard. The “Bertalanffy Circle” shared an ambition to develop a systems transdiscipline, grounded in a General Systems Theory (GST), that would help overcome academic fragmentation and that could be leveraged to build a systemically healthy world that promotes personal dignity, human welfare, international cooperation and environmental stewardship. They saw this as an urgently needed response to impending human, social and environmental calamities (Laszlo, 1972; Rapoport, 1974, p. 247; von Bertalanffy, 1964, pp. 496–498; Hofkirchner, 2005, p. 1; Hofkirchner & Schafranek, 2011, p. 192; Pouvreau, 2014, p. 180).

Since the 1950s, systems researchers have developed dozens of specialized theories centred on specific systemic behaviours and structures. However, a powerful and integrating systems transdiscipline remains elusive (Dubrovsky, 2004; Francois, 2007; Adams, Hester, Bradley, Meyers, & Keating, 2014). Furthermore, with specialization has come a divergence of worldviews and discourse domains (Flood & Robinson, 1989, p. 63; Midgley, 2003, p. xvii; Francois, 2004, p. 248; Troncale, 2009, p. 553), resulting in a fragmentation that undermines our ability to muster integrated responses to our present challenges. This fragmentation cannot be overcome while we do not have a unifying theory for the systems field.

Historically, disciplinary fields have only become scientifically and technically powerful once their unifying theory starts to take shape. Theories such as those of Darwin, Mendeleev and

Newton transformed their respective disciplines by unifying hitherto fragmented areas of study under a common conceptual and explanatory framework, and by rapidly opening up new avenues of scientific discovery.

In the case of the systems disciplinary field the unifying theory would be a GST in the sense of a theory that encapsulates the universal principles underlying systemic behaviours and structures (we call this theory GST\*, pronounced “g-s-t-star”, to differentiate it from other uses of the term “GST”). Without such a unifying theory providing for an integrated approach the empirical complexity of the world may always subvert our attempts to achieve thriving.

However, the challenge for the systems field is that so far we have only fragments of a GST\*, and research towards GST\* and the General Systems Transdiscipline (GSTD) it would empower does not have sufficient individual, financial and institutional support for rapid progress to be possible (Drack & Schwarz, 2010; Rousseau & Wilby, 2014).

### 3.2. A Renewed Vision

The Bertalanffy Circle envisioned that a GSTD could be developed and used to support interdisciplinary communication and cooperation, to facilitate scientific discoveries in disciplines that lack exact theories, to promote the unity of knowledge, to help to bridge the divide between the object-oriented and the subject-oriented disciplines without reducing either to the other, and to contribute to the building of a “better world” (von Bertalanffy, 1972, pp. 413,424–424; Laszlo, 1974, pp. 15–16, 19; Rapoport, 1976; Hammond, 2003, p. 247).

Although progress towards this vision has been slow, we believe that the conditions have turned in favour of breakthrough progress towards a GSTD in the immediate future:

- Recent times have seen an important growth in academic credibility of the moderate naturalism and critical realism implicit in the Bertalanffy Circle’s vision (Psillos, 1999; Ellis, 2002; Glennan, 2010; Hooker, 2011; Illari, Russo, & Williamson, 2011; Archer, 2013; Craver & Darden, 2013; Mingers, 2014);
- Researchers have made compelling arguments that a GST\* is in principle a feasible prospect given such philosophical views (Rousseau, 2015; Wilby et al., 2015), that it would be productive rather than so general as to be trivial (Rousseau, 2014, 2015; Rousseau, Wilby, Billingham, & Blachfellner, 2015a; Wilby et al., 2015), and they have presented concrete ideas about the form a GST\* might take (Billingham, 2014a, 2014b, 2015);
- Systems-oriented societies and institutes have recently demonstrated an active interest in developing a GST\*/GSTD <sup>3</sup>;
- Individual researchers have identified a variety of approaches to the issue of developing a GST\*, thus increasing the likelihood of breakthrough discoveries and synergistic progress (Billingham, 2014b, 2015; Friendshuh & Troncale, 2012; Klir, 1985; Palmer, 2004, 2015; Rousseau, 2015).

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<sup>3</sup> see e.g.:

- <https://sites.google.com/site/syssciwg/projects/unified-sys-sci-theory>
- <https://sites.google.com/site/syssciwg/projects/o-systems-philosophy>
- <https://sites.google.com/site/syssciwg2015iw15/sswg-at-iw15>
- <https://sites.google.com/site/syssciwg2015iw15/systems-science-workshop-at-is15>
- <https://iss2015.sched.org/event/5fdc2e6f7214f77847486fc1d1d84c78#.VbKtsPn4kfg>
- <http://www.bcass.org/research/fields-and-groups/systems-science-and-philosophy/>
- <http://www.incoase.org/newsevents/currentevents/2015/04/16/webinar-76---systems-philosophy-and-its-relevance-to-se>
- <http://emcsr.net/calls-2014/calls-for-papers-2014/bertalanffy-and-beyond-improving-systemics-for-a-better-future/>
- <http://www.ifsr.org/wp-content/uploads/2015/05/IFSR-Conversation-2014-Proceedings.pdf>
- [http://projects.iss.org/doku.php?id=sig\\_on\\_research\\_towards\\_general\\_theories\\_of\\_systems](http://projects.iss.org/doku.php?id=sig_on_research_towards_general_theories_of_systems)
- [http://projects.iss.org/doku.php?id=sig\\_on\\_systems\\_philosophy](http://projects.iss.org/doku.php?id=sig_on_systems_philosophy),

We, the authors of this Manifesto, believe that the discovery and development of a General Systems Transdiscipline is both possible and important, so we have been striving to outline a vision and research agenda for how progress might be made by a research community working towards this common goal. Initially, we abstracted the structure and dynamics of a discipline, and used this to show what would be involved and contained in a “systemological” discipline (Rousseau et al., 2015a; Rousseau, Wilby, et al., 2016a). We also explored the nature of transdisciplines, to understand what would additionally characterize a general systems transdiscipline (Rousseau, Wilby, Billingham, & Blachfellner, 2015b; Rousseau, Wilby, et al., 2016b). We argue that this disciplinary structure provides a framework for organizing the collective efforts of the GSR community. In addition, we realized that progress towards discovering a GST\* is intimately linked with progress towards articulating a General Systems Worldview (GSW), and that this provides a potentially powerful new route towards a GST\* (Rousseau, 2015; Rousseau, Billingham, et al., 2016b). We hold that these foundations will facilitate collaboration towards realizing the vision of the founders, and call upon general systems researchers to join in our collective efforts.

### 3.3. Steps toward a General Systems Transdiscipline

In accordance with the new vision outlined above, we believe that progress can best be made by focussing on the development of:

- a **General Systems Worldview (GSW)** that is informed by our best scientific knowledge, by new discoveries in systems science, by advances in general systems research, and by the debate about the unity of science and the plurality of perspectives employed in systems thinking and practice;
- a **General Systems Theory (GST\*)** that includes:
  - an ontology of systems that can be used to describe systems and classify them in an unambiguous way;
  - models that characterize the kinds of processes that support the evolution, expression or degradation of systemic behaviours;
  - models of the mechanisms that underpin systemic evolution or systemic behaviour;
- **General Systems Methodologies (GSMs)** that can leverage GST\* under the guidance of the GSW to:
  - extend and refine GST\*, the GSW and the methods of GSR;
  - discover new Theoretical Systemics, i.e. specialised theories about kinds of systemic structures, processes, behaviours, etc., or enhance existing ones;
  - discover new Methodological Systemics, i.e. specialised methods for systemic research, design, engineering, management, education etc., or enhance existing ones;
  - support exploratory science in all areas of scientific inquiry;
- a **General Systems Transdisciplinarity (GSTD)** that employs the GSMs to address the looming and present crises facing human civilization; and to contribute to the building of a thriving future world.

We encourage general systems researchers to meet, connect, discuss and report on progress towards the establishment of GSTD, whether by creating new opportunities or via existing fora e.g.:

- Special Integration Groups (SIGs) of the ISSS;
- Discussion Groups and Workshops of INCOSE’s Systems Science Working Group;
- Symposia of the EMCSR;
- Conversations of the IFSR;
- Groups, Symposia and Workshops of the BCSSS;
- [www.facebook.com/GeneralSystemsResearch](http://www.facebook.com/GeneralSystemsResearch).

### 3.4. Call to Action

We call on all who support the vision for a better tomorrow facilitated by GSTD to:

- [sign the Manifesto](#) to indicate your support, and recommend it to others who might support the vision and objectives of the general systems research community;
- support or undertake efforts to **raise awareness** of the need for and potential of GST\* and GSTD;
- support or undertake efforts to **improve institutional support** for research towards the development and application of GST\* and a GSTD;
- support or undertake efforts to **raise funding** for research towards the development and application of GST\* and GSTD;
- encourage or **undertake research** towards the development of GST\* and a GSTD and towards strengthening its foundations and credibility;
- participate or encourage others to **participate** in institutional and societal initiatives and activities in support of the development and application of GST\* and a GSTD;
- support the building and effectiveness of the community of general systems researchers by using the GSR Facebook page to **engage** with general systems researchers, including notifying the community of relevant events, discussion groups, funding opportunities, presentations, workshops and publications. The Facebook page is at:  
www.facebook.com/GeneralSystemsResearch

### 4. Epilogue

The Manifesto for General Systems Transdisciplinarity is available on-line at:  
<http://systemology.org/manifesto.html>.

Since the launch in August 2015 it has attracted signatures from researchers in more than 20 countries, demonstrating wide-ranging contemporary interest in general systems research. Looking ahead:

- We will be presenting advances in GSTD at the forthcoming 60<sup>th</sup> conference of the [International Society for the Systems Sciences](#) in Boulder, Colorado, July 24-30, 2016. The conference theme is “Realizing Sustainable Futures in Socio-Ecological Systems”;
- Springer will be publishing an introductory text by us on GSTD in 2017, under the title: “General Systemology: Transdisciplinarity for Discovery, Insight and Innovation”, see <http://www.springer.com/gb/book/9789811008917>.

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