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Philadelphia, PA
June 24-27, 2013

Towards a Common Language for Systems Praxis

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System Praxis

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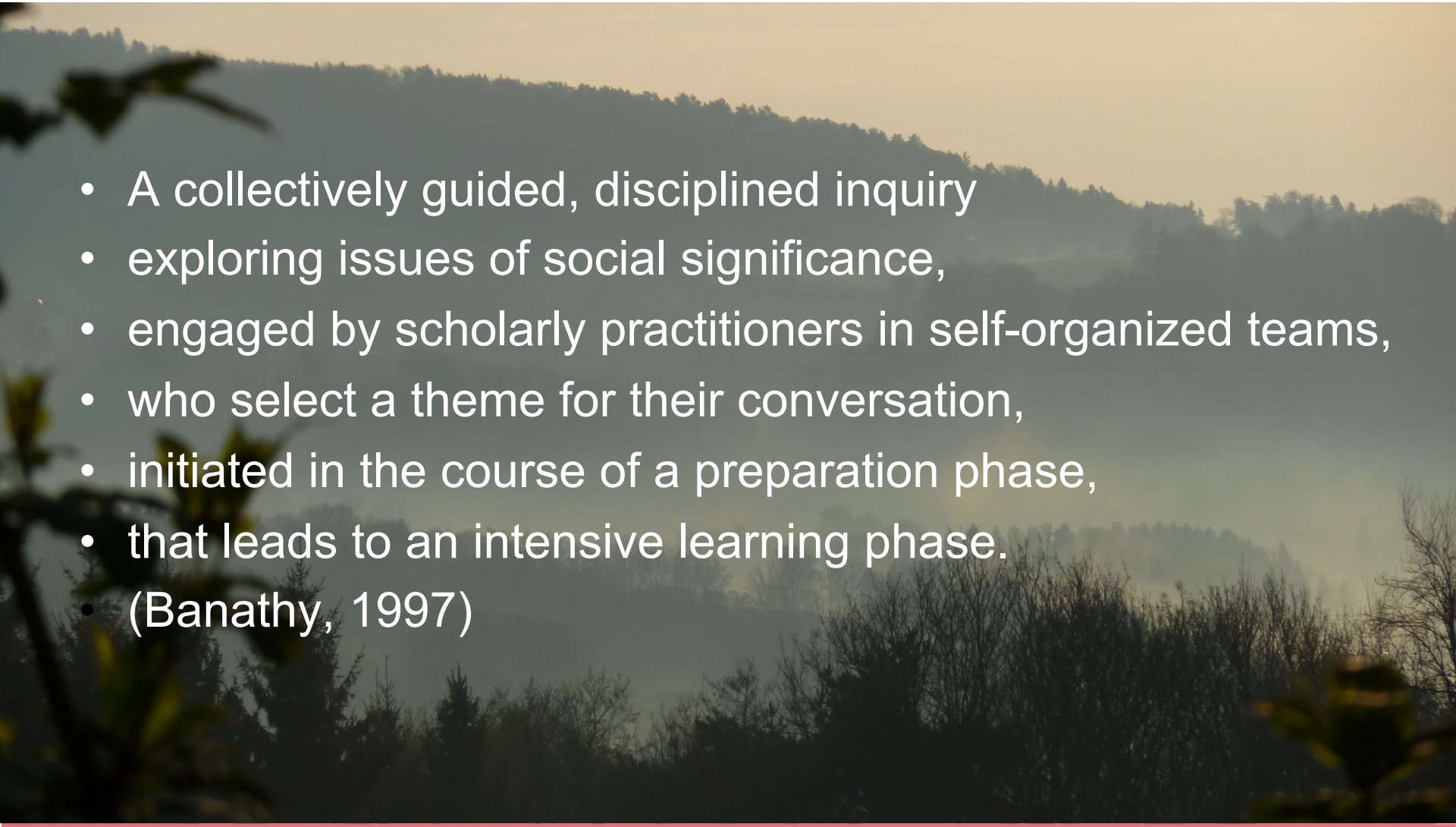
- Systems praxis, as a human activity system, strives to prescribe competencies and processes for organizing various technologies for designing and building complex, responsive socio-technical systems.

- This activity is greatly complicated by the variety of systems types and the lack of a common language among systems theories and practices.

IFSR Conversation
Linz, Austria, April 2012



- A collectively guided, disciplined inquiry
- exploring issues of social significance,
- engaged by scholarly practitioners in self-organized teams,
- who select a theme for their conversation,
- initiated in the course of a preparation phase,
- that leads to an intensive learning phase.
- (Banathy, 1997)

Proposed Goals

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- Focus on concepts or ontology, not language
- Focus on shared understanding, shared knowledge, and shared vision
- Define and adopt one common language
- Define and adopt one common ontology
- Define and adopt a small core common language
- Define and adopt a small core common ontology
- Define and adopt a set of common ontology views

Challenges

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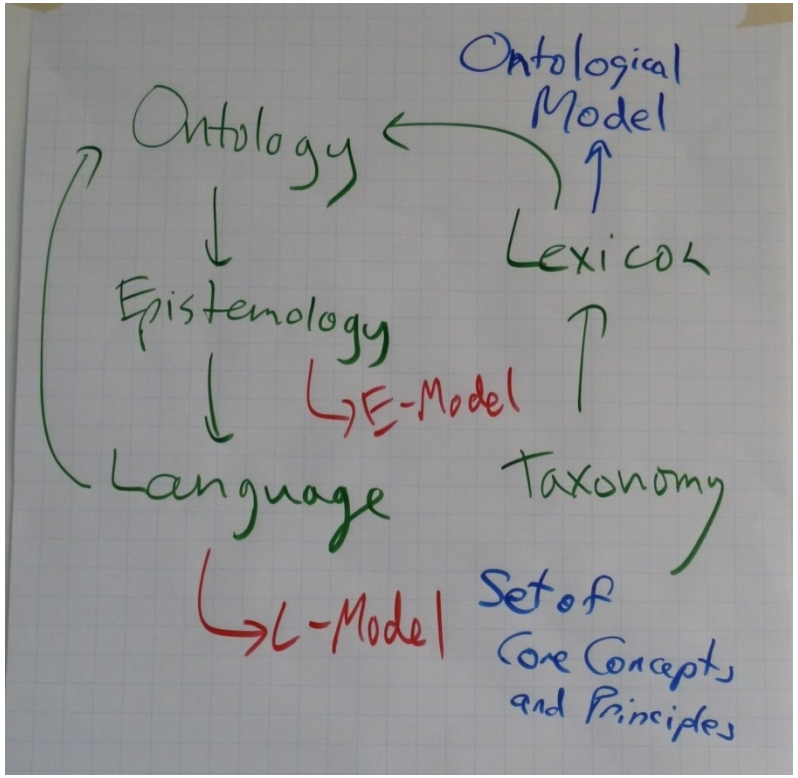
- Systems praxis is multi-lingual and multi-domain, even within a given system;
- Development of common terminologies has often proved problematic, even for a single domain;
- Development of common ontologies has also proved historically problematic.



Observations on standardisation efforts

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- Agreed definitions are in many cases not used by authors or editors of new works
  - negligible reuse of definitions across domains
  - few provide reuse even within domains
- Even ISO standards are largely ignored.
- Most terms have several, sometimes conflicting, definitions.

Example of synset links relating "System" to"Entity"

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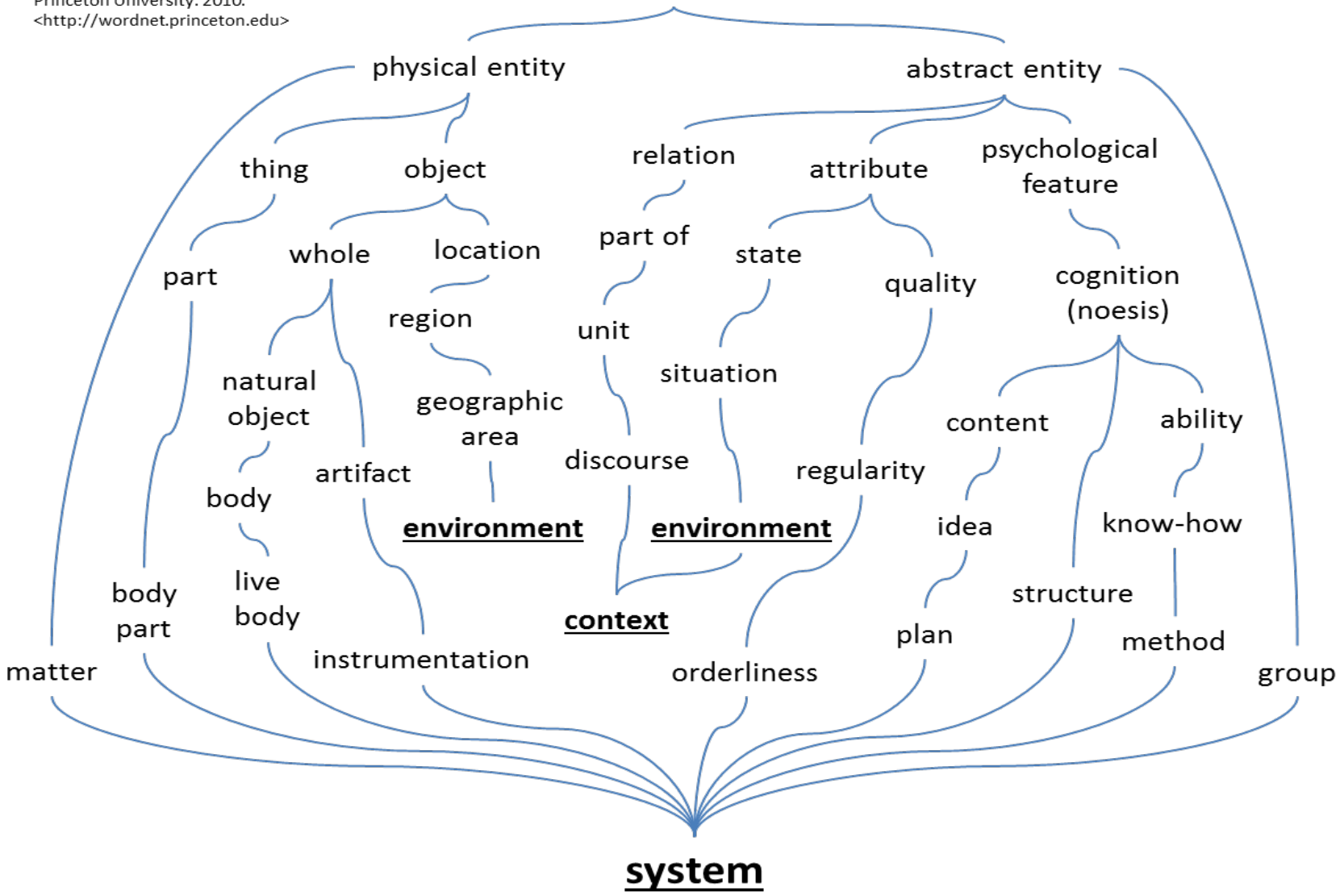
Princeton University "About WordNet." WordNet. Princeton University. 2010. <http://wordnet.princeton.edu>

synset links from WordNet Search 3.1



Some key concepts wrt system

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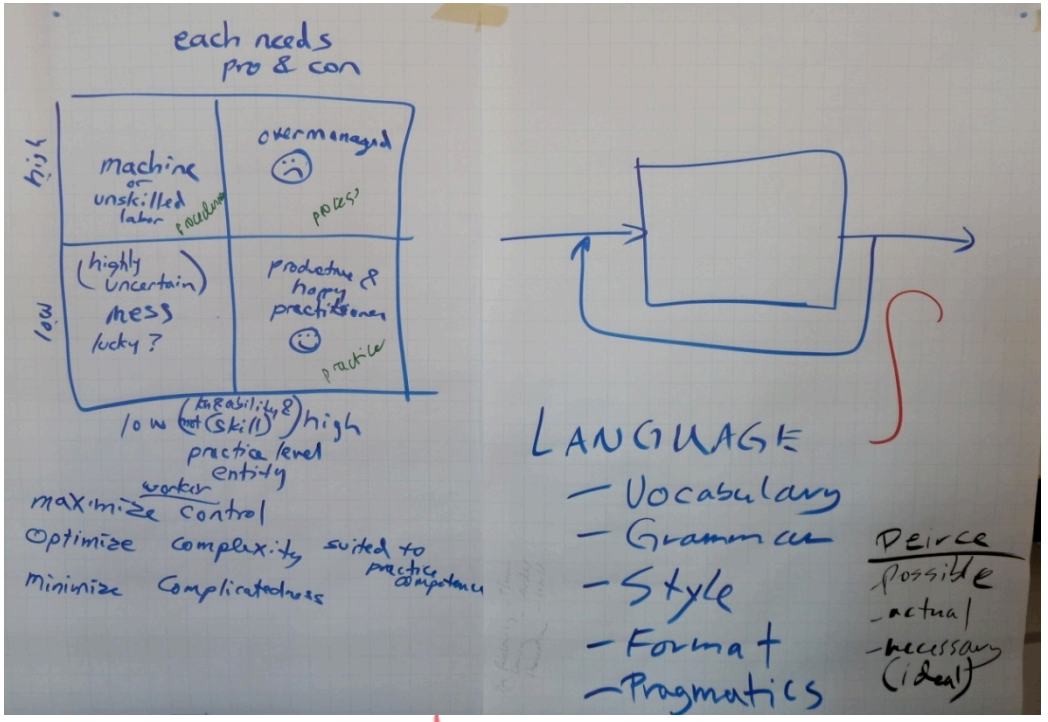
- Emergence
- Boundaries (especially purpose-dependent selection of boundaries)
- Recursion
- Patterns and Affordances
- Dualities
  - Hard/Soft
  - Open/Closed
  - Product/Process
  - Holistic/Reductionist
  - Positivist/Constructivist
  - Subjective/Objective
  - Potential/Actual
  - Hierarchy/Holarchy.



PICARD theory of systems

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System = Holistic Image of

- Parts
- Interactions
- Context
- Actions
- Relationships
- Destiny

From the Point of View of an Observer

The Three Cultures (Cross, 1982)

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Culture	Phenomena	Methods	Values
Science	Natural world	Controlled experiment Classification Analysis	Objectivity Rationality Neutrality Concern for 'truth'
Design	Man-made world	Modeling Pattern-formation Synthesis	Practicality Ingenuity Empathy Concern for 'appropriateness'
Humanities	Human experience	Analogy Metaphor Criticism Evaluation	Subjectivity Imagination Commitment Concern for 'justice'

Trying to define Systems Praxis

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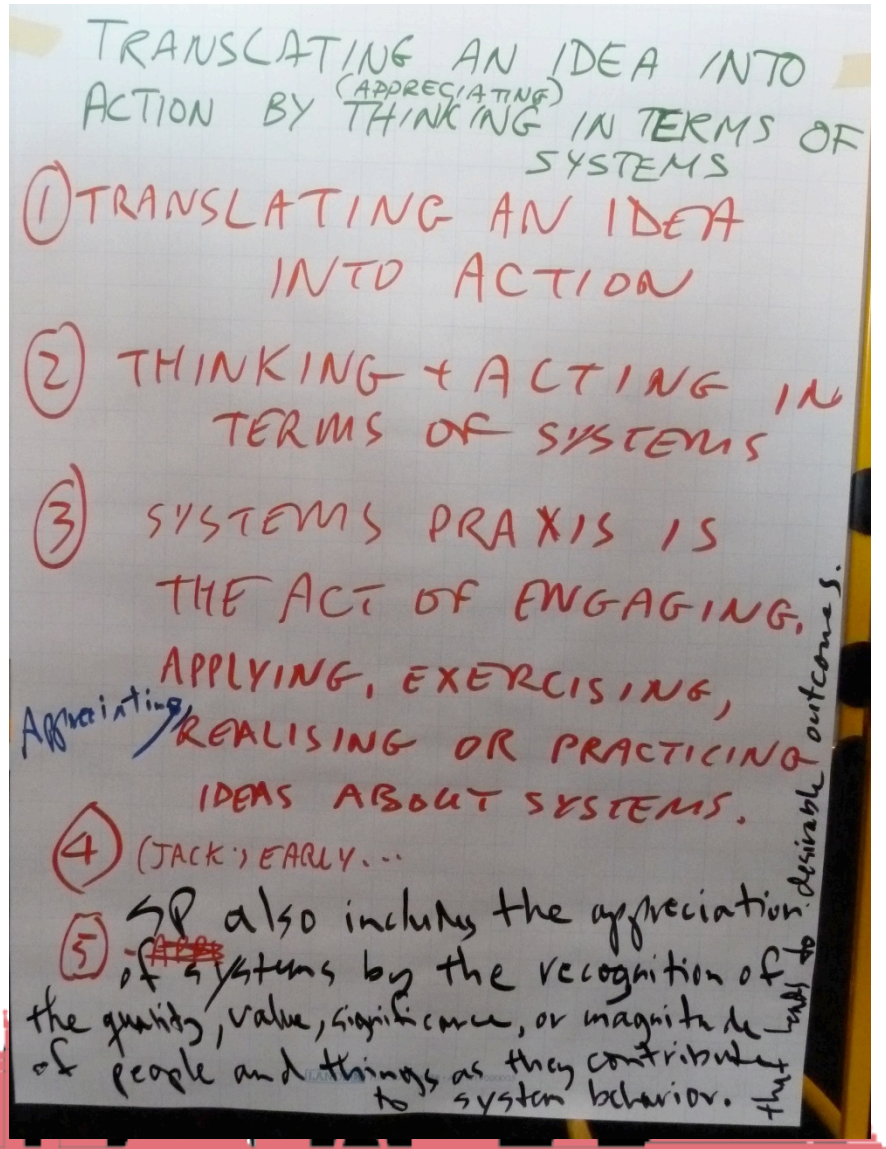
- Praxis
  - "putting theories into action"
  - "theory-informed practice".
  - Systems Praxis – trial definitions:
  - appreciation of systems by recognizing the quality, value, magnitude, or significance of, e.g., things or people
  - as they contribute to system behaviors that lead to desirable outcomes.
- With these as a starting point, the team came up with working definitions of "systems praxis" as:
  - Translating theory into action by thinking and acting in terms of systems.
  - The act of engaging, applying, exercising, realizing, or practicing ideas about systems.



Jack Ring's Value Cycle seems to encapsulate some peoples' idea of "systems praxis"

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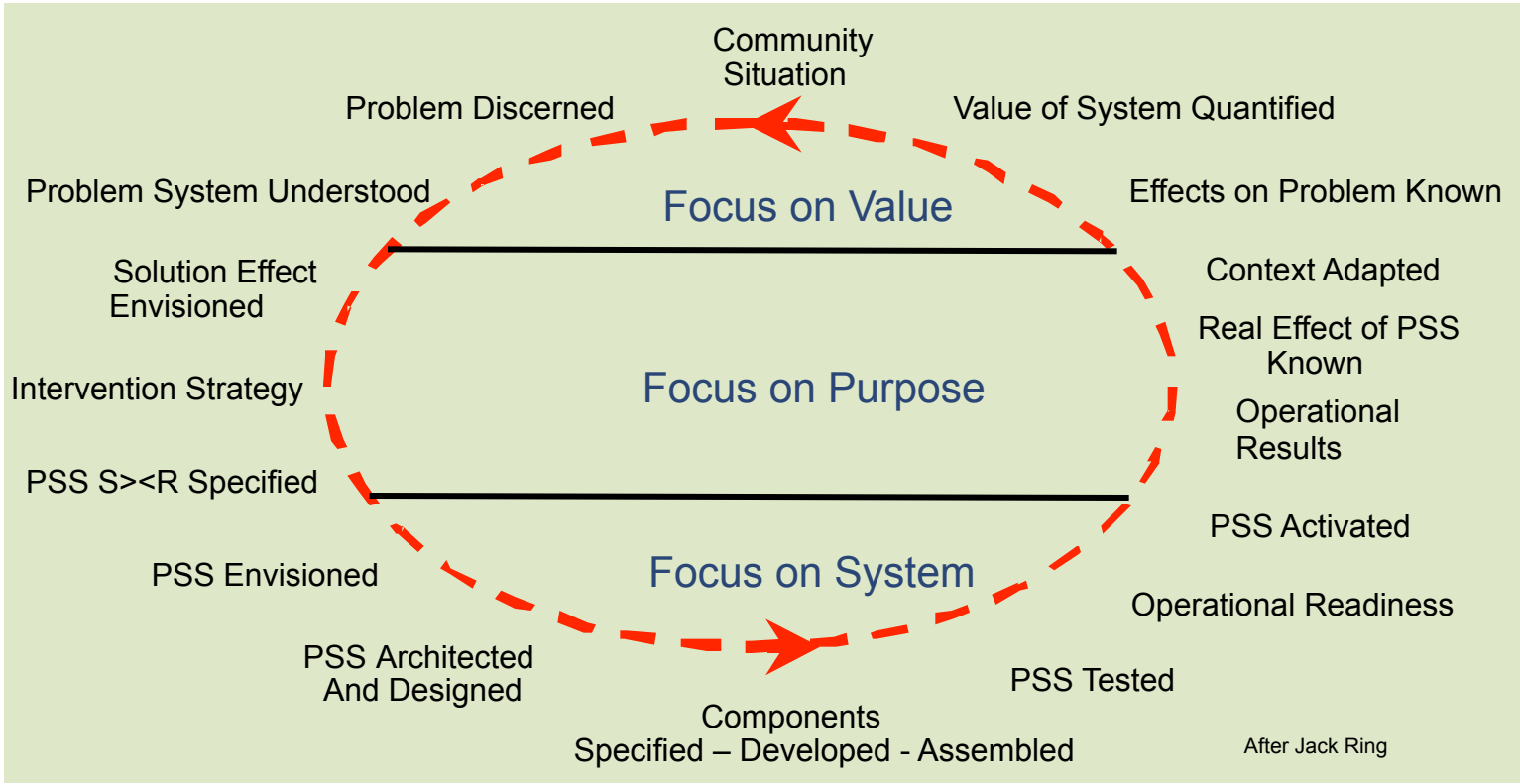

Another perspective: Bud Lawson's System Coupling Diagram, 2010

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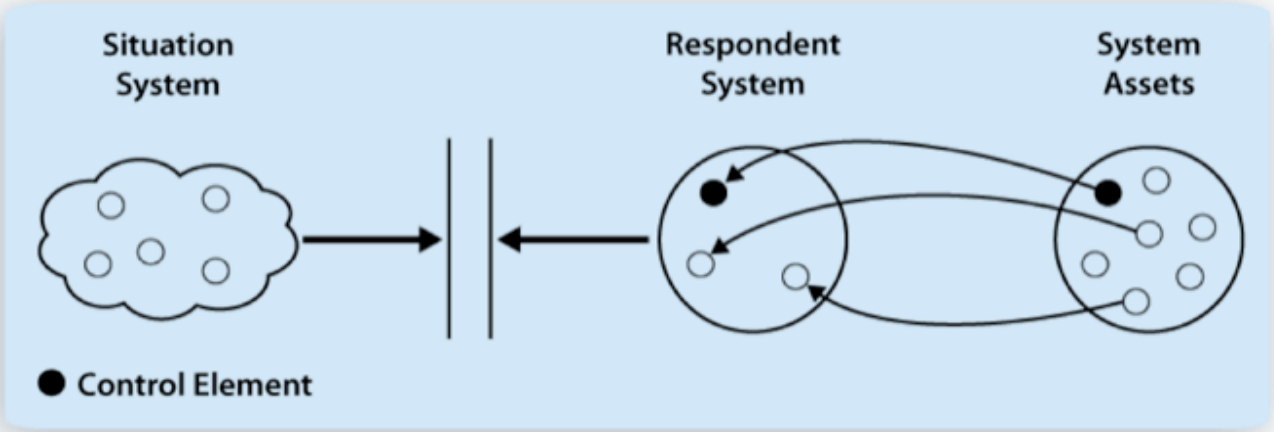
Natural
Man-Made
Mixed
(Thematic)

Project
Program
Task
Experiment

Facilities
Instruments
Theory
Knowledge



Science – "Understanding"
Engineering – "Creating Solutions"

Methods
Tools
Processes

Checkland's CATWOE analysis

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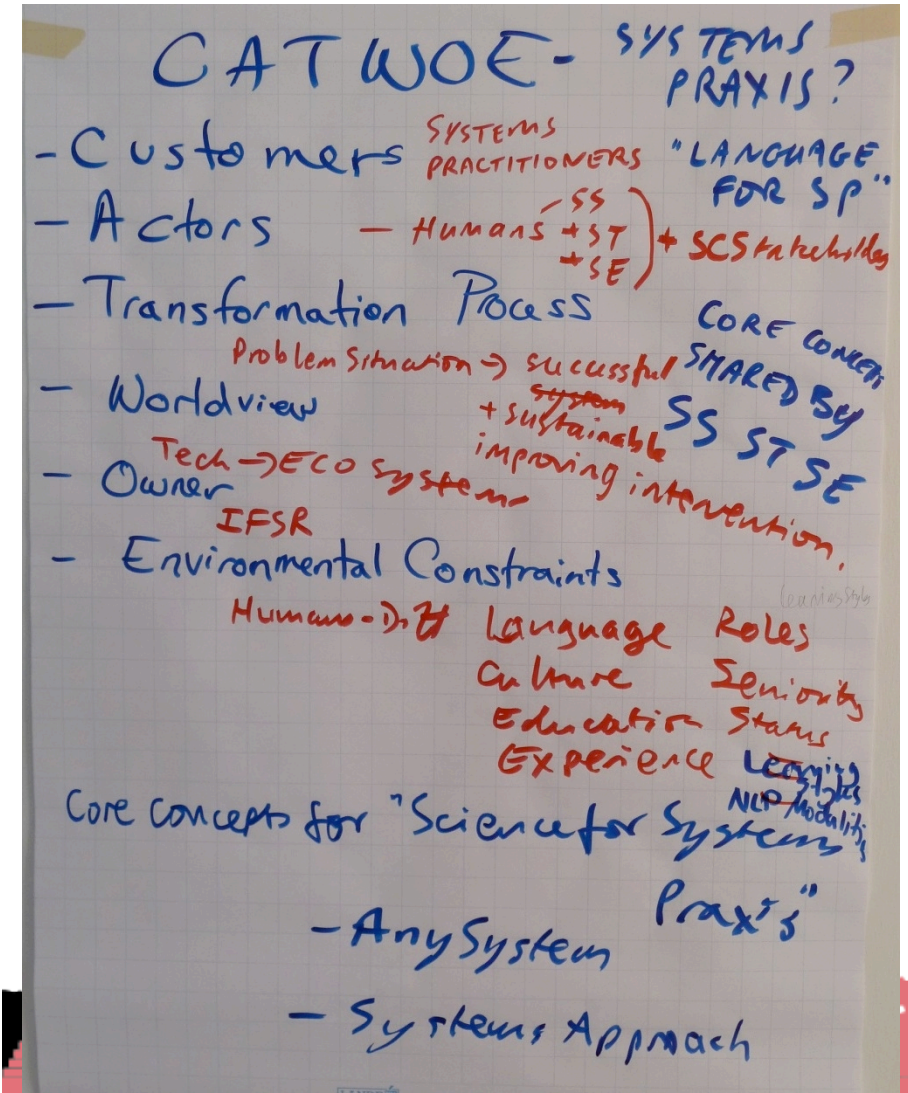

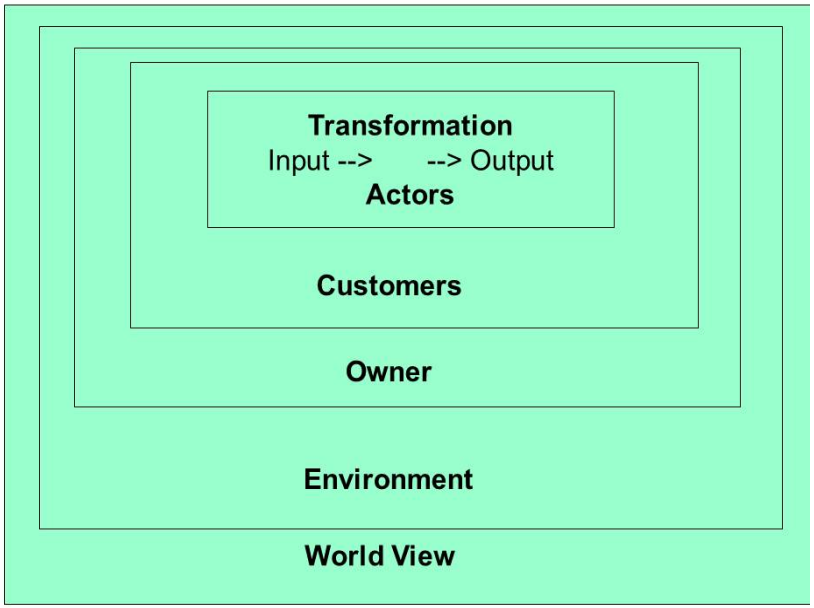

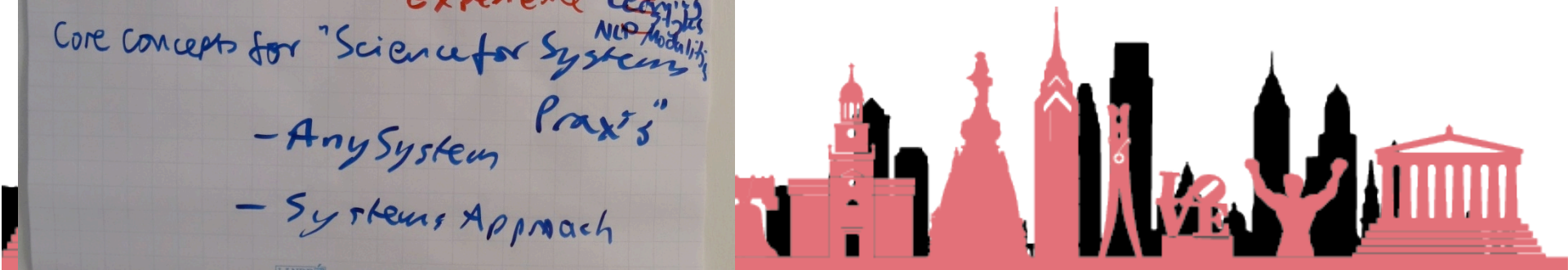

Integrated systems approach
(Sillitto, 2012)

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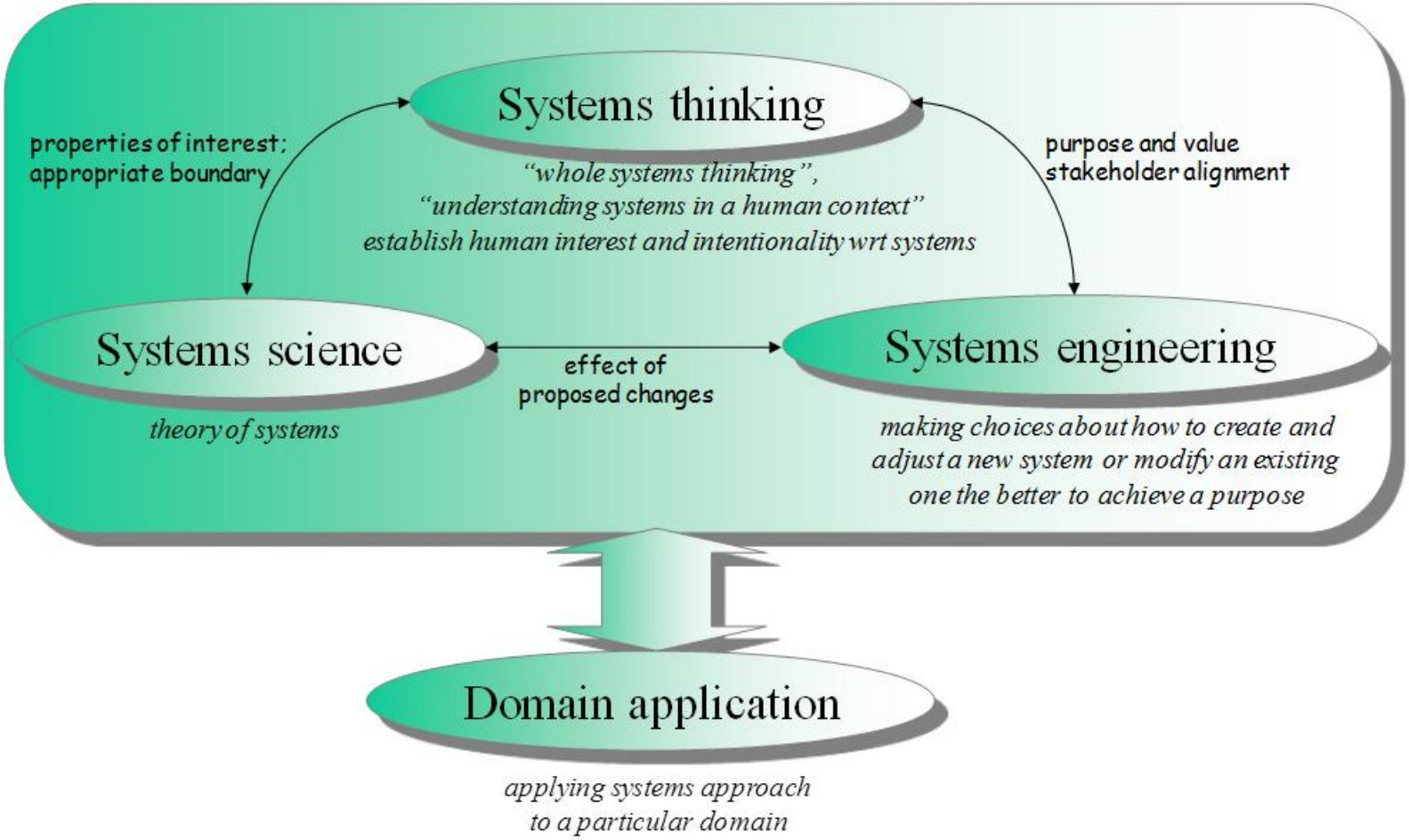

Evolution of thinking

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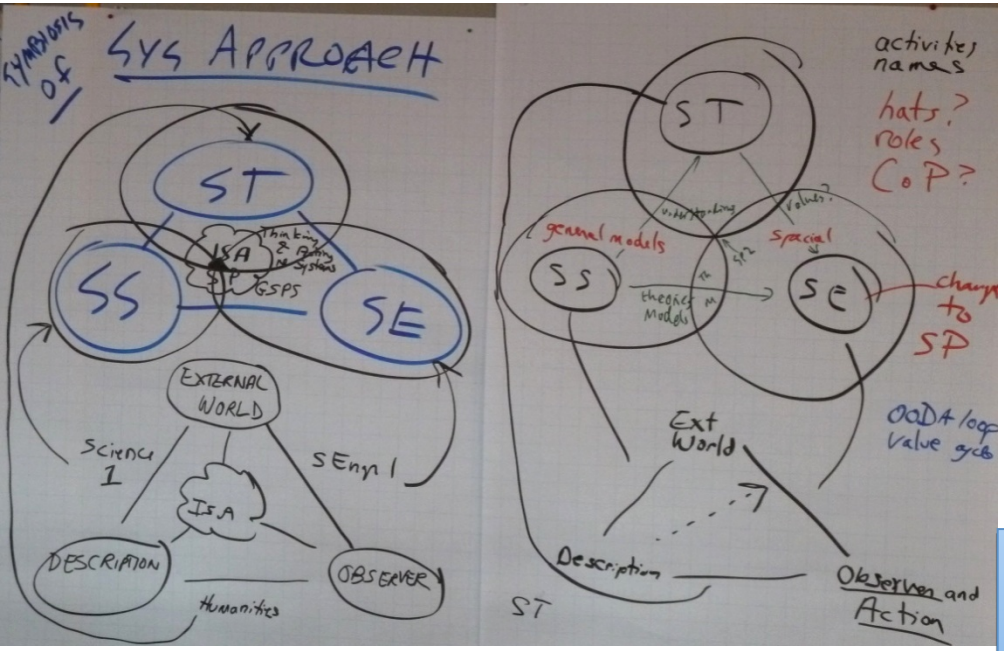

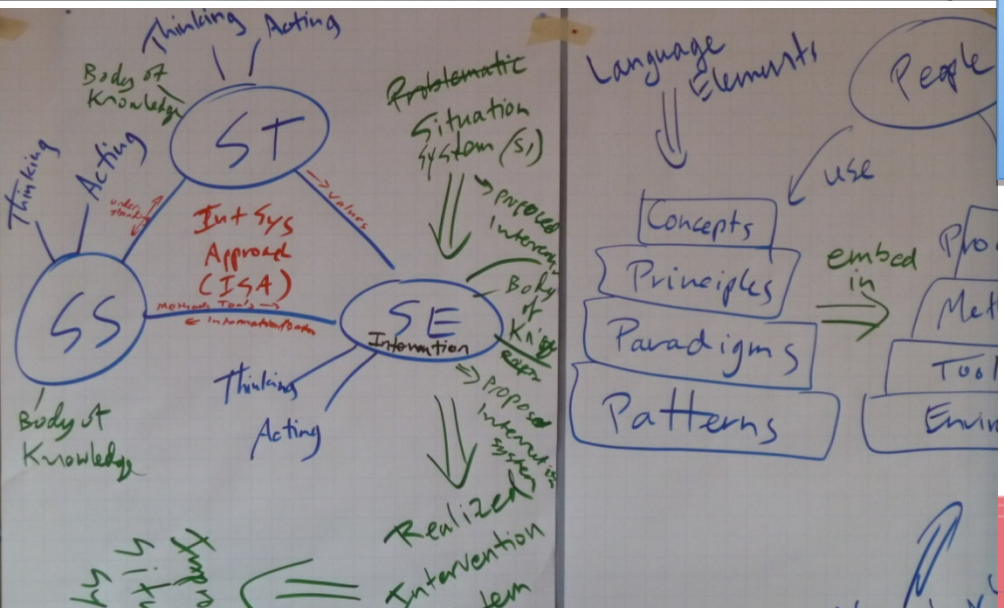

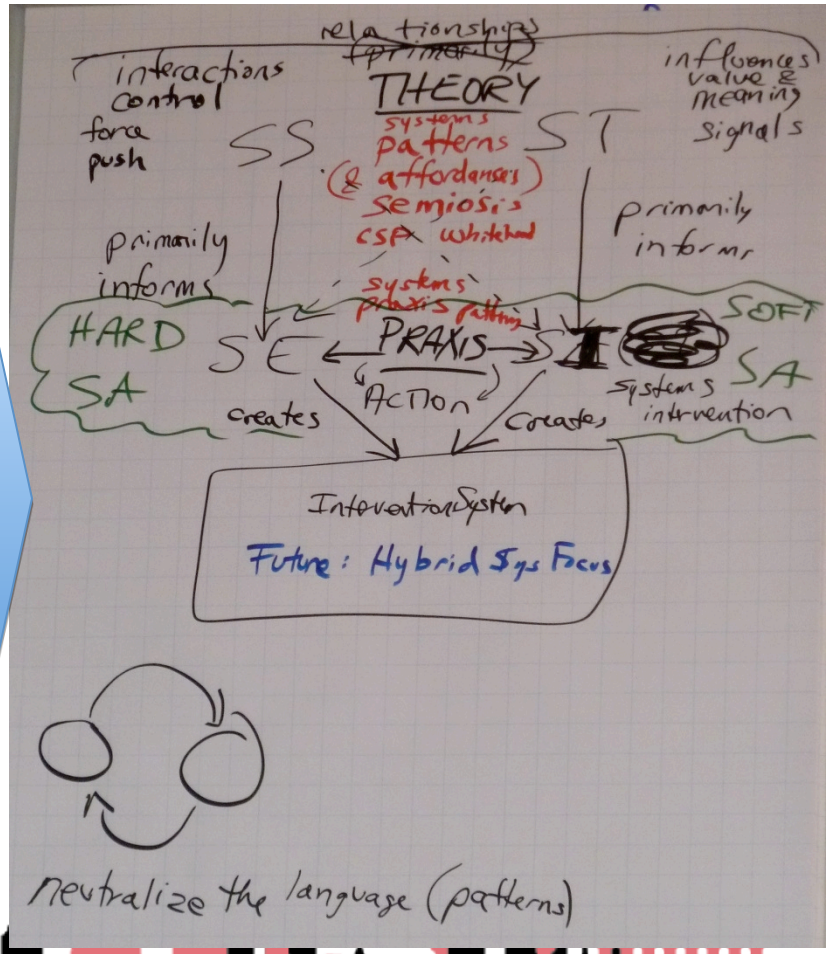

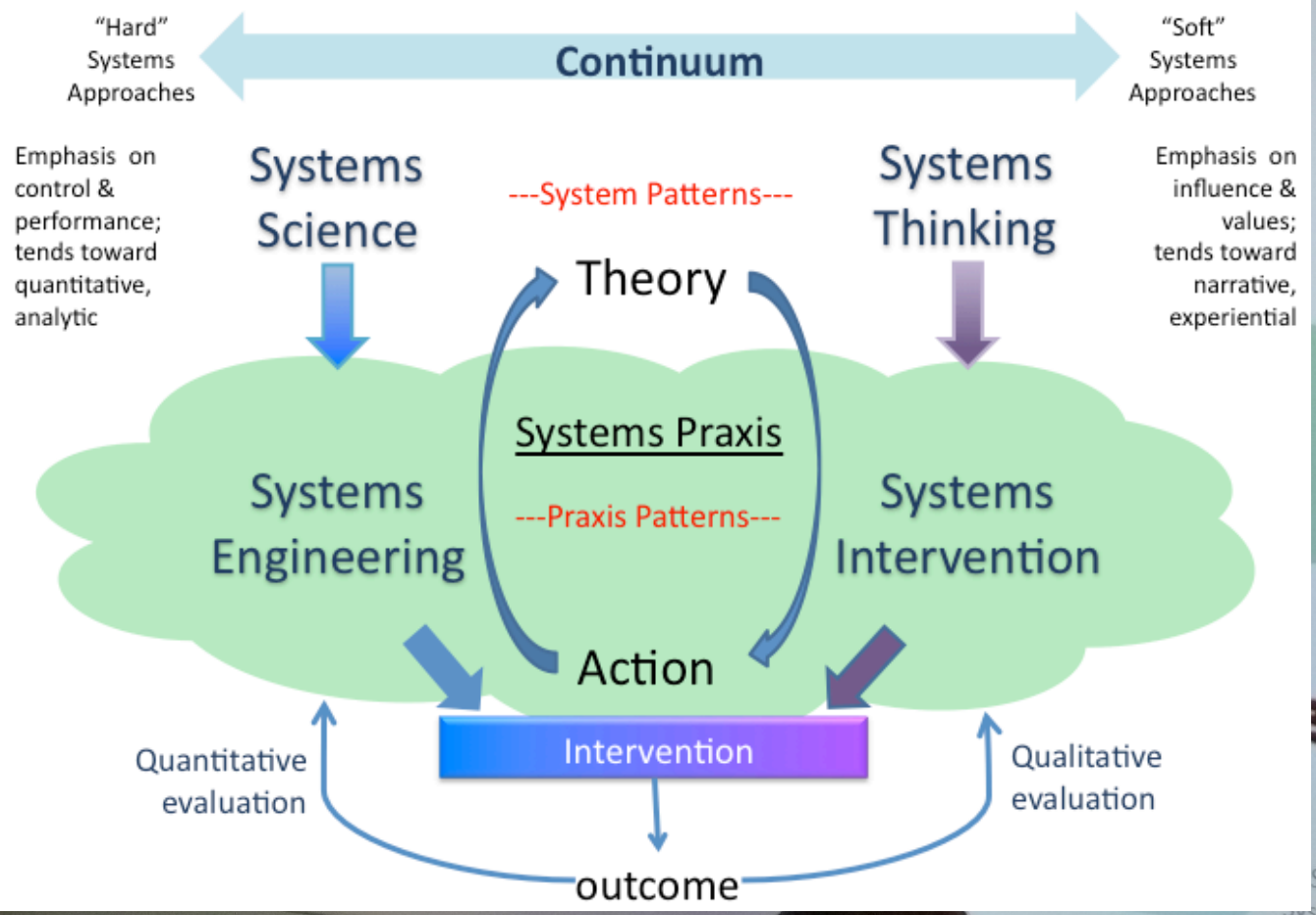
"Hard" Systems Approaches
Continuum
"Soft" Systems Approaches
Emphasis on control & performance; tends toward quantitative, analytic
Systems Science
---System Patterns---
Systems Thinking
Emphasis on influence & values; tends toward narrative, experiential
Theory
Systems Praxis
Systems Engineering
---Praxis Patterns---
Systems Intervention
Action
Intervention
Quantitative evaluation
Qualitative evaluation
outcome

The Systems Praxis Framework

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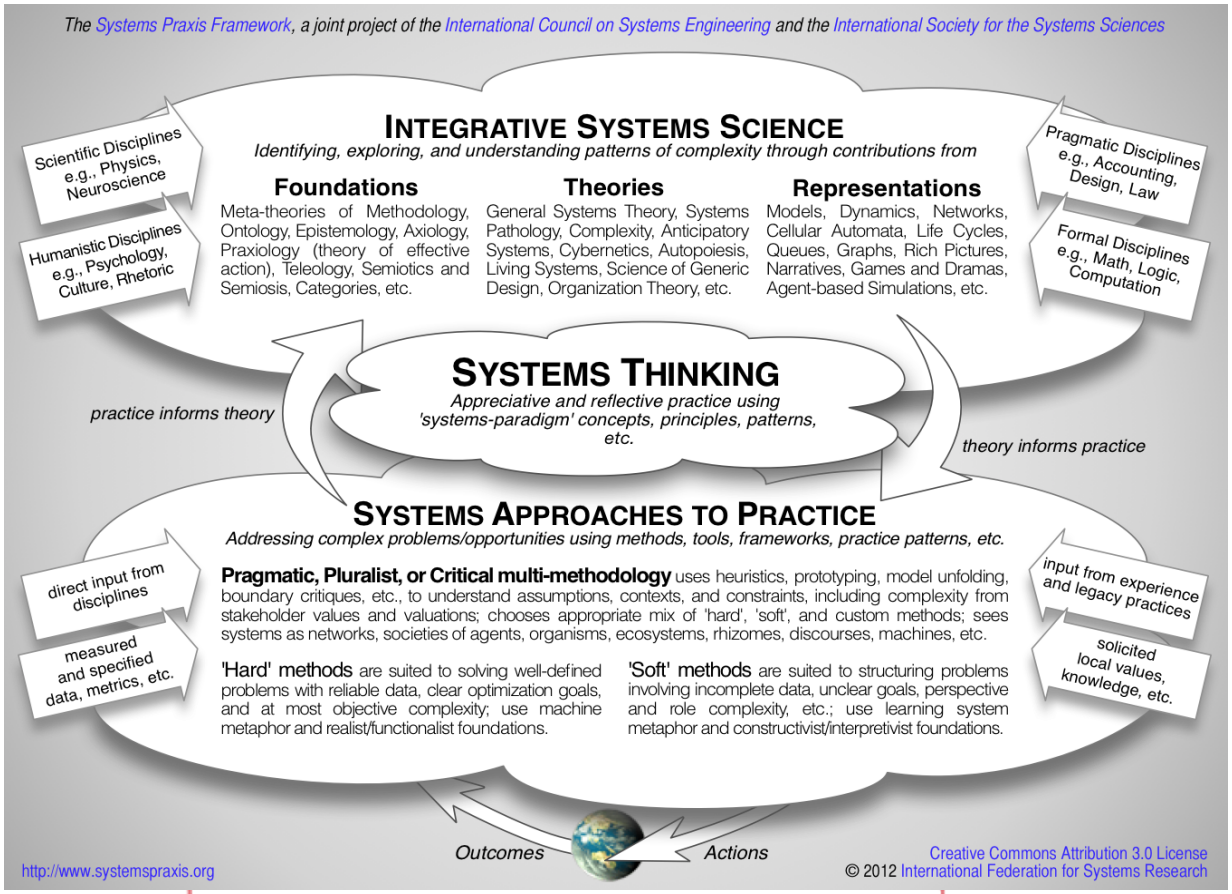
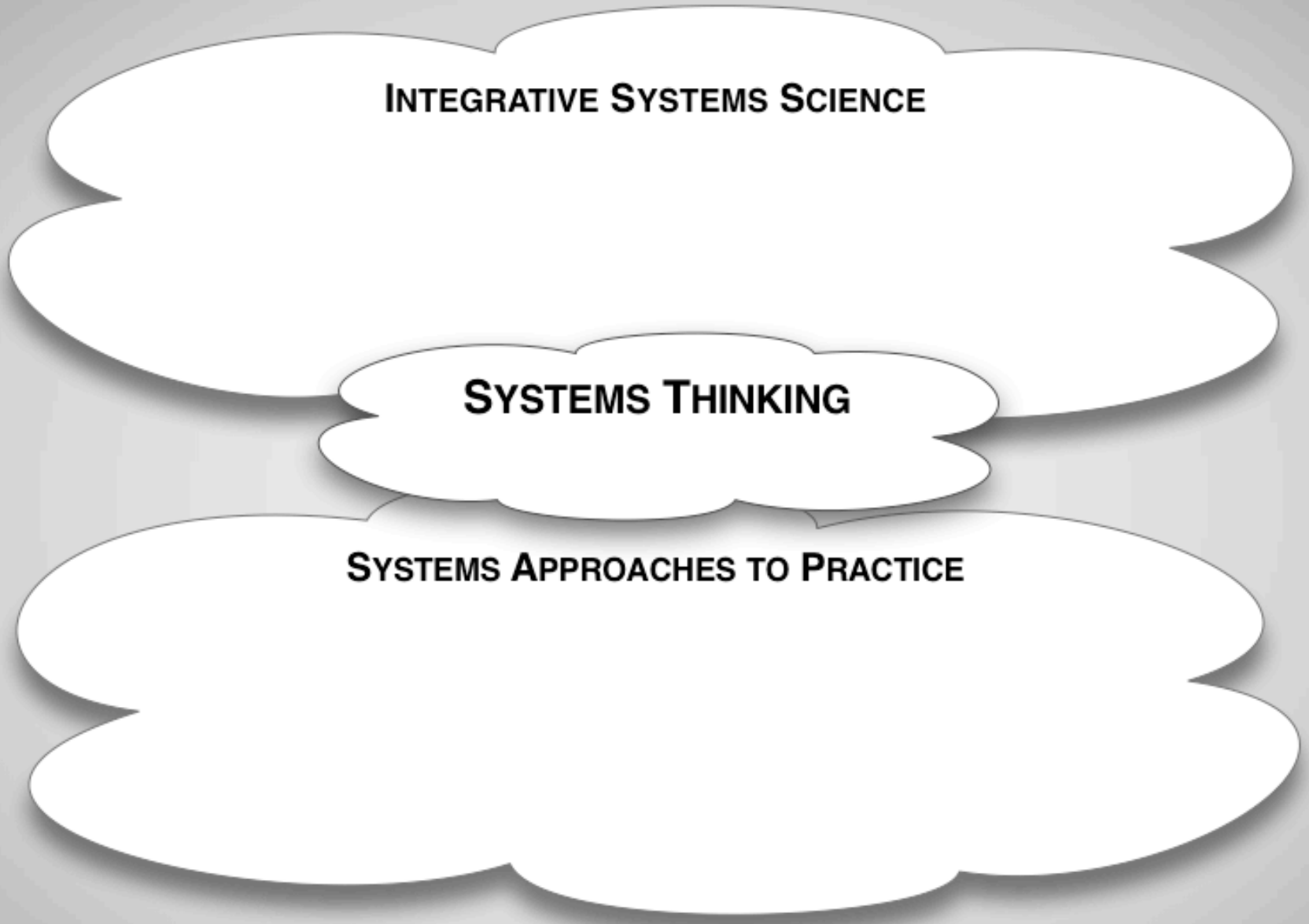
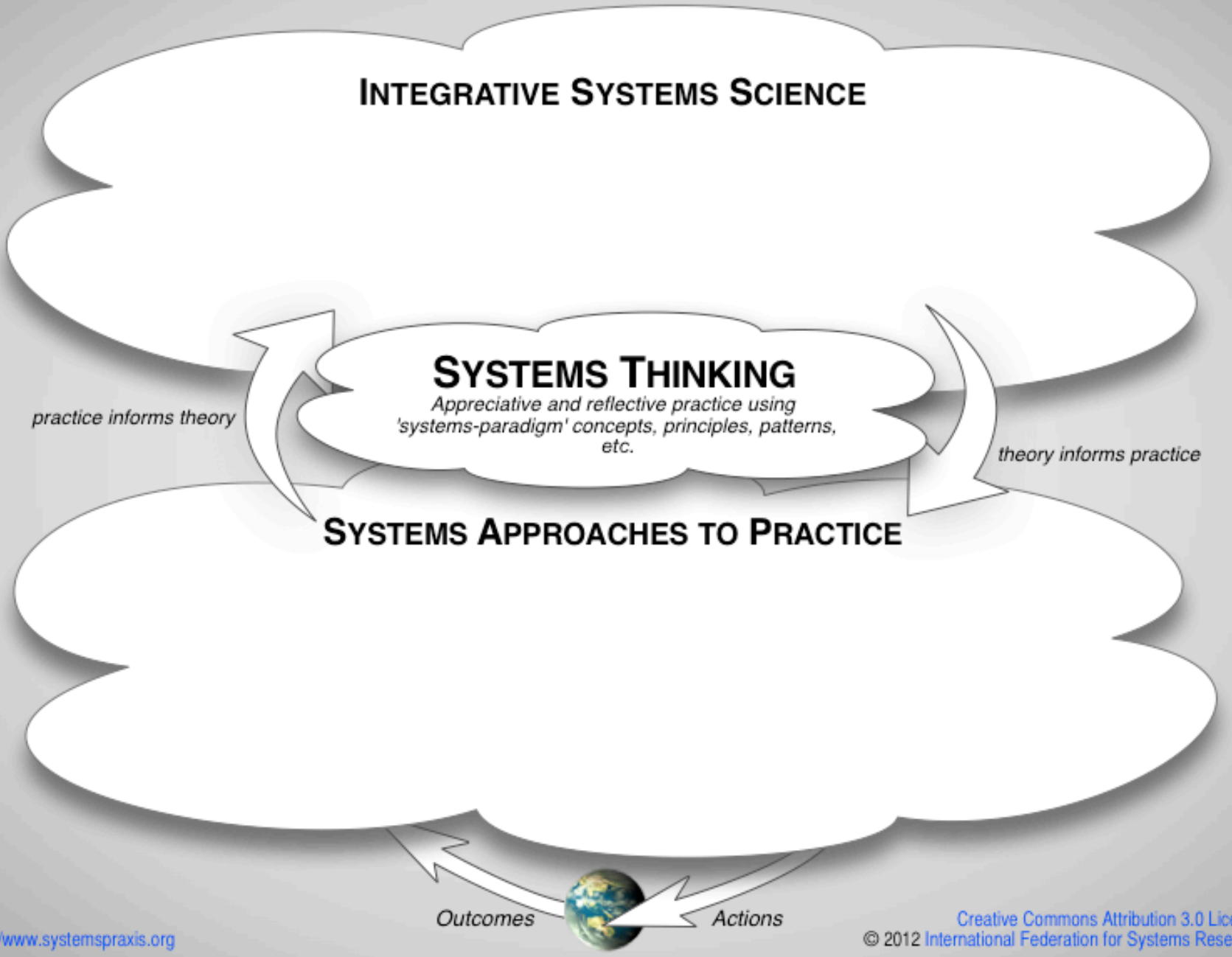




The Systems Praxis Framework, a joint project of the International Council on Systems Engineering and the International Society for the Systems Sciences



http://www.systemspraxis.org

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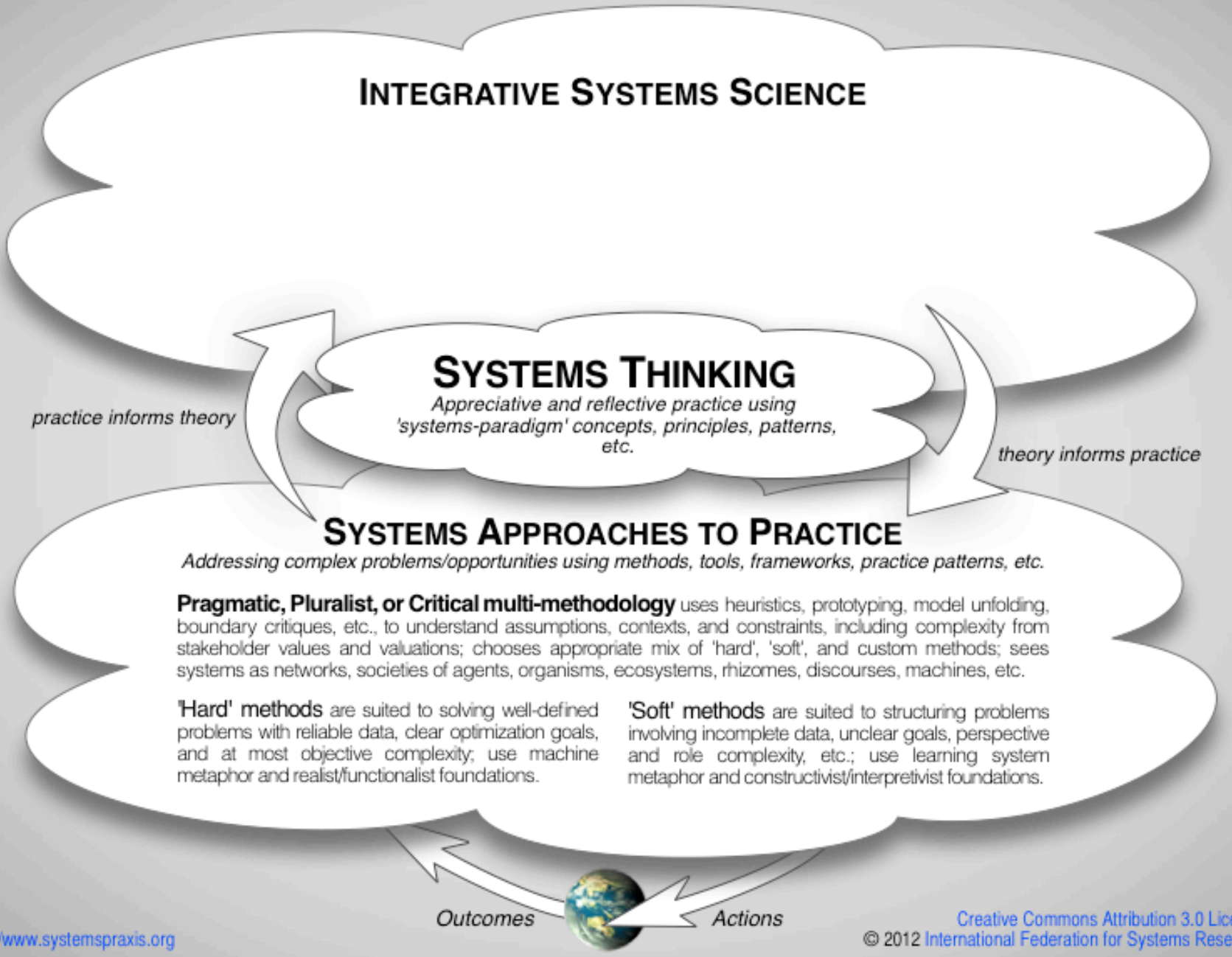

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INTEGRATIVE SYSTEMS SCIENCE

Identifying, exploring, and understanding patterns of complexity through contributions from

Foundations

Meta-theories of Methodology, Ontology, Epistemology, Axiology, Praxiology (theory of effective action), Teleology, Semiotics and Semiosis, Categories, etc.

Theories

General Systems Theory, Systems Pathology, Complexity, Anticipatory Systems, Cybernetics, Autopoiesis, Living Systems, Science of Generic Design, Organization Theory, etc.

Representations

Models, Dynamics, Networks, Cellular Automata, Life Cycles, Queues, Graphs, Rich Pictures, Narratives, Games and Dramas, Agent-based Simulations, etc.

practice informs theory

SYSTEMS THINKING

Appreciative and reflective practice using 'systems-paradigm' concepts, principles, patterns, etc.

theory informs practice

SYSTEMS APPROACHES TO PRACTICE

Addressing complex problems/opportunities using methods, tools, frameworks, practice patterns, etc.

Pragmatic, Pluralist, or Critical multi-methodology uses heuristics, prototyping, model unfolding, boundary critiques, etc., to understand assumptions, contexts, and constraints, including complexity from stakeholder values and valuations; chooses appropriate mix of 'hard', 'soft', and custom methods; sees systems as networks, societies of agents, organisms, ecosystems, rhizomes, discourses, machines, etc.

'Hard' methods are suited to solving well-defined problems with reliable data, clear optimization goals, and at most objective complexity; use machine metaphor and realist/functionalist foundations.

'Soft' methods are suited to structuring problems involving incomplete data, unclear goals, perspective and role complexity, etc.; use learning system metaphor and constructivist/interpretivist foundations.

Outcomes *Actions*

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INTEGRATIVE SYSTEMS SCIENCE

Identifying, exploring, and understanding patterns of complexity through contributions from

Scientific Disciplines e.g., Physics, Neuroscience

Humanistic Disciplines e.g., Psychology, Culture, Rhetoric

Pragmatic Disciplines e.g., Accounting, Design, Law

Formal Disciplines e.g., Math, Logic, Computation

Foundations

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SYSTEMS APPROACHES TO PRACTICE

Addressing complex problems/opportunities using methods, tools, frameworks, practice patterns, etc.

direct input from disciplines

measured and specified data, metrics, etc.

input from experience and legacy practices

solicited local values, knowledge, etc.

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Outcomes

Actions

http://www.systemspraxis.org

Where we are now

- Believe a common understanding of systems is possible, based on
  - paradigms,
  - concepts,
  - principles
  - patterns
- Not convinced about a “common language”

Thank you for your attention

Would you like to ask any questions?

Survey

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