Systems Thinking, Service Systems, Affordance Pattern Language

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Häme University of Applied Sciences (HAMK), Finland
Business Co-Evolution and Change of Behavior Culture
December 2, 2017

Agenda

1. Introductions, and forming teams

2. Systems thinking basics

3. Service systems (co-responding)

4. Affordance pattern language

5. Theory + philosophy

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David Ing,
Professional Experience

IBM Canada /
North America
(1985-2012; retired early)
Management consultant;
market development;
marketing scientist

Aalto U.
(2003-)
Since 2010, teaching in
master's program in
Creative Sustainability

U. of Toronto
Canadian Centre for
Marketing Information
Technologies (C^{2}MIT)
(cofounder 1990-1992)

International Society
for the
Systems Sciences
(President 2011-2012)

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December 2017

Organizations embark on *open innovation* initiatives to sweep in external knowledge, practices and resources in cooperation with partners. This contrasts to the mainstream *private innovation* approach of in-house research and development sponsored solely by an incorporated funder, with intellectual property protected by copyright. Few organizations simultaneously engage in both approaches, within and across the levels of programs, projects and individuals. How does *learning* occur in such an organization -- and the communities of members within the organization -- in both cumulative and distributed ways?

The *open innovation learning* exhibited by IBM in the decade of 2001-2011 provides a foundation for building both descriptive theories and normative theories. Legal protocols for *open source* licensing began in 1998, and "open innovation" became popular in the business press from 2003. At the beginning of the 2001-2011 period, a behaviour of *open sourcing* by commercial enterprises departed from a tradition of *private sourcing* that presumes trade secrets for competitive advantage that maintaining economic viability. After a decade, *Open Sourcing while Private Sourcing* (*OSwPS*) had been demonstrated as a successful way of doing business at IBM, and had also become adopted by other companies and institutions.

The primary method employed to appreciate the phenomenon of OSwPS is multiparadigm inquiry. Theories are developed inductively from seven case studies, characterized in five containing contexts over the period, in a process orientation observing events, activities and choices ordered over time. Three descriptive theories have been built in parallel perspectives based on contrasting philosophies. Pursuit of a normative theory subsequently led to the proposal of additional hypotheses.

Emerging theories of open innovation learning challenge a presumption that commercial and non-commercial interests are incompatible. Open sourcing *while* private sourcing is a demonstrable way of conducting a viable business.

David Ing is a cofounder of the *Trito Innovation Colab*, centered in Toronto, Canada. An alumnus of IBM after 28 years, this research was conducted during doctoral studies of the *Aalto University School of Science* in Finland. He received a master's degree from the *Kellogg School of Management* at *Northwestern University*, and a bachelor's degree from *Trinity College* at the *University of Toronto*. He has served as president of the *International Society for the Systems Sciences*, and is an ambassador for the *International Society of Service Innovation Professionals*.

Jim Spohrer is a Director of the IBM Cognitive Opentech Group at *IBM Research Almaden*, in San Jose, California. Previously, he was Director of IBM Global University Programs, a cofounder of the Almaden Services Research group, and the founding CTO of IBM's Venture Capital Relations Group in Silicon Valley. He has a Ph.D. in artificial intelligence from *Yale University*, and a bachelor's degree in Physics from *MIT*.

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Open Innovation Learning

Theory building on open sourcing while private sourcing

Ing

Open Innovation Learning

Theory building on open sourcing while private sourcing

David Ing

Foreword by Jim Spohrer

Agenda

1. Introductions, and forming teams

2. Systems thinking basics

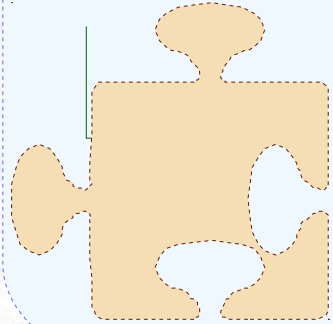3. Service systems (co-responding)

4. Affordance pattern language

5. Theory + philosophy

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Systems thinking is a perspective on wholes, parts and their relations

containing whole

Function (non-living) or role (living)
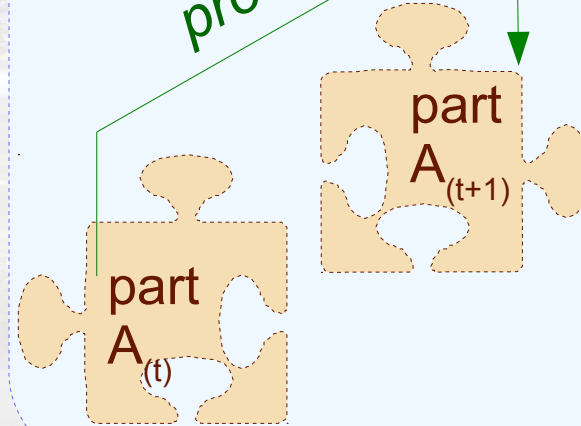
Function
"contribution of the part to the whole"

structure

part A$_{(t)}$ part B$_{(t)}$
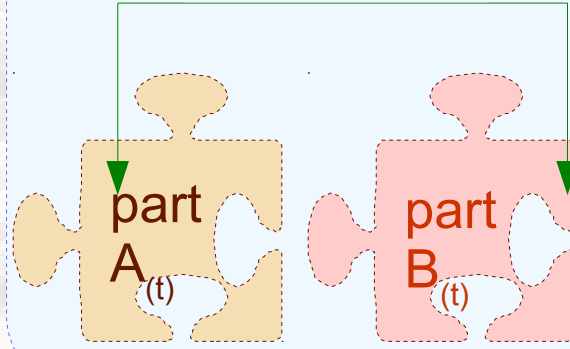
Structure
"arrangement in space"

process

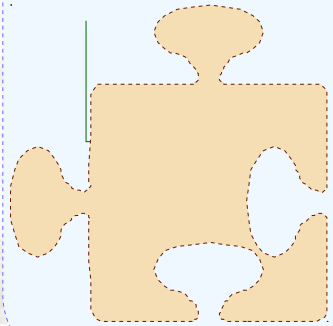part A$_{(t)}$ part A$_{(t+1)}$

Process
"arrangement in time"

In authentic systems thinking, synthesis precedes analysis and the containing whole is appreciated

containing whole

Function (non-living) or role (living)

Synthesis precedes analysis
1. Identify a containing whole (system) of which the thing to be explained is a part.
2. Explain the behavior or properties of the containing whole
3. Then explain the behavior or properties of the thing to the explained in terms of its role(s) or function(s) within its containing whole.

Source: Ackoff, Russell L. 1981. *Creating the Corporate Future: Plan or Be Planned For. New York:* John Wiley and Sons. http://books.google.com/books?id=8EEO2L4cApsC.

Pacing layers emphasize coevolution and learning

SITE
This is the geographical setting, the urban location, and the legally defined lot, whose boundaries outlast generations of ephemeral buildings. "Site is eternal", Duffy agrees.

STRUCTURE
The foundation and load-bearing elements are perilous and expensive to change, so people don't. These are the building. Structural life ranges from 30 to 300 years (but few buildings make it past 60, for other reasons).

SKIN
Exterior surfaces now change every 20 years or so, to keep up with fashion or technology, or for wholesale repair. Recent focus on energy costs has led to re-engineered Skins that are air-tight and better-insulated.
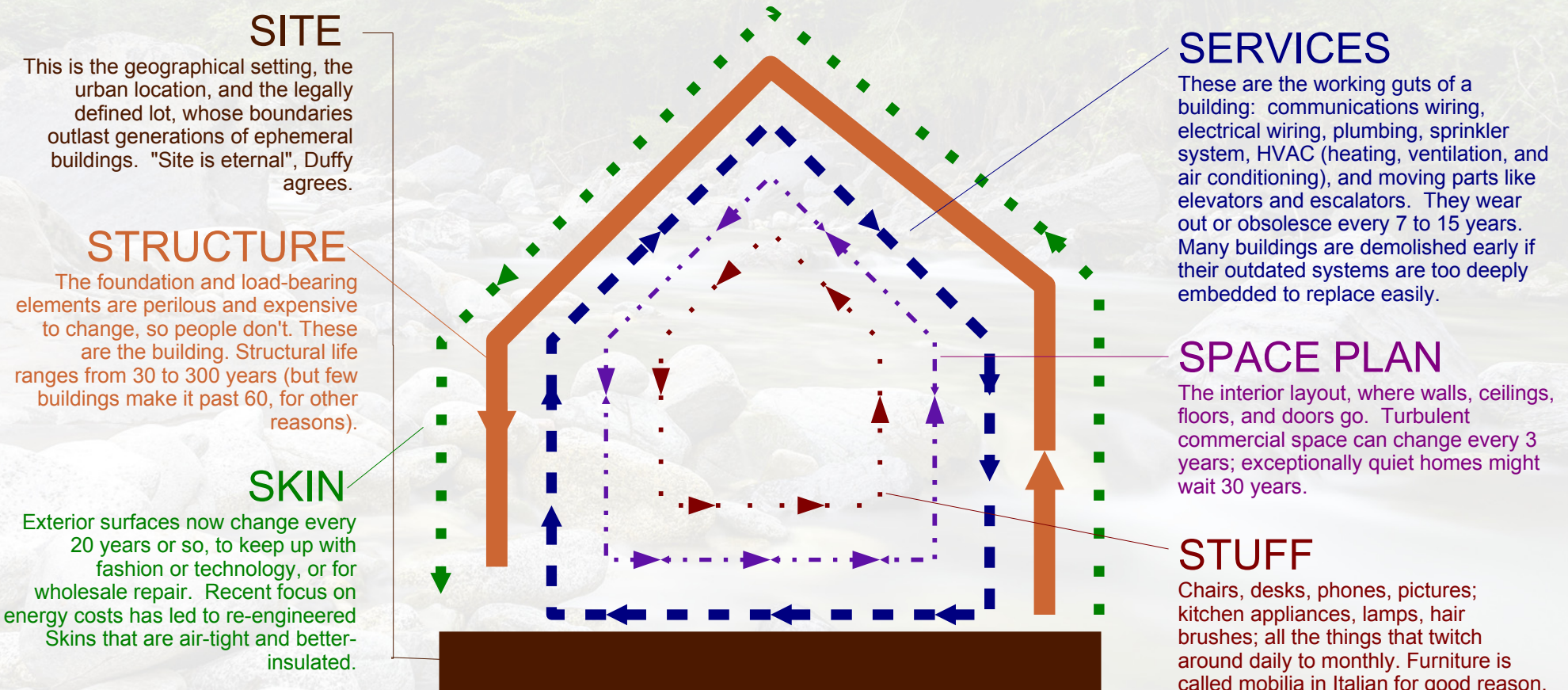
SERVICES
These are the working guts of a building: communications wiring, electrical wiring, plumbing, sprinkler system, HVAC (heating, ventilation, and air conditioning), and moving parts like elevators and escalators. They wear out or obsolesce every 7 to 15 years. Many buildings are demolished early if their outdated systems are too deeply embedded to replace easily.

SPACE PLAN
The interior layout, where walls, ceilings, floors, and doors go. Turbulent commercial space can change every 3 years; exceptionally quiet homes might wait 30 years.

STUFF
Chairs, desks, phones, pictures; kitchen appliances, lamps, hair brushes; all the things that twitch around daily to monthly. Furniture is called mobilia in Italian for good reason.

Source: Stewart Brand. 1994. *How Buildings Learn: What Happens after They're Built*. New York: Viking.

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Panarchy theory and resilience science see system connections to larger-slower levels, and smaller-faster levels
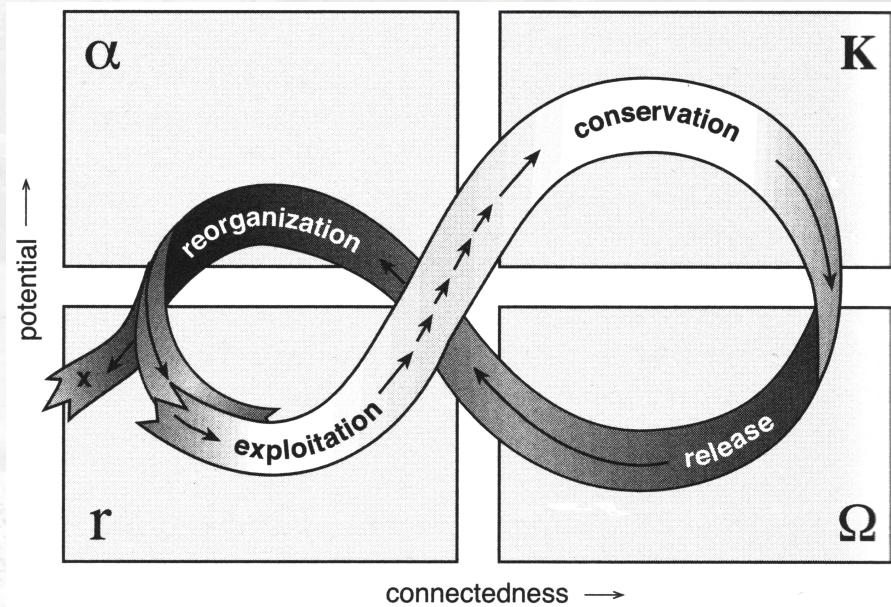

Figure 4. A stylized representation of the four ecosystem functions (r, K, Ω, α) and the flow of events among them.

Figure 7. Panarchical connections. [....] the "revolt" connection ...can cause a critical change in one cycle to cascade up to a vulnerable stage in a larger and slower one. The ... "remember" connection ... facilitates renewal by drawing on the potential that has been accumulated and stored in a larger, slower cycle.
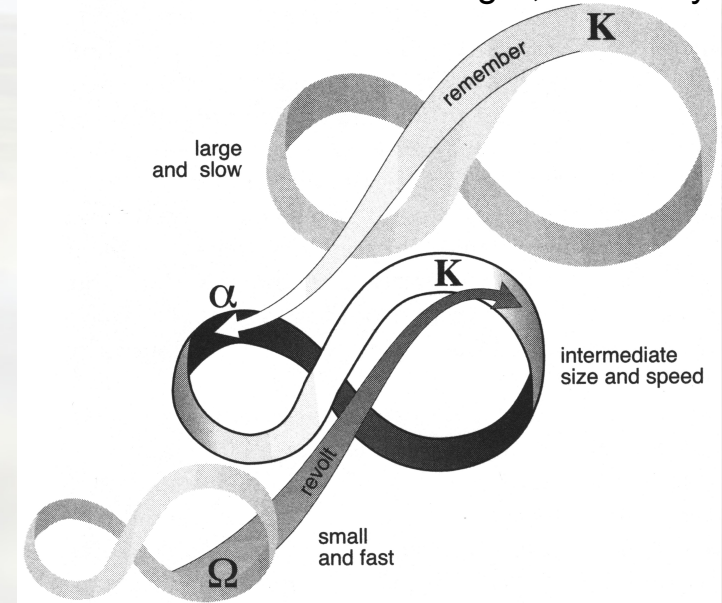
Source: C. S. Holling 2001. "Understanding the Complexity of Economic, Ecological, and Social Systems." *Ecosystems* 4 (5): 390–405. doi:10.1007/s10021-001-0101-5. http://dx.doi.org/10.1007/s10021-001-0101-5.

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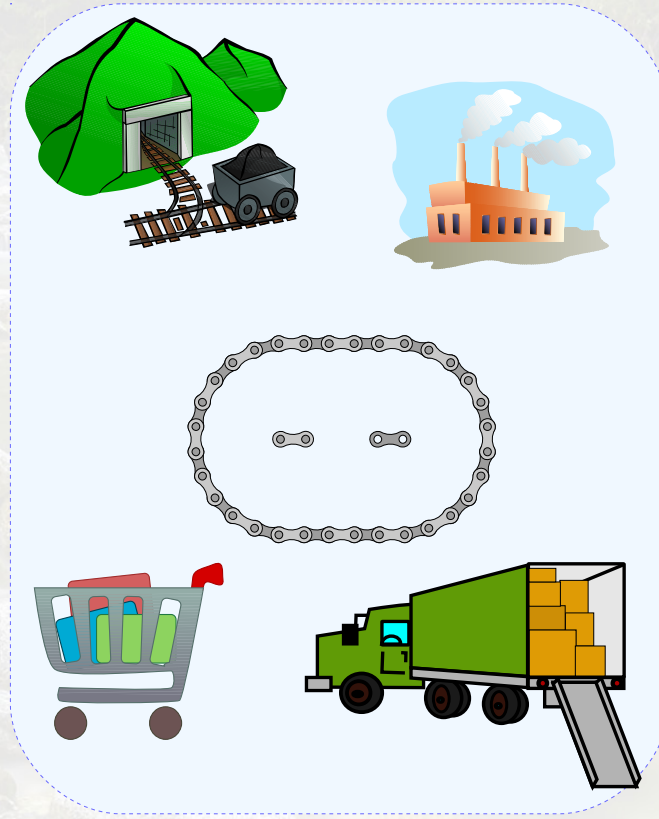3. Service systems (co-responding)

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Is thinking different across agricultural systems, industrial systems, and service systems?
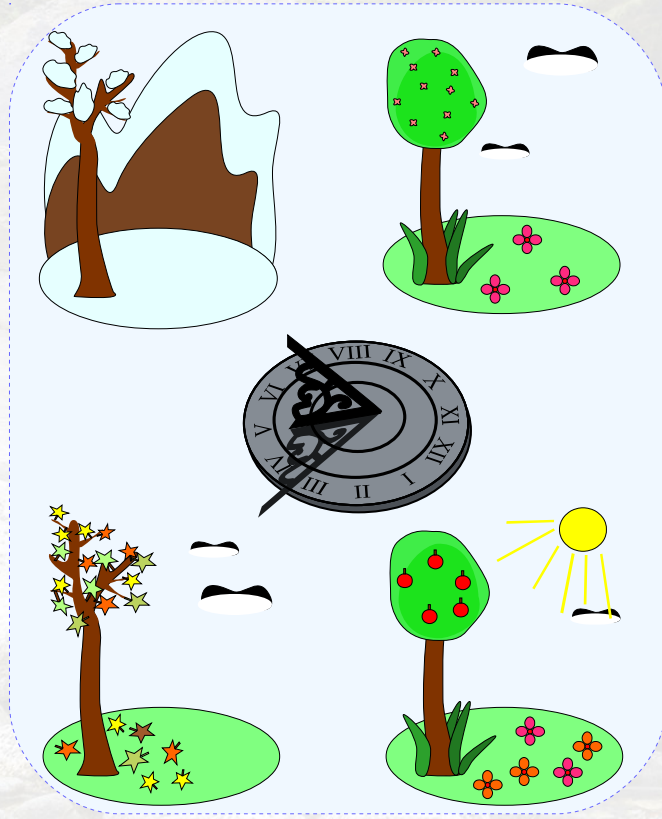
Agricultural Systems

Industrial Systems

Service Systems(?)

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Service systems in our society can be ranked from concrete to abstract, as subjects for schoolchildren

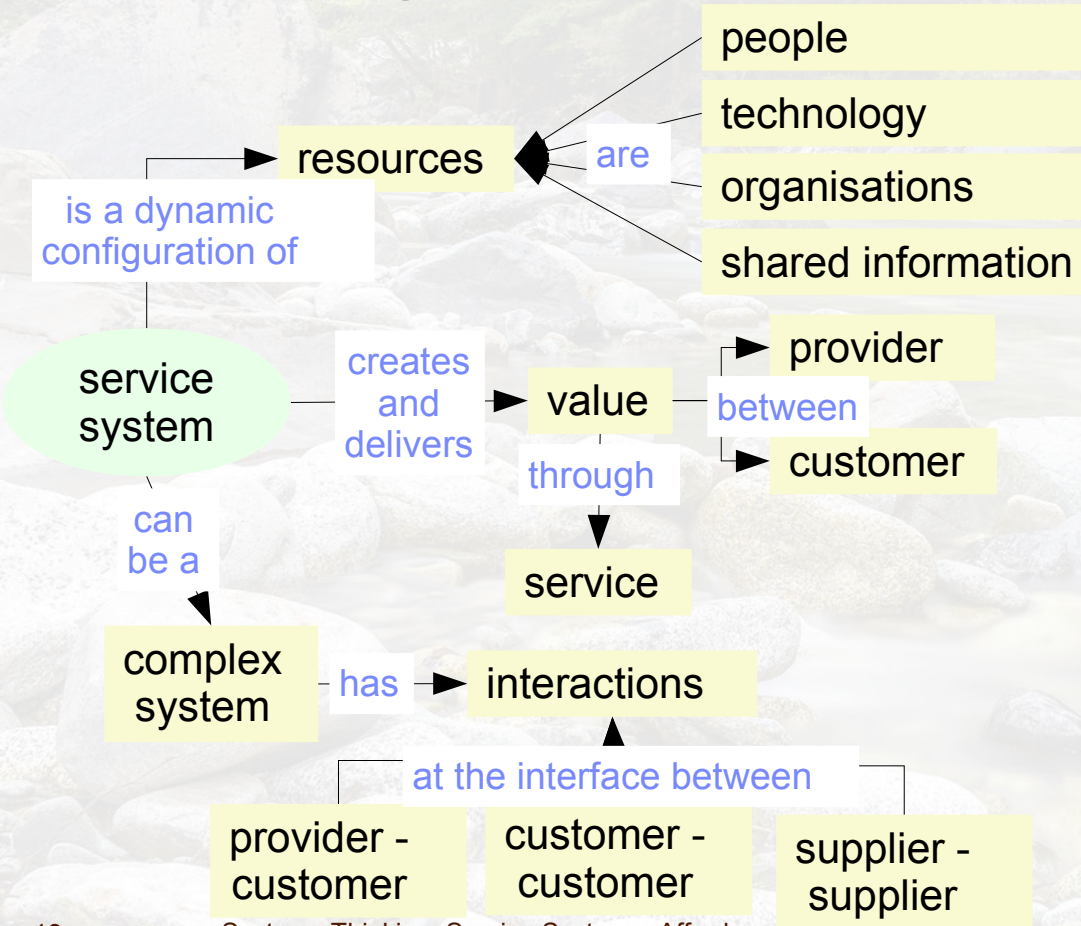| Systems that move, store, harvest, process		
Systems that move, store, harvest, process	• Transportation	K
	• Water and waste management	1
	• Food and global supply chain	2
	• Energy and energy grid	3
	• Information + communications (ICT) infrastructure	4
Systems that enable healthy, wealthy and wise people	• Building and construction	5
	• Banking and finance	6
	• Retail and hospitality	7
	• Healthcare	8
	• Education (including universities)	9
Systems that govern	• Government (cities)	10
	• Government (regions / states)	11
	• Government (nations)	12

After 2007, service systems have been recognized as the largest part of developed economies globally

resources — **are**
- people
- technology
- organisations
- shared information

is a dynamic configuration of

service system

creates and delivers → value — **between**
- provider
- customer

value — **through** → service

service system — **can be a** → complex system

complex system — **has** → interactions

interactions — **at the interface between**
- provider - customer
- customer - customer
- supplier - supplier

A service system can be defined as a dynamic configuration of resources (people, technology, organisations and shared information) that creates and delivers value between the provider and the customer through service.
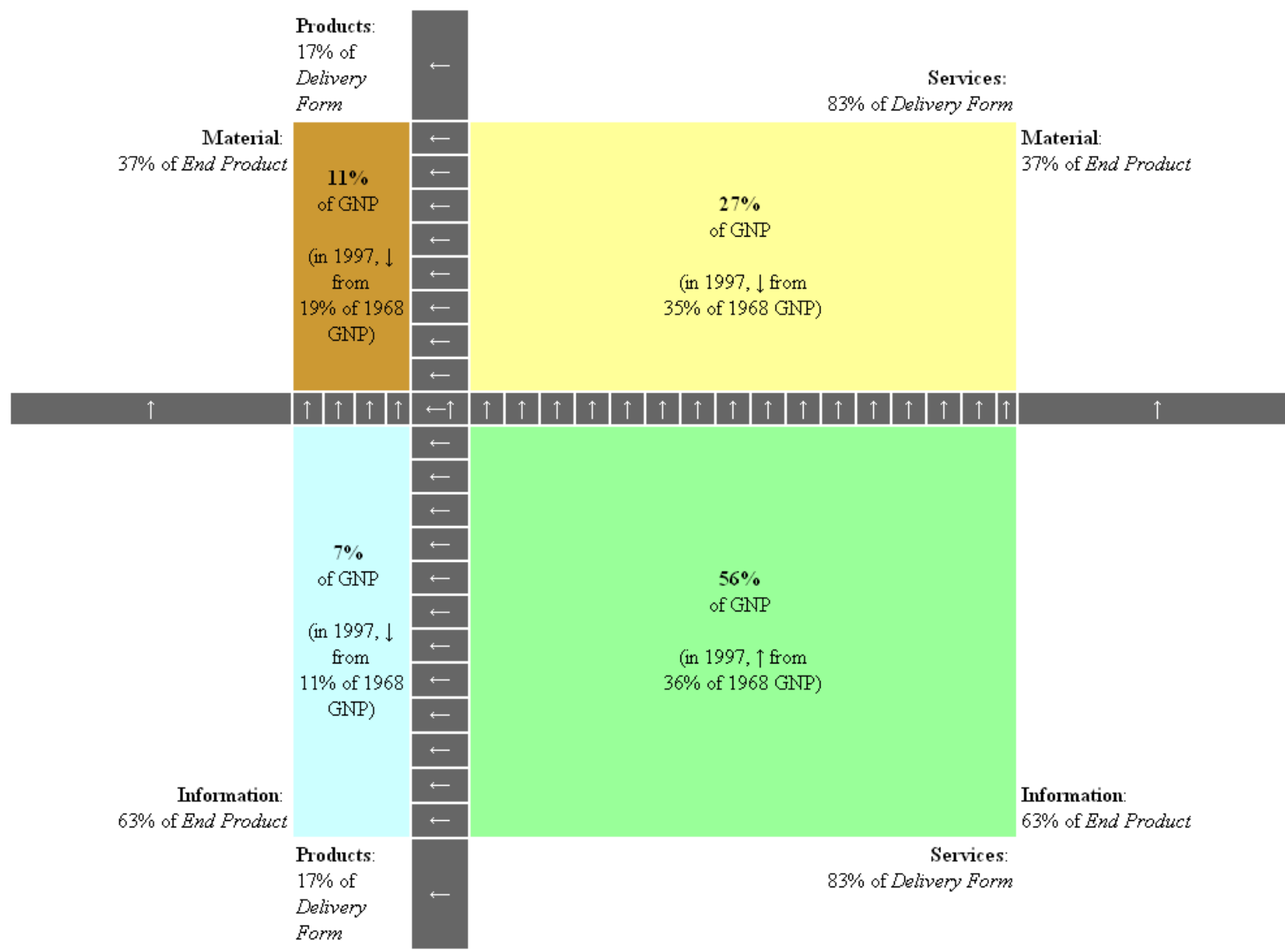In many cases, a service system is a complex system in that configurations of resources interact in a non-linear way.
Primary interactions take place at the interface between the provider and the customer.
However, with the advent of ICT, customer-to-customer and supplier-to-supplier interactions have also become prevalent.
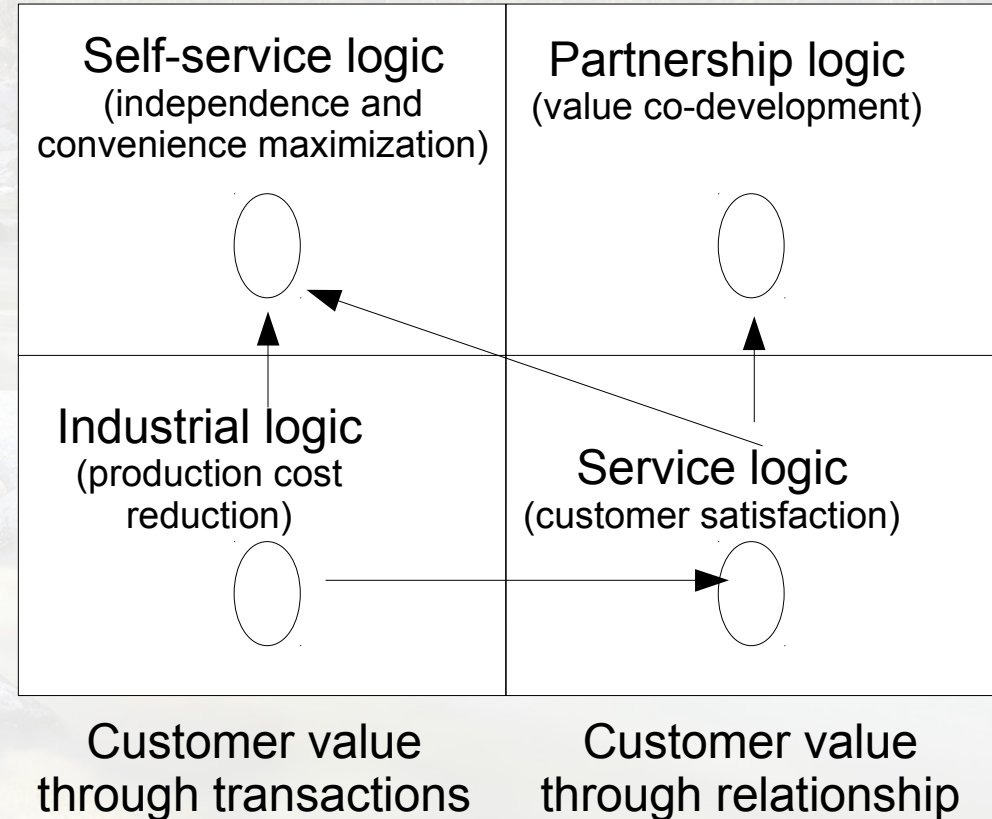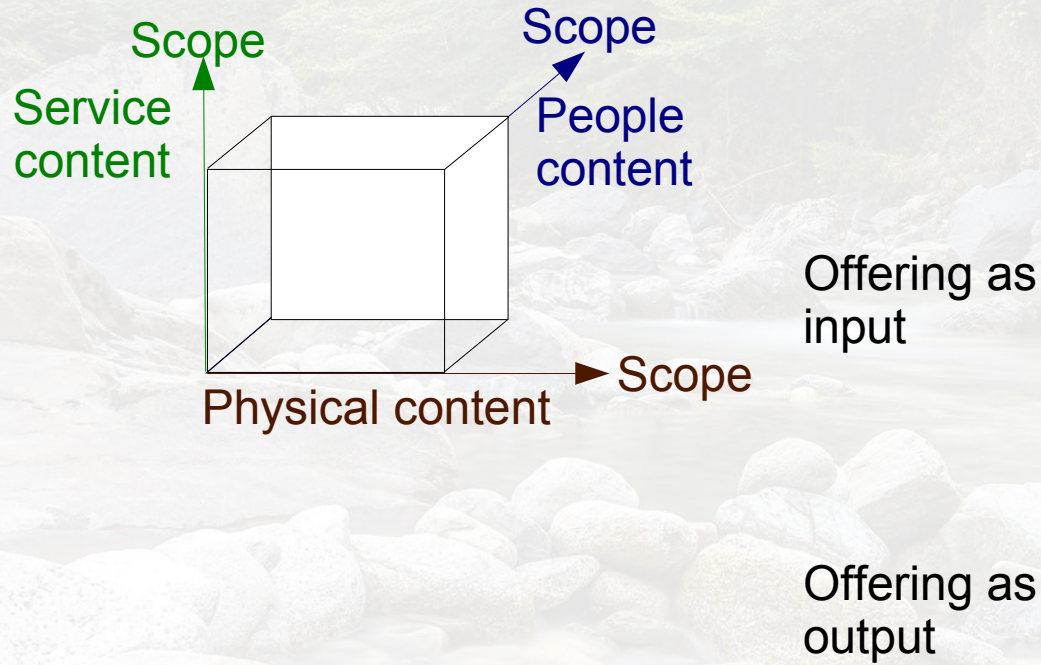These complex interactions createa system whose behaviour is difficult to explain and predict.
(IfM and IBM, 2008, p. 6)

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Products:
17% of *Delivery Form*

Services:
83% of *Delivery Form*

Material:
37% of *End Product*

11%
of GNP

(in 1997, ↓ from 19% of 1968 GNP)

27%
of GNP

(in 1997, ↓ from 35% of 1968 GNP)

Material:
37% of *End Product*

7%
of GNP

(in 1997, ↓ from 11% of 1968 GNP)

56%
of GNP

(in 1997, ↑ from 36% of 1968 GNP)

Information:
63% of *End Product*

Information:
63% of *End Product*

Products:
17% of *Delivery Form*

Services:
83% of *Delivery Form*

Uday M. Apte, Uday S. Karmarkar and Hiranya K Nath, "Information Services in the US Economy: Value, Jobs and Management", *Business and Information Technologies (BIT) Project*, Anderson School of Management at UCLA, June 2007

# Theory of the offering sees coproduction with *input*, or *output*

Scope

Service content

Scope

People content

Scope

Physical content

Offering as input

Offering as output

	Self-service logic (independence and convenience maximization)	Partnership logic (value co-development)
	Industrial logic (production cost reduction)	Service logic (customer satisfaction)

Customer value through transactions

Customer value through relationship

Rafael Ramirez and Johan Wallin. *Prime Movers: Define Your Business or Have Someone Define It Against You*, 2000, p. 141.

The theory of firms adding value cost has given way to mobilizing customers towards creating their own value

Adding ~~value~~ cost

Suppliers   Service Provider   Customer
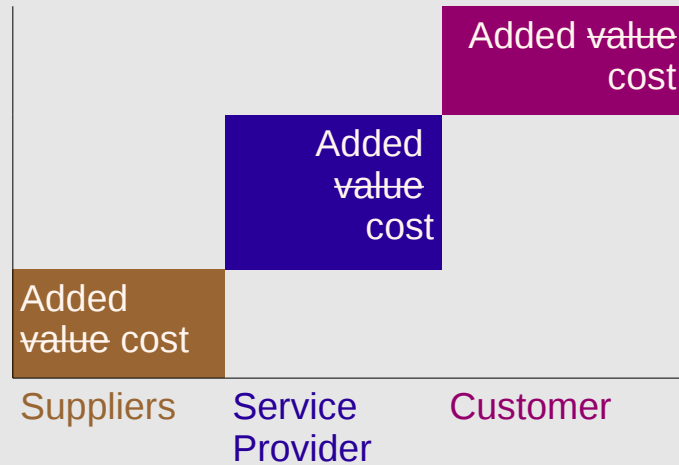
Our traditional about value … [says] every company occupies a position on the value chain. Upstream, suppliers provide inputs. The company then adds values to these inputs, before passing them downstream to then next actor in the chain [whether another business or the final consumer].

Enabling interactive value creation
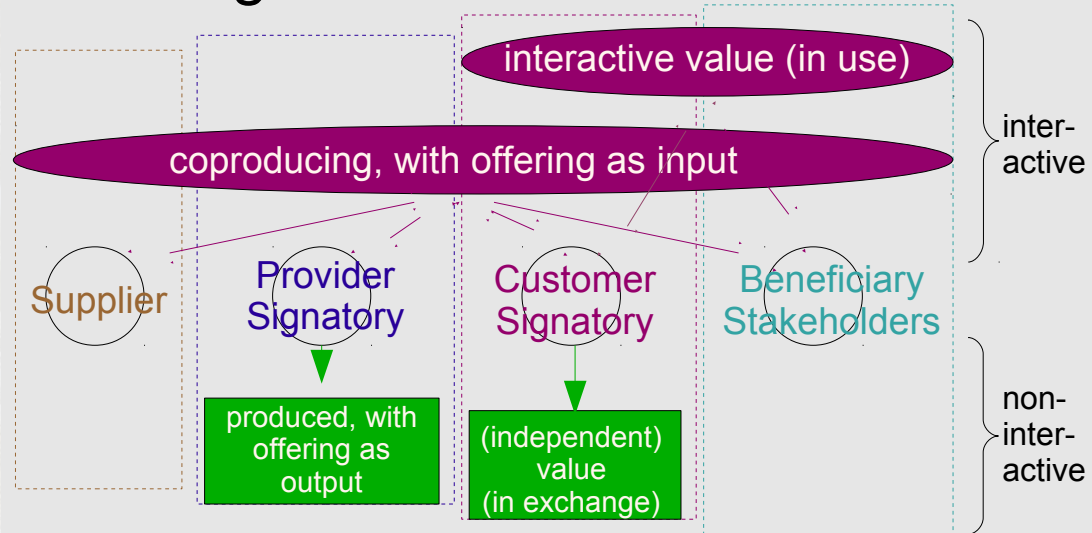
… IKEA's strategic intent [is] to understand how customers can create their own value and create a business system that allows them to do it better. IKEA's goal is not to *relieve* customers of doing certain things but to *mobilize* them to do easily certain things they have never done before. Put another way, IKEA invents value by enabling customers' own value-creating activities. … Wealth is [the ability] to realize your own ideas.

Service systems are dynamic, with parties interacting and providers and/or clients

A service system can be defined as "**a dynamic value-cocreation configuration of resources**, including people, organizations, shared information (language, laws, measures, methods), and technology, all connected internally and externally to other service systems by **value propositions**"
(Maglio, Vargo, Caswell, & Spohrer, 2009, p. 399).

The smallest service system centers on an individual as he or she **interacts** with others, and the largest service system comprises the global economy. Cities, city departments, businesses, business departments, nations, and government agencies are all service systems.

Every service system is b**oth a provider and client of service** that is connected by **value propositions** in value chains, value networks, or value-creating system ….
(Maglio & Spohrer, 2008, p. 18)

# Ask Not What's Inside Your Head, but What Your Head's Inside of

Stimulus – Response
(Behavioral Psychology)

[In the 1950] psychophysics of perception … "givens" in the light to the eye could not support perceptual phenomena, but only elementary experiences such as sensations. [….] Succinctly put, the psycho-physical program was … traditional in considering perception to be a set of responses to presented stimuli (albeit "higher order" stimuli).

Ecological Approach to Perception
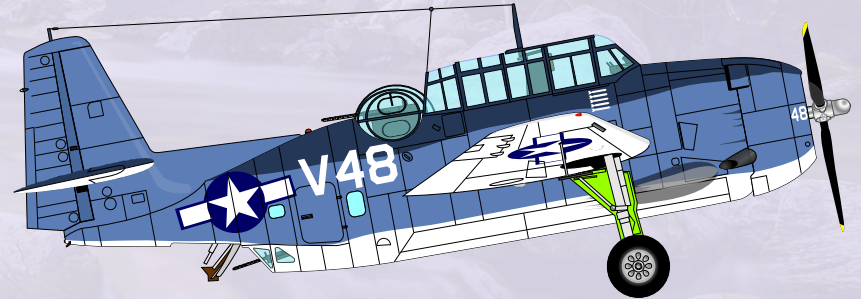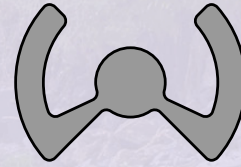
Over the last 10-15 years [James J. Gibson] has tried to develop enough theory … to demonstrate that direct perception is indeed plausible even if hordes of difficult details remain to be worked out. The … analysis of the optic array, stimulus organization, and the functional organization of perceptual systems are what Gibson oftens points to as radical features ….
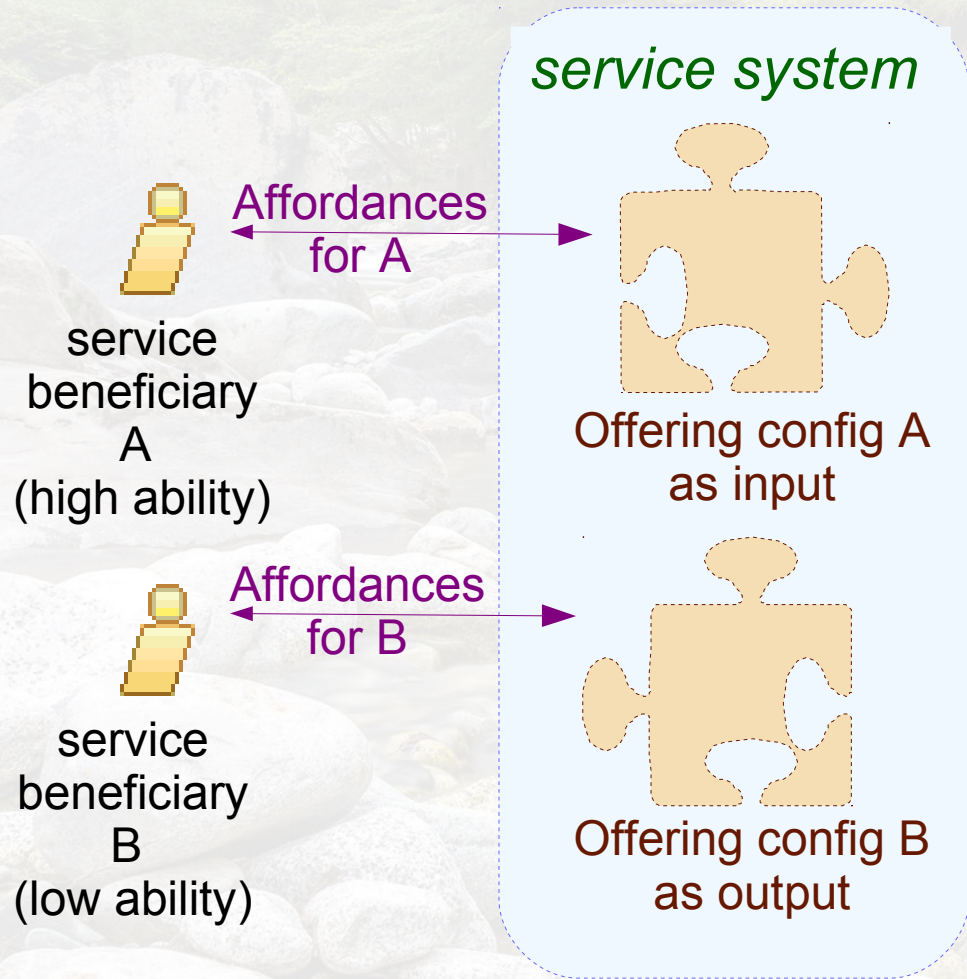
William M. Mace 1977. "James J. Gibson's Strategy for Perceiving: Ask Not What's inside Your Head, but What Your Head's inside of." In *Perceiving, Acting, and Knowing: Toward an Ecological Psychology*, edited by Robert Shaw and John Bransford, 43–65.

Affordances are relational in an ecological perception

service system

Affordances for A

service beneficiary A (high ability)

Offering config A as input

Affordances for B

service beneficiary B (low ability)

Offering config B as output

The term *affordance* refers to whatever it is about the environment that contributes to the kind of interaction that occurs. [….]

An affordance relates attributes of something in the environment to an interactive activity by an agent who has some ability, and an ability relates attributes of an agent to an interactive activity with something in the environment that has some affordance.

The relativity of affordances and abilities is fundamental. Neither an affordance nor an ability is specifiable in the absence of specifying the other.

James G. Greeno 1994. "Gibson's Affordances." *Psychological Review* 101 (2): 336–342.

How do we recognize a living system? As (a) the being of an organism; or (b) an animate becoming?
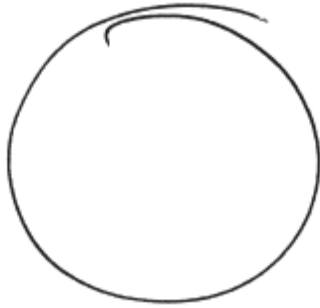
I have folded the organism in on itself such that it is delineated and contained within a perimeter boundary, set off against a surrounding world – an environment – with which it is destined to interact according to its nature. The organism is 'in here', the environment 'out there'.

In this depiction there is no inside or outside, and no boundary separating the two domains. Rather there is a trail of movement or growth. Every such trail discloses a relation. But the relation is not between one thing and another – between the organism 'here' and the environment 'there'. It is rather a trail along which life is lived. Neither beginning here and ending there, nor vice versa ….
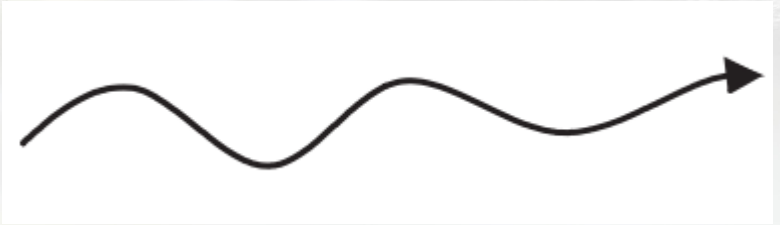
Tim Ingold. 2011. "Rethinking the animate, reanimating thought." In *Being Alive: Essays on Movement, Knowledge and Description,* p. 69.

How do we interpret a line? As (a) a static perimeter; or (b) a trajectory of movement?

Space

Place

Pathway
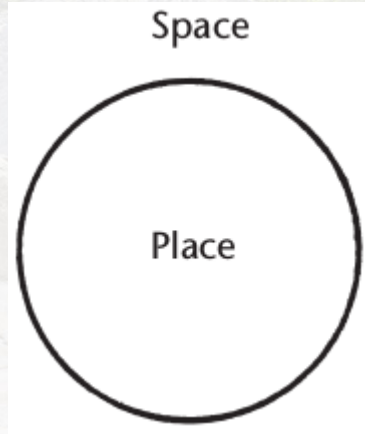
For the Inuit, as soon as a person moves he becomes a line.

… lineal movement *along* paths of travel [is] referred to ... as wayfaring.

… lateral movement *across* a surface, … I call transport.

My contention is that lives are led not inside places but through, around, to and from them, from and to places elsewhere ….
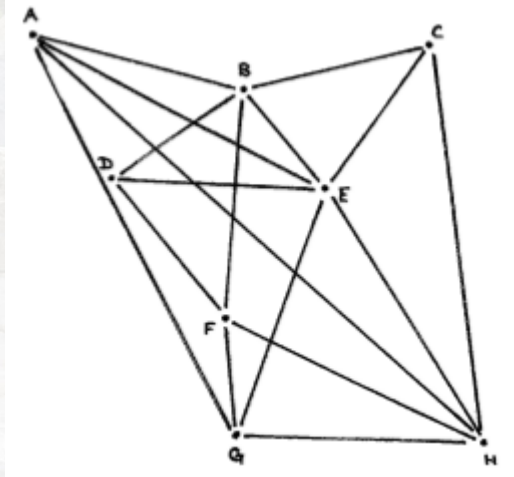
Human existence … unfolds not in places but along paths. Proceeding along a path, every inhabitant lays a trail.
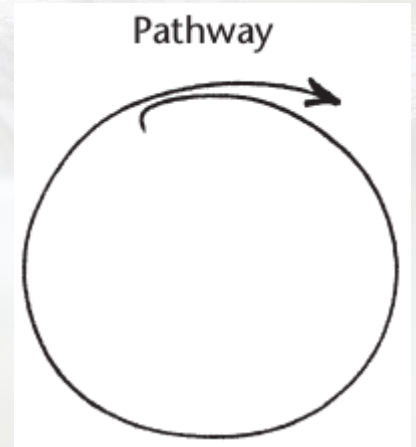
Tim Ingold. 2011. "A storied world." In *Being Alive: Essays on Movement, Knowledge and Description,* p. 148-149.

How are lives lived? As
(a) a network of connected points; or (b) a meshwork of entangled lines?
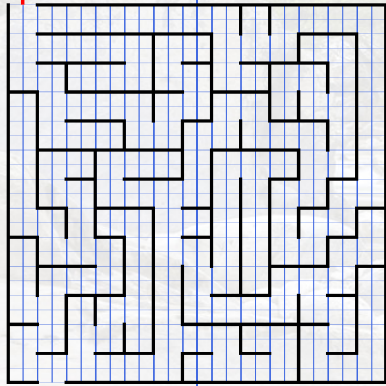

The lines of a network, in its contemporary sense, join the dots. They are connectors.
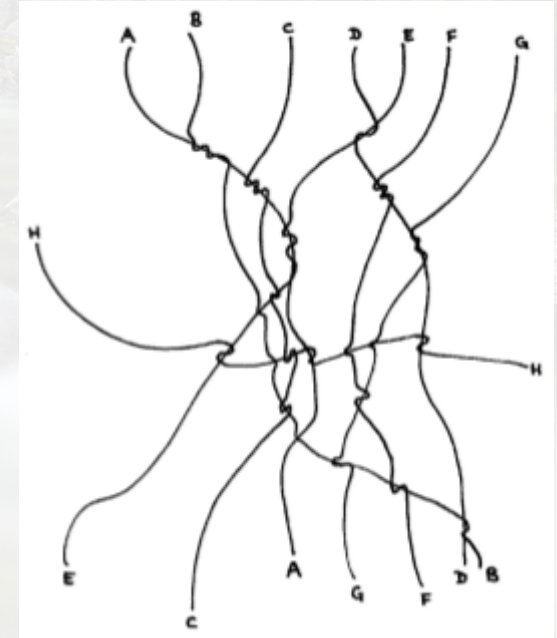
The lines of the meshwork are the trails *along* which life is lived.

Tim Ingold. 2007. "Up, across and along." In *Lines: A Brief History,* p. 80-82.

What is learning? (a) transmission of representations; or (b) an education of attention?

The maze … offers not one path, but multiple choices, of which each may be freely made but most lead to dead ends. It also differs, however, in that its avenues are demarcated by barriers which obstruct any view other than straight ahead. The maze does not open up to the world …, it encloses, trapping its inmates within the false antimony of freedom and necessity

In walking the labyrinth, by contrast, choice is not an issue. The path leads, and the walker is under the imperative to go where it takes him. But the path is not always easy to follow. …. The danger lies not in coming to a dead end, but in wandering off the track. …. You are, rather, fated to carry on nevertheless, along a path that, if you are not careful, may take you ever further from the living, to whose community you may never make it back.

Tim Ingold, 2013. "The Maze and the Labyrinth: Walking and The Education of Attention." In *Walk On: From Richard Long to Janet Cardiff -- 40 Years of Art Walking*, edited by Cynthia Morrison-Bell and Mike Collier, pp. 6–11, https://issuu.com/stereographic/docs/walkon_for_issuu.

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Human lifelines co-respond in a theory of (i) habit, (ii) agencing, and (iii) attentionality

Habit,
rather than volition:
I become my walking, and that my walking walks me. I am there, inside of it, animated by its rhythm. And with every step I am not so much changed as modified, in the sense not of transition from one state to another but of perpetual renewal. [p. 16]

Agencing,
rather than agency:
Interaction goes back and forth as agents, facing each other on opposite banks of the river, trade messages, missiles, and merchandise. But to *correspond*, in my terms, is to join with the swimmer in the midstream. It is a matter not of taking sides but of going along. [p. 18]

Attentionality,
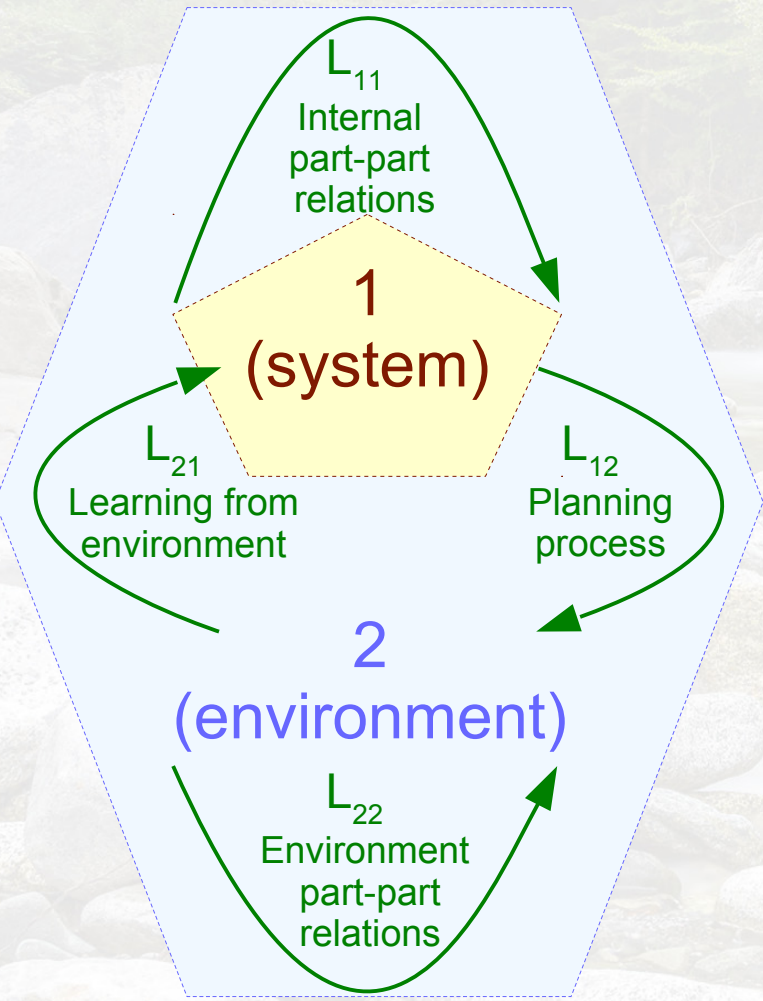rather than intentionality:
Walking calls for the pedestrian's continual responsiveness to the terrain, the path, and the elements. To respond, he must attend to these things as he goes along, joining or participating with them in his own movements. [p. 19]

Ingold, Tim. 2017. "On Human Correspondence." Journal of the Royal Anthropological Institute 23 (1):9–27. https://doi.org/10.1111/1467-9655.12541.

Causal texture theory sees shifts in the field of system + environment

	Where O = goals (goodies), X = noxiants (baddes)	
Type I. Random Placid		Goals and noxiants randomly distributed. Strategy is tactic. "Grab it if it's there". Largely theoretical of micro, design, e.g. concentration camps, conditioning experiments. Nature is not random.
Type 2. Clustered Placid		Goals and noxiants are lawfully distributed – meaningful learning. Simple strategy – maximize goals, e.g. use fire to produce new grass. Most of human span spent in this form. Hunting, gathering, small village. What people mean by the "good old days".
Type 3. Disturbed Reactive		Type 2 with two or more systems of one kind *competing* for the same resources. Operational planning emerges to out-manoeuvre the competition. Requires extra knowledge of both Ss and E. E is stable so start with a set of givens and concentrate on problem solving for win-lose games. Need to create insturments that are variety-reducing (foolproof) – elements must be standardized and interchangeable. Birth of bureacractic structures where people are redundant parts. Concentrate power at the top – strrategy becomes a power game.
Type 4. Turbulent		Dynamic, not placid/stable. Planned change in type 3 triggers off unexpected social processes. Dynamism arises from the field itself, creating unpredictability and increasing *relevant uncertainty* and *its continuities*. Linear planning impossible, e.g. whaling disrupted reproduciton, people react to being treated as parts of machine. Birth of open systems thinking, ecology, and catastrophe theory.

Source: Fred E. Emery, and Eric L. Trist. 1965. "The Causal Texture of Organizational Environments." Human Relations 18 (1) (February): 21–32. doi:10.1177/001872676501800103

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1. Introductions, and forming teams

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Systems Thinking, Service Systems, Affordance Language

Pattern Manual for Service Systems Thinking: A proposal for discussion

David Ing, Aalto University and the International Society for the Systems Sciences, coevolving@gmail.com

Abstract:

What is properly required to take the learning on generative pattern languages from the built environment and software development communities, to a world of service system thinking?

This position paper winds back to early days of Center for Environmental Studies, and presents an alternative view on the 1968 Multi-Service Center work, informed by 21st century developments in service systems science. The conventional format for a pattern language has settled into a three-part rule of relations between context, problem and solution. An alternative format of (i) voices on issues (who + what), (ii) affording value(s) (how + why), and (iii) spatio-temporal frames (where + when) is proposed, with a straw man example.

Methods from the 1985 Eishin campus project, published in 2012, are compared against practices that have become common in agile development.

The conceptual shifts from built environment to service systems thinking are expressed as (i) amplifications, (ii) rephilosophizations, and (iii) reinterpretations. The generation and legitimization of pattern languages is considered across a community, with a shift from publishing in books on paper to collaborating with online technologies such as wiki.

At the 2014 PLoP and the 2015 PURPLSOC conferences, the idea of extending the pattern language for environment structure into a new domain of service systems thinking was introduced. In 2016, this idea has been further developed as a baseline for further discussion.

Keywords: *service systems; systems thinking; issue-seeking; interactive value; wayfaring*

Coevolving Innovations
... in Business Organizations and Information Technologies

Commons front page ...

Home

Publications

Publication Date	Publication Title	Author(s)	Form
October 2016	"Pattern Manual for Service Systems Thinking: A proposal for discussion" [view abstract and article]	David Ing	article in review for Pre the 2016 Internationa Conference
October 2016	"Curriculum Making for Trito Learning: Wayfaring along a meshwork of systems thinking" [view abstract and presentation slides]	David Ing	presentation at RSD5 Relating Systems Thin Design
	"Service Systems and the Systems Sciences"		presentation at Wuhar

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2016/10/28 Pattern Manual for Service Systems Thinking

Authors

David Ing

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This position paper winds back to early days of Center for Environmental Studies, and presents an alternative view on the 1968 Multi-Service Center work, informed by 21st century developments in service systems science. The conventional format for a pattern language has settled into a three-part rule of relations between context, problem and solution. An alternative format of (i) voices on issues (who + what), (ii) affording value(s) (how + why), and (iii) spatio-temporal frames (where + when) is proposed, with a straw man example.

Methods from the 1985 Eishin campus project, published in 2012, are compared against practices that have become common in agile development.

The conceptual shifts from built environment to service systems thinking are expressed as (i) amplifications, (ii) rephilosophizations, and (iii) reinterpretations. The generation and legitimization of pattern languages is considered across a community, with a shift from publishing in books on paper to collaborating with online technologies such as wiki.

At the 2014 PLoP and the 2015 PURPLSOC conferences, the idea of extending the pattern language for environment structure into a new domain of service systems thinking was introduced. In 2016, this idea has been further developed as a baseline for further discussion

Citation

David Ing, "Pattern Manual for Service Systems Thinking: A proposal for discussion", *Proceedings of the 2016 International PUARL Conference*.

Content

- [view/download article as DOCX] (1.4 MB, originally edited in LibreOffice 5)
- [view/download article as PDF] (2.2 MB)

Pattern language intends to give 3 types of help
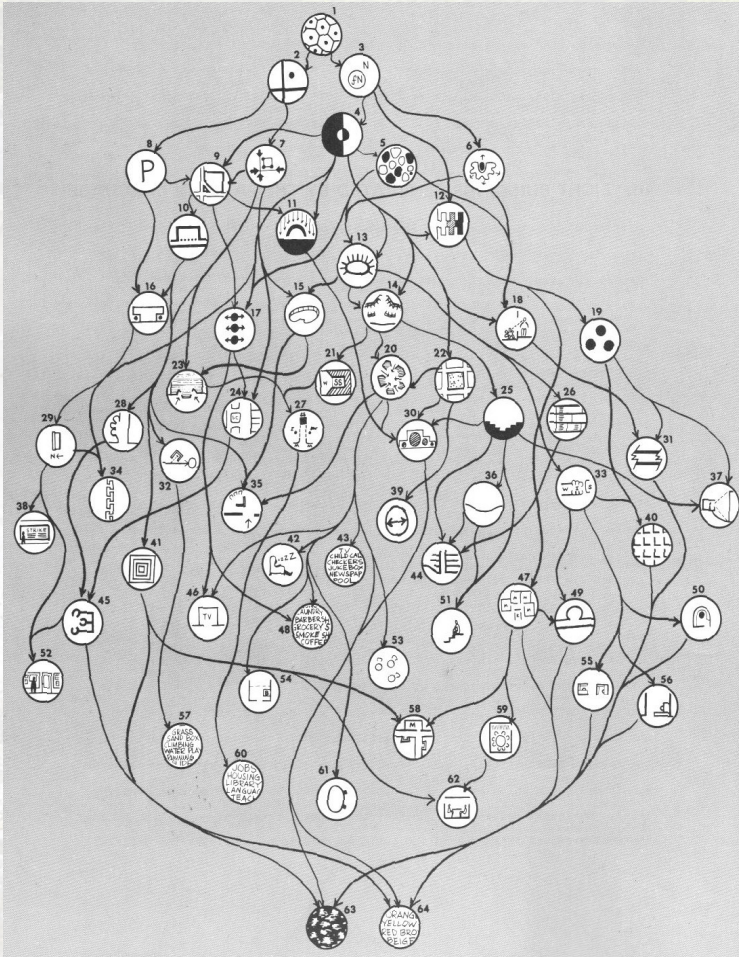
1. It gives him the opportunity to use the patterns in the way which pays full respect to the **unique features** of each special building: the local peculiarities of the community, its special needs …

2. It tells him which patterns to consider **first,** and which ones to consider **later**. Obviously he wants to consider the **biggest ones** … before he considers the **details**.

3. It tells him which patterns "**go together**" … so that he knows which ones to think about at the same time, and which ones separately (Alexander et al., 1968, pp. 17–19).

Try who+what, how+why, where+when, containing, contained

(i) Pattern label	Tapping into the grapevine	Signing in for services	Minding children
	◊ ◊ ◊	◊ ◊ ◊	◊ ◊ ◊
(ii) Voices on issues (who and what)	(a) For a client, what jobs and training are available? (b) For a neighbour, in what ways can we share and update community news?	(a) For a client, what services are available to me, now and on appointment? (b) For a parent, what do I do with my kids while I'm busy? (c) For a child, what can I do while my parent is at the MSC?	
(iii) Affording value(s) (how and why)	Displaying up-to-date news and local information, so that individuals can know ways to independently act. Adding, revising and moderating community contributions so that individual and authoritative viewpoints are balanced.	Matching client needs with MSC resources, so that holistic treatments are received. Triaging and scheduling so that urgent cases are prioritized, and wait times are tolerable	Leaving a child at a supervised play area so that whereabouts are known. Availing distractions for toddlers through teens, so that coming with parents is less of a chore
(iv) Spatio-temporal frames (where and when)	Access to information onsite MSC for clients who don't have devices, and on the open Internet for the public	On demand lookups of trending and prior MSC busy and slow periods transparently visibie onsite and on the Internet, enabling clients to adjust and/or rebook	Facilities and programs are known both to children and parents in advance of appointments
	◊ ◊ ◊	◊ ◊ ◊	◊ ◊ ◊
(v) Containing systems (slower and larger)	For municipal, regional and national agencies, are community health and social services in their jurisdictions well provide?		For extended family, schools and community workers, what personal responsibilities inhibit service engagement?
vi) Contained systems (faster and smaller)	For neighbours in mutual support, friends and family ties, who should know about news?	For friends or assistants speaking on behalf or interpreting for a client, is the situation understood?	For other parents at the MSC at the same time, would you look after my kids like I look after yours?

Minding children: who+what, how+why, where+when, containing, contained

(i) Pattern label	Minding children
	◊ ◊ ◊
(ii) Voices on issues (who and what)	(a) For a client, what services are available to me, now and on appointment? (b) For a parent, what do I do with my kids while I'm busy? (c) For a child, what can I do while my parent is at the MSC?
(iii) Affording value(s) (how and why)	Leaving a child at a supervised play area so that whereabouts are known. Availing distractions for toddlers through teens, so that coming with parents is less of a chore
(iv) Spatio-temporal frames (where and when)	Facilities and programs are known both to children and parents in advance of appointments
	◊ ◊ ◊
(v) Containing systems (slower and larger)	For extended family, schools and community workers, what personal responsibilities inhibit service engagement?
(vi) Contained systems (faster and smaller)	For other parents at the MSC at the same time, would you look after my kids like I look after yours?

Alexandrian format mapped to proposed service systems thinking

Format for service systems thinking	
(i) Pattern label	An interaction phrased as a present participle
(ii) Voices on issues (who and what)	Archetypal roles of stakeholders, with concerns and interests posed as questions
(iii) Affording value(s) (how and why)	Objects and/or events that enable modes of practised capacities for independent or mutual action
(iv) Spatio-temporal frames (where and when)	Occasions at which dwelling in issues and affordances are salient and at hand
(v) Containing systems (slower and larger)	Constraining conditions in which the pattern operates, potentially where multi-issue messes are dissolved
(vi) Contained systems (faster and smaller)	Opportunistic conditions which the pattern contains, potentially allowing ad hoc resolving of a specific issue at hand

Agenda

1. Introductions, and forming teams

   2. Systems thinking basics

      3. Service systems (co-responding)

      4. Affordance pattern language

   5. Theory + philosophy

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All architecture is design, but not all design is architecture

Architectural thinking as
    shaping the structure of the environment ...

Living systems are *autopoietic*,
self-organizing and self-generating;

assembly lines are *allopoietic*,
externally-organizing and externally-generating.

Design thinking as
divergent steps (i.e. creating choices) and
convergent steps (i.e. making choices)

In 1969, problem seeking was *architectural programming*, and problem solving was *design*

Programming is a specialized and often misunderstood term. It is "*a statement of an architectural problem and the requirements to be met in offering a solution.* While the term is used with other descriptive adjectives such as *computer* programming, *educational* programming, *functional* programming, etc., in this report, programming is used to refer only to architectural programming.

Why programming? The client has a project with many unidentified sub-problems. The architect must define the client's total problem.

problem seeking → problem solving → solution
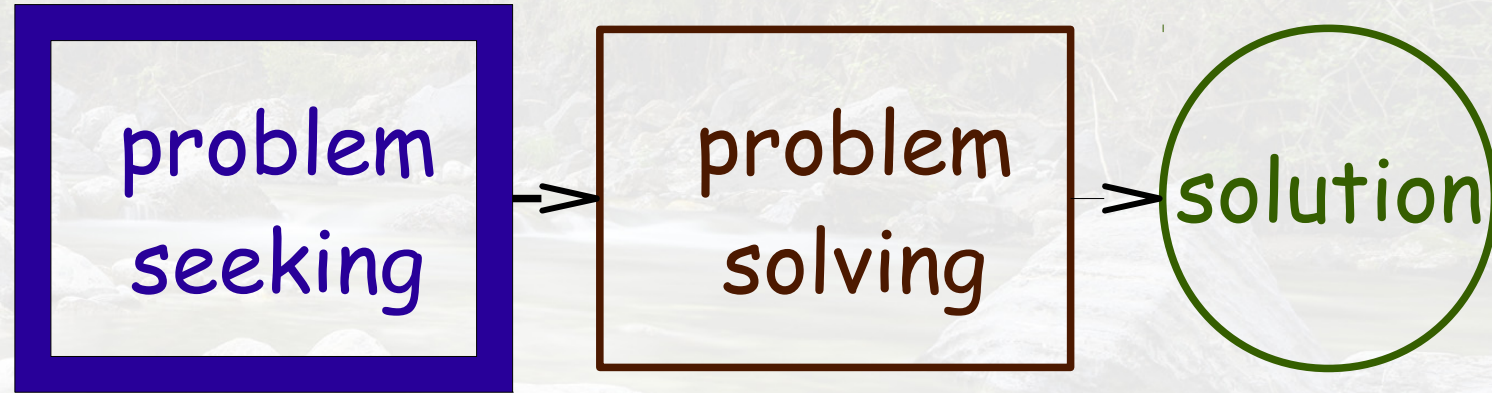
Design is problem solving; programming is problem seeking. The end of the programming process is a statement of the total problem; such a statement is the element that joins programming and design. The "total problem" then serves to point up constituent problems, in terms of four considerations, those of form, function, economy and time. The aim of the programming is to provide a sound basis for effective design. The State of the Problem represents the essense and the uniqueness of the project. Furthermore, it suggests the solution to the problem by defining the main issues and giving direction to the designer (Pena and Focke 1969, 3).

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

Unknown Unknowns
All the things you don't know you don't know

Errors
All the things you think you know but don't

Known Unknowns
All the things you know you don't know

Unknown Knowns
All the things you don't know you know

Taboos
Dangerous, polluting or forbidden knowledge

Denials
All the things too painful to know, so you don't

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

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

If they can get you asking the wrong questions, they don't have to worry about answers (Thomas Pynchon)

Type **1** error	**False positive**: finding a (statistical) relation that isn't real
Type **2** error	**False negative**: missing a (statistical) relation that is real
Type **3** error	**Tricking ourselves**: Unintentional error of solving wrong problems precisely (through ignorance, faulty education or unreflective practice)
Type **4** error	**Tricking others**: Intentional error of solving wrong problems (through malice, ideology, overzealousness, self-righteousness, wrongdoing)

Ian I. Mitroff and Abraham Silvers. 2010. *Dirty Rotten Strategies: How We Trick Ourselves and Others into Solving the Wrong Problems Precisely.* Stanford University Press.

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Coevolving Innovations

… in Business Organizations and Information Technologies

Christopher Alexander, Horst Rittel, C. West Churchman

At U.C. Berkeley in the 1960s, Christopher Alexander, Horst Rittel and C. West Churchman could have had lunch together. While disciplinary thinking might lead novices to focus only on each of pattern language, wicked problems and the systems approach, there are ties (as well as domain-specific distinctions) between the schools.

Circa 1968-1970: Christopher Alexander, Horst Rittel, West Churchman

Recent Posts

- Christopher Alexander, Horst Rittel, C. West Churchman
- Open Innovation Learning and Open Data
- Learning data science, hands-on
- Innovation Learning and Open Sourcing: IoT + Cloud + Cognitive
- Acts of representation with systems thinking (OCADU 2017/03)
- Service Systems Thinking, with Generative Pattern Language (Metropolia 2016/12)

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Anshansicun: Whimsically residential area,... bit.ly/2jU

At Berkeley: Churchman, Rittel and Alexander taught in 1960-1970s

C. West Churchman (1913-2004)
- 1957 joined Berkeley, graduate programs in OR at School of Business Administration
- 1964-1970 Associate Director and Research Philosopher, Space Sciences Laboratory
- 1981-1994 retired, taught Peace & Conflict Studies

Horst Rittel (1930-1990)
- 1963 Berkeley College of Environmental Design
- 1974 both Berkeley and University of Stuttgart
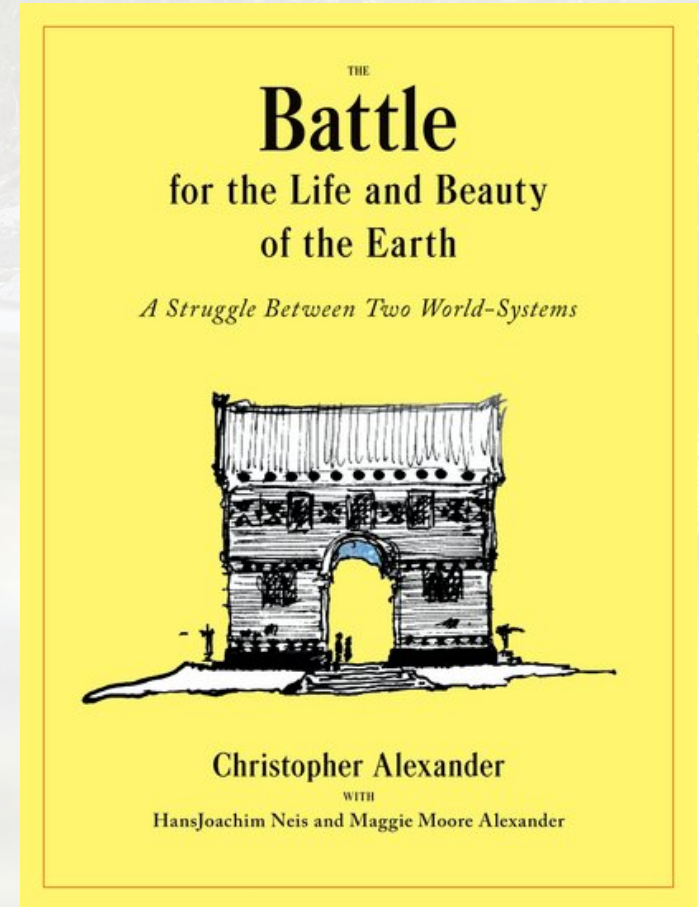
Christopher Alexander (1936 -)
- 1963 Berkeley College of Environmental Design
- 1967 cofounder Center for Environmental Structure
- 1998 retired from university

Both Alexander and Rittel were part of what at the time was called the 'design methods' movement in architecture, worked and taught in the same building, and did talk and were seen walking off to have lunch together. Churchman was teaching in the Business School a few minutes down on the way to the center of campus.

- *Thor Mann* (posted April 17, 2017)

The writing of 1975-1979 by Alexander was prescriptive; the 2012 is reflections on practice

A Pattern Language
Towns · Buildings · Construction

Christopher Alexander
Sara Ishikawa · Murray Silverstein
WITH
Max Jacobson · Ingrid Fiksdahl-King
Shlomo Angel

The Timeless Way of Building

Christopher Alexander

The Oregon Experiment

Christopher Alexander
Murray Silverstein · Shlomo Angel
Sara Ishikawa · Denny Abrams

THE
Battle
for the Life and Beauty
of the Earth

A Struggle Between Two World-Systems

Christopher Alexander
WITH
HansJoachim Neis and Maggie Moore Alexander

Here is a short and necessarily incomplete definition of a pattern:

A recurring structural configuration that solves a problem in a context, contributing to the wholeness of some whole, or system, that reflects some aesthetic or cultural value.[1]

Pattern Name: A name by which this problem/solution pairing can be referenced

Problem: The specific problem that needs to be solved.

Context
The circumstances in which the problem is being solved imposes constraints on the solution. The context is often described via a "situation" rather than stated explicitly.

Forces
The often contradictory considerations that must be taken into account when choosing a solution to a problem.

Solution: The most appropriate solution to a problem is the one that best resolves the highest priority forces as determined by the particular context.

Resulting Context
The context that we find ourselves in after the pattern has been applied. It can include one or more new problems to solve

Rationale
An explanation of why this solution is most appropriate for the stated problem within this context.

Related Patterns
The kinds of patterns include:
- Other solutions to the same problem,
- More general or (possibly domain) specific variations of the pattern,
- Patterns that solve some of the problems in the resulting context (set by this pattern)

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The essential idea of a pattern language is: a *solution* to a *problem* in *context*

Every time a designer creates a pattern (or, for that matter, entertains any idea about the physical environment), he essentially goes through a three-step process.

He considers a PROBLEM, invents a PATTERN to solve the problem, and makes mental note of the range of CONTEXTS where the pattern will solve the problem. [….]

The format says that whenever a certain **CONTEXT** exists, a certain **PROBLEM** will arise; the stated **PATTERN** will solve the **PROBLEM** and there should be provided in the **CONTEXT**.

While it is not claimed that the PATTERN specified is the only solution to the PROBLEM, it is implied that unless the PATTERN or an equivalent is provided, the PROBLEM will go unsolved (Alexander, Ishikawa, & Silverstein, 1967, pp. 1–4).

Alexander, Christopher, Sara Ishikawa, and Murray Silverstein. 1967. *Pattern Manual.* Berkeley, California: Center for Environmental Structure

# "Dilemmas in a General Theory of Planning", (Rittel + Weber, 1973)

There are at least ten distinguishing properties of planning-type problems, i.e. wicked ones .... We use the term "wicked" in a meaning akin to that of "malignant" (in contrast to "benign") or "vicious" (like a circle) or "tricky" (like a leprechaun) or "aggressive" (like a lion, in contrast to the docility of a lamb). [....]

1. There is no definitive formulation of a wicked problem ....
2. Wicked problems have no stopping rule ....
3. Solutions to wicked problems are not true-or-false, but good-or-bad ....
4. There is no immediate and no ultimate test of a solution to a wicked problem ....
5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial-and-error, every attempt counts significantly ....

6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan ....
7. Every wicked problem is essentially unique ....
8. Every wicked problem can be considered to be a symptom of another problem ....
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution ....
10. The planner has no right to be wrong ....

Wicked problems ↔ IBIS: Issues-Based Information Systems

1. There is no definitive formulation of a wicked problem.
2. Wicked problems have no stopping rule.
3. Solutions to wicked problems are not true-or-false, but good or bad.
4. There is no immediate and no ultimate test of a solution to a wicked problem.
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6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
7. Every wicked problem is essentially unique.
8. Every wicked problem can be considered to be a symptom of another problem.
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
10. The social planner has no right to be wrong (i.e., planners are liable for the consequences of the actions they generate). (Rittel & Weber, 1973)
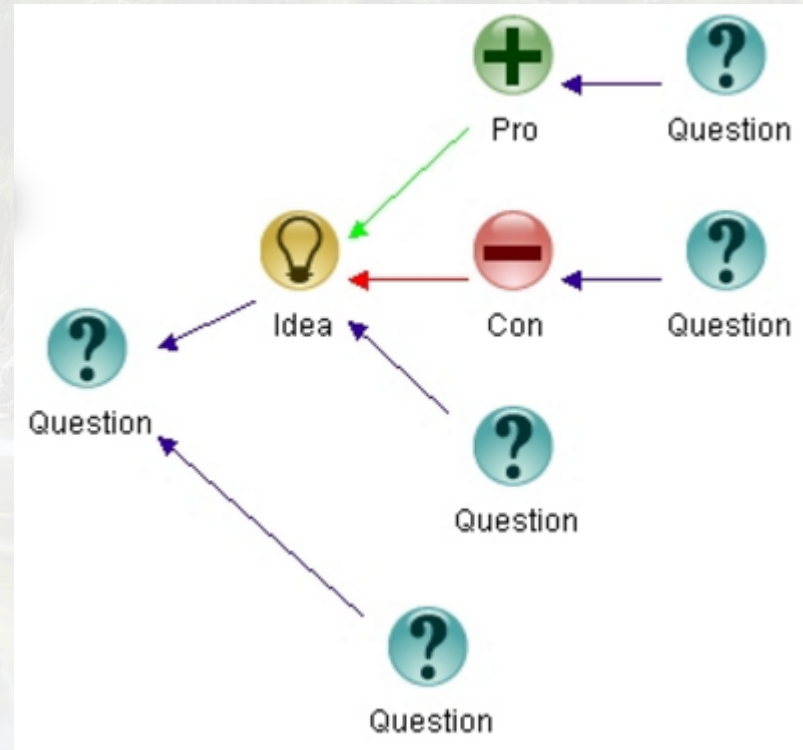
...type of information system meant to support the work of cooperatives like governmental or administrative agencies or committees, planning groups, etc., that are confronted with a problem complex in order to arrive at a plan for decision… (Kunz & Rittel, 1970)

Pattern manual as an initial position for a community of practice

A Pattern Language		
A Pattern Language • The original 253 patterns in effect became frozen in time • The publisher has not released the content of the patterns into the public domain • A severe constraint on the further use, modification and addition to pattern languages (Cunningham & Mehaffy, 2013, p. 6)	→	• Federated wiki?

The design of inquiring systems		
Way of knowing	*Inquiring System*	*Philosopher*
First	Inductive Consensual (agreement)	John Locke
Second	Analytic Deductive (fact nets)	Gotfried Wilhelm Leibniz
Third	Multiple Realities (representations)	Immanuel Kant
Fourth	Dialectic (conflict)	Georg Wilhelm Friedrich Hegel
Fifth	Systems Approach (progress, sweeping in)	Edgar Arthur Singer; C. West Churchman

From System-B to System-A, c.f. from waterfall to agile

From System-B to System-A		From waterfall methods to agile	
(i) Pattern language for the community	From preprogrammed assembly to local adaptation with feedback and correction	(i) Writing user stories	From detailing specifications to conversing on narratives
(ii) Construction budget	From overemphasizing tangible aspects to negotiating collective feelings	(ii) Scoping; estimating value, costs and dates	From projecting and committing to converging on estimates
(iii) Reality of the land	From drawing abstract layout plans to adjusting the wholeness on the real site	(iii) Reviewing iteratively; tracking work item backlogs	From dividing-and-conquering to collaborating for learning

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Amplifications from Alexandrian to service systems thinking

1.	Shared meaning on the situated	The pattern is merely a mental image, which can help to predict those situations where forces will be in harmony, and those in which they won't. But the actual forces which will occur in a real situation, although objectively present there, are, in the end unpredictable, because each situation is so complex, and forces may grow, or die, according to subtle variations of circumstance (Alexander, 1979, pp. 285–286).
2.	Systems thinking and complexity	Systems generating systems 1. There are two ideas hidden in the word system: the **idea of a system as a whole** and the idea of a **generating system**. 2. A **system as a whole** is not an object but a way of looking at an object. It focuses on some holistic property which can only be understood as a product of interaction among parts. 3. A **generating system** is not a view of a single thing. It is a kit of parts, with rules about the way these parts may be combined. 4. Almost every 'system as a whole' is generated by a 'generating system'. If we wish to make things which function as 'wholes' we shall have to invent generating systems to create them. In a properly functioning building, the building and the people in it together form a whole: a social, human whole. The building systems which have so far been created do not in this sense generate wholes at all (Alexander, 1968, p. 605).
3.	Method content + development process	Volume 1, The Timeless Way of Building [TWB], and Volume 2, A Pattern Language [APL], are two halves of a single work. This book [APL] provides a language, for building and planning; the other book [TWB] provides the theory and instructions for the sue of the language. This book [APL] describes the detailed patterns for towns and neighbourhoods, houses, gardens and rooms. The other book [TWB] explains the discipline which makes it possible to use these patterns to create a building or a town. This book [APL] is the sourcebook of the timeless way; the other [TWB] is its practice and its origin (Alexander et al., 1977, p. ix).

Rephilosophizations from Alexandrian to service systems thinking

1.	From structuralism to alternative stable states	• Criticism of teleology • Three types of change in biological evolution: (I) environmental change; (ii) somatic (cellular) change; and (iii) genotypic change (Bateson 1963) • Teleonomic processes through closed programs or open programs • Regime shifts (ecosystem ecology, community ecology)
2.	From dwelling to journeying	• Being served over a period of time (a journey) rather than in a moment of time (dwelling)? • Heidegger world-time and time-as-ordinarily-conceived • Places existing not in space, but as nodes in a matrix of movement (Ingold 2000)
3.	From semi-lattice to meshwork	• "A City is Not a Tree" focuses on physical invariants • Social relations with movement and time (e.g. gaining and losing friends) • Each person not as a point, but as a line (Ingold 2011) • Meshworks as trails of movements or growth

Reinterpretations from Alexandrian to service systems thinking

1.	From problem-solving to issue-seeking	• Design is problem-solving; [architectural] programming is problem-seeking (Peña & Focke, 1969, p. 4). • Issues-based approach appreciating how values influence and impact defining problems (Rittel & Webber, 1973, p. 159). • Problem Structuring Methods (e.g. Soft Systems Methodology, Strategic Choice Approach, Strategic Optoins Development and Analysis)
2.	From quality-wholeness to interactive value	• "Quality without a name" – "an objective quality that things ... can possess that makes them good places or beautiful places. (Gabriel 1996) • 15 geometric invariants, mutually-reinforcing centers • Services separating value from the outcome • Interactive value: enjoyment takes place over time • Outcomes of service systems: use-value, exchange value
3.	From anti-patterns to wayfaring	• Dead patterns leak out, infect other patterns (Alexander 1979) • Anti-patterns as non-solutions; to be coupled with patterns in pairs (towards problem-solving) • Wayfaring more equivalent to piecemail growth (than transport from origin to destination)

Agenda

1. Introductions, and forming teams

    2. Systems thinking basics

        3. Service systems (co-responding)

           4. Affordance pattern language

              5. Theory + philosophy

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