

Faculty of Design

2016

Curriculum making for trito learning: Wayfaring along a meshwork for systems thinking

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Suggested citation:

Ing, David and Nousala, Susu (2016) Curriculum making for trito learning: Wayfaring along a meshwork for systems thinking. In: Relating Systems Thinking and Design Symposium (RSD), 13-15 Oct 2016, Toronto, Canada. Available at <http://openresearch.ocadu.ca/id/eprint/1925/>

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Curriculum Making for Trito Learning: Wayfaring along a meshwork of systems thinking

David Ing + Susu Nousala

October 16, 2016

RSD5: Relating Systems Thinking & Design

Agenda

1. ST in Aalto CS 2010-2016

2. Trito Learning

3. Curriculum-making

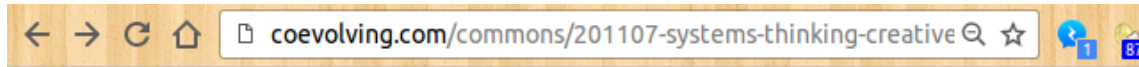
The Master's Programme in Creative Sustainability started in fall 2010 at the merger of 3 universities

NEW CREATIVE SUSTAINABILITY MASTER'S PROGRAMME

RE-THINKING ARCHITECTURE,
BUSINESS, DESIGN,
LANDSCAPE PLANNING,
REAL ESTATE and
URBAN PLANNING

120 credits		Master's in Creative Sustainability
6 to 10 credits compulsory	32 credits compulsory	M.A. in Design (from legacy Taik)
	48 credits compulsory	M.Sc. in Business (from legacy HSE)
	50 credits compulsory	M.Sc. In Engineering (either in architectural building design or in urban planning and design) (from legacy TKK)
	40 credits compulsory	M.Sc. in Real Estate (from legacy TKK)

Two systems thinking courses launched in 2010-2011



Coevolving Innovations

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2011/07 Systems Thinking Courses in the Master's Programme on Creative Sustainability at Aalto University: Reflections on Design and Delivery of the 2010-2011 Sessions

Author

David Ing

Abstract

In fall 2010 and winter 2011, two new courses in systems thinking were initiated as core curriculum in the master's programme in Creative Sustainability at Aalto University in Finland. As intensive courses, each was to be conducted as three full days of lectures over eight days, with students fulfilling credit hour requirements both independently and in group activities over a two-to-three month period. To complement the teaching staff at the university, a researcher active in the systems science community was brought in from abroad as a subject matter expert for the two courses.

In the summer preceding the first session, a reading list for the courses was drawn from current leading sources in the systems sciences, starting from 2010 and linking back to prior references of relevance. Lectures were prepared as minimal critical specifications, with concepts mapped into clusters of references, with the majority of sources available electronically over the Internet. On each set of the three lecture days, the courses were delivered in a face-to-face classroom setting, coupled with group activities designed in the

SYSTEMS THINKING COURSES IN THE MASTER'S PROGRAMME ON CREATIVE SUSTAINABILITY AT AALTO UNIVERSITY: REFLECTIONS ON DESIGN AND DELIVERY OF THE 2010-2011 SESSIONS

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ABSTRACT

In fall 2010 and winter 2011, two new courses in systems thinking were initiated as core curriculum in the master's programme in Creative Sustainability at Aalto University in Finland. As intensive courses, each was to be conducted as three full days of lectures over eight days, with students fulfilling credit hour requirements both independently and in group activities over a two-to-three month period. To complement the teaching staff at the university, a researcher active in the systems science community was brought in from abroad as a subject matter expert for the two courses.

In the summer preceding the first session, a reading list for the courses was drawn from current leading sources in the systems sciences, starting from 2010 and linking back to prior references of relevance. Lectures were prepared as minimal critical specifications, with concepts mapped into clusters of references, with the majority of sources available electronically over the Internet. On each set of the three lecture days, the courses were delivered in a face-to-face classroom setting, coupled with group activities designed in the style of Singerian inquiring systems. Coordinating artifacts from the instructors evolved and were incrementally updated on a publicly-accessible web site, and students followed the social media style of posting their reflections on publicly-visible weblogs linked with notifications on an activity stream at a systems community hub.

Supplementing the chronological recollections of development and learning during the courses sessions, theoretical reflections constructed in hindsight may serve to inform the form and content of similar educational opportunities in other contexts.

Preparations are underway as the courses are being naturally evolved for a second cohort of students in fall 2011. The completion of one cycle of two courses presents an opportunity for reflections on the approach employed in the innovation/startup cycle, with

CS0004 (2010) + CS0005 (2011) materials are online

2010/10 CS0004 Systemic Thinking of Sustainable Communities -- Course Outline

This document is accessible (and may be updated) at <http://coevolving.com/aalto/201010-cs0004>.

- This is revision 1018a (as posted at October 18, 08:30 ET).

jump to: [\[Friday, October 1\]](#) [\[Monday, October 4\]](#) [\[Between sessions\]](#) [\[Friday, October 8\]](#) [\[Due November 1\]](#)

jump to: [\[Dilemmas\]](#) [\[Grading\]](#) [\[Tools\]](#)

jump to: [References](#) [\[Cluster 1\]](#) [\[Cluster 2\]](#) [\[Cluster 3\]](#) [\[Cluster 4\]](#) [\[Cluster 5\]](#) [\[Cluster 6\]](#) [\[Cluster 7\]](#)

Course instructors:

- Aija Staffans, aija.staffans@tkk.fi
- Katri-Liisa Pulkkinen, katri.pulkkinen@opendesign.fi
- David Ing, <http://coevolving.com> and <http://syscoi.com/commons/members/daviding/>

The course is listed as *CS0004*, with the code of *Syst Think Su C*, as part of the [Master's Degree program in Creative Sustainability at Aalto University](#). Sessions are scheduled as:

- 01.10.10, fri 10.00-16.00
- 04.10.10, mon 10.00-16.00
- 08.10.10, fri 10.00-16.00

From a systemic perspective, this course is seen as a complement to *Systemic Thinking for Planners and Designers*, *CS0005*, with the code of *Syst Think P D*. While the core systems concepts between the two courses are compatible, the underlying philosophy, models and methods have different emphases.

Friday, October 1

2011/02 CS0005 Systemic Thinking for Planners and Designers

This document is accessible (and may be updated) at <http://coevolving.com/aalto/201010-cs0005>.

- This is revision 0210a (as posted at February 11, 01:00 CET).

jump to: [\[Pre-course Preparation\]](#) [\[Concurrent Studies\]](#) [\[Friday, February 4\]](#) [\[Tuesday, February 8\]](#) [\[Between sessions\]](#) [\[Friday, February 11\]](#) [\[Due March 14\]](#)

jump to: [\[Dialectics\]](#) [\[Grading\]](#) [\[Tools\]](#)

jump to: [References](#) [\[Cluster 1\]](#) [\[Cluster 2\]](#) [\[Cluster 3\]](#) [\[Cluster 4\]](#) [\[Cluster 5\]](#) [\[Cluster 6\]](#) [\[Cluster 7\]](#)

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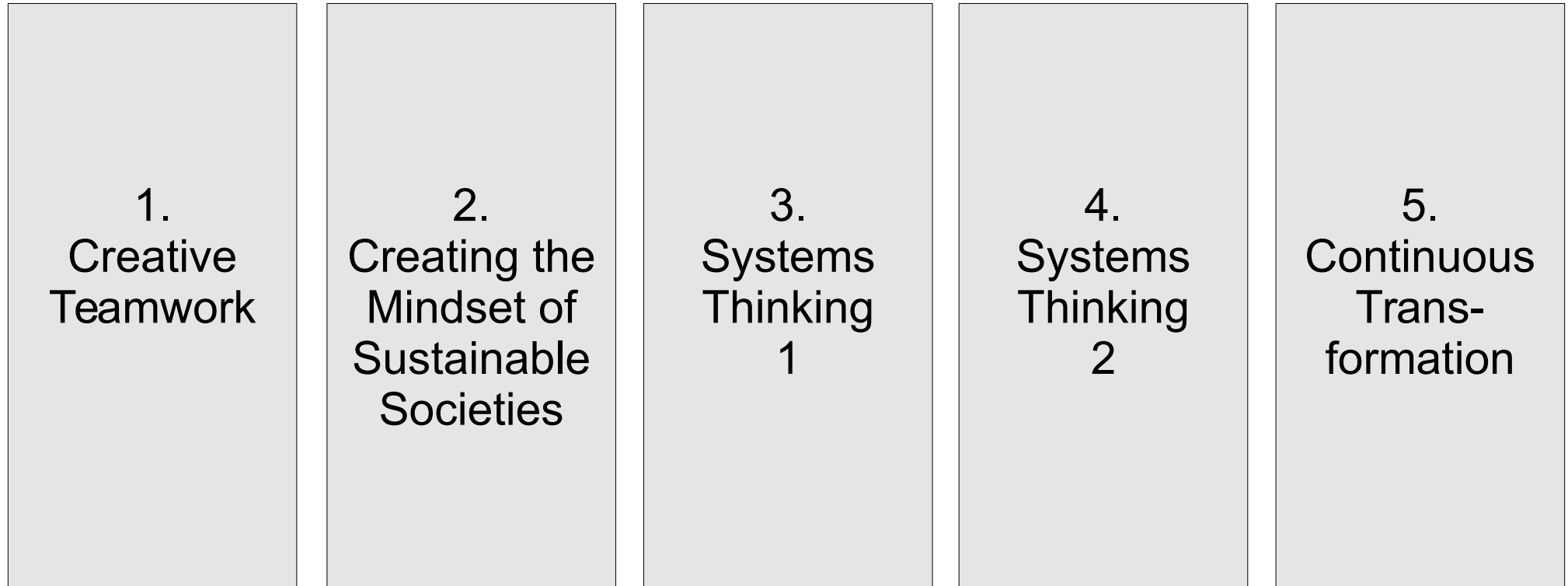
This course is listed as *CS0005*, with the code of *Syst Think P D*. Sessions are scheduled as:

- 04.02.11, fri 10.00-16.00
- 08.02.22, tues 10.00-16.00
- 11.02.11, fri 10.00-16.00

From a systemic perspective, this course is seen as a complement to *Systemic Thinking of Sustainability Communities*, *CS0005*, with the code of *Syst Think Su C*. While the core systems concepts between the two courses are compatible, the underlying philosophy, models and methods have different emphases.

Pre-course Preparation

By 2015-2016, the structure of the curriculum had matured



Tiina Laurila (2015). Creative Sustainability – monialaisuutta hyödyntävä lähestymistapa kestävän kehityksen opetukseen. *UAS Journal*, 5(1). Retrieved from https://arkisto.uasjournal.fi/uasjournal_2015-1/laurila.html

Systems Thinking 2 MUO-E8004 (February 2016) is online

2016/02 Systems Thinking 2 MUO-E8004 -- Index

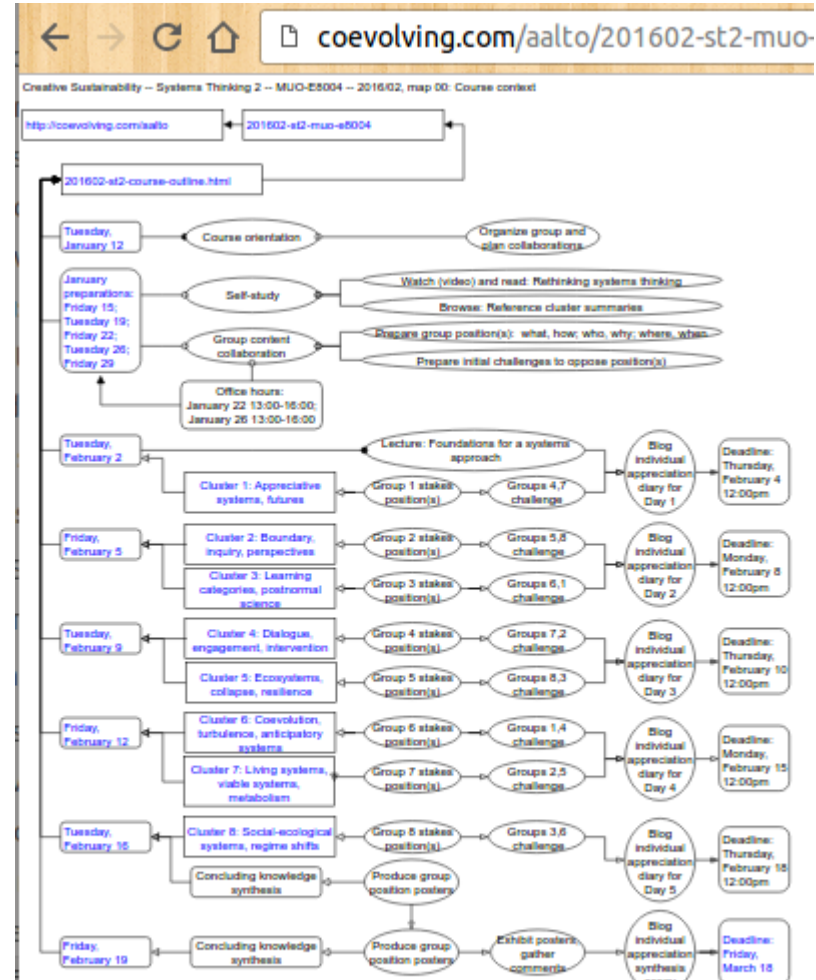
The February 2016 session of CS0005 at Aalto University has its presentation materials available as open courseware, browsable at <http://coevolving.com/aalto/201602-st2-muo-e8004/>.

The key documents include:

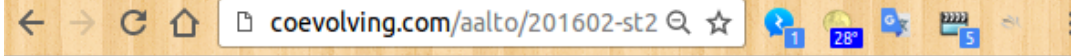
Map 00: Course Context	[as SVG]	[as PNG]	...
Course outline	[as HTML]
Map 00: Foundations for a Systems Approach	[as SVG]	[as PNG]	[reference cluster 0]
Map 01: Appreciative Systems, Futures	[as SVG]	[as PNG]	[reference cluster 1]
Map 02: Boundary, Inquiry, Perspectives	[as SVG]	[as PNG]	[reference cluster 2]
Map 03: Learning categories, postnormal science, ignorance	[as SVG]	[as PNG]	[reference cluster 3]
Map 04: Dialogue, engagement, intervention	[as SVG]	[as PNG]	[reference cluster 4]
Map 05: Ecosystems, collapse, resilience	[as SVG]	[as PNG]	[reference cluster 5]
Map 06: Coevolution, turbulence, anticipatory systems	[as SVG]	[as PNG]	[reference cluster 6]
Map 07: Living systems, viable systems, metabolism	[as SVG]	[as PNG]	[reference cluster 7]
Map 08: Social-ecological systems, regime shifts	[as SVG]	[as PNG]	[reference cluster 8]

The maps were created with [draw.io](#) exported to SVG and PNG formats.

Aalto University, MUO-E8004 "Systems Thinking 2" (February 2016 course) by David Ing is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](#).



Student teams prepared 3 weeks to lead 8 dialectics in 6 days



2016/02 Systems Thinking 2 MUO-E8004 Course Outline

This document is accessible (and may be updated) at <http://coevolving.com/aalto/201602-st2-muo-e8004/>. The pages are listed in [~index.html](#).

- This is revision 0117a (as posted at January 16, 21:00 ET). All maps 1 through 8 complete.

A more readable map is at <http://coevolving.com/aalto/201602-st2-muo-e8004/201602-st2-muo-e8004-map00-context.svg> (or try the [png version](#) if SVG looks bad in your browser).

Set the style sheet for this page:

jump to: [Course orientation](#) -- [\[Learning approach\]](#) [\[Grading\]](#)

jump to: [Sessions](#) -- [\[Tuesday, January 12\]](#) [\[January preparations\]](#) [\[Tuesday, February 2\]](#) [\[Friday, February 5\]](#) [\[Tuesday, February 9\]](#) [\[Friday, February 12\]](#) [\[Tuesday, February 16\]](#) [\[Friday, February 19\]](#) [\[Due: Appreciation Synthesis\]](#)

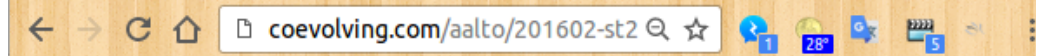
jump to: [References](#) -- [\[Cluster 0\]](#) [\[Cluster 1\]](#) [\[Cluster 2\]](#) [\[Cluster 3\]](#) [\[Cluster 4\]](#) [\[Cluster 5\]](#) [\[Cluster 6\]](#) [\[Cluster 7\]](#) [\[Cluster 8\]](#)

Course orientation

Course instruction team:

- David Ing, <http://coevolving.com>, <https://plus.google.com/+DavidIng>, isss@daviding.com.
- Aija Staffans, aija.staffans@aalto.fi
- Susu Nousala, <https://plus.google.com/u/0/112093238106785699723>
- Glen Forde, glen.forde@aalto.fi

This course is a complement and continuation from Systems Thinking 1 (MUO-E8003). Since



At the course orientation commencement on January 12, students will form groups. In 8 sessions, each of these groups will in turn lead a learning discussion by staking a collective position on the topic cluster. Members of two other groups will then challenge the presented position by probing on claims and questioning premises. A rich dialectic can serve to deepen understanding amongst all participant.

Individual students will write five appreciation diary logs, and a concluding appreciation synthesis, following an academic style of referencing.

[\[jump to top of page\]](#)

Grading

Grades will be assigned in the following scheme:

- (1) Group discussion engagement, group position poster exhibition and class attendance: 60%
- (2) Individual appreciation diary logs: 15%
- (3) Individual appreciation synthesis: 25%

(1) *Groups* will each collaborate:

- (i) by preparing presentation materials (e.g. slides, maps, charts, models, exercises) including references to sources;
- (ii) as presenter-facilitators, sharing highlights from an assigned research reference cluster (for 45 to 60 minutes);
- (iii) as challengers, responding to presenters with lines of inquiry that will deepen learning (for 15 to 30 minutes); and
- (iv) by producing a concluding group position on the most salient system ideas from the course (not just the assigned research topic cluster) on exhibition posters for the last class meeting.

Groups should draw on their collective disciplinary backgrounds and experiences, and create highlights by extending their understanding of the research topic clusters. Extending the pattern language approach, the following framework may be helpful in structuring content:

Concluding infographics of resonances were created in 72 hours



Eight infographics from "Systems Thinking 2" (2016)

Posted on March 09, 2016 by daviding

Concluding 3 intensive weeks of content immersion, eight student groups created infographics of the ideas that resonated with them from the "Systems Thinking 2" class in the Creative Sustainability program at Aalto University. Each group had been given 3 weeks in advance to prepare content to lead a learning discussion, staking a position on a list of references. As students participated in the intensive sessions, the broader contexts reshaped those positions into a broader appreciation of the breadth of systems thinking. The initial positions and concluding syntheses were:

1. Appreciative systems, futures → Into the Future with Systems Thinking
2. Boundary, inquiry, perspectives → Systems thinking — synthesis
3. Learning categories, postnormal science, ignorance → Systems Thinking from learning and knowledge making perspective
4. Dialogue, engagement, intervention → Systems thinking from a dialogue perspective
5. Ecosystems, collapse, resilience → What is the purpose of understanding the differentiation between complexity and complicatedness in systems thinking
6. Coevolution, turbulence, anticipatory systems → Anticipatory systems, turbulence and coevolution
7. Living systems, viable systems, metabolism → How to make STEW (Systems Thinking Endless Wisdom)
8. Social-ecological systems, regime shifts → Systems? No problem!

The ending infographics represent a synthesis of the content from the course, each group having traced a different path. To rebalance team sizes, a few individuals migrated to a different group. Some anchored more on the content they had led, while others chose to strengthen linkages to other ideas.



1. Appreciative systems, futures → Into the Future with Systems Thinking

Group 1 read through a [cluster of references on appreciative systems and futures](#) and a map of the basic ideas to produce a presentation slide set.



2. Boundary, inquiry, perspectives → Systems thinking — synthesis

Group 2 worked through a [cluster of references on boundary, inquiry and perspectives](#) and a map of the basic ideas to produce a presentation slide set.

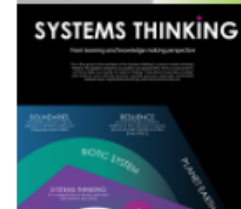


Boundary Inquiry & Perspectives

Annina Lattu
Miguel Fonseca
Jennifer Pitkanen

The concluding infographic by Miguel Fonseca, Annina Lattu and Jennifer Pitkanen put a higher emphasis on learning (a cluster of references led by Group 3), wrapping in ideas of resilience, turbulence, anticipatory systems on top of the content for which they were primarily responsible.

See the *Systems thinking — synthesis* infographic as [900px width](#) or as [600px width](#).



3. Learning categories, postnormal science, ignorance → Systems Thinking from learning and knowledge making perspective

Group 3 focused on a [cluster of references on learning categories, postnormal science and ignorance](#) and a map of the basic ideas to produce a presentation slide set.

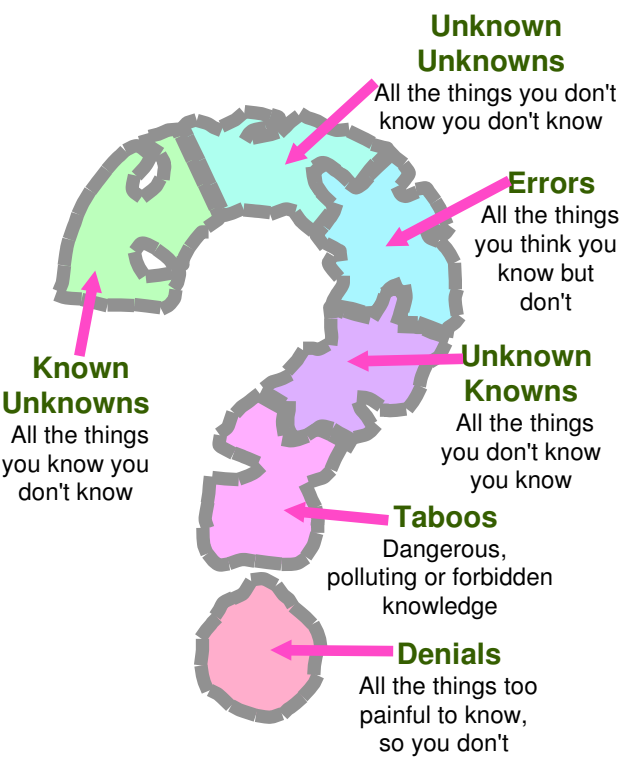
Agenda

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With known knowns in science eroding by systemic world changes, collective learning on why, how + when-where-whom gains value



<i>Colloquial description:</i>	Learning why	Learning how	Learning when, learning where, learning whom
<i>Pursuits:</i>	Uncovering universal truths	Instrumental rationality towards a conscious goal	Values in practice based on judgement and experience
<i>Primary intellectual virtue:</i>	Episteme	Techne	Phronesis
<i>Translation / interpretation:</i>	Science (viz. epistemology)	Craft (viz. technique)	Prudence, common sense
<i>Type of virtue:</i>	Analytic scientific knowledge	Technical knowledge	Practical ethics
<i>Orientation:</i>	Research	Production	Action
<i>Nature:</i>	Universal	Pragmatic	Pragmatic
	Invariable (in time and space)	Variable (in time and space)	Variable (in time and space)
	Context-independent	Context-dependent	Context-dependent

[1] Ing, David, Minna Takala, and Ian Simmonds. 2003. "Anticipating Organizational Competences for Development through the Disclosing of Ignorance." In Proceedings of the 47th Annual Meeting of the International Society for the System Sciences. Hersonissos, Crete.
http://systemicbusiness.org/pubs/2003_ISSS_47th_Ing_Takala_Simmonds.html

[2] Ing, David. 2013. "Rethinking Systems Thinking: Learning and Coevolving with the World." *Systems Research and Behavioral Science* 30 (5): 527–47. doi:10.1002/sres.2229.

Trito Learning rolls with turbulent contexts by negotiating in worlds where proto-learning and deutero-learning break down

	<i>Process discriminating context change over time</i>	<i>Example / metaphor (groups learn to cook)</i>
Trito-learning (Learning 3)	Change in response correcting for contexts (i.e. systems of sets of alternatives)	Competing on tv cooking challenges as teams and individuals (e.g. Hell's Kitchen)
Deutero-learning (Learning 2)	Change in response correcting the set of alternatives	Mastering a range of food prep traditions (e.g. Culinary Institute of America)
Proto-learning (Learning 1)	Change in response correcting errors within a set of alternatives	Training on food service handling for consistency and safety (e.g. cafeteria kitchens)

Proto-learning, deutero-learning and trito-learning are described in Bateson, Gregory. 1972. "The Logical Categories of Learning and Communication." In *Steps to an Ecology of Mind*, 279–308. Northvale, NJ: Jason Aronson.
http://books.google.ca/books?id=Wfe2t_qzaHEC&pg=PA279.

To roll with the turbulence, T-shaped individuals collectively gain intelligence into T-shaped teams

Boundary-Crossing Competencies

Customer centricity, strategic thinking, operational excellence, people engagement, leveraging ICTs, and others

Many disciplines/business functions

Many systems/vertical industry expertise

Many cultures/geographical experiences

Deep Knowledge

At least one discipline/business function

At least one system/vertical industry expertise

At least one discipline/business function

From I-shaped to T-shaped knowledge, at layers of individuals and cooperating communities of practice

	←	Perspective	→
Observation layer	Motivations	Enabling factors	Expected benefits
Individual	Empowerment Personal success Influence	Self-image Learning Information variety	Increased problem-solving and decision-making abilities
Social entity	Survival Social identity achievement Influence	Consonance Trust Learning organization Relational capabilities Communication	Resonance Increased know-how and survival capability

[1] Demirkan, Haluk, and Jim Spohrer. 2015. "T-Shaped Innovators: Identifying the Right Talent to Support Service Innovation." *Research-Technology Management* 58 (5): 12–15. doi:10.5437/08956308X5805007

[2] Barile, Sergio, Giacomo Franco, Giancarlo Nota, and Marialuisa Saviano. 2012. "Structure and Dynamics of a 'T-Shaped' Knowledge: From Individuals to Cooperating Communities of Practice." *Service Science* 4 (2): 161–80. doi:10.1287/serv.1120.0014.

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Ontogenetic development from the *transmission of representations* → the *education of attention* in ecological anthropology (Tim Ingold)

Cognitive science → **Phenomenological, ecological, practice-theoretic**

Knowledge as information, human as devices for processing info

→ Knowledge as skills, humans aware and agency in a field of practice

Enculturation

→ Enskilment

Passing along information (e.g. writing out a recipe, from which an image in the mind forms as pattern)

→ Copying not other persons, but instead their actions (Merleau-Ponty) in guided rediscovery (e.g. showing someone how to crack an egg by taking their hand)

Innate dispositions (i.e. speaking, climbing, throwing), then receiving informational content

→ Perception as the activity of a whole organism in an environment, learning as fine-tuning or sensitisation of the entire perceptual system (Gibson)

Knowing as relations between structures in the world and structures in the mind

→ Knowing as immanent in life and consciousness of the knower as it unfolds within the field of practice (taskscape) with presence as being-in-the-world

Tim Ingold. 2001. "From the Transmission of Representation to the Education of Attention." In *The Debated Mind: Evolutionary Psychology versus Ethnography*, edited by Harvey Whitehouse, 113–53. New York: Berg. <http://psycnet.apa.org/psycinfo/2001-01499-004>.

Modality of travel from *transport* → *wayfaring* (Tim Ingold)

Transport → Wayfaring

Sailing <i>across</i> the surface of the globe (British)	→ Moving <i>along</i> paths of travel (Inuit)
Destination-oriented, of people and goods from location to location	→ Development- or process-oriented, no final destination, always somewhere further to go
Every port as a point of re-entry from temporary exile while in transit	→ Active engagement perceptually and materially, as the country opens up along the path
Moves to relocate people and their baggage	→ Lines that wend hither and thither, pausing here and there before moving on
In a maze (i.e. a multicursal puzzle with many branches, paths and dead-ends) as intentional	→ In a labyrinth (i.e. a unicursal puzzle with a single non- branching path) attentional in action

Tim Ingold, 2006. "Up, across and along." *Place and Location: Studies in Environmental Aesthetics and Semiotics* 5: 21–36.
http://www.eki.ee/km/place/koht_5.htm ; Tim Ingold 2007. "Traces, Threads and Surfaces." In *Lines: A Brief History*, 39–71. Routledge.

Interactions from *network* → *meshwork* (Tim Ingold)

Network → Meshwork

Network of point-to-point connections	→	Meshwork of trails woven as lives go along them
Living within a perimeter	→	Living along lines (of flight, or of becoming)
Point of origin to another point (contiguous or distant)	→	Line of becoming with neither a beginning nor an end, only a middle
Impulse to reach a terminus	→	Impulse to keep going
Text (as verbal composition)	→	Texture (as a tissue of lines)

Tim Ingold, 2011. "Point, Line, Counterpoint: From Environment to Fluid Space." In *Being Alive: Essays on Movement, Knowledge and Description*, 76–88. Routledge.

Enactment of education from *sequencing pedagogical content* → *curriculum-making* (Ross & Mannion)

Sequencing pedagogical content

Representing the world, with mental schemas

Textual understandings of curriculum

Culture as socially constructed, invoking (i) a “real” nature, and (ii) a constructed representation

Planned activity and prescribed propositional knowledge

Shared representations of the world or experiences of the world

Curriculum-making

→ Living in the world, as dwelling in domains of entanglement

→ A process of living and through the world

→ Immersion in a “dwelt-in” world, with active, practical and perceptual engagement

→ Living as an ongoing process of improvisation, in response to relations among people, places, material and activities

→ Shared environment of the communicators

Hamish Ross and Greg Mannion. 2012. “Curriculum Making as the Enactment of Dwelling in Places.” *Studies in Philosophy and Education* 31 (3): 303–13. doi:10.1007/s11217-012-9295-6.

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