Proceedings of the 2016 IFSR Conversation
Team 3: Systems Research Team

Systems Research: A Foundation for Systems Literacy

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Abstract

In this paper, the Systems Research Team (SRT) details the activities and outcomes of the 2016 IFSR Conversation in Linz, Austria. The 2016 SRT includes: Mary Edson (team leader), Pam Buckle Henning, Tim Ferris, Andreas Hieronymi, Ray Ison, Gary Metcalf, George Mobus, Nam Nguyen, David Rousseau, and Shankar Sankaran, with guest team member, Peter Tuddenham, anchoring the endeavor in Systems Literacy. While the 2014 SRT's focus was answering the question, "What distinguishes Systems Research from other types of research?" an internal focus intended to provide grounding for researchers new to the Systems Sciences, the 2016 SRT's focus is on reaching out to a broader community in order to provide a foundation for Systems Literacy. The team's Conversation revolved around the question, "How can Systems Research be in service to Systems Literacy?" The team's discussions were directed into two essential aspects, separate and integrated, of this question. First, Systems Research serves Systems Literacy by providing a credible foundation for the principles and practices of Systems Science and Systems Thinking in both systematic and systemic modes. Second, Systems Research provides a neutral frame for development of ethical applications of those principles and practices.

The SRT recognizes the exigency in providing foundational principles that can be effectively adopted and disseminated through Systems Literacy. The team's narrative begins with an understanding the urgency for application of Systems Sciences and Systems Thinking to critical issues. Systems research, as with other types of research, is typically a slow generation of results; however, the body of knowledge gained through this process can be confidently used to address complexity in timely ways. The criticality of the need for salient approaches to complexity is shown in a graphic representation of some possible trajectories of applying or not applying these

Systems principles[1] in practice. The choice of how we respond to these issues relates to a process model that can be applied. Through understanding the relationship of the process model to the trajectory, the team directed its focus to developing a MindMap (Eppler, 2006) of eight essential aspects or features of how Systems Research can support Systems Literacy. These include: Systems Science knowledge base, roles and personas, maturity models, role profile, ontology/vocabulary, perspective/framing choice, frameworks, and political ecology. Each of these eight has its own process of unpacking, which was demonstrated to the Conversation participants by delving more deeply into the aspect of knowledge base. The eight relate to unpacking the Systems landscape in a coherent but loosely coupled investment portfolio (economic, social, and relational) for building *systemic sensibility* in such a way as to be dis/aggregated for different audiences. The week's work culminated in a plan for "Looking Ahead," which outlines the intentions of the SRT to continue its activities in support of Systems Literacy in the upcoming months. An example of this continued work is a workshop, "Toward Systems Literacy, the Role of Systems Research," that was conducted at the 60th Meeting of the International Society for the Systems Sciences in Boulder, July 25, 2016. The following sections describe the SRT's Conversation in detail, with some updates and reflections from the workshop.

Introduction: Systems Literacy as the Bridge from Sensibility to Capability

The opening discussion of the SRT meeting aimed to articulate the value of systems literacy, explore ways in which that value can be realized, and reflect on how Systems Research can facilitate this transition. Ray Ison suggested that systems literacy engenders systemic capability in practice, and achieves this by developing innate talents people have (see Figure 1 and discussion further on). The group adopted this view and Ray's diagram is shown redrawn and slightly expanded in Figure 2.

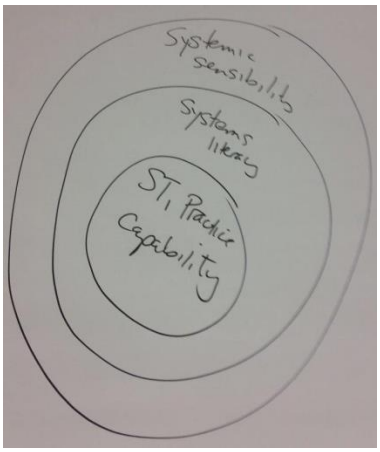

Figure 1. Relationship of Systems Literacy to Systemic Capability in Practice

[1] In her novel, *Sense and Sensibility* Jane Austen created characters who primarily embodied sense (which we will understand through the term 'systems literacy') and sensibility. The meanings she ascribed to these terms were: "Sense" …. means good judgment or prudence, and "sensibility" means sensitivity or emotionality (see https://en.wikipedia.org/wiki/Sense_and_Sensibility). Sense and sensibility (or systems literacy and sensibility) can thus be understood through the systemic concept of a duality, a totality.

According to this view, everyone starts out with "systemic sensibility", i.e. an innate, intuitive or tacit appreciation of systemicity in the empirical world. Such a view is theoretically defensible in the light of George Mobus's report that the "language of thought" is systemic, if we combine that finding with the idea from evolutionary epistemology that our cognitive capacities and mental categories are evolutionary adaptations to the intrinsic nature of the world. Systemology formalizes this tacit knowledge, so that education in Systemology provides persons with clear concepts and a common language that gives them the capability to articulate and reflect on this innate sensibility, and act on it in a considered way.

Systems literacy therefore not only empowers people individually but can connect people to communities of practice in which their sensibility can be expressed as a responsible and effective capability. Systemic capability is then enacted in terms of various roles systems literate persons can fulfill as they apply systems knowledge (see Figure 2).

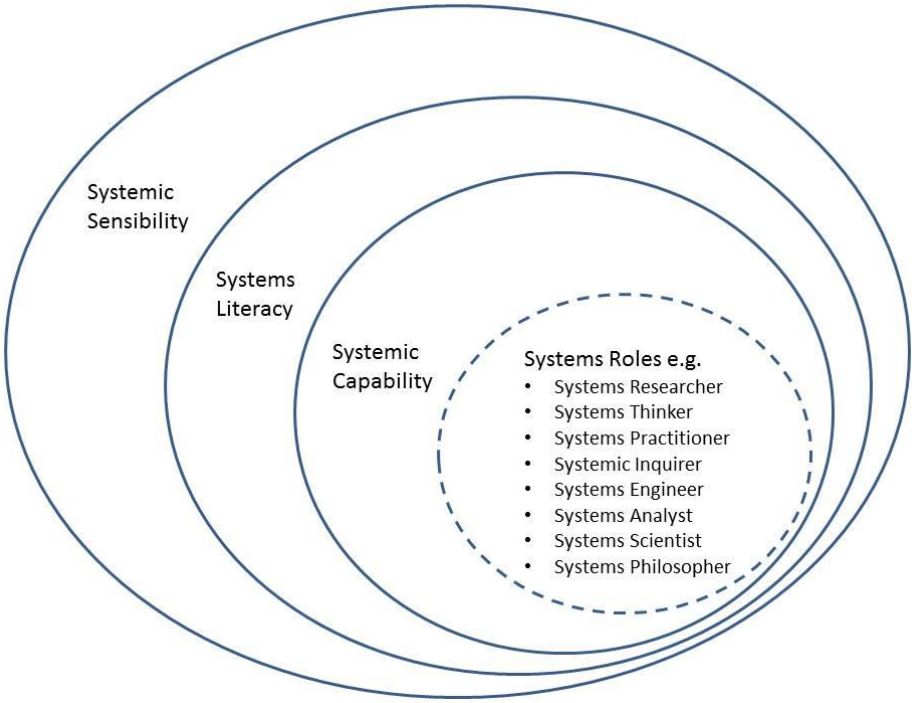

Figure 2. Systems Literacy Refines Systemic Sensibility to become Systemic Capability

The extended version of Ray's diagram shows systems roles as examples of ways in which systemic capability can be enacted. The dotted boundary around the roles serves as a reminder that the roles are not fixed designations but that the same person can fulfil different roles at different times or in different contexts, and that the roles also have some overlaps with each other and roles from other disciplines in terms of their profiles (although there are roles concerned with developing and promoting Systemology per se, the roles typically involve applying systems knowledge in the context of specialized problems, concerns or intents).

The team felt that this framing of systems education as nurturing and empowering a natural talent that is of evolutionary significance is compelling, and a simple diagram like this and the

basic narrative that goes with it can serve as an accessible and persuasive introduction to the importance of systems education and the need for investment towards wider systems literacy.

Exigency of Systems Research to Systems Literacy

The necessity for Systems approaches to address larger issues and problems informed much of the Conversation, as the limitations of traditional approaches have been realized. Nam Nguyen shared the following graphic of this trajectory (Figure 3), emphasizing the urgency for putting these approaches into practice.

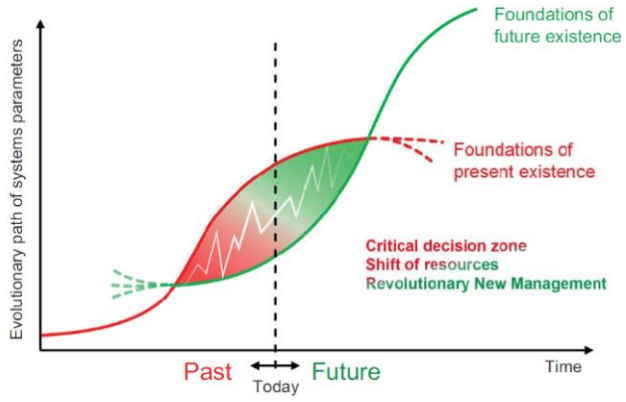

Figure 3. The Great Transformation21 (from the Old to a New World) from Malik (2016) at http://www.malik-management.com/en. *Note: Colors of "Red Curve" and "Green Curve" do not carry any meaning except for distinction to illustrate "The Great Transformation21"*

Economies and societies are going through a Great Transformation. We have been going through the red curve for a long time with the existing foundations. There is another curve (the green curve) with foundations of future existence.

There is a universal pattern of transformational change. It is the particular case of substitution, also called creative destruction. However, growth can go on, but it changes direction. While the Old World is still strongly growing (symbolized by the red curve), a New World is already emerging – slowly and often unnoticed or neglected (symbolized by the green curve). It will substitute the Old World. Examples are the horse cart and the automobile; chemical photography and digital image processing. For long term growth and prosperity, one needs to get onto the green curve on time or face the consequences, anticipated and unanticipated. While in earlier times, societal revolutions were induced by technological innovations, today social technology of system-cybernetic management will revolutionize the functioning of companies, societal organisations and whole countries (Malik, 2016).

The overlap area is a critical zone in which 3 decisions need to be made:

- Keep going on the red curve for as long as possible
- Providing resources to move from the red curve to the green curve
- Getting on the green curve

In order to do the right things today, one needs to know the patterns of change – and recognize them. For us, as individual systems scientists/scholars and also, collectively, as the systems

society, it is critical to find ways to move ourselves and the systems field, together with systems research and system literacy, from the red curve to the green curve.

Process Model

Andreas Hieronymi led the co-creation of a visual process model that provides an overview of the role of systems research for the advancement of systems literacy. The following thoughts represent aspects of what the SRT discussed over the week in Linz. We asked ourselves, "Why do we care about systems science, systems literacy and systems approaches?" The purpose is not just about increasing the number of systems books and papers, but finally about the changes we want to see in the world. But how can we bridge the perceived gap between academic knowledge and real-world practice? What are the necessary intermediary factors from insight to impact? The following process model (Figure 4) tries to capture this and consists of five main variables/factors (or pillars) that are linked through a sixth one. In one long sentence we can connect all these aspects as follows: A "high quality of systems knowledge" (pillar one) enables "systems researchers" (pillar two) to gain influence in "supporting organizations" (pillar three) and through them to better enable "systems thinking and acting of individuals and groups" (pillar four) what may lead to more "quality in dealing with complex challenges" (pillar five) and produce "reports and case studies" (sixth factor) that finally feeds back into improving the "systems knowledge base" (pillar one).

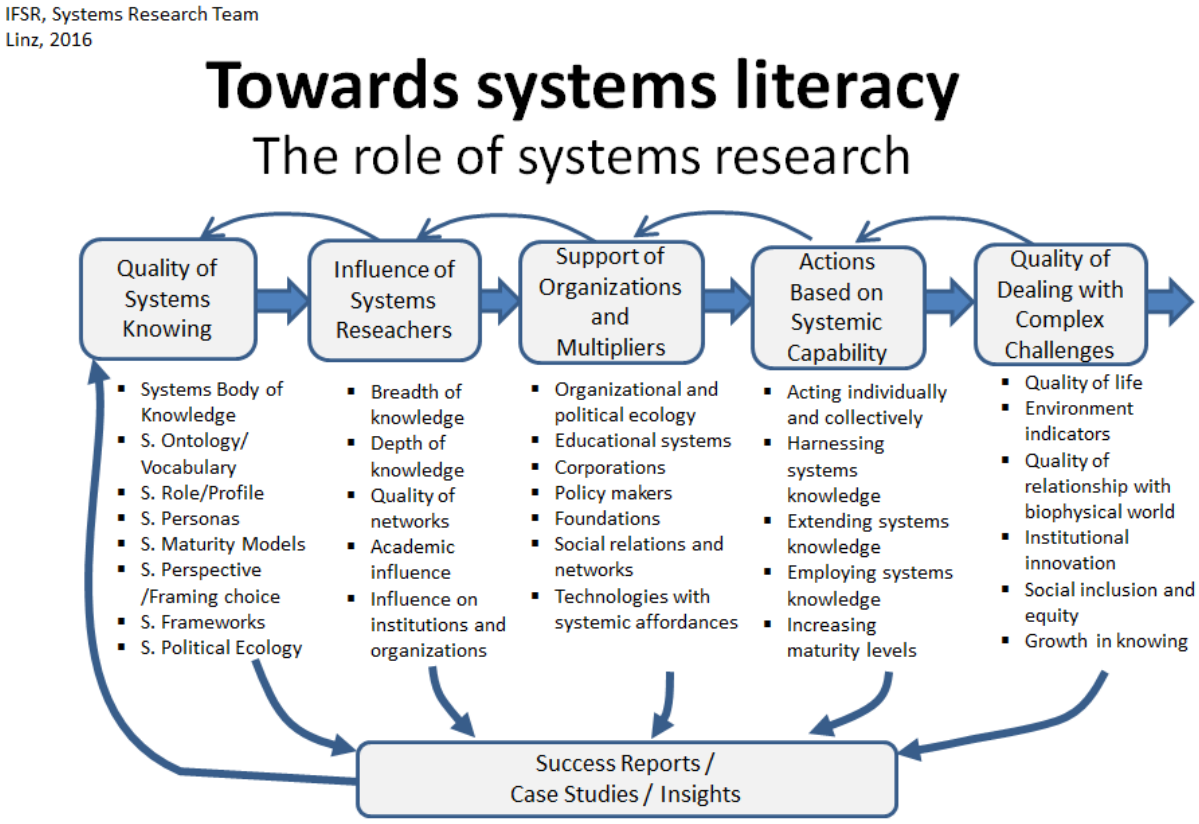

Figure 4. Towards systems literacy – The role of systems research

Systems Analysis – Future Potentials

George Mobus shared his observation that the process started here, at the Conversation, essentially a kind of agile method for finding a set of seed ideas, has provided an excellent beginning for a more rigorous top-down systems analysis. Here is a sense of what we are working on and toward.

The SRT is *acting as a process to generate a process*, i.e. to develop a framework for the production of a set of guiding principles, including possible structures to be employed, for the doing of systems research. The intent of this effort is that by doing so future systems researchers (in different roles such as pure or applied research) will contribute to a common framework in which the other sciences (natural and social alike) can operate to enhance and increase the systemicity of their work. The objective includes a broader application of systems literacy that goes beyond just doing science to the whole of social thinking and doing. The work started here must eventually be witnessed succeeding as social norms in thinking through complex problems (e.g. political) and move from linear, isolated conceptualization to the systems point of view.

To that end the team identified eight believably critical factors or components that form the structural aspects of the hoped for process. As mentioned, one of these, the body of knowledge of a scientific process (what can be considered "normal" science) was further unpacked by David who had already given (with J. Billingham, J. Wilby, and S. Blachfellner) a great deal of careful thought to what the knowledge base would look like structurally and functionally. This unpacking procedure can be seen as an essentially top-down systems analysis or deconstruction of the parts without losing track of the connections. The same kind of unpacking is needed with the other identified factors. The matter of "vocabulary" will be tabled, but it could be treated as a need for a full language of systems, something George has been working on for several years.

With this proposal, we now have a five-part projection model of what effects we should be looking for as the “product” if our to-be-invented process is conveyed to the systems science research world and hence to the science and social world beyond. While we have referred to this as a Process Model, it may also be characterized as an evolutionary transformation model. This is because what will follow in the long run is not under our, or the systems scientists’, or the disciplinary scientists’ direct control; it is only under our influence if we do a good job in communicating its value for application in other fields.

George proposed the application of a systems analysis (Mobus, 2015) to what we have so far in order to better identify the actual processes that will produce the actual products and resource inputs needed. He had previously done this kind of analysis to a small degree and will be sharing that work incorporated into a larger systems analysis of what the team is doing and following the longer term societal transformation progression.

Through an iterative process of feedback exchanged with the team, the SRT in essence becomes the "users" (actors or agents) thus capturing the real needs of the users. In other words, the members of the SRT are not merely attempting to be objective observers but participants in the systems in which they research, possibly agents of change and transformation.

Eight Critical Factors

After identifying eight, believably critical factors or components that form the structural aspects of the hoped for process our team decided to explore these further. After debating about whether to use textual forms or visual forms, it was agreed that we prepare a list and then create a mind map for each factor. As shown in the Process Model, the list of eight factors we compiled is as given in Table 1 below.

Table 1. Eight Critical Factors of the Systems Landscape

	Systems Landscape Critical Factors
1	Systems Body of Knowledge
2	Systems Ontology/Vocabulary
3	Systems Role/Profile
4	Systems Personas
5	Maturity Models
6	Systems Perspective/Framing Choice
7	Systems Frameworks
8	Systems Political Ecology

note: the "Maturity Models" factor relates to three identified aspects: Maturity Models of Systems Roles, Maturity Models of the Systems Body of Knowledge, and Maturity Models of the Systems Field as a whole.

The team then worked on drawing a mind map of the critical factors (or ways of knowing) and developed separate mind maps of each of these factors.

Using these mind maps and the preceding discussions during the week it is possible to briefly characterize each factor and the relationships between them in the following way.

The **Systems Body of Knowledge** enables the activities involved in expressing systemic capabilities, and it consists of data, methods, methodologies and theories (more detail on this is given further below). This body of knowledge is grounded in a **Systems Ontology/Vocabulary** that captures the core concepts and key terms needed to characterize and explain the kinds and natures of systems, and to articulate assumptions about the fundamental constituents or 'building blocks' of systems. The structure of the systems body of knowledge is akin to that of other scientific bodies of knowledge, and this makes it possible to construct a **'Systems Body of Knowledge Maturity Model'** which can be used to identify key gaps for research attention (more on this further below)

The knowledge base is applied under the guidance of **Systems Perspectives** and **Systems Frameworks.** A **'Systems Perspective'** reflects the fundamental assumptions that are made in systemic undertakings. This involves components of the systems worldview such as a systems

ontology (assumptions about the kinds and components of systems), a systems metaphysics (assumptions about the nature of systemic entities) and a systems epistemology (assumptions about the nature and possibility of knowledge about systems). These aspects of the systems perspective condition how systems terms are interpreted (which meanings are applied), and what is framed as a problem or research question in relation to a particular presented scenario. An important aspect of the systems perspective is that it is reflective and reflexive, that is, it is an express aim of systemic undertakings to make explicit the assumptions that underlie perspectives, to critically reflect on how they condition perceptions and possibilities, and to consider the viability of alternative assumptions. It is by critical reflection on such alternatives that alternative **'Framing Choices'** are identified for a given scenario, enabling selections to be made that are appropriate for the given scenario and context rather than having the perspective set a priori. A framing choice therefore represents a systems perspective that is tailored for the specific situation. '**Systems Frameworks'** then formalize how to use a given framing choice to select systems methodologies as appropriate for use a given situation, problem or context, and guide how the methodology and its outcomes are interpreted in that specific case.

The enactment of the knowledge base under the guidance of perspectives and frameworks are executed by individuals that fulfil certain **Systems Roles**, e.g. Systems Researcher, Systems Thinker, Systems Practitioner, Systemic Inquirer, Systems Engineer, Systems Analyst, Systems Scientist, Systems Philosopher. These roles reflect kinds of intentional context in which the person is working, for example exploration, theory or method development, innovation, design, consulting, etc., and each role is identified in terms of kinds of actions that can be performed in different contexts. Each systems role represents some way of being involved in the transdisciplinary activity scope of Systemology, but usually involves systems knowledge combined with some other field of specialized interest, in order to address some specialized question, problem or intention.

Each role can be characterized in terms of a '**Role Profile'.** The role profile matches the technical demands on that role (the kinds of issues/situations the person must be able to deal with) to a range of systems knowledge elements and personal qualities (e.g. adaptability, neutrality) needed for such activity. Each role profile can be further specified in terms of the level of competency required in each element of the systems knowledge base and each kind of personal quality, and this makes it possible to frame **'Systems Role Maturity Models'** which can be used to frame training plans for specific roles, and to assess/certify individuals in terms of their systemic competency for a certain role.

In order to identify the kinds of people who are suitable to fulfill specific roles, one can define a **'Systems Persona'** for each kind of role. A persona is an idealized version of a person that might enact a given role, identifying typical social, psychological, educational, domestic and demographic factors. A persona specification makes it easier to plan recruitment and training, and to anticipate how roles might be acted out in different contexts.

The roles fulfilled by Systemologists are executed within a wider **'Political Ecosystem'** that constrains and enables the potential of Systemologists, via competition with other disciplines for access to respect, acceptance, research funding, student recruitment, inclusion in reviews, consultations and calls for tenders/proposals, etc. Operations within this wider ecosystem is dependent on a special kind of disciplinary role, that of representing the discipline in a context of competition and cooperation with other disciplines and institutions. Every discipline has such a

role. In the case of Systemology this requires persons with knowledge of both the scope and depth of the systems landscape and knowledge of the political context in which Systemology has to succeed. Within this political ecosystem credibility is a major leverage point, and this was identified in discussions as an important point to focus on. This was included in the major process overview (see Fig. 4) as involving **'Success Reports'**, **'Case Studies'** and **'Insights'** arising from the systems approach. These items might be treated as data included in the knowledge base of Systemology, but they represent key content for defending the credibility and potential of Systemology in the political ecosystem in which Systemology is an actor. The field as a whole can be assessed in terms of a **'Systems Field Maturity Model'** that can be used to identify areas that need attention to improve the adoption of and support for Systemology as a valuable discipline.

All of these 'critical factors' have to be taken into consideration when working to establish Systemology as a valued and powerful contributor to how academia and industry moves forward in trying to establish a world that is sustainable, resilient, evolvable and, most importantly, fair to all stakeholders.

As an example, in the team discussion the first factor, 'Systems Body of Knowledge', was elaborated as shown in Figure 5:

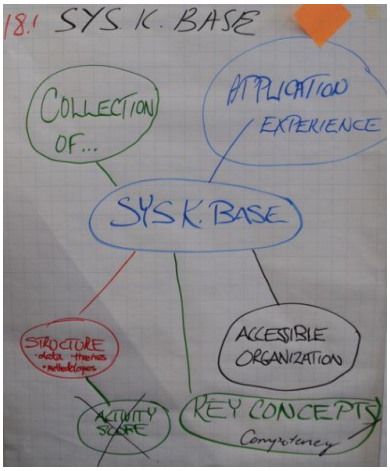

Figure 5. Systems Body of Knowledge mind map of possible elements

In relation to this component David Rousseau then showed us how we can use the work he and others recently did to elaborate further the content on this poster (Figure 5). This could be repeated for all the eight Critical Factors, which could then be used to attract people to invest time and resources for further development.

Knowledge Base of a Discipline

David showed a generic way of modelling the structure of the knowledge base of a discipline. This model was developed by the General Systems Transdisciplinarity team, but it is suitable as a basis for the sort of direction the SRT is aiming at in terms of developing views on the components of the Systems Landscape, as we discussed in the SRT during the week. Three important things should be noted at the outset.

First, the building up of the knowledge base depends on factors that are not part of the knowledge base per se but originate in the discipline's guidance framework. This includes the definition of the subject of interest for the discipline (creating an empirical boundary for the discipline) and a technical vocabulary (which, like the empirical boundary, can be interpreted differentially based on worldviews of individual scientists). Second, the basic knowledge base model is fairly simple, making the model easy to apply. It shows that the knowledge base consists of data, three kinds of theories and also methodologies (with all these terms very broadly construed). This provides a framework for elaboration as shown in Figure 6.

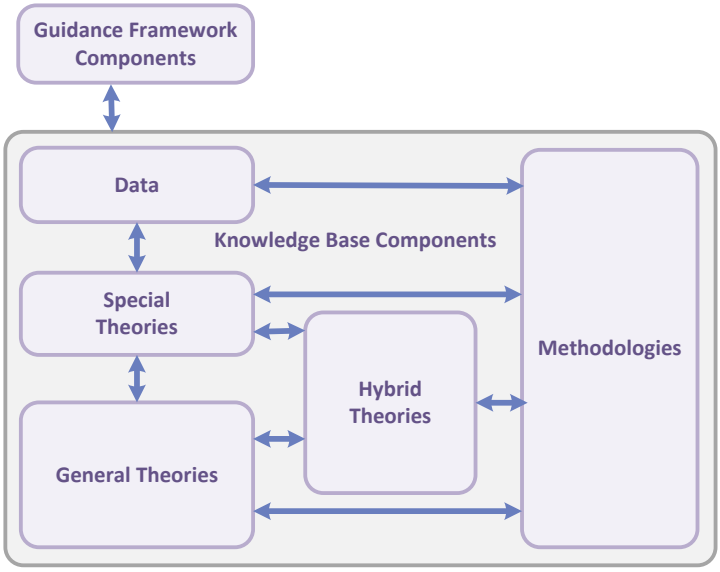

Figure 6. The structure of a Knowledge Base (adapted from Rousseau et al., 2016, Figure 9)

Third, the knowledge base of any discipline is typically developed by working through a set of structured questions about the disciplinary subject, namely what are the subject entities like, how do they work, how do they come about, and why some types and designs do not appear or persist. At each stage we develop descriptions and theories that can support the development of methodologies. The questions address systemic issues of increasing sophistication - complexity ("what are entities like?"), machine models ("how does it work?"), developmental models ("how do complex individuals come about?") evolutionary models ("how do diverse kinds come about?") and eventually holistic models ("why do only some types appear or persist?"), as shown in Figure 7.

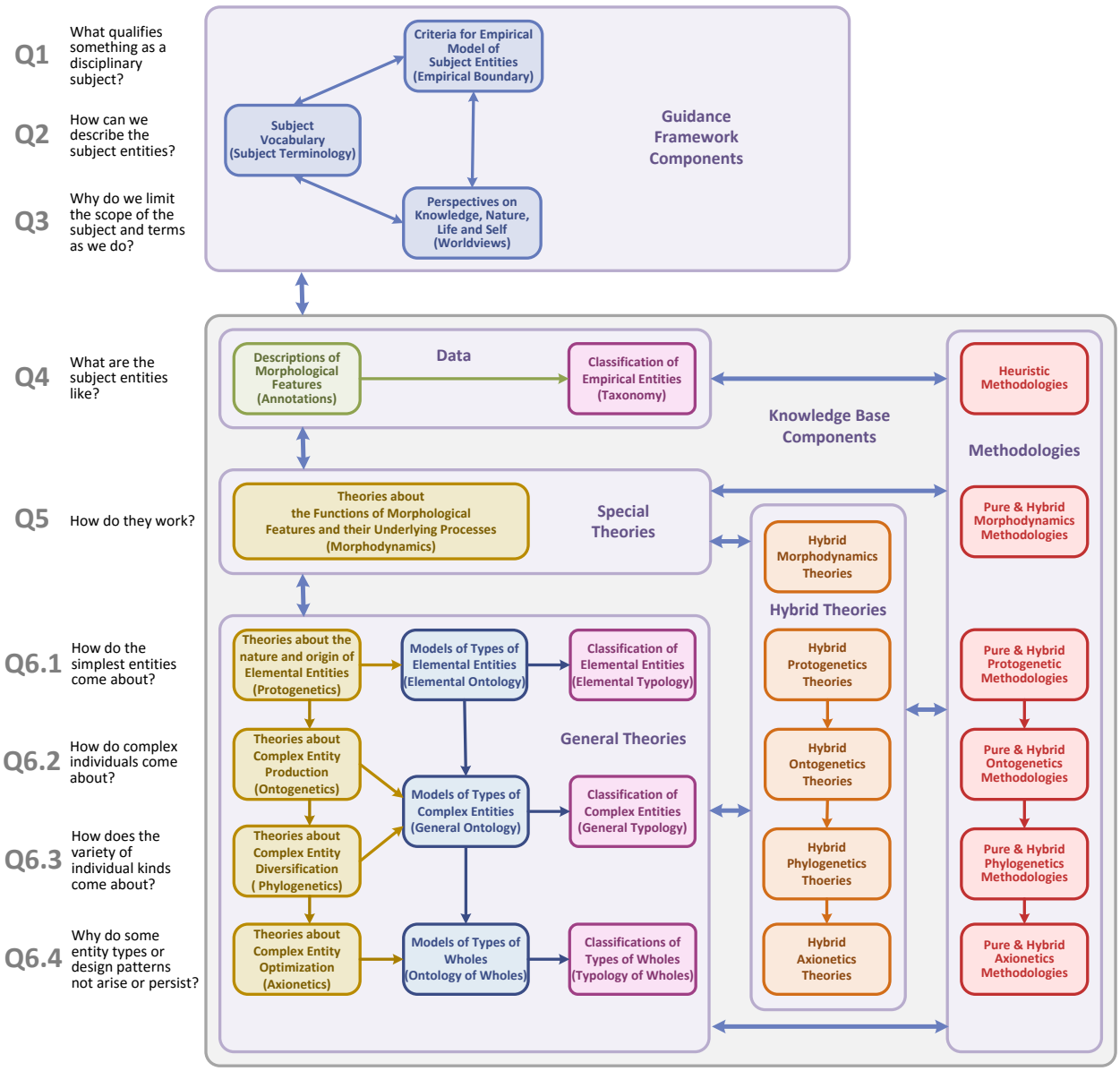

Figure 7. Description and Theory Development through Structured Questions (Rousseau et al., 2016 , Figure 9)

Such a model of the knowledge base of the systems field could have multiple uses within the "portfolio" envisioned by the SRT. First, it can be used to make an inventory of current knowledge holdings, showing the scope of present data, theories and models, putting existing work into context and revealing significant gaps. Second, the structure of the knowledge base can be used to index the disciplinary knowledge, making it accessible to systems researchers in a principled way. Third, because the structure reflects work of increasing sophistication due to the progression of inquiry-driving questions, this can be used as the beginnings of a framework for a maturity model of the systems knowledge base. Fourth, because it provides an overview of the available or potential knowledge it can contribute to defining the resources available or needed for performing different kinds of roles within the scope of systems research and practice.

This kind of model can therefore be useful in the context of several of the components of the "investment portfolio' the SRT discussed as a framework for guiding activities that would make progress towards achieving systemic literacy and sensibility in the broader community.

Systems Landscape and Systemic Sensibilities

Ray urged the team to frame the next steps of the contribution of the SRT (or rebranded as the 'Landscape of Systems Knowing Inquiry') as we devised a 'first-cut' model (Figure 4 and Table 1) of an 'investment portfolio' as a device to aid on-going inquiry by us, as well as a means to organize and report on our work and that of other groups committed to supporting transitions to systemic literacy (systemic capability + [systems science + systems thinking in practice or STiP]) (Blackmore, C., Reynolds, M., Ison, R. & Lane, A., 2015).

We understand investment to include financial, individual, intellectual, group, organizational, philanthropic, among other characteristics or attributes, and the 'portfolio' to be designed drawing on concepts of self-organisation, open-source protocols, and easy refinement for different purposes/investors. As outlined earlier we identified eight elements of a possible system to enhance the quality of systems knowing, though the possible systemic relations among these eight are yet to be established, understood and articulated (e.g. there may need to be more or fewer). We suggest that in a 'first-cut' portfolio design each of these eight elements needs to utilize/complete the following template:

- What are the characteristics of the element?
- Why is it important?
- What is a story (narrative) or case study about it - of need, failure, success, etc.?
- Suggest possible 'investment' agendas or pathways - who; how; when?

Perhaps this template needs to be completed also for the outer 'system' in Figure 4 - hence the question mark? Monitoring and evaluation systems against agreed, yet adaptable, measures of performance are needed 'in service' of moving towards systemic literacy. Controlling action will also be needed. These 'systems' will also require a conducive institutional/organizational platform from which to operate and thrive.

Shadow Side of Systems - Systems Ethics

Tim Ferris suggested that Systems Literacy could benefit from looking at the ethics of Systems Research and in Systems Practice and some of its nascent assumptions. There is general agreement among scholars and practitioners interested in systems science and systemic methods that using systemic perspectives will enable them to produce better results in their work than they would achieve if they were to continue to use the discipline perspective approaches to their work that traditionally would have been applied. The improvement that they perceive achieving through the use of systemic perspectives results from producing data/findings reflecting a more complete vision of the situation which enables more complete understanding of the interaction between the aspects of the situation and reducing unintended consequences, and the knowledge to deal with the emergent effects more effectively through better understanding of what they reflect about the situation. This aspect of improvement in work approached systemically improves the results achieved, so the word "good" is appropriate to reflect that the results of

work done systemically are more likely to match the actor's intent. That is, these results are "good" from the perspective of the actor intervening in the situation.

In the rhetoric of some systems researchers or practitioners the idea of "good" to describe the results is conflated with the idea of moral goodness, leading to the suggestion that results achieved through systemic work are morally better than would otherwise be achieved, and thus a suggestion that systemic approaches are inherently benevolent and good (Mary drew the team's attention to the notion of " benevolent bias" in the history of the systems sciences). This assumption is not justified since the systems science and methods are, like any other knowledge and methods developed through any approach, morally neutral. The knowledge and methods describe the world and potential ways of acting in the world, with the possibility of providing understanding and prediction in situations of interest to a user of the knowledge and methods. The person using the knowledge and methods constructs their desired learning or intervention outcome based on their own motivation which is developed from their underlying belief structure. The effect is that the knowledge and methods may be used for a variety of purposes, some of which may harm some people or the environment.

As a result systems research and practice must be understood as morally neutral, with potential to be used for good and ill, and therefore in developing systems knowledge, or in the rhetoric of discussing systems and systemic approaches to engagement with the world, it is necessary to avoid the assumption of moral desirability of systemic perspectives, and also to discuss systemic approaches in a way that explicitly recognizes where the moral judgement of the systems practitioner or researcher will impact the choices made.

Looking Ahead and Moving Forward

The SRT left the 2016 Conversation in Linz with two commitments and an invitation. A valuable framework (i.e. the "investment portfolio") has been created, but it needs to be further refined and explored. A summary of what has been accomplished has been created for this contribution to the Proceedings of the Conversation. Beyond this, team members need to decide whether the work is worth additional investments of time and energy. The first commitment was for a team discussion in June, after team members would have time for additional, post-Conversation reflection. This meeting occurred and substantially set the stage for the second commitment. The second commitment was a presentation for the ISSS 2016 Conference in Boulder, CO. That presentation was redesigned into a workshop titled, "Toward Systems Literacy, the Role of Systems Research," that was conducted at the 60th Meeting of the International Society for the Systems Sciences in Boulder, on July 25, 2016. The team redesigned the presentation as a workshop to invite greater participation and feedback from the Systems Community. The workshop resulted in expansion of ideas about Systems Research in support of Systems Literacy, in response to the question, "What does Systems Literacy need from Systems Research?"(Figures 8, 9, and 10).

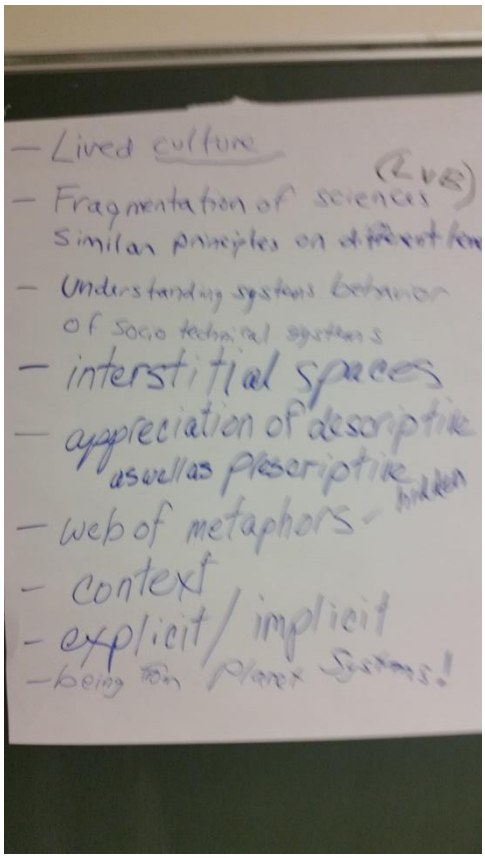

Figure 8. Systems Research/Systems Literacy Workshop Discussion 1

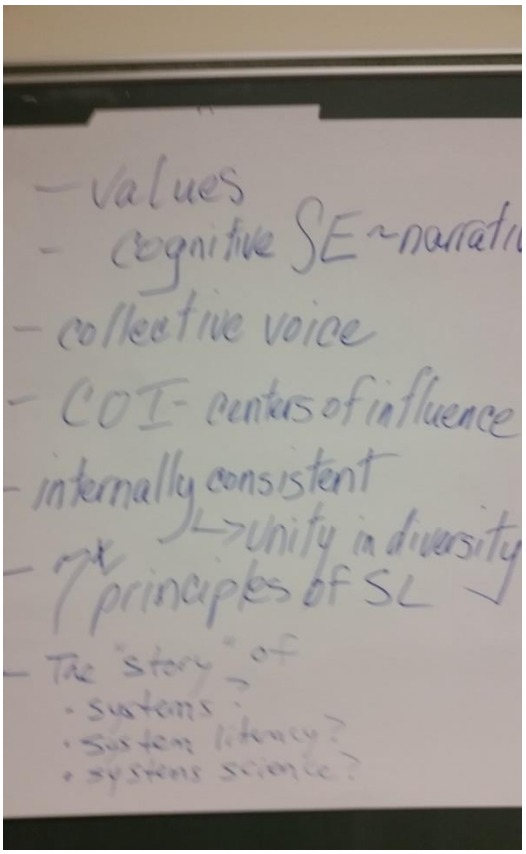

Figure 9. Systems Research/Systems Literacy Workshop Discussion 2

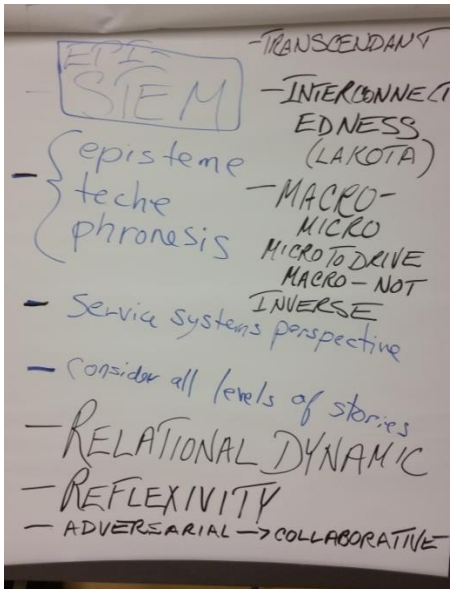

Figure 10. Systems Research/Systems Literacy Workshop Discussion 3

Since the workshop at the ISSS meeting in Boulder, the SRT has developed sub-teams to address different aspects of this project and those teams will continue the work going forward. Perhaps the one of the biggest insights from the workshop was invocation by participants of a guiding principle of *elegance* in our approach to Systems Research in service to Systems Literacy, especially in the light of complexity. The invitation remains open for others to join the sub-teams, especially those who find the initial work to be sufficiently compelling to help in its further development. The true value of the portfolio will be demonstrated by the additional investment that it draws from the Systems Community and beyond.

Conclusions and Recommendations

The SRT's Conversation focused on the question, "How can Systems Research be in service to Systems Literacy?" To reiterate, discussions were coalesced into two essential aspects. First, Systems Research serves Systems Literacy by providing a credible foundation for the principles and practices of Systems Science and Systems Thinking in both systematic and systemic ways. Second, Systems Research provides an impartial, dispassionate frame for development of ethical applications of those principles and practices.

In the team's view, successful programs in Systems Literacy will be grounded in Systems Research encompassing: 1.) a *history* of systems thinking (context, sources, and development of key ideas – principles expressed in clear language); 2.) *literature* of systems (a canon of essential theory, results of practice, and criticism); and 3) *transdisciplinarity* (shared relations and effects of systems sciences with other disciplines). The SRT's role is to foster the relationship between these aspects of Systems Research with Systems Literacy in timely and relevant ways.

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