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Incubating service systems thinking: New frames for collaborating on a pattern language for service systems

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An Invitation to Service Systems Thinking: Collaborating on a New Generative Pattern Language

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International Society for the Systems Sciences, and
Aalto University

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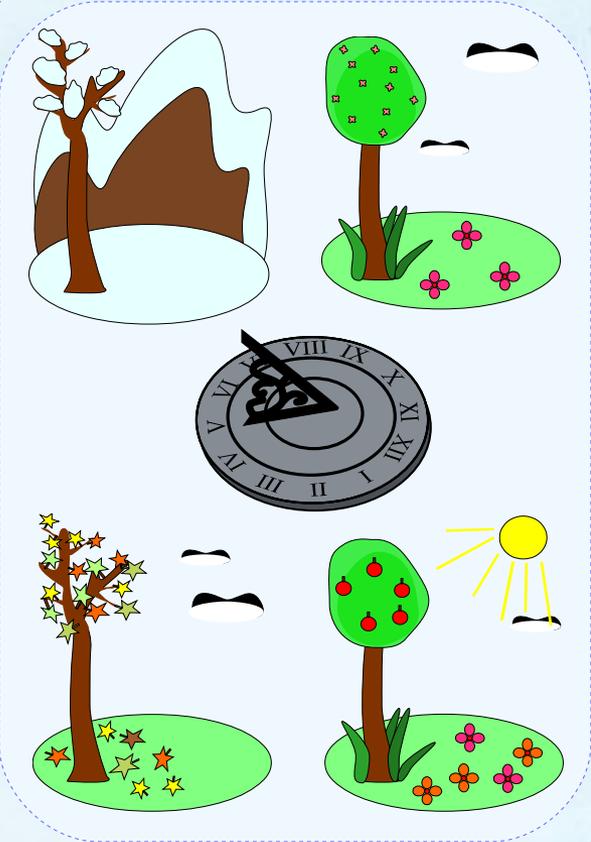
Agenda

- 1. What could Service Systems Thinking be?
 - 2. The practices of Christopher Alexander
 - 3. Extending to service systems?
 - 4. An invitation
- Ap. Orientation

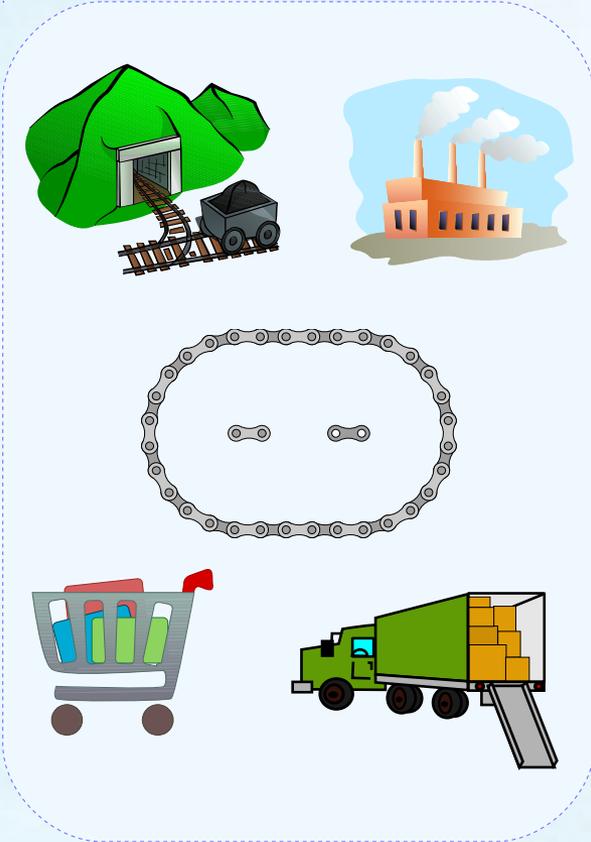
Agenda

- 1. What could Service Systems Thinking be?
 - 1.1 Thinking about systems frames
 - 1.2 An intentional representation
 - 1.3 An object-process representation
 - 2. The practices of Christopher Alexander
 - 3. Extending to service systems?
 - 4. An invitation
- Ap. Orientation

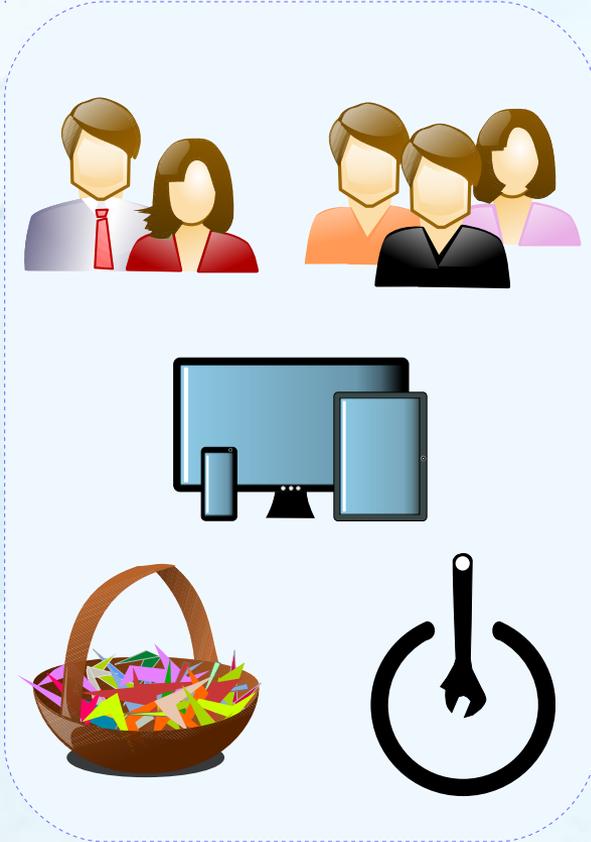
Is thinking different across agricultural systems, industrial systems, and service systems?



Agricultural Systems



Industrial Systems



Service Systems(?)

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

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 and communications (ICT) infrastructure	4

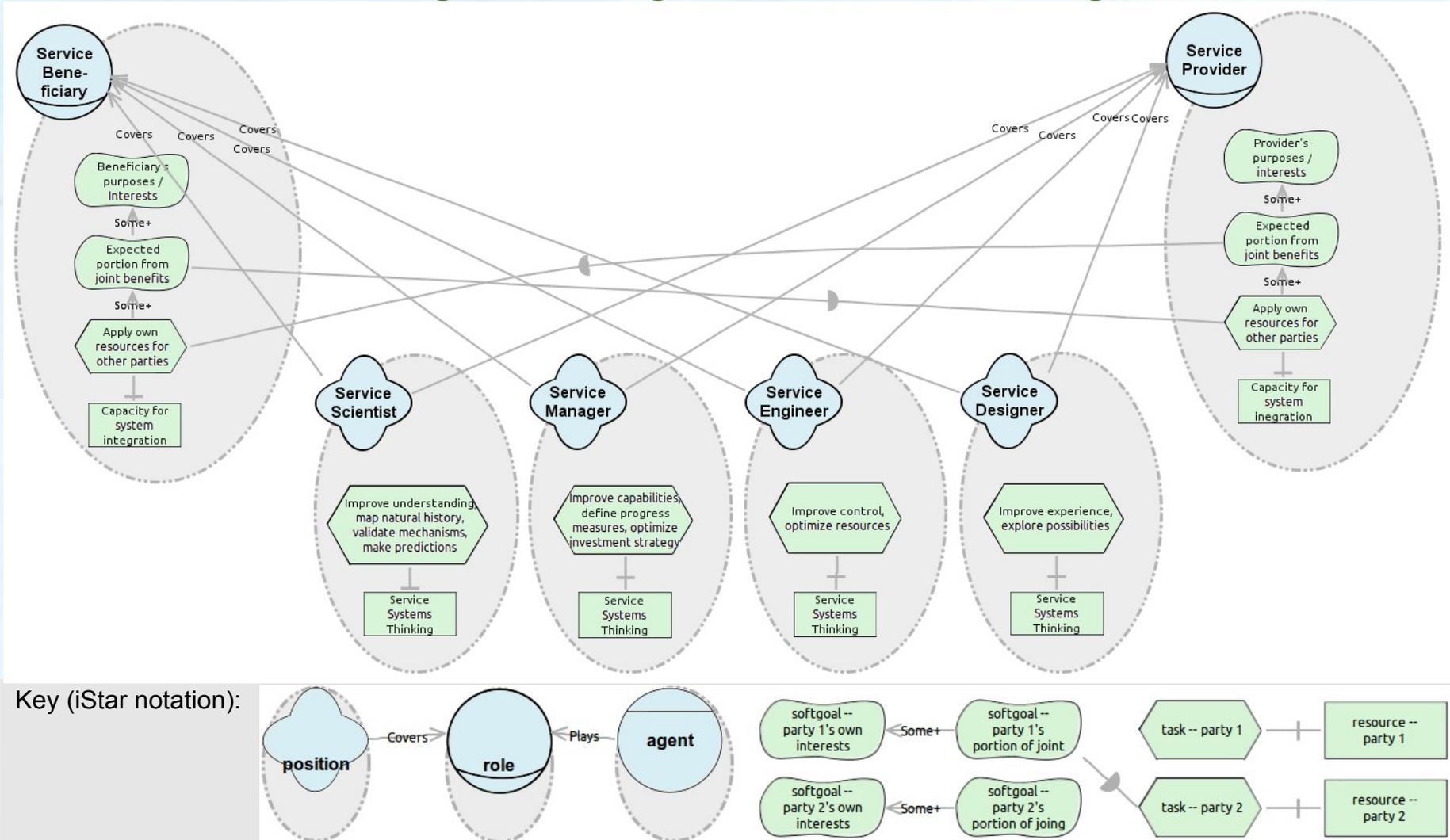
Systems that enable healthy, wealthy and wise people

• 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

In an intentional representation, service systems thinking is a resource that can be applied by service scientists, managers, engineers and designers

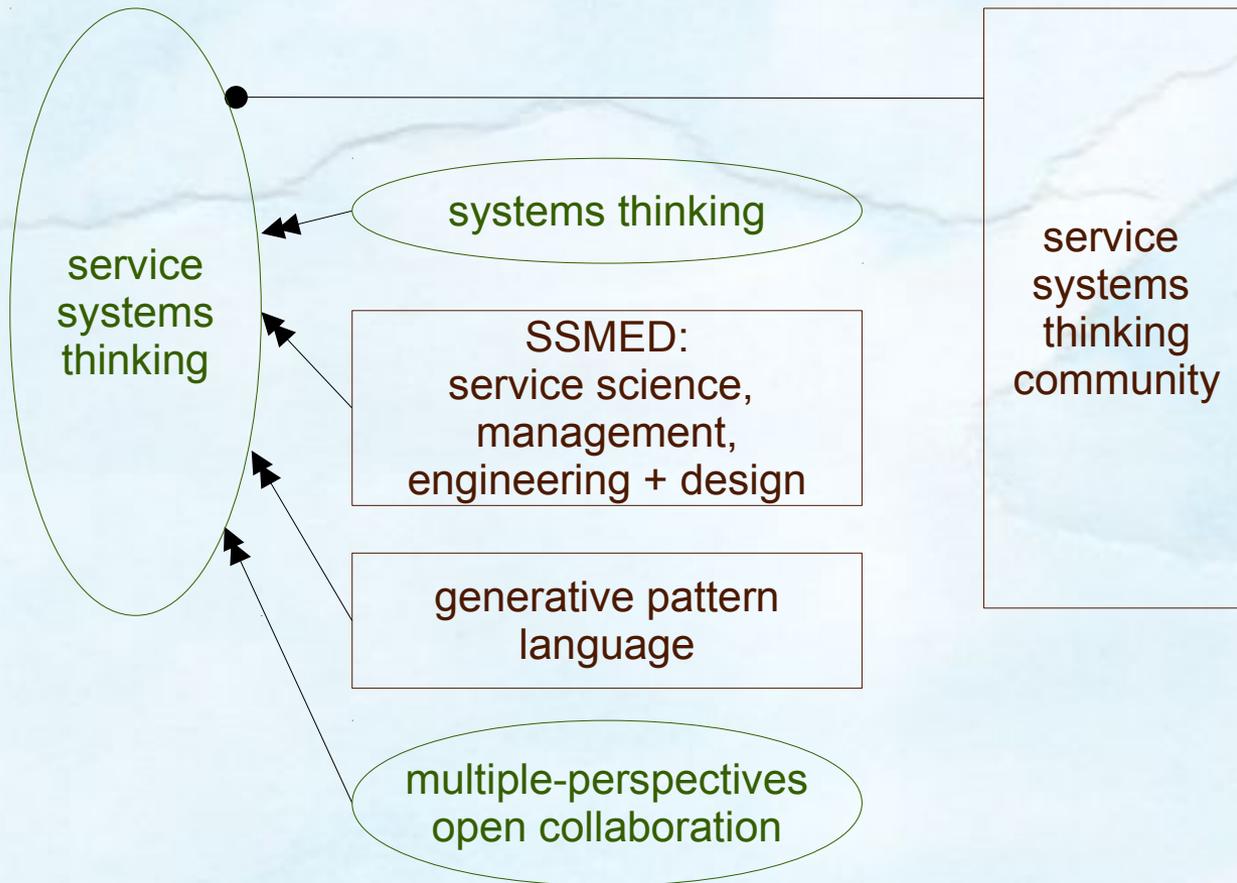


In an object-process representation, service systems thinking is handled by a community



Key (OPM notation): object process agent handles process ● object is exhibited by (o or p)
process is exhibited by (o or p) ►►

Service systems thinking exhibits systems thinking, SSME, generative pattern language and multiple perspectives open collaboration



Key (OPM notation):

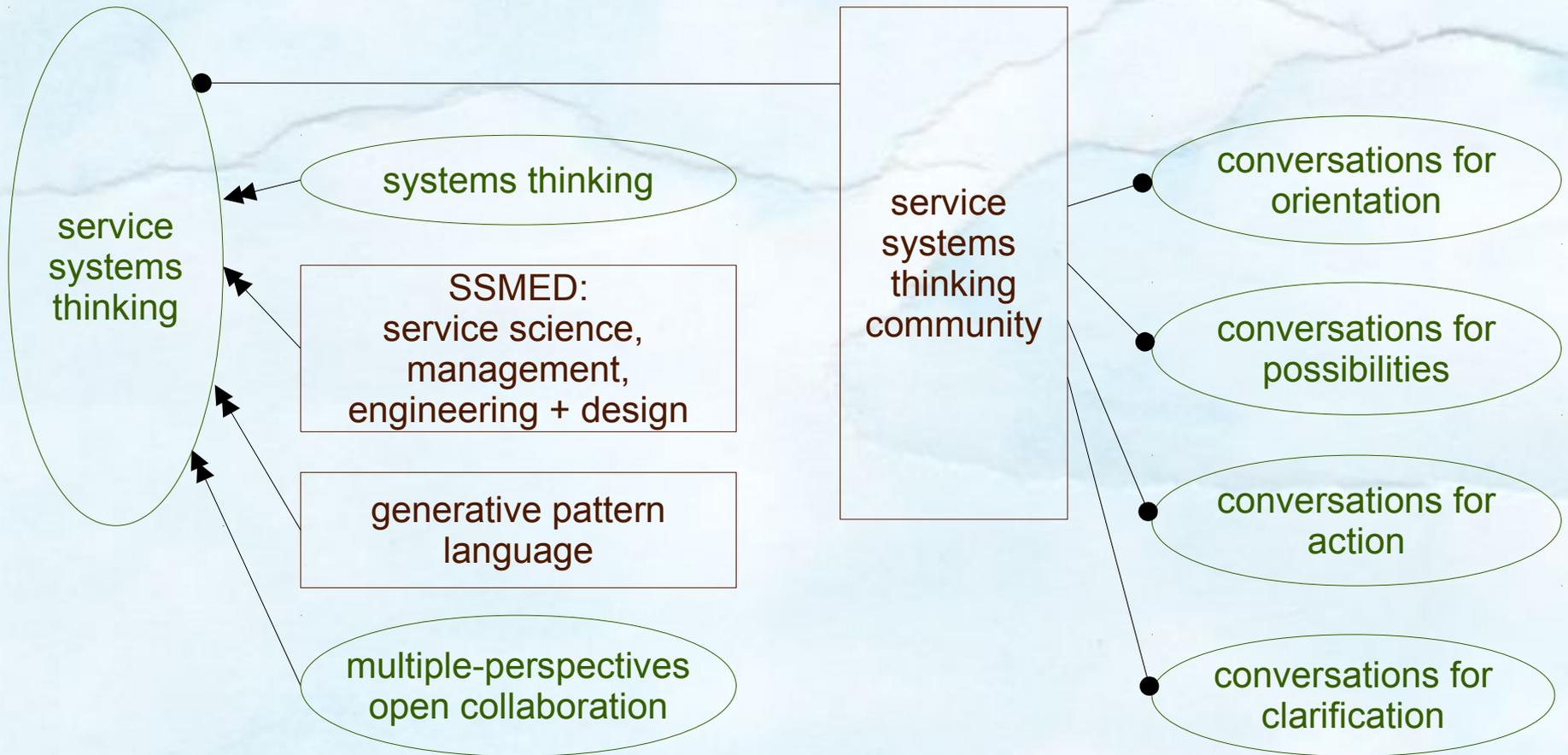
object

process

agent handles process

object is exhibited by (o or p)
process is exhibited by (o or p)

Development within the community can be recognized as conversations: for orientation, for possibilities, for action, and for clarification



Key (OPM notation):

object

process

agent handles process

object is exhibited by (o or p)
process is exhibited by (o or p)

Service Systems Thinking

The Service Systems Thinking was first introduced in January 2014. More history is available at s2t.org



The lay of the land might be appreciated by Service Systems Thinking, In Brief.

Engagement in the community may be clarified by recognizing the language action perspective with four types of conversation. See an outline of these four types

1. Conversations for Orientation on Service Systems Thinking
2. Conversations for Possibilities on Service Systems Thinking
3. Conversations for Action on Service Systems Thinking
4. Conversations for Clarification on Service Systems Thinking

Conversations for Orientation on Service Systems Thinking

Service systems thinking builds on the foundations of a variety of fields. An appreciation of parts of those fields can serve as a common understanding to be cross-appropriated for further development of a body of knowledge.

1. Systems Thinking
2. Service Science, Management, Engineering and Design
3. Generative Pattern Language
4. Multiple Perspectives Open Collaboration

Agenda

1. What could Service Systems Thinking be?

→ 2. The practices of Christopher Alexander

2.1 Prescription (1975-1979) vs. practice (1985) in reflection (2012)

3. Extending to service systems?

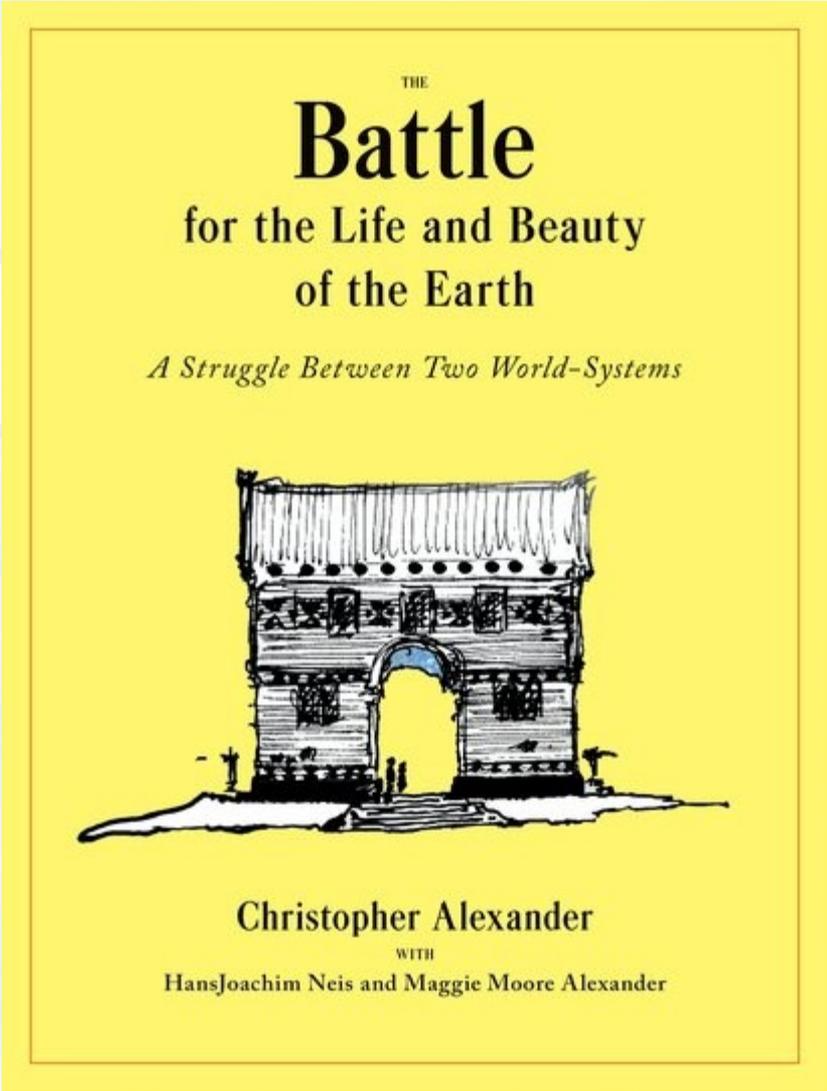
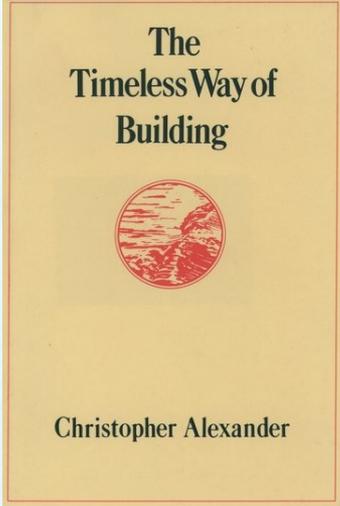
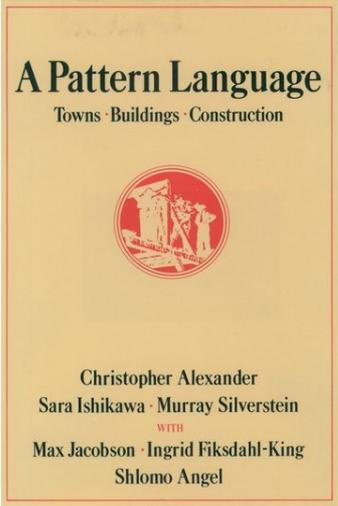
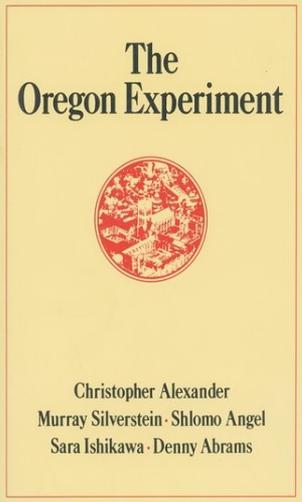
2.2 Eishin Higashino

2.3 Methods in practice

4. An invitation
Ap. Orientation

2.4 Multi-service centers (1968)

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



HEARTS AND MINDS

 [twitter](#) 犬猿の仲印巴からノーベル平和賞受賞者。17歳のマララさんについて「テロリストが最も恐れるのは『教科書を持った少女』だ」と潘基文氏。<ペンは剣より強し>

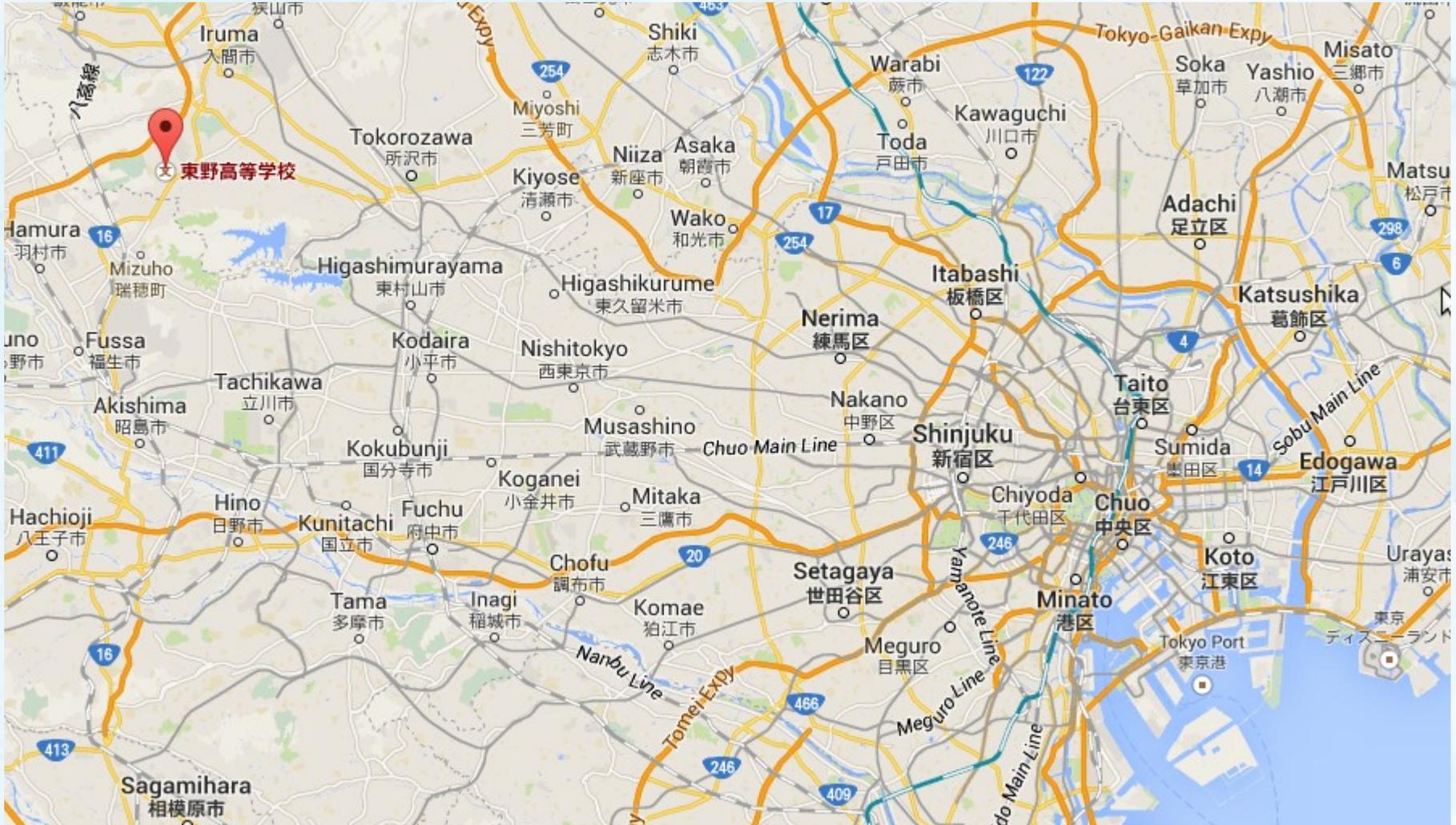
教職員
インタビュー

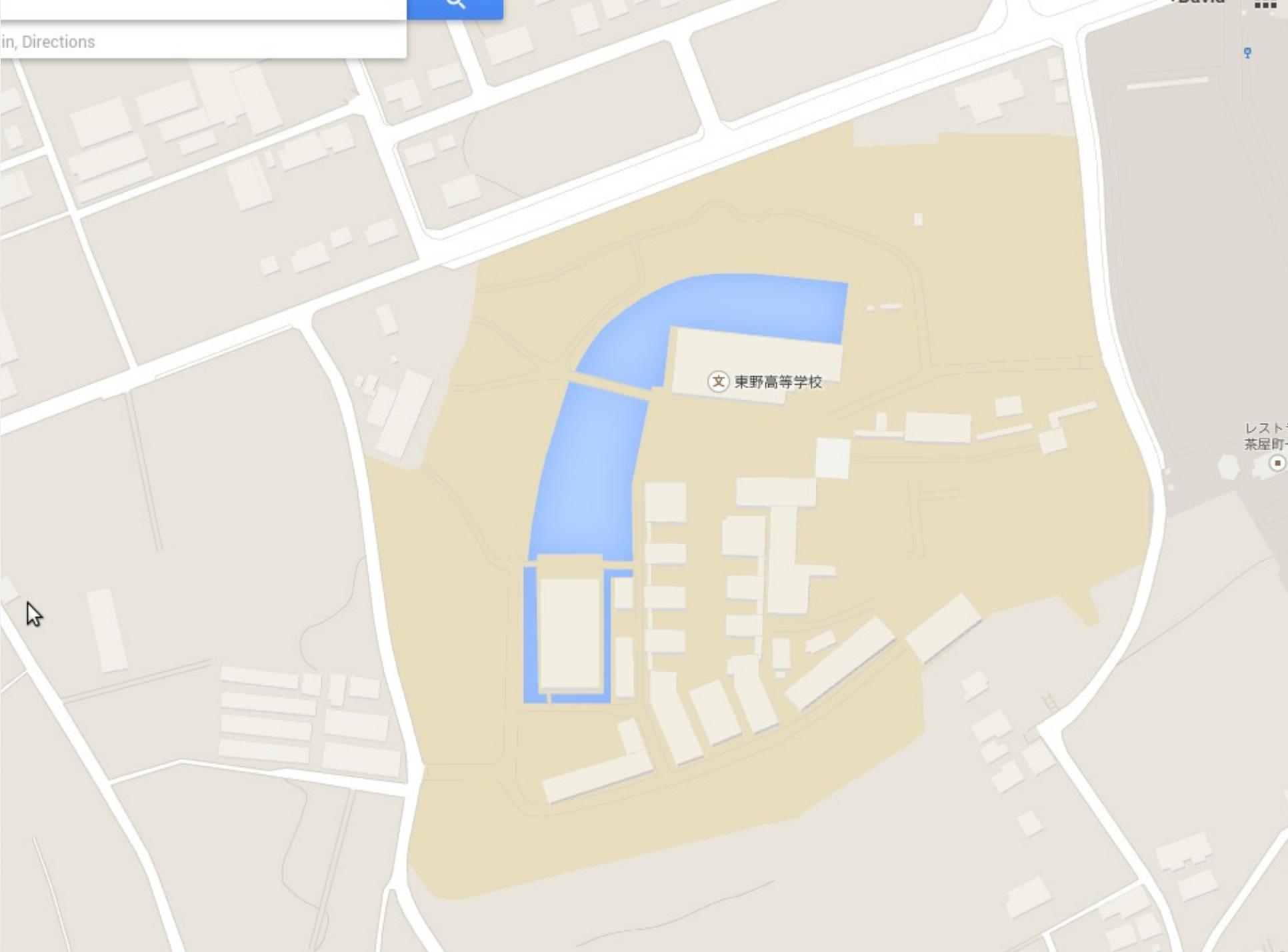


第1学年主任
芸術科教師
大森久美



The site originally was tea fields in Iruma, Saitama prefecture, northwest of Tokyo





文 東野高等学校

レスト
茶屋町





東野高等学校

The practices employed on the 1985 Eishin project can be traced with 8 activities

1. Interview on hopes and dreams
2. Make a “poetic vision” as first sketch of a pattern language
3. Make the rudimentary pattern language physically coherent
4. Refine the language through discussions
5. Obtain approval of the pattern language
6. Renegotiate pattern language with space and money within budget
7. Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them.
8. Adjust the site plan on the site itself (not on models)

(1) Interview on hopes and dreams

Our work on the Eishin project began, as promised in the contract, with the construction of a pattern language. We spent four to five months engaging students, teachers and administrators in creating this new pattern language, which would spring from their hopes and dreams as well as from the land itself.

The very first thing we did was spend two weeks just talking to different teachers and students, to get a feeling for their hopes and dreams. These talks were one-on-one and often lasted about an hour, for any one interview, during which we asked questions, talked, probed, explored dreams of an ideal campus, and tried to understand each person's deepest visions as a teacher, or as a student. We asked people about their longings, and their practical needs. We asked them to close their eyes and imagine walking about in the most wonderful campus they could imagine. [Alexander (2012) p. 117]

Examples of People's Dreams

Here are a few examples of the dreams of teachers that, with many others, formed the base for our first rough Pattern Language draft.

"The main entrance is critical to the character of the whole campus, its placement on the edge of the site must be done with great care. I see the main entrance as a gate, where I can greet students and teachers in the morning."

"I see the new campus surrounded by some fence or wall."

"There is one essential center, where the sun shines on the buildings, and which catches the spirit of the whole school. It is an open place, where very important buildings lie Something is there, do not know exactly what, that makes the place catch the spirit of the whole school, and stays in the memory".

[p. 121, 10 more paragraphs not transcribed]

(2) Make a “poetic vision” as first sketch of a pattern language

1. The new campus will consist of an outer precinct with all of the sports fields, gardens and outer buildings, and an inner precinct with all of the buildings, high school and college activities.
2. The inner precinct of the school is made up of seven major entities.
3. The entrance street, which connects the outer boundary to the inner boundary.
4. The main yard, which contains the great hall.
5. The ta-noji center, which contains two narrow crossing streets, and the communal functions, and the college departments.
6. The home base street, which contains the individual home base buildings, and the common space for high school students.
7. The college cloister which contains the library, and special college functions such as research center.
8. The lawn which is shared by the high school and college.
9. The gymnasium, which stands at the end of the home base street, and forms its head.²

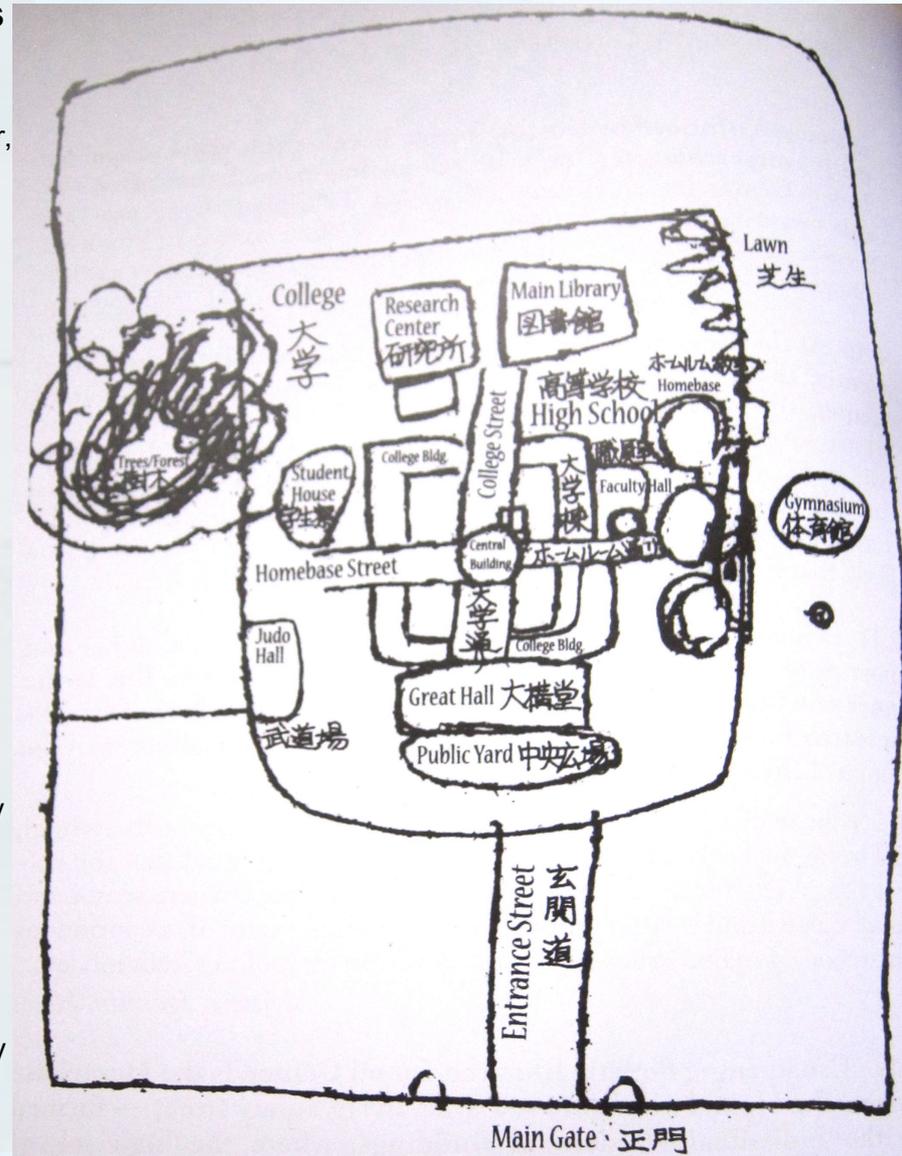
² As it turned out in the event, the gymnasium was placed on the lake, not on the home base street. In the evolution of a language, contents do sometimes change.

It should be strongly emphasized that this very brief and rudimentary pattern language was not created by sociological “research,” nor was it done by making a list of what people spoke about. Rather, it was a poetic vision, crude but potent, which tried to flesh out in architectural language and in three dimensions, a physical world whose inner meaning corresponded to the meaning conveyed to us by teachers, staff, and students, and by them to one another, as discussion of the nature of the school began. This language was made and polished by us, the architects. But it was made, more essentially, by the teachers and students from the raw material and work and expressions of intent that they first gave to us. [pp. 122-123]

(3) Make the rudimentary pattern language physically coherent

The Completeness of the Language: Seven Principles

- **Relationships.** Each pattern establishes certain relationships which should exist in the finished campus. The sum total of those relationships, expressed by the patterns in the language, acting together, define the possible configurations which this language generates. [p. 124]
- **Spatial.** A given pattern contains, or defines, certain spatial entities. The relationships are defined among these spatial entities.
- **Reliability.** The essence of these relationships is that they must be reliable, and true. They cannot be arbitrary relationships (as they might often be in a single person's design). They need to be sufficiently true, so that we can trust them, and would want to find these relationships present in any version of any campus that might be generated by this language.
- **Consistency.** It is not necessarily easy to define a system of patterns which is consistent. For example, if one pattern asserts a certain relationship between two entities, and another pattern asserts a further relationship between the same entities, but one which is inconsistent with the first, then that system of two patterns is inconsistent, and can only, with great difficulty, work to generate real physical configurations.
- **Inconsistency.** From time to time, two patterns which are physically inconsistent may be refreshing and life-giving. This happens because the contradiction generates vigor and opens new ideas.
- **Completeness.** A system of patterns is complete if it contains sufficient relationships to allow a well-formed configuration to be built.
- **Coherence.** A system of patterns is coherent if the relationship specified amongst the patterns tend, most of the time, to generate easily graspable mathematical configurations.



(4) Refine the language through discussions

Once we had the language working to the extent that it could generate coherent plans, we then began a series of meeting with the school's Building Committee to discuss and refine specifics of the various patterns. [...]

Types of discussion included:

1. The degree of separation or integration of high school and university.
2. The existence of separate buildings.
3. The meaning of the homeroom street.
4. The meaning of the tanoji center.
5. Walking around in the rain, and how much cover to have.
6. The number of buildings which would be shared between the college and the high school.
7. The material of the buildings.
8. The degree of difference and autonomy of different classroom buildings.

What was remarkable was that the teachers understood the specific details of the pattern-language at a practical and concrete level. [p. 126]

Examples of Kinds of Discussions

Clinic Room Teacher

... Her main concern was sun in the health room.

Political Economics and Social Studies

Homeroom very important. ... See each student's face clearly. Little bigger desk with containers. Much light, clear windows. No plastics. Traditional materials. Calm. Wood.

President of Student Body

He likes the classroom He think that the stairs in the existing school are grotesque, too dark, too hard, so he wants to have some more fun stairs in the new school.

Chairman of Budget Committee

... students can walk around barefooted, so that the foot can touch the ground directly, with grass, flowers, and earth. Education should be more related to nature not to the city. [...]

Chairman of Personal Learning

He is very keen on a large gymnasium. [...]

[pp. 128-130, 7 more paragraphs not transcribed]

(5) Obtain approval of the pattern language [page 1 of 8]

This pattern language is a list of key centers, each of which contributes some essential quality to the campus. The list was established long before any design started. [p. 130]

The list contains 110 essential patterns, each describing a generic kind of center, and itself made of other centers. As they are defined here, these 110 key patterns completely govern and define the life of the school. Even before we have any idea about the physical configuration of the buildings, their shape, or design, or the way these centers are made real in space, it is already obvious that the school is given its life to an enormous degree, merely by this list of patterns. [p. 151]

1.	Global Character of the Campus	1.1	An outer Boundary surrounds the Campus.	A white, 60 cm wall serves as the based for a wooden fence. [...]
2.	The Inner Precinct	1.2	Contained by this Outer Boundary there is an Outer Precinct. ...	A second wall, far inside the first, surrounds the school itself, and forms a second zone between the first and second wall. [...]
3.	The Buildings of the Inner Precinct			
4.	The Streets of the Inner Precinct	1.3	The Inner Precinct is a densely built area where School and College have their major buildings and activities.	It is the place where the daily life of students and faculty occurs. [...]
5.	The Outer Precinct			
6.	Features of the Inner Precinct	1.4	...	...
7.	Special Outdoor Details	1.5	As a whole, the Campus is given character by stone foundation walls, natural concrete walls, wood columns, ...	In addition ...
8.	Interior Building Character			



(5) Obtain approval of the pattern language [page 2 of 8]

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1.	Global Character of the Campus	2.1	The Entrance Street to the campus is a highly visible pedestrian Way. It begins at the Outer Boundary of the Campus, and ends at the Inner Precinct.	The Entrance Street is vital to the character of the whole campus. [...]
2.	The Inner Precinct			
3.	The Buildings of the Inner Precinct			
4.	The Streets of the Inner Precinct	2.2	The Small Gate marks the outer end of the Entrance Street.	It is a small, imposing building, which has height and volume.
5.	The Outer Precinct	2.3	...	...
6.	Features of the Inner Precinct	...	...	...
7.	Special Outdoor Details	2.14	The lake is a peaceful place to rest.	At the lowest point along the land, there is a lake, with grass and trees along the edges ...
8.	Interior Building Character			



(5) Obtain approval of the pattern language [page 3 of 8]

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1.	Global Character of the Campus	3.1	The main building of the Campus is the Great Hall.	This great hall is a long hall with seating for 600 people, surrounded by rooms and galleries, so that it can seat a full congregation of 1200 ...
2.	The Inner Precinct			
3.	The Buildings of the Inner Precinct	3.2	The second building of the Public Yard is the Eishin Museum -- a small house, which explains the place ...	[blank]
4.	The Streets of the Inner Precinct			
5.	The Outer Precinct	3.3	...	...
6.	Features of the Inner Precinct	...	...	...
7.	Special Outdoor Details	3.12	The Campus Library is the center of the college cloister. It stands three stories high, ...	In the university, a place of very great importance, a main place, quiet and with quiet walks and gardens near it. [...]
8.	Interior Building Character			

(5) Obtain approval of the pattern language [page 4 of 8]

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1.	Global Character of the Campus	4.1	The Public Yard has a gravel surface, with stone paths crossing it.	It is informal and quiet in character. In some ways the yard is like a forecourt to the a major building. [...]
2.	The Inner Precinct	4.2	The Homebase Street is the widest street, even wider than the streets of the Tanoji Center.	The Homebase Street is the forum where the high school students sense themselves as a large group ...
3.	The Buildings of the Inner Precinct	4.3	...	...
4.	The Streets of the Inner Precinct	...	...	...
5.	The Outer Precinct	4.15	Around the tanoji grid, but inside the inner boundary, there is an additional passage,...	[blank]
6.	Features of the Inner Precinct			
7.	Special Outdoor Details			
8.	Interior Building Character			

(5) Obtain approval of the pattern language [page 5 of 8]

This pattern language is a list of key centers, each of which contributes some essential quality to the campus. The list was established long before any design started. [p. 130]

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1.	Global Character of the Campus	5.1	The Wall which surrounds the Inner Precinct is quite irregular, and follows the buildings, and paths, ...	It is similar to the inner wall of a great Japanese castle. [...]
2.	The Inner Precinct	5.2	Outside this irregular Inner Wall, is the outer precinct, which surrounds the inner precinct, ...	The outer precinct is divided into a series of roughly square pieces of land, each with its own character and purpose. [...]
3.	The Buildings of the Inner Precinct	5.3	...	...
4.	The Streets of the Inner Precinct	...	...	...
5.	The Outer Precinct	5.25	And finally, there is a Path, which goes all around the Outer Precinct ...	A path around the site, with grave on the ground for walking and informal jogging ...
6.	Features of the Inner Precinct			
7.	Special Outdoor Details			
8.	Interior Building Character			

(5) Obtain approval of the pattern language [page 6 of 8]

This pattern language is a list of key centers, each of which contributes some essential quality to the campus. The list was established long before any design started. [p. 130]

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1.	Global Character of the Campus	6.1	Inside the inner precinct, the buildings and exterior spaces are placed in such a way that there is a subtle, indirect path, passing through the school, and always reaching places ...	
2.	The Inner Precinct			
3.	The Buildings of the Inner Precinct	6.2	The buildings themselves continue this feeling, in their inner structure.	All the buildings are organized internally, to produce a rather intimate collection of larger rooms and smaller rooms ...
4.	The Streets of the Inner Precinct	6.3	...	...
5.	The Outer Precinct	...	...	...
6.	Features of the Inner Precinct	6.22	Somewhere in the school, perhaps outside the Calligraphy Room, there is a Small Exhibition Space or Gallery, ...	This space will be located in such a way that people who just walk by can see the displays without having to go into a special room.
7.	Special Outdoor Details			
8.	Interior Building Character			

(5) Obtain approval of the pattern language [page 7 of 8]

This pattern language is a list of key centers, each of which contributes some essential quality to the campus. The list was established long before any design started. [p. 130]

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1.	Global Character of the Campus	7.1	The approach to many of the buildings is indirect, and passes through a green area, ...	The approach to the building is more like a traditional approach to traditional Japanese buildings perhaps a gravel approach way ... with changes in direction, passing through different courtyards.
2.	The Inner Precinct			
3.	The Buildings of the Inner Precinct	7.2	There will be stone paths, particularly in the inner precinct, following the main lines of movement.	The homeroom street has paved terraces along both sides, with an earthen street in the middle where there are trees -- maybe gravel on the ground.
4.	The Streets of the Inner Precinct			
5.	The Outer Precinct	7.3	...	...
6.	Features of the Inner Precinct	...	...	...
7.	Special Outdoor Details	7.8	Flowering cherry trees, where they are very visible in spring, are placed in particular locations ...	[blank]
8.	Interior Building Character			

(5) Obtain approval of the pattern language [page 8 of 8]

This pattern language is a list of key centers, each of which contributes some essential quality to the campus. The list was established long before any design started. [p. 130]

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1.	Global Character of the Campus	8.1	The interior character is warm and subdued: wooden columns, floors and walls in places; pale yellow wall color, ...	Wooden columns, often visible; Wood floors in classrooms; Passages and more public areas, floor of soft red tile; ...
2.	The Inner Precinct			
3.	The Buildings of the Inner Precinct	8.2	Floors of many buildings are raised, slightly, off the ground.	... each building an extra two feet of height ... and helping to make the whole thing a little more stately.
4.	The Streets of the Inner Precinct			
5.	The Outer Precinct	8.3	...	...
6.	Features of the Inner Precinct	...	...	...
7.	Special Outdoor Details	8.9	Inside, here and there throughout ... there are surprising soft highlights of color, shining out among the subdued colors of the rest	For the most part, the school is composed of materials with beautiful, subdued, natural colors; wood columns; But, occasionally, and only where necessary, highlights of lively colors are used. [...]
8.	Interior Building Character			

(6) Renegotiate pattern language with space and money within budget

How can something like the cost or budget be made practical?

... we finish the pattern language phase with a serious analysis of space and money. It is done right away, so that any hidden conflicts are visible, and can immediately come into the open to get resolved.

First of all, we make a record of all of the spaces and areas which were defined by the pattern language -- adding up, pattern by pattern, the total outdoor space and indoor space. In our case, the analysis showed us that the requested numbers were too large. [...]

Second, as the simplest way to trim all space to our available budget, we made an average percentage reduction for all items, one figure for trimming indoor space; and then another for exterior land area. Each item was trimmed by a similar (but not identical) percentage. [...]

AREAS REQUESTED BY THE FACULTY

A. Built Space (indoor space in square meters)		First guess requested	Available 73.4%	Renegotiated finalized
	Public Yard Buildings	945 m ²	693 m ²	750 m ²
	Buildings of the Tanoji Center	7583 m ²	5566 m ²	5604 m ²
	Cloister (research center)	1350 m ²	991 m ²	1150 m ²
	Homebase Street buildings	5680 m ²	4169 m ²	4300 m ²
	Buildings in the Outer Precinct	2432 m ²	1785 m ²	1400 m ²
	Total	17990 m²	13204 m²	13204 m²
B. Coverage of Land (outdoor space in square meters)		First guess requested	Available 79.5%	Renegotiated finalized
	Total	84286 m²	67000 m²	67000 m²

Third, we then asked the faculty to re-allocate the spaces, keeping the same trimmed totals, in order to conform to the available resources.

The rule was simple: they could increase some, but must then decrease others, so that the total areas remained as they must remain.

(7) Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them. [page 1 of 3]

The first system consists of **patterns** created notions or entities that exist in people's minds). These patterns exist in a loose and undeveloped form in people's minds, even if they have not explicitly built a pattern language. When the pattern language *is* explicitly defined, it is more clear and makes a more powerful system which will get better results, especially because it comes from the feelings of people themselves. [p. 169]

The Most Important Centers Given by the Pattern Language

... the patterns together, geometrically ... does not indicate any one arrangement on the land.

1. The **Entrance Street**.
2. The entrance street leads to a big square element which we refer to as the **Tanoji Center**.
3. This was to be the core of the college, and the center of gravity of the **Five College Buildings**.
4. Leading out from the Tanoji Center, in some direction, is **The Homebase Street**, the core of the high school.
5. **Individual Classroom Buildings** open along the **Homebase Street**.
6. The **Great Hall** and **Main Square** next to it.
7. The **Library and Research Center**, to one side. [p. 170]

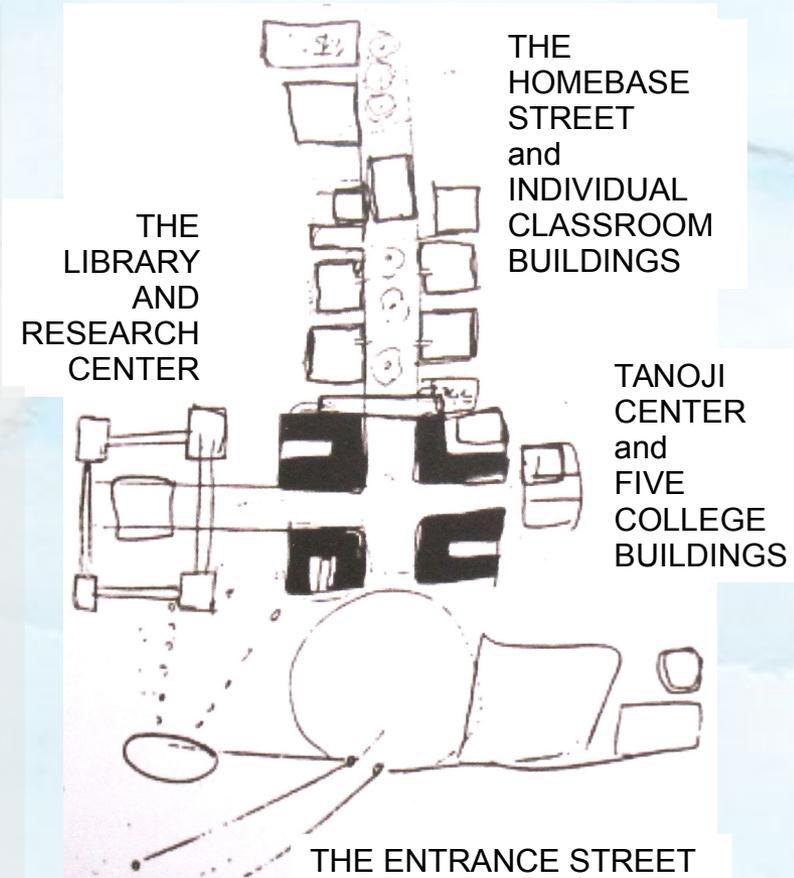


Diagram 1: Seven most important centers in the pattern language, which together give a broad conceptual picture of a possible layout that the centers can have. Not to scale.

(7) Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them. [page 2 of 3]

The second system exists in the form of **places** on the site, discernible places that can be seen and felt on the site, if you have sufficient sympathy with the land. You can make this system explicit, by making a map of the centers, and paying attention to their structure. [p. 169]

The Most Important Centers Suggested by Land Forms

... "natural places" in the land.

1. **Natural Entrance Position.** The most important among these centers was the location of the main approach. This was in the southeast corner, partly because of a bus stop in Nihongi village, and partly because of the feeling of one's natural desire about how best to approach the site.
2. **The Ridge,** running along the south of the project site. A beautiful spot, with breeze, sunshine, view ... and a very delightful feeling. This was the high point in the site, and it was on this very point that we sat and looked and sat and talked, until we began to see what was really there to be seen.
3. **The Swamp,** where vegetables used to be grown, the low point in the terrain -- a kind of swamp -- that later became a lake.
4. **A Natural Place for Large Buildings,** a zone in the middle, running the way contours ran, from north to south.
5. **Minor Entrance Position,** the northwest corner -- a natural high spot, from which to view the site, also a natural point for a secondary entrance.
- 6&7. **East and West Ends of the Ridge,** the two ends of the ridge, which formed natural high points, and at each end, the feeling of a terminus, along the two ends of the ridge. [p. 171]

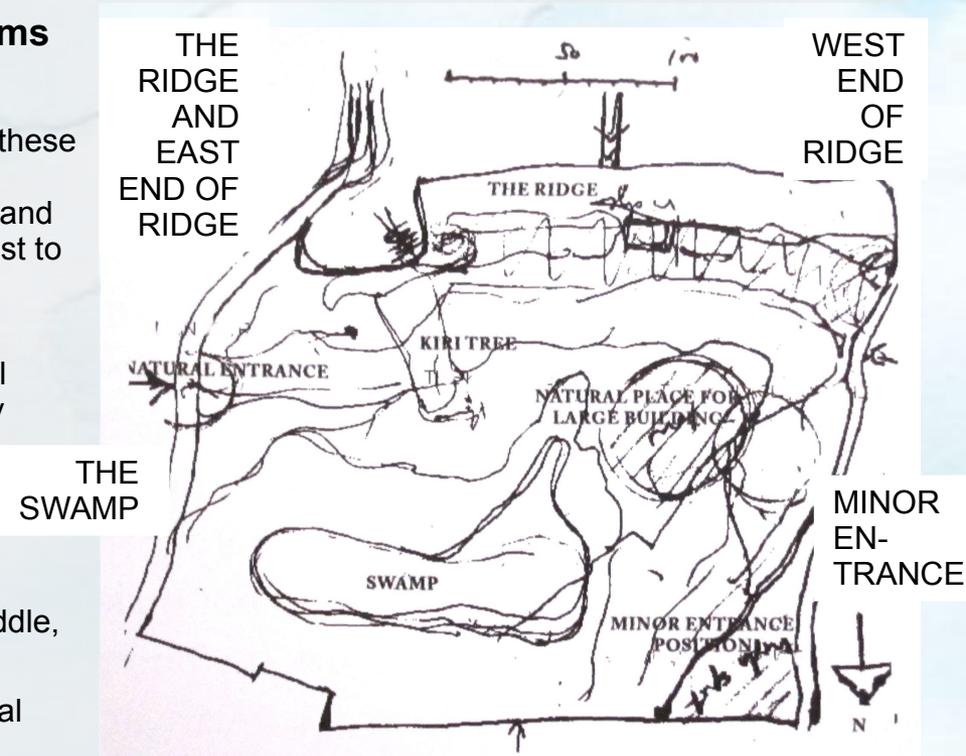


Diagram 2: The seven most NATURAL centers in the land, which, together can lead to a basic possible layout that the centers can have, in their LOCATIONS in the land.

(7) Find systems of centers in (i) the pattern language, and (ii) the places in the land. Combine them. [page 3 of 3]

... to bring these two systems of centers together. We have to hunt for a single configuration which springs from both centers, and integrates the qualities of both. We must find a way in which the system of centers defined by the pattern language can be placed, so that it enhances, preserves, and extends, the system of centers which is already in the land. It is a kind of healing process, which uses the new centers given by the pattern language, to heal the configuration of the old centers -- those that exist in the land.

... this is the single most difficult phase of the work. ... it took ... about nine months of continuous effort, to get the site plan right. [p. 173]

... after ... months of frustration, the problem did get solved.

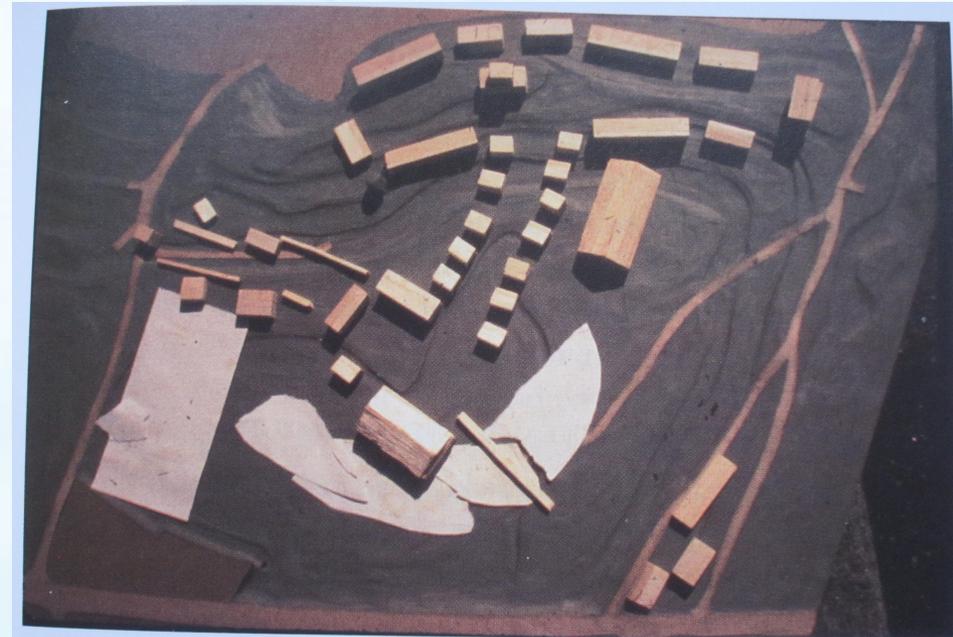
[...] a new point emerged. The fact that the homebase street would be more powerful as an *approach* to the Tanoji Center, than as something *hanging off* it. This was hard to see, at first, because it implied reversing the main sequence of the pattern language. But when we tried it, it was clear that the sequence almost instantaneously "jelled" with the land configuration.

Instead of this:

- 1) Entrance Street
- 2) Main Square
- 3) Tanoji Center (College)
- 4) Home Base Street (High School)

We now had:

- 1) Entrance Street
- 2) Main Square
- 3) Home Base Street (High School)
- 4) Tanoji Center (College)



The small balsa-wood model of the site, scale 1:500, on which the solution finally became apparent

(8) Adjust the site plan on the site itself (not on models)

We have already made it clear that nearly all of our work on the site plan was done on the site itself. Whatever we did on models, we used the models as if they were site itself -- and relied on feelings that we could feel in the model, imagining that it was the site itself. This was made necessary by the huge distance between California and Japan.

As one works on a site, and the plan gradually emerges, it is necessary, of course, to leave marks -- sticks, stones, markers of various kinds -- to fix the position of the different things which have been decided. On the Eishin site... the site was covered in tea bushes. [...] A marker therefore had to be about six feet high, even to be seen at all.

So we used six-foot-long bamboos. [...]. We ... tied different colored ribbons and cloths -- white, yellow, red, blue -- to the ends of our long bamboos. These were our markers -- our *flags*. [p. 180]

We had started making these flags quite early in the process. Even in July of 1982, as we began to get an idea established about the entrance position, we marked it with three or four of these flags. They looked beautiful. **And they made it possible to visualize the evolving site plan, truly, because they were real.**

When I came back to Japan after the breakthrough in November, we took about two hundred of these flags to the site, and began planning them in the ground, starting to make a realistic version as opposed to the very rough-and-ready diagram we had made so far. At this stage, now dealing with the real positions and dimensions on the land, we brought true feeling to the land itself. It was visible on the ground. [p. 181]



Colored flags, to identify various special purposes and areas on the land.

Agenda

1. What could Service Systems Thinking be?

→ 2. The practices of Christopher Alexander

2.1 Prescription (1975-1979) vs. practice (1985) in reflection (2012)

3. Extending to service systems?

2.2 Eishin Higashino

2.3 Methods in practice

4. An invitation
Ap. Orientation

2.4 Multi-service centers (1968) ←

Generative Pattern Language

While the label "pattern language" has been appropriated for a variety of contexts, the label of "generative pattern language" can be used for the "purer" thinking originating from the Center for Environmental Structure at U.C. Berkeley.

Christopher Alexander and his colleagues have a significant body of artifacts since the formation of the CES in 1967.

Pattern Manual (1967) is a charter for the CES.

A Pattern Language Which Generates Multi-Service Centers (1968) demonstrates how a pattern language could become instantiated differently for a variety of sites and circumstances.

"*Systems Generating Systems (1968)*" articulates the ties between a pattern language and systems thinking.

The Battle for Life and Beauty of the Earth (2012) is a history of a development project for the Eishin campus in Japan, demonstrating the CES vision from start to finish.

The variety of [Current Applications of Pattern Languages](#) often don't reflect the full vision of generativity.

A Pattern Language Which Generates Multi-Service Centers (1968)

Christopher Alexander, Sara Ishikawa, and Murray Silverstein. 1968. *A Pattern Language Which Generates Multi-Service Centers*. Center for Environmental Structure. [preview on Google Books](#)



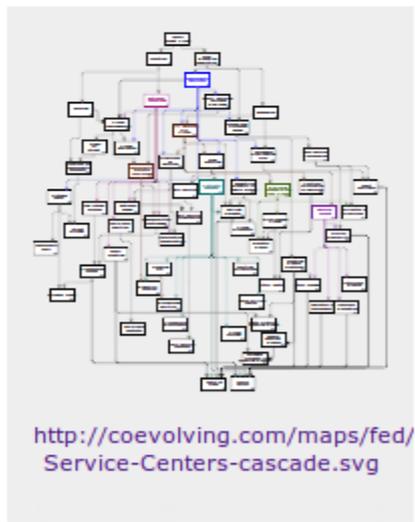
[Introduction \(Alexander et. al. 1968\)](#)

[I. Summaries of 64 Patterns \(Alexander et al. 1968\)](#)

[II. The Idea of a Pattern \(Alexander et al. 1968\)](#)

[III. Eight Buildings Generated by the Pattern Language \(Alexander et al. 1968\)](#)

[IV. The Language \(Alexander et. al 1968\)](#)



This page is part of [Historic Works on Generative Pattern Languages](#)

A Pattern Language Which Generates Multi-Service Centers (1968)

Christopher Alexander, Sara Ishikawa, and Murray Silverstein. 1968. *A Pattern Language Which Generates Multi-Service Centers*. Center for Environmental Structure. [preview on Google Books](#)

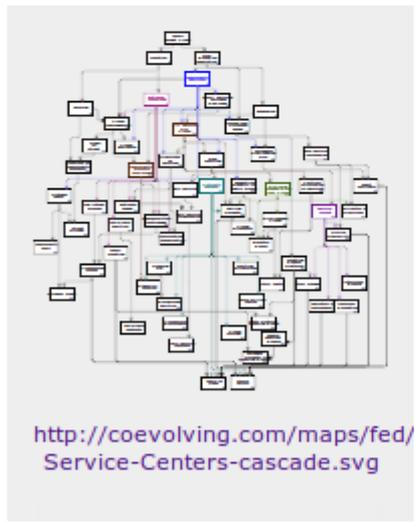
[Introduction \(Alexander et. al. 1968\)](#)

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[IV. The Language \(Alexander et. al 1968\)](#)



This page is part of [Historic Works on Generative Pattern Languages](#)

The Idea of a Pattern (Alexander et al. 1968)

If we examine the patterns as they are presented in full, in the Appendix, we shall see that each pattern has two parts: the PATTERN statement itself, and a PROBLEM statement. The PATTERN statement is itself broken down into two further parts, an IF part, and a THEN part. In full the statement of each pattern reads like this:

IF:X THEN:Z / PROBLEM:Y

X defines a set of conditions. Y defines some problem which is always liable to occur under the conditions Z. Z defines some abstract spatial relation which needs to be present under the conditions X, in order to solve the problem Y.

In short, IF the conditions X occur, THEN we should Z, in order to solve the PROBLEM Y. [p. 17]

This page is part of [A Pattern Language Which Generates Multi-Service Centers \(1968\)](#)



Summaries of 64 Patterns (Alexander et al. 1968)

Each pattern prescribes some feature of a multi-service center building. It describes a relationship which is required to solve a problem which will occur in that building. The summary does not describe this problem; it describes only the pattern. [...] [p. 5]

1. **Small Target Areas (1968)**: The multi-service center services a target area with population of 34,000 ± 20%.
2. **Location (1968)**: Service centers are located within two blocks of a major intersection.
3. **Size Based on Population (1968)**: The total size of an MSC which services a target area of population N, is .9N square feet.
4. **Community Territory (1968)**: The service center is divided into two zones, services and community territory; community territory includes space for community projects and a public area.
5. **Small Services without Red Tape (1968)**: No one service has a staff size greater than 12; each service is physically cohesive and autonomous; the services are loosely organized with respect to each other.

Community Territory (1968)

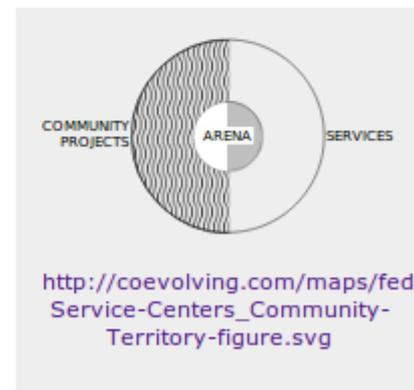
PATTERN

IF: Any multi-service center,

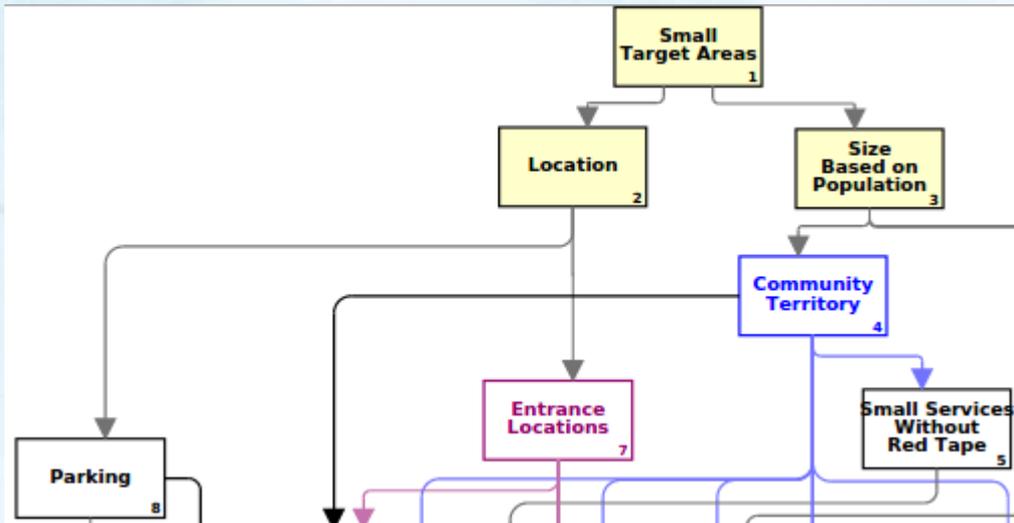
THEN:

1. The building should contain a major area which is established as community territory.
2. Community territory is distinct from the area devoted to services, but is interlocking with it.
3. Community territory contains two main components: An arena, and an area given over to community projects.

The arena is a public area, open to passers-by (whether or not they are visiting the service center), shaped in such a way as to encourage public discussions (both formal and informal), equipped with walls for day to day notices and poster, microphones, and loudspeakers. [p. 80]



Hunts Point [page 1 of 4]: 40,000 people -- Strong community corporation -- Large block worker program -- 9 to 12 services -- Site open to three sides -- Near major intersection and transit station



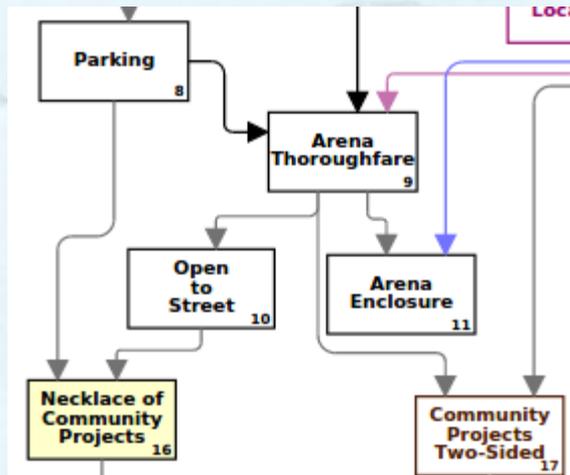
A

This multi-service center is to service 40,000 people. According to Pattern 1 Small Target Areas, this population is too large, but for political reasons, the decision stands and is irrevocable.

First a triangle site was selected, right on a major intersection (Pattern 2: Location (1968)). However, other requirements made it clear that this site was too small (Pattern 3 Size Based on Population (1968)), and a larger, rectangular site was chosen, one-half block from the original site (thus still conforming to Pattern 2 Location (1968)).

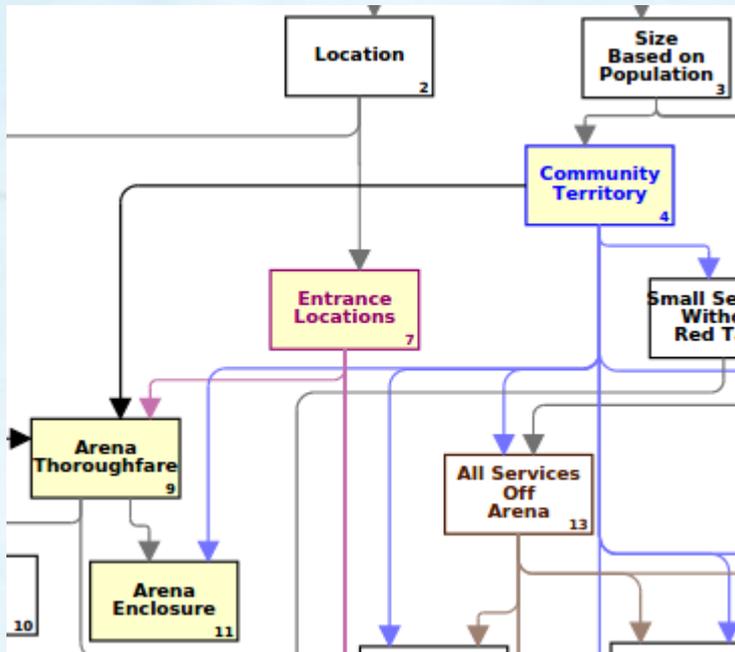
On this site there was room only for emergency parking, and so Pattern 8 (Parking) does not play a major role. Nor does 5 Small Services without Red Tape, which had not been formulated prior to the Hunts Point Design.

Hunts Point [page 2 of 4]: 40,000 people -- Strong community corporation -- Large block worker program -- 9 to 12 services -- Site open to three sides -- Near major intersection and transit station



B
Pattern 16 (Necklace) calls for provisions for community projects around the "live" edge of the building; hence we confine services to the "dead" edge of this building, against other buildings.

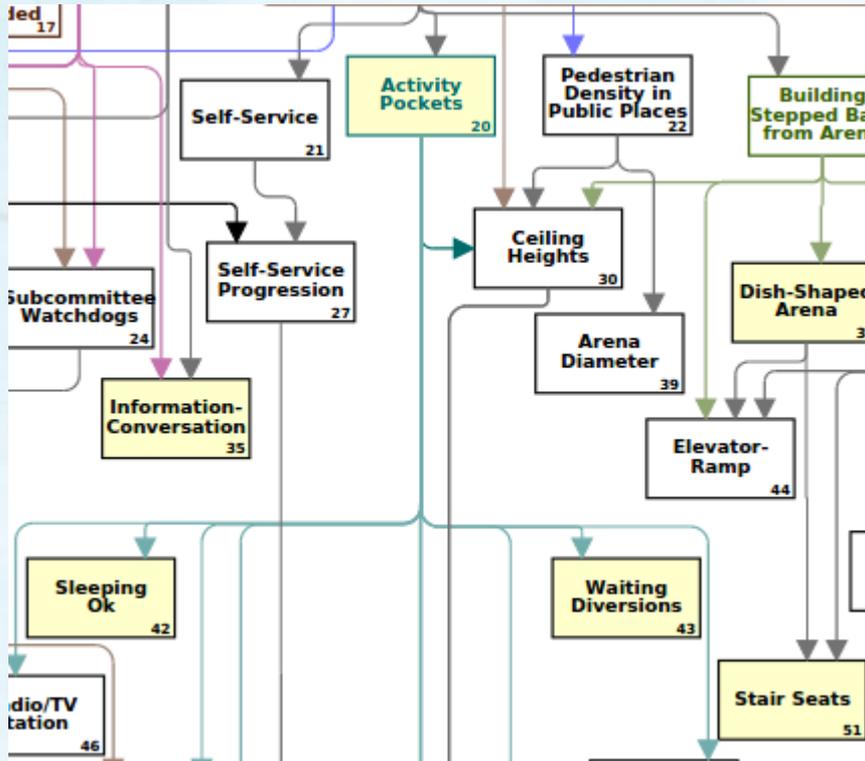
Hunts Point [page 3 of 4]: 40,000 people -- Strong community corporation -- Large block worker program -- 9 to 12 services -- Site open to three sides -- Near major intersection and transit station



C
Climate considerations made it clear that the arena could not be open (11: Arena Enclosure), and so it was developed as an interior street. Orientation of this "street" is given by local conditions in accordance with Pattern 7 (Entrance Locations).

D
The size of the arena and its relationship to waiting and services is established by Patterns 13 (All Services Off Arena), 14 (Free Waiting) and 15 (Overview of Services); and the arena is shaped accordingly.

Hunts Point [page 4 of 4]: 40,000 people -- Strong community corporation -- Large block worker program -- 9 to 12 services -- Site open to three sides -- Near major intersection and transit station



G
Finally, "pockets" in the arena are shaped and filled according to Patterns 29 (Activity Pockets), 35 (Information-Conversation), 43 (Waiting Diversions), and 42 (Sleeping Ok) (Alexander, Ishikawa, and Silverstein 1968, 22).

San Francisco: “Combination service and recreation center -- Mild climate -- Outdoor arena -- Strong community organization -- Corner site -- Off site parking provided”

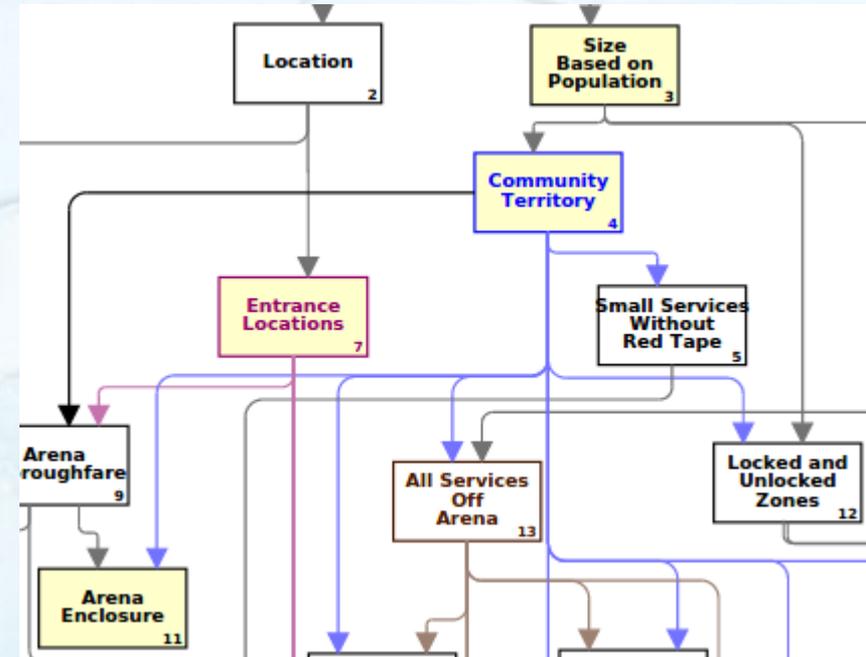
A

To make the recreation part of the building highly accessible, the whole ground floor is devoted to recreation activity -- this area will be open late, according to Pattern 12 (Locked and Unlocked Zones); also it is highly visible from the street (10 Open to Street), and provides a thoroughfare (Pattern 9 Arena Thoroughfare). In this climate, the arena, which can be open to the sky (11 Arena Enclosure) takes on an unusual character -- it becomes a park. The whole ground floor becomes community territory (4 Community Territory).

B

The recreation ware, which will become the hang-out for many members of the community, gives the building a natural base for community organization.

It is therefore essential to put information, and community organizers and community projects at ground level. Patterns 17 (Community Projects Two-Sided), 28 The Intake Process), 35 (Information-Conversation) and 16 (Necklace of Community Projects) put them into the positions shown. [...]



E

To get windows overlooking life (18 Windows Overlooking Life), there are holes from the second and third story, looking down into the recreation floor (Alexander, Ishikawa, and Silverstein 1968, 26).

Agenda

1. What could Service Systems Thinking be?

2. The practices of Christopher Alexander

→ 3. Extending to service systems?

4. An invitation

Ap. Orientation

3.1 Unfolding wholeness reframed to value both in use and in exchange

3.2 Architectural programming as problem seeking

3.3 Scale, scope, speed, acceleration

Generative pattern language – systems generating systems (1968)

← → ↻ 🏠 [coevolving.com/blogs/index.php/archive/systems-generating-systems-architectural-design-theory-by-christopher-](http://coevolving.com/blogs/index.php/archive/systems-generating-systems-architectural-design-theory-by-christopher-alexander)

Systems generating systems — architectural design theory by Christopher Alexander (1968)

Posted on April 10, 2014 by [daviding](#)

The systems thinking roots from architect [Christopher Alexander](#) aren't completely obvious in his work on [pattern language](#). A [republished version of an 1968 article](#) resurfaces some clarification on a perspective on systems thinking originating from practices in architecture.

This article introduced ways in which systems thinking could be most directly applied to [built environments](#). The cross-appropriation of pattern languages across a variety of domain types — object-oriented programmers were the earliest motivating adopters — could be enlightened by revisiting the foundations. Alexander concisely presented 4 points, and then provided detailed reasoning for each:

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. [Alexander 2011, p. 59; Alexander 1968, p. 605]

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 2011, p. 58; Alexander 1968, p. 605]

Let's leave analytical explications of the original 1968 text as secondary, to first appreciate the idea of "systems generating systems" through sensemaking done some decades after 1968, and in the broader context of Alexander's other writings and interviews.

[Molly Wright Steenson](#), as part of her [2014 dissertation](#), has a 66-page digest of Alexander's work between 1962 and 1968. Her deep reading was reflected in a 2009 recorded presentation on "Loving and Hating Christopher Alexander". Generally speaking, interaction

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[@PaulaFletcher30](#) said hello.
Long time neighbour,
represents our ward well. Not
yet campaigning, officially
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Conversations for Possibilities on Service Systems Thinking

With Service Systems Thinking at its inception, community participants can discuss potential futures for their collaborations.

For [Multiple Perspectives Open Collaboration](#),

1. We could have [Federated Authored Content](#) on open source platforms.

For [Generative Pattern Language](#),

2. We could be reoriented for [Unfolding Wholeness, Layering Systems of Centers and/with Creating Interactive Value](#).

For [Service Science, Management, Engineering and Design](#),

3. We could have [Transdisciplinary Cooperation on Service Systems Improvement](#).

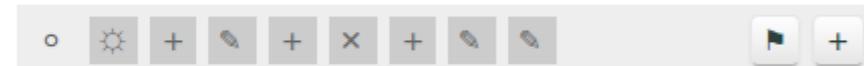
For [Systems Thinking](#),

4. We could have service systems [Evolving from the Systems Thinking Tradition](#).

Unfolding Wholeness

In Christopher Alexander's post-*Nature of Order* work, the ideas of [Generative Code](#), [Wholeness](#) and [Unfolding](#) are strongly coupled.

Some reconciliation between designing goal-oriented and platform-oriented approaches can be understood through the distinction between [Teleological Systems Development](#) and [Ateleological Systems Development](#). While the pattern language work of Christopher Alexander has largely been seen as ateleological, the philosophy behind the design of service systems is not always clear.



Generative Code

The context for generative code, in the work of Christopher Alexander, is in built environments, and directly related to [Morphogenesis](#).

A generative code is a system of explicit steps, for creating [a social-spatial] fabric. It defines the end product, not by specifying the end-product itself, but by defining the steps that must be used to reach the end product. Unlike a process which defines the end product, and then leaves the getting there to the developer, the processes initiated by a generative code assure that the end product will be unique each time it occurs, and will be unique in just the ways that matter.¹

¹This approach to building is based on morphogenesis, which has been the basis of Alexander's work throughout his career as architect, planner, educator, theorist and builder. The theory, connections to other fields of science, and hundreds of examples of putting this theory into action are covered in the four books of *The Nature of Order*, Alexander's recently completed four-volume work.

Morphogenesis

Morphology is "the study of the form of things", and *morphogenesis* (in biology) is "the origin and development of morphological characteristics, according to Oxford Dictionaries [↗](#)".

Christopher Alexander speaks to morphogenesis in the context of built environments, drawing inspiration from biology.

Things in the biological world, almost by definition, are created continuously by morphogenesis, that is by a process which is all the time growing and adapting, whether it be in a growing embryo or in a forest or a field, and which gives form, progressively, while growth and change and adaptation are happening. In real morphogenesis the form of what is coming, or what is about to be, is always drawn from the form of what was in the moment just before. That is, things are always going like that. If a tree is growing for 500 years, it is continuously unfolding from its previous state, and then what we see and recognize is first of all in itself a process. But even if you just look at it in its static state, it is at that moment the end product of transformations that have

Wholeness

The "quality without a name" described in *The Timeless Way of Building* (1979) came to be described by Christopher Alexander as "wholeness" in the *The Nature of Order* (2004):

The argument of Book 1, *The Phenomenon of Life*, may be captured by the following results that summarize 30 years of observation and experiment:

1. A previously unknown phenomenon that may be called "life" or "wholeness" has been observed in artifacts. This quality has been noticed in certain works of art, buildings, public space, parts of buildings, and in a wide range of other humanmade things.
2. The idea of how much life is in things is objective in the sense of observation and is thus common to people of different inclinations and cultures. This is a surprise, since the finding seems to contradict the accepted wisdom of cultural relativity. (demonstrated)
3. This quality of life seems to be correlated with the repeated appearance of 15 geometric properties—or geometrical invariants—that appear

Unfolding

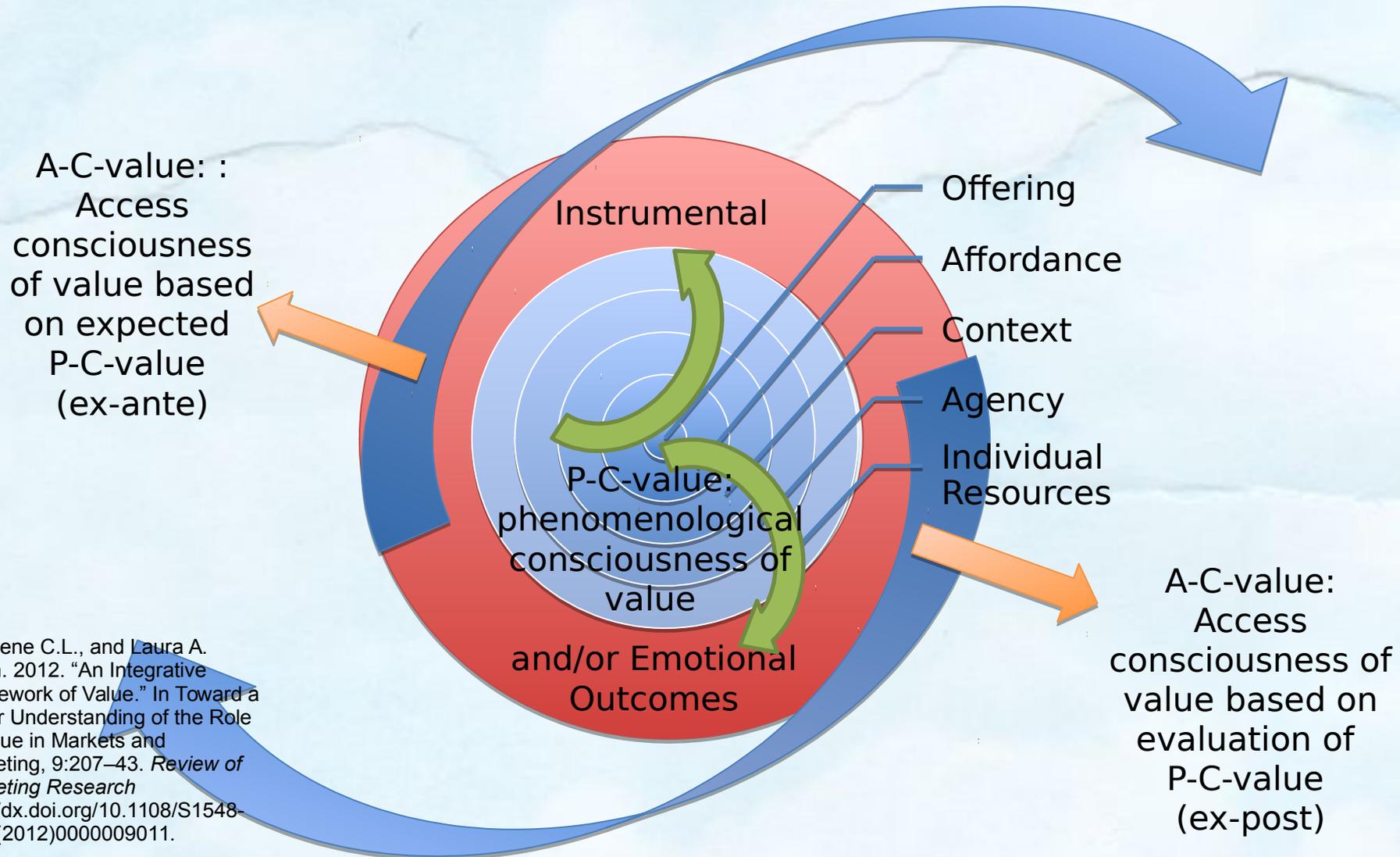
While patterns have generally been static, unfoldings are intended as dynamic.

Unfoldings slightly resemble patterns, in that they are nuggets of information, which help you shape some part or aspect of the environment. However, unfoldings are vastly different from patterns in the way they work, and it is these differences which give them their power and effectiveness. Each unfolding has three key features which define its operation and its effect.

1. Unlike a pattern, which is a static configuration, an unfolding is dynamic. It acts to generate form.
2. Unlike a pattern, an unfolding arises from the whole, is shaped by the whole, and acts upon the whole.
3. An unfolding is by its nature personal, and requires human input and human feeling from the people doing the work, as an essential part of its contribution to the formation of the environment.

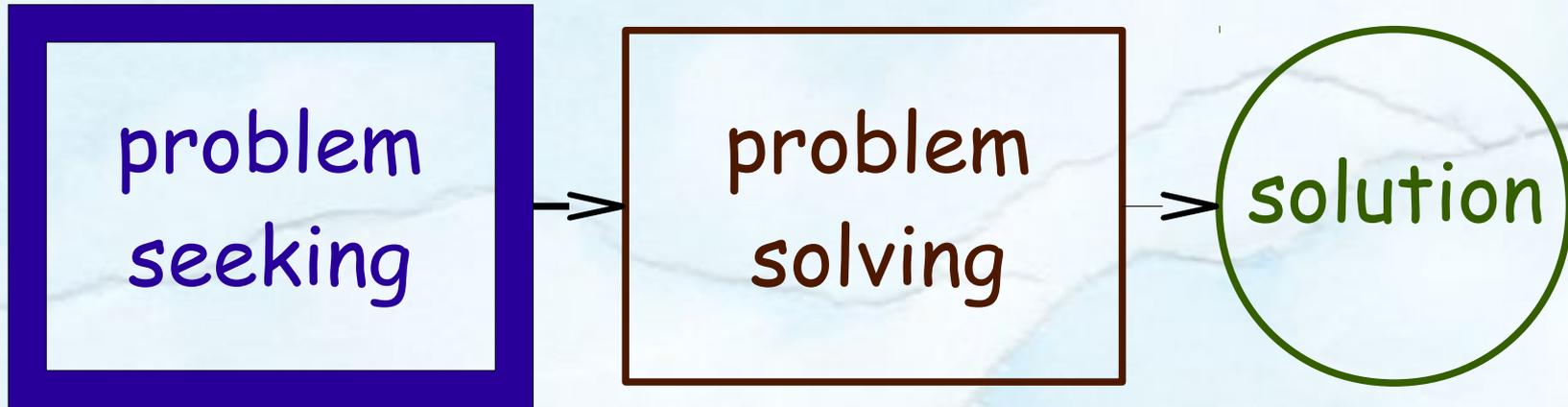
See "[What is an unfolding](http://livingneighborhoods.org)" on livingneighborhoods.org

Research in service science provides new dynamic conceptualization of value of an offering



Ng, Irene C.L., and Laura A. Smith. 2012. "An Integrative Framework of Value." In *Toward a Better Understanding of the Role of Value in Markets and Marketing*, 9:207–43. *Review of Marketing Research* [http://dx.doi.org/10.1108/S1548-6435\(2012\)0000009011](http://dx.doi.org/10.1108/S1548-6435(2012)0000009011).

Pattern language presumes *problem seeking* as *architectural programming*, and *problem solving* as *design*

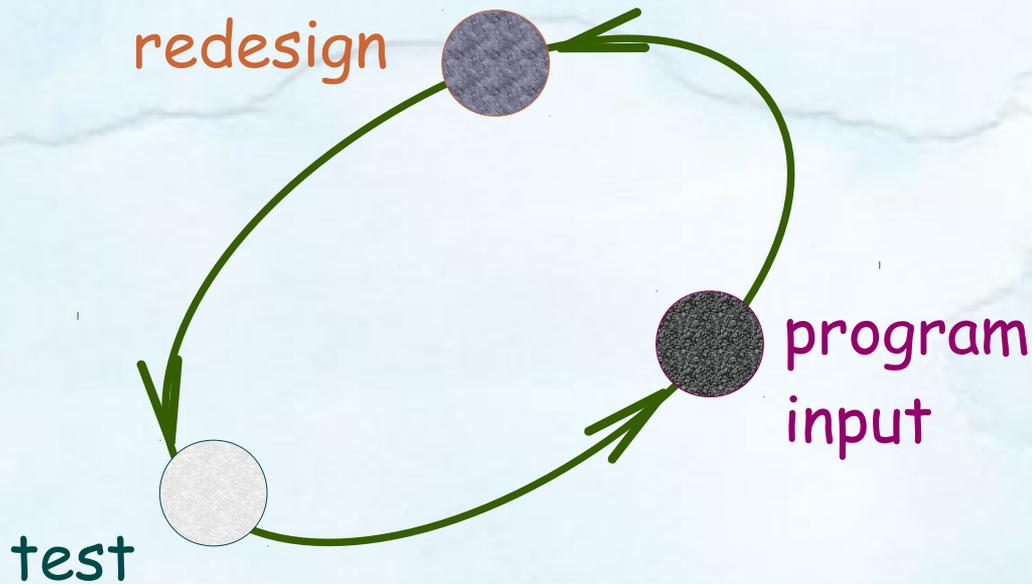


Programming is a specialized and often misunderstood term. It is “a *statement of an architectural problem* and the requirements to be met in offering a solution. While the term is used with other descriptive adjectives such as *computer programming*, *educational programming*, *functional programming*,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

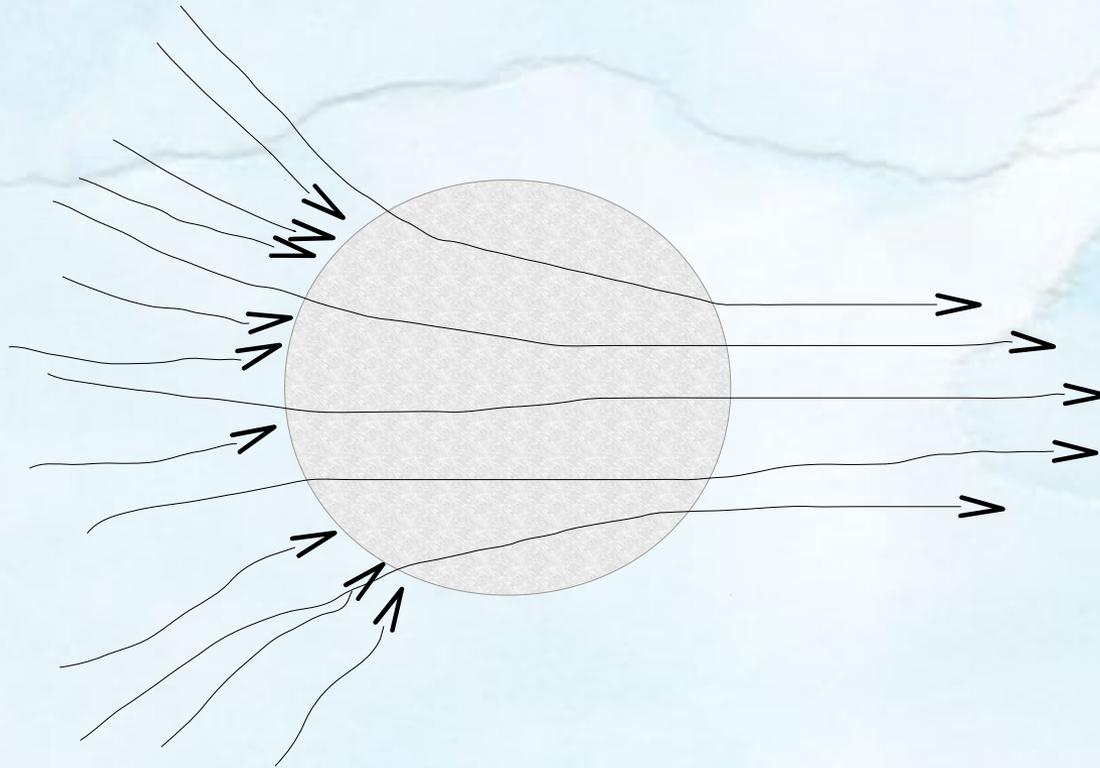
Design is problem solving; programming is problem seeking. The end of the programming process is a statement of the total problem; such a statement is the element that joins programming and design. The “total problem” then serves to point up constituent problems, in terms of four considerations, those 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 essence 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).

Programming through design, testing and redesign is inefficient



If a client approaches the architect with very little information, the architect may have to respond by programming through design. He could produce sketch after sketch and plan after plan trying to satisfy undefined requirements. Programming through design can involve misuse of talent and, indeed, risks of creating a “solution“ to the wrong problem. (Pena and Focke 1969).

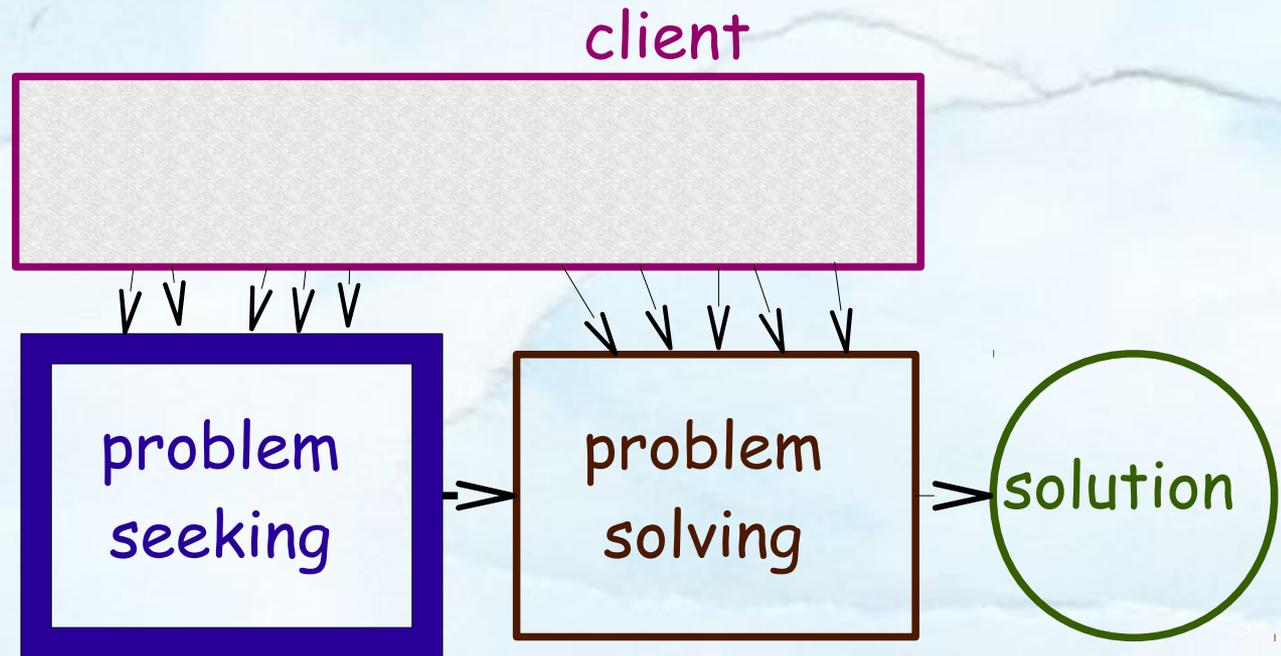
Discrimination between major ideas and details is necessary to avoid confusion in problem solving



On the other hand, a client may present the architect with too much information but involving mostly irrelevant details. The risk here is that the architect's solution will be based on details rather than major ideas. In this case, the architect must plough through an abundance of information and discriminate between major ideas and details (Pena and Focke 1969).

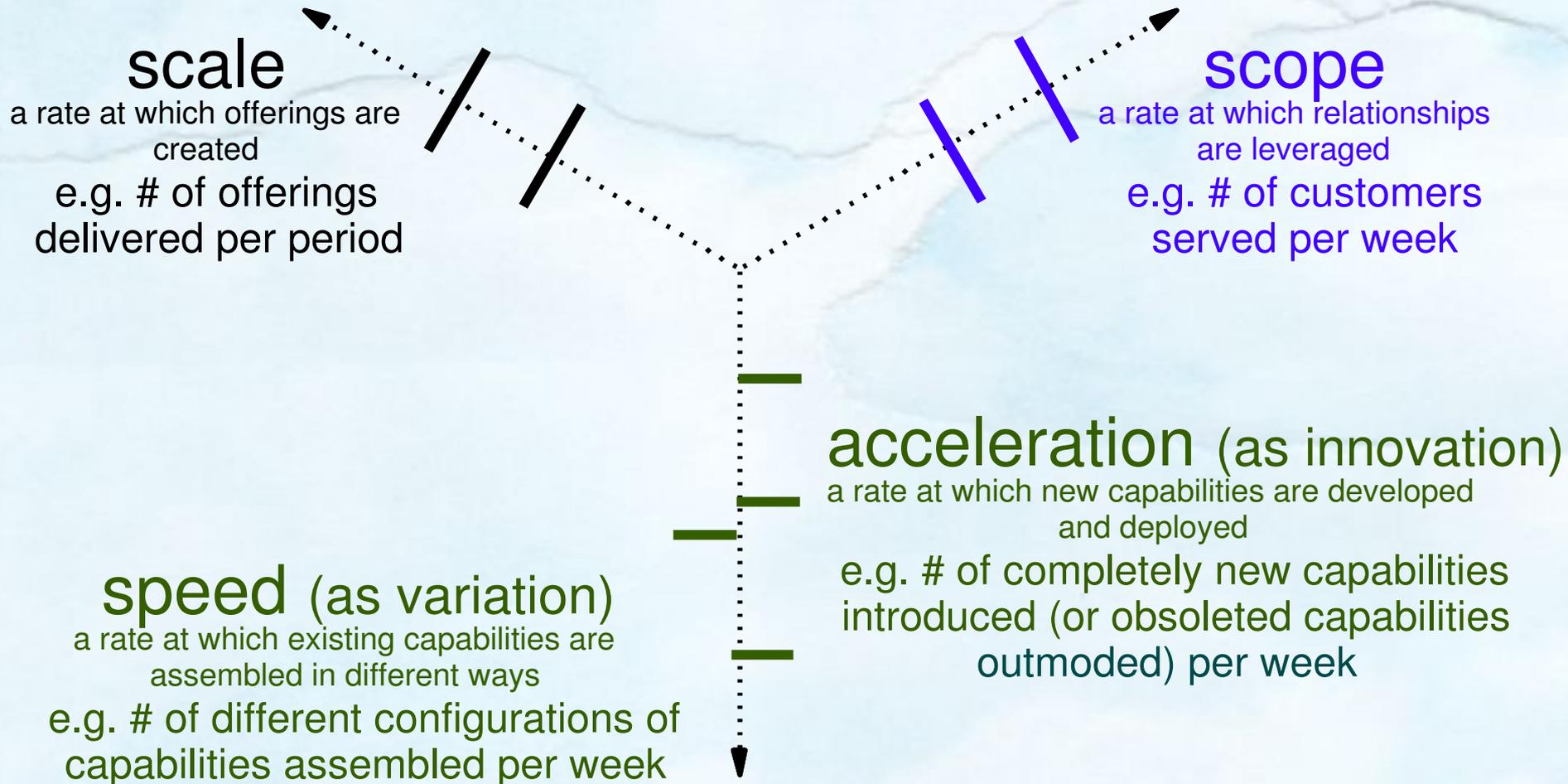
The client is involved in the process of architectural programming

The analytical procedure used by CRS provides a framework for decision making. Within it the architect help the client identify and make decisions that need to be made prior to design. Within it, the architect can suggest alternatives and other information to bring about decisions.



There are times when the architect must evaluate the gains and risks in order to stimulate a decision. Yet, note the emphasis on client decisions; the architect merely participates and at most, recommends.
(Pena and Focke 1969).

Should we think of architectural programming as trade-offs between scale, scope, speed and acceleration?



Agenda

1. What could Service Systems Thinking be?

2. The practices of Christopher Alexander

3. Extending to service systems?

→ 4. An invitation

Ap. Orientation

4.1 Seeking concurrence

4.2 A first step

Seeking concurrence



- International Workshop, January 2014, Los Angeles
- International Symposium, June 2014, Las Vegas



- Human Side of Service Engineering, July 2014, Krakow



- 58th Annual Meeting, July 2014, Washington, DC



- Pattern Languages of Programming Conference, September 2014, Allerton, IL



- Relating Systems Thinking and Design Symposium, October 2014, Oslo

A first step: try out federated wiki

The image shows a screenshot of a web browser with two side-by-side wiki pages. The browser's address bar shows the URL `fed.coevolving.com/view/welcome-visitors/view/wiki-openshift-quickstart`. The browser's toolbar includes icons for Apps, GCal, GContacts, G+, Feedly, and Owncloud. The left page is titled "Welcome Visitors" and contains a welcome message, a "Who" section mentioning David Ing, a "What" section about the Service Systems Thinking initiative, a "How" section about joining the community, and a "References on Federated Wiki" section. The right page is titled "Wiki OpenShift Quickstart" and contains an introductory paragraph, followed by two numbered steps for deployment, each with sub-steps (a), (b), and (c) detailing the process from setting up Git to pushing code to OpenShift.

Welcome Visitors

Welcome to the *Coevolving Innovations* branch of an open source project where content is shared in a Federated Wiki.

Who

[David Ing](#) is seeding content here, that others may curate-bookmark-fork on their own federated wiki sites.

What

The [Service Systems Thinking](#) initiative is in startup mode, with content gradually being added.

How

Joining the Service Systems Thinking community calls for each author to write on his or her own federated wiki. The easiest way to do this is through the [Wiki OpenShift Quickstart](#).

Readers may follow the [Recent Changes](#) for greater awareness of progress across the federation.

References on Federated Wiki

Wiki OpenShift Quickstart

An easy way to start your personal wiki in the federation is to sign up for a free [OpenShift PaaS](#) (Platform as a Service), and deploy the [Wiki OpenShift Quickstart on GitHub](#). The [Getting Started with OpenShift eBook](#) is informative. There are two ways to deploy the SFW (Smallest Federated Wiki) technology.

- (1) For a site to be labelled as `wiki-$yournamespace.rhcloud.com`, the [OpenShift web creation](#) workflow fills in most of the fields for a one-button browser installation.
 - (a) [Set up Git](#) on your Mac, Windows or Linux.
 - (b) [Install the RHC Client Tools](#). Through [Remote Access](#) to Openshift, setup RHC and login.
 - (c) Following the Wiki OpenShift Quickstart [readme](#), (i) create the node-0.10 application, (ii) add the upstream Wiki Quickstart repository and pull to your personal workstation, and (iii) push the code [OpenShift](#).
- (2) For a site to be customized as `wiki.$yourdomain.com`, you will have to not be intimidated by a command line terminal.
 - (a) [Set up Git](#) on your Mac, Windows or Linux.
 - (b) [Install the RHC Client Tools](#). Through [Remote Access](#) to Openshift, setup RHC and login.
 - (c) Following the Wiki OpenShift Quickstart [readme](#), (i) create the node-0.10 application, (ii) add the upstream Wiki Quickstart repository and pull to your personal workstation, and (iii) push the code [OpenShift](#).

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→ Ap. Orientation

A.1 Systems thinking

A.2 SSMED

(Service Science, Management, Engineering and Design)

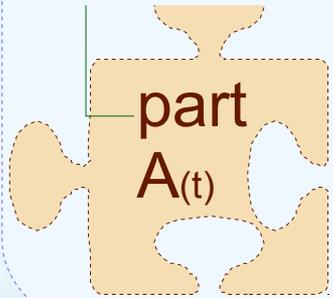
A.3 Generative Pattern Language

A.4 Multiple Perspectives
Open Collaboration

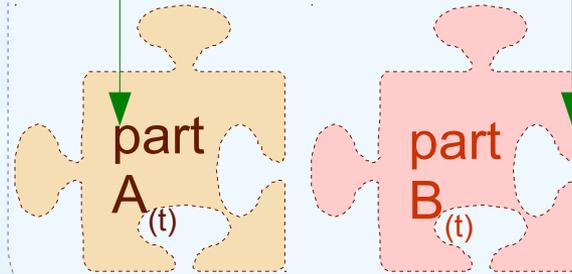
Systems thinking is a perspective on wholes, parts and their relations

containing
whole

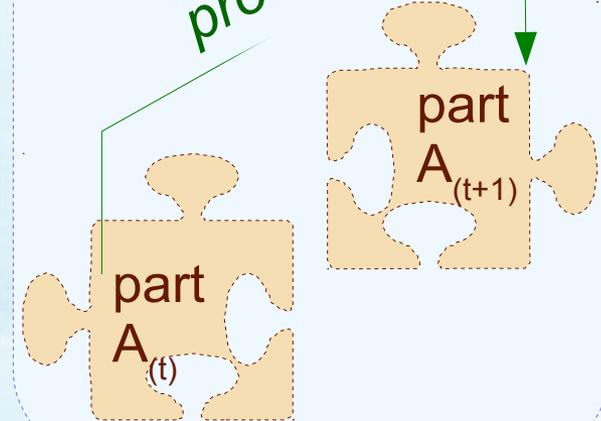
↑
*Function (non-living)
or role (living)*



structure



process



Function

“contribution of the
part to the whole”

Structure

“arrangement in
space”

Process

“arrangement in
time”

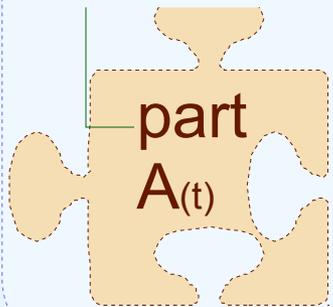
Source: Ing, David. 2013. “Rethinking Systems Thinking: Learning and Coevolving with the World.” *Systems Research and Behavioral Science* 30 (5): 527–47. doi:10.1002/sres.2229. Gharajedaghi, Jamshid. 1999. *Systems Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture*. Elsevier. <http://books.google.ca/books?id=7N-sFxFntakC>.

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

containing
whole



*Function (non-living)
or role (living)*

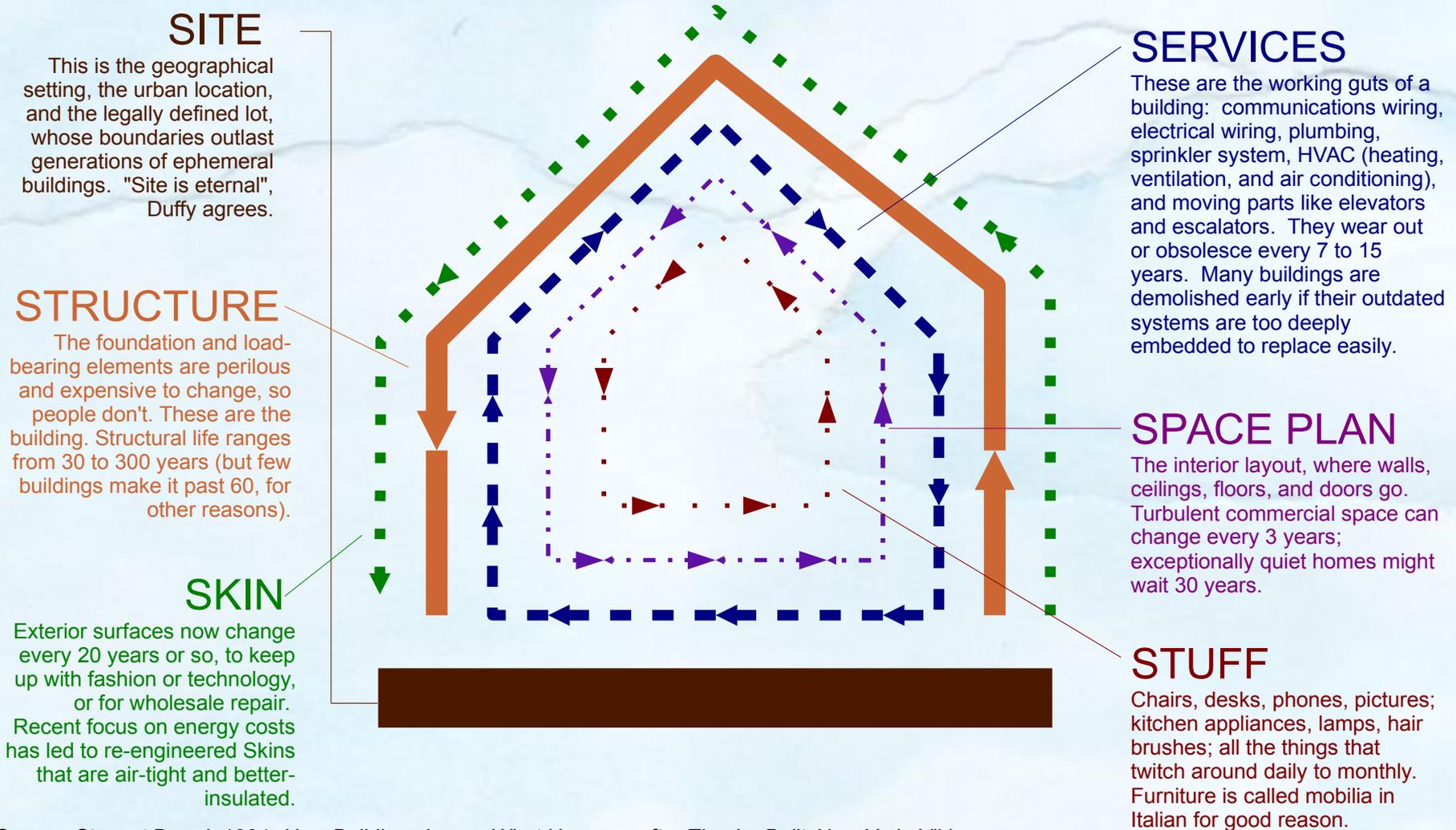


Synthesis precedes analysis

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 (shearing layers) can be seen as containing wholes in a coevolutionary view



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

Agenda

1. What could Service Systems Thinking be?

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4. An invitation

→ Ap. Orientation

A.1 Systems thinking

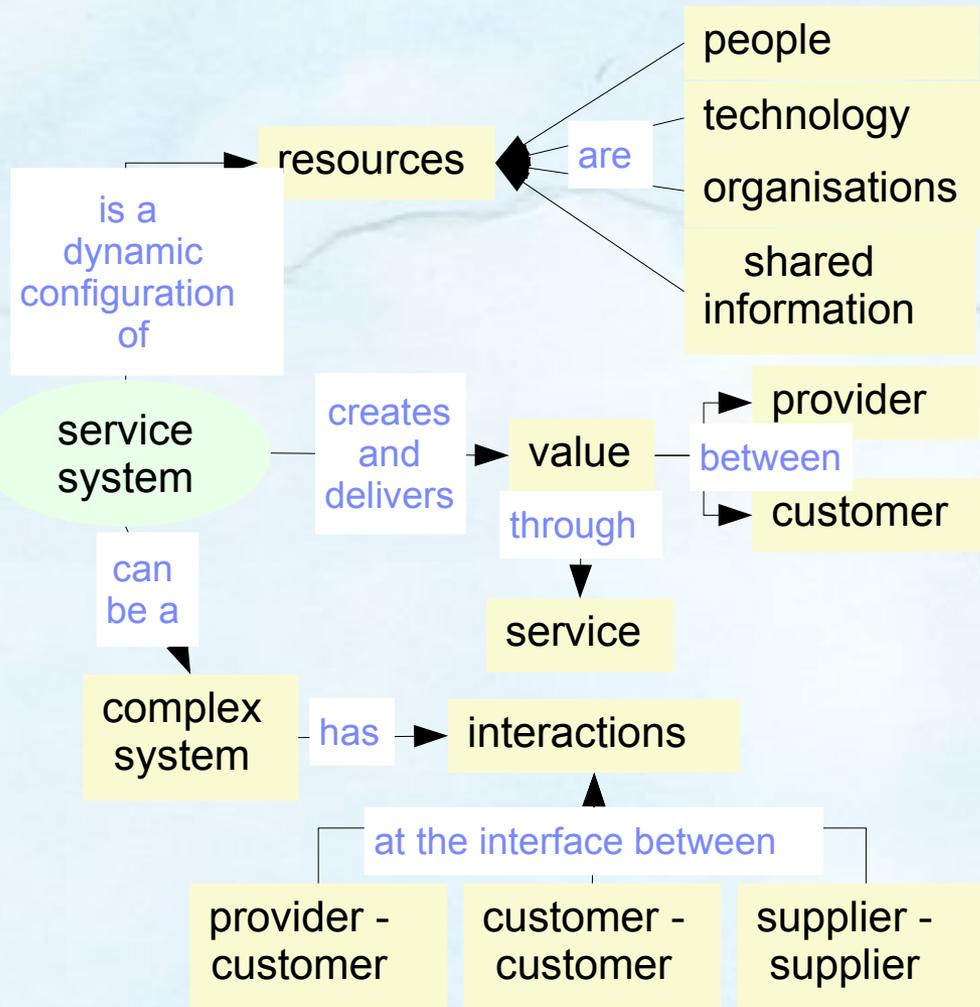
A.2 SSMED

(Service Science, Management, Engineering and Design)

A.3 Generative Pattern Language

A.4 Multiple Perspectives
Open Collaboration

Service systems (Cambridge IfM and IBM, 2008)



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.

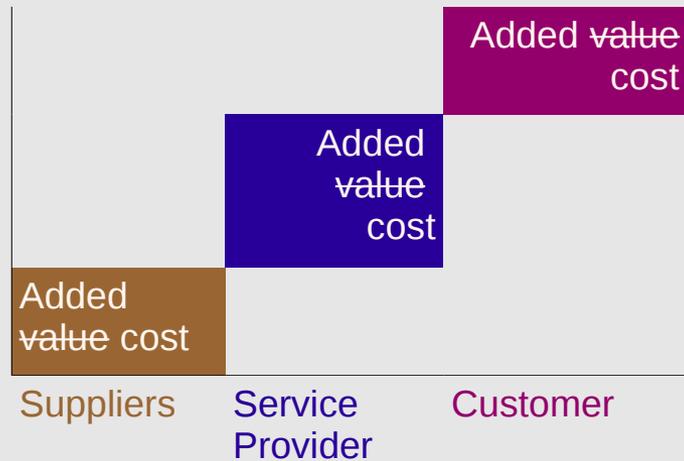
These complex interactions create a system whose behaviour is difficult to explain and predict.

(IfM and IBM, 2008, p. 6)

Source: IfM, and IBM. 2008. *Succeeding through Service Innovation: A Service Perspective for Education, Research, Business and Government*. Cambridge, UK: University of Cambridge Institute for Manufacturing. <http://www.ifm.eng.cam.ac.uk/ssme/> .

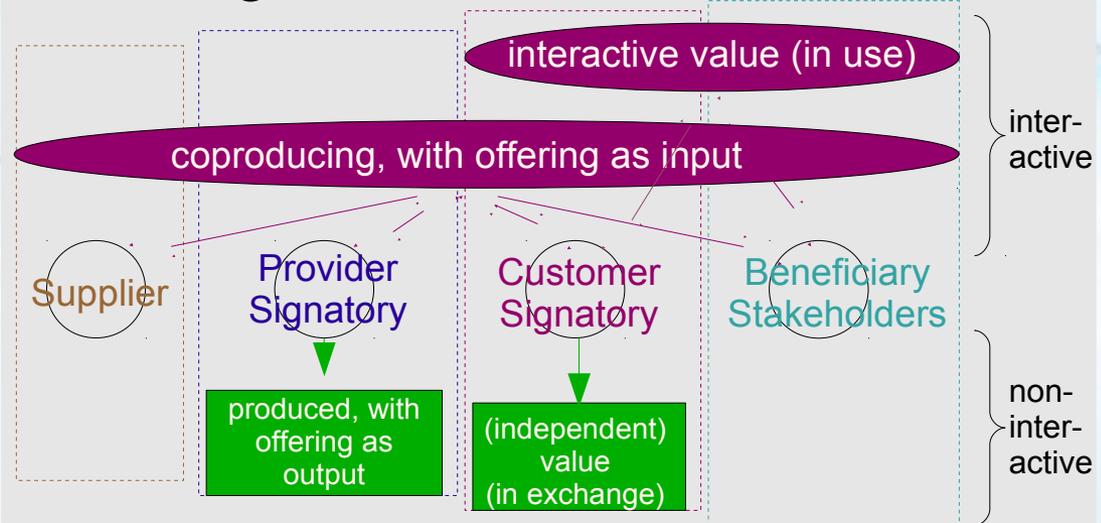
The theory of firms adding value cost has given way to mobilizing customers towards creating their own value

Adding value cost



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.

Source: Richard Normann and Rafael Ramirez. 1993. "From Value Chain to Value Constellation: Designing Interactive Strategy." Harvard Business Review 71: 65–65. <http://hbr.org/1993/07/designing-interactive-strategy> .

Basic Concepts. If we are to understand human history as the evolution and design of value-cocreation mechanisms between entities, then where should we begin?

Let's start by understanding the following ten basic concepts:

1.	Resources	Businesses may own physical resources or contract for physical resources, but as a type of resource they are themselves not physical, but instead a conceptual-legal construct. So in the end, all resources fall into one of four types: <i>physical-with-rights</i> , <i>not-physical-with-rights</i> , <i>physical-with-no-rights</i> , and <i>not-physical-with-rights</i> .
2.	Service system entities	The most common types of service system entities are people and organizations. New types of service system entities are constantly emerging and disappearing. Recently, open-source and on-line communities have emerged as service systems entities.
3.	Access rights	"By what authority, do you use that resource?" Service system entities have four main types of access rights to the resources within their configuration: <i>owned outright</i> , <i>leased/contracted</i> , <i>shared access</i> , and <i>privileged access</i> . Shared access resources include resources such as air, roads, natural language, and internet web sites. Privileged access resources include resources such as thoughts, individual histories, and family relationships.
4.	Value-proposition-based interactions	"I'll do this, if you'll do that." [...] Interactions via value propositions are intended to cocreate-value for both interacting entities. Both interacting entities must agree, explicitly or tacitly, to the value proposition.
5.	Governance mechanisms	"Here's what will happen if things go wrong." [...] If value is not realized as expected, this may result in a dispute between the entities. Governance mechanisms reduce the uncertainty in these situations by prescribing a mutually agreed to process for resolving the dispute.
6.	Service system networks	"Here's how we can all link up." [...] Over time, for a population of entities, the patterns of interaction can be viewed as networks with direct and indirect connectivity strengths. A service system network is an abstraction that only emerges when one assumes a particular analysis overlay on the history of interactions amongst service system entities.
7.	Service system ecology	"Populations of entities, changing the ways they interact." Different types of service systems entities exist in populations, and the universe of all service system entities forms the service system ecology or service world
8.	Stakeholders	"When it comes to value, perspective really matters." The four primary types of stakeholders are <i>customer</i> , <i>provider</i> , <i>authority</i> , and <i>competitor</i> . In addition ... other stakeholder perspectives include employee, partner, entrepreneur, criminal, victim, underserved, citizen, manager, children, aged, and many others.
9.	Measures	"Without standardized measures, it is hard to agree and harder to trust." The four primary types of measures are <i>quality</i> , <i>productivity</i> , <i>compliance</i> , and <i>sustainable innovation</i> .
10.	Outcomes	"How did we do? Can this become a new routine or long-term relationship?" [...] Beyond a standard two player game, with a customer player and a provider player, ISPAR assumes there exists both an authority player as well as a competitor-criminal player.

Source: Jim Spohrer and Stephen K. Kwan. 2009. "Service Science, Management, Engineering, and Design (SSMED): An Emerging Discipline - Outline & References." *International Journal of Information Systems in the Service Sector* 1 (3): 1–31. doi:10.4018/jisss.2009070101 .

Service systems worldview. These ten basic concepts underlie the *service systems worldview* ...

... the world is made up of populations of service system entities that interact (normatively) via value propositions to cocreate-value, but often disputes arise and so governance mechanisms are invoked to resolve disputes.

Formal service system entities are types of legal entities with rights and responsibilities, that can own property, and with named identities that can create contracts with other legal entities. [...] Formal service systems exist within a legal and economic framework of contracts and expectations.

Informal service system entities include families ..., open source communities ..., and many other societal or social systems that are governed typically by unwritten cultural and behavioral norms (social systems with rudimentary political systems).

Natural history of service system entities. Service science seeks to create an understanding of the formal and informal nature of service in terms of entities, interactions, and outcomes, and how these evolve (or are designed) over time. An initial premise is that the entities, which are sophisticated enough to engage in rationally designed service interactions that can consistently lead to win-win value cocreation outcomes, must be able to build models of the past (reputation, trust), present, and future (options, risk-reward, opportunities, hopes and aspirations) possible worlds, including models of themselves and others, and reason about knowledge value

1.	Resources
2.	Service system entities
3.	Access rights
4.	Value-proposition-based interactions
5.	Governance mechanisms
6.	Service system networks
7.	Service system ecology
8.	Stakeholders
9.	Measures
10.	Outcomes

Basic questions. A general theory of service system entities and networks formed through value-proposition-based interactions has four parts

... which directly lead to the four basic types of questions that SSMED seeks to answer.

Science

(improve understanding, map natural history, validate mechanisms, make predictions).

What are service system entities, how have they naturally evolved to present, and how might they evolve in the future? What can we know about their interactions, how the interactions are shaped (value propositions, governance mechanisms), and the possible outcomes of those interactions both short-term and long-term?

Management

(improve capabilities, define progress measures, optimize investment strategy).

How should one invest to create, improve, and scale service system networks? How do the four measures of quality, productivity, compliance, and sustainable innovation relate to numerous key performance indicators (KPIs) of business and societal systems? Is there a “Moore’s Law” of service system investment? Can doubling information lead to a doubling of capabilities (performance) on a predictable basis?

Engineering

(improve control, optimize resources).

How can the performance of service system entities and scaling of service system networks be improved by the invention of new technologies (and environmental infrastructures) or the reconfiguration of existing ones? What is required to develop a CAD (Computer-Aided Design) tool for service system entity and service system network design?

Design

(improve experience, explore possibilities).

How can one best improve the experience of people in service system entities and networks? How can the experience of service system creation, improvement, and scaling be enhanced by better design? Can the space of possible value propositions and governance mechanisms be explored systematically?

Sciences of the artificial. Sciences of the artificial are different from natural sciences, and so it becomes especially important to consider these four parts – science, management, engineering, and design – as important knowledge components. In “The Sciences of the Artificial” (Simon 1996), Simon reflects “The world we live in today is much more man-made, or artificial, world than it is a natural world....”

Service Science, Management, Engineering, and Design (SSMED) is emerging as one of the sciences of the artificial. Service science is knowledge about service system entities, value-proposition-based interactions (or value-cocreation mechanisms), governance mechanisms, and the other seven basic concepts. Following Simon even further, one could argue that service system entities are physical symbol systems, dealing with symbols that are named resources, and grounded in physical routines for carrying out the symbolic manipulations related to named resources.

Source: Jim Spohrer and Stephen K. Kwan. 2009. “Service Science, Management, Engineering, and Design (SSMED): An Emerging Discipline - Outline & References.” *International Journal of Information Systems in the Service Sector* 1 (3): 1–31. doi:10.4018/jisss.2009070101 .

Key concepts of value cocreation can be expressed through intentional (iStar) modeling constructs

Key service system concepts

*i** constructs

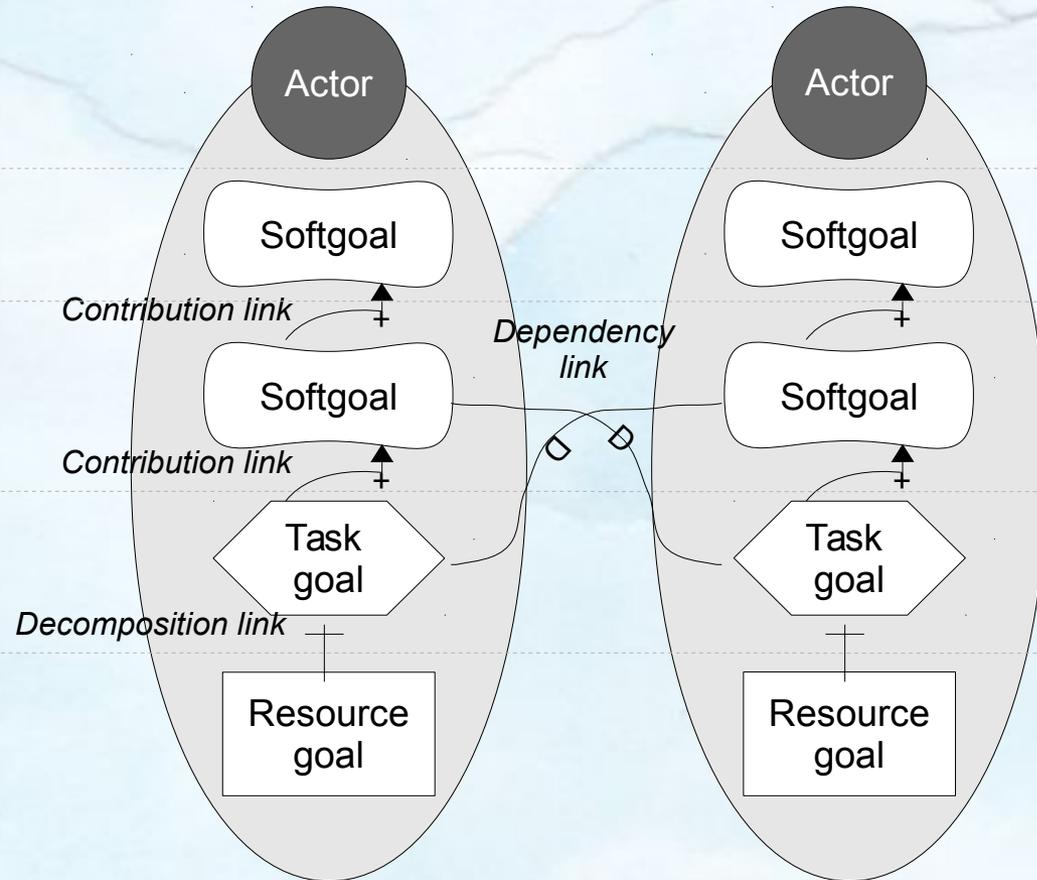
Service system entity

High-level interests

Expected benefits

Value propositions

Resources



Source: Lysanne Lessard and Eric Yu. 2013. "Service Systems Design: An Intentional Agent Perspective." *Human Factors and Ergonomics in Manufacturing & Service Industries* 23 (1): 68–75. doi:10.1002/hfm.20513.

Agenda

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→ Ap. Orientation

A.1 Systems thinking

A.2 SSMED

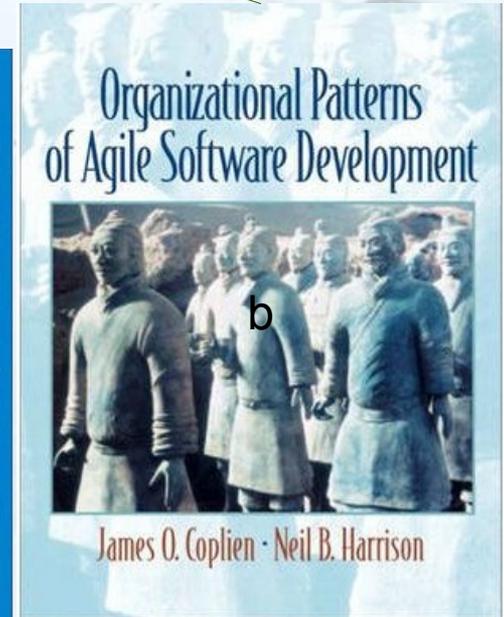
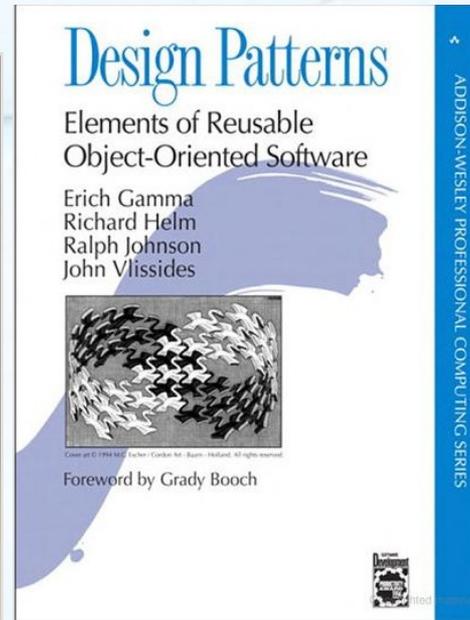
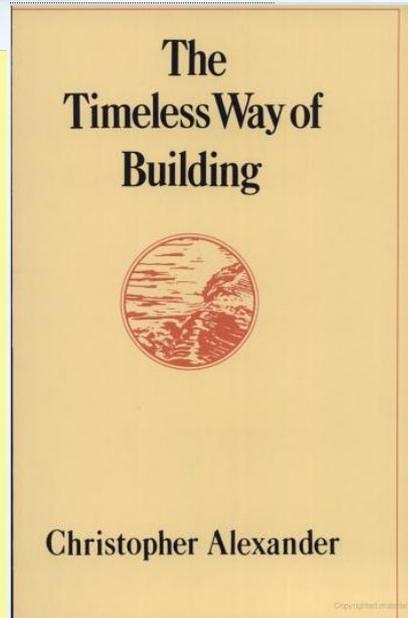
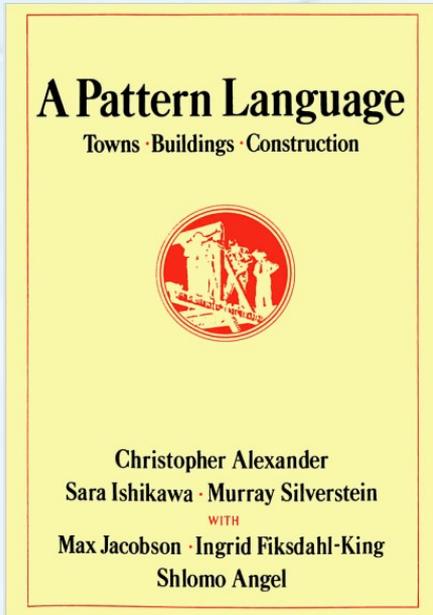
(Service Science, Management, Engineering and Design)

A.3 Generative Pattern Language ←

A.4 Multiple Perspectives
Open Collaboration

An evolution of pattern languages across domains

2005 <http://books.google.com/books?id=6K5QAAAAMAAJ> ;
<http://orgpatterns.wikispaces.com/>



1994 <http://books.google.com/books?id=6oHuKQe3TjQC>

1979 <http://books.google.com/books?id=H6CE9hIbO8sC>

1977 <http://books.google.com/books?id=hwAHmktpk5IC>
; <http://www.patternlanguage.com/>

Patterns and Pattern Languages are ways to describe best practices, good designs, and capture experience in a way that it is possible for others to reuse this experience^[1]

Pattern

Name:

(Use italics for pattern names per Meszaros).

Aliases:

(Aliases, or none)

Problem

Give a statement of the problem that this pattern resolves. The problem may be stated as a question.

Context

Describe the context of the problem.

Forces

Describe the forces influencing the problem and solution. This can be represented as a list for clarity.

- Force one
- Force two

Solution

Give a statement of the solution to the problem.

Resulting Context

Describe the context of the solution.

Rationale

Explain the rationale behind the solution.

Known Uses

List or describe places where the pattern is used.

Related Patterns

List or describe any related patterns.

Source: [1] "Patterns", The Hillside Group, <http://hillside.net/patterns> ; [2] "Writing Patterns", AG's HTML template at <http://hillside.net/index.php/ag-template> ; "Canonical Form" (for writing patterns) at <http://c2.com/cgi/wiki?CanonicalForm>

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 up by this pattern)

Source: [1] Coplien, James O., and Neil B. Harrison. 2004. Organizational Patterns of Agile Software Development. Prentice-Hall, Inc. <http://books.google.ca/books?id=6K5QAAAAMAAJ> . [2] Gerard Meszaros and Jim Doble, "A Pattern Language for Pattern Writing", Pattern Languages of Program Design (1997), <http://hillside.net/index.php/a-pattern-language-for-pattern-writing>

Writing Software Patterns

I've spent a lot of my writing energy writing patterns. From time to time I have questions about why I do that and what makes a good pattern. This is how I look at patterns with my suggestions for people who are interested in writing patterns themselves.

01 August 2006



Martin Fowler

Find similar writing

- Gang-of-Four**
(Gamma, Helm, Johnson, Vlissides 1994, Design Patterns)
- Intent
 - Motivation
 - Applicability
 - Structure
 - Participants
 - Collaborations
 - Consequences
 - Implementation
 - Sample Code
 - Known Uses
 - Related Patterns

Contents

- What is a Pattern
- Patterns versus Recipes
- Why are Patterns important?
- Important Parts of Patterns
- Patterns are Solutions
- An Evocative Name
- Why as well as how
- Code Examples
- Common Pattern Forms
- Alexandrian Form
- GOF Form
- Portland Form
- Coplien Form
- POSA Form
- P of EAA Form
- Choosing Your Pattern Form
- Common Issues
- Arranging Patterns into a Structure
- Patterns and Pattern Languages
- Granularity of Patterns
- Tasks rather than Tools
- Nothing new here

Christopher Alexander

- (1) Picture with archetypal example
- (2) Paragraph sets context with how it helps to complete larger patterns
- (3) Three diamonds (start of problem)
- (4) Headline essence of problem (bold type)
- (5) Body of problem, empirical background
- (6) Solution instructions (bold type) describing field of physical and social relations
- (7) Diagram
- (8) Three diamonds (main body finished)
- (9) Paragraph that ties pattern to smaller patterns

Portland

- (C2 wiki, short)
- Problem
 - ... therefore ...
 - Solution

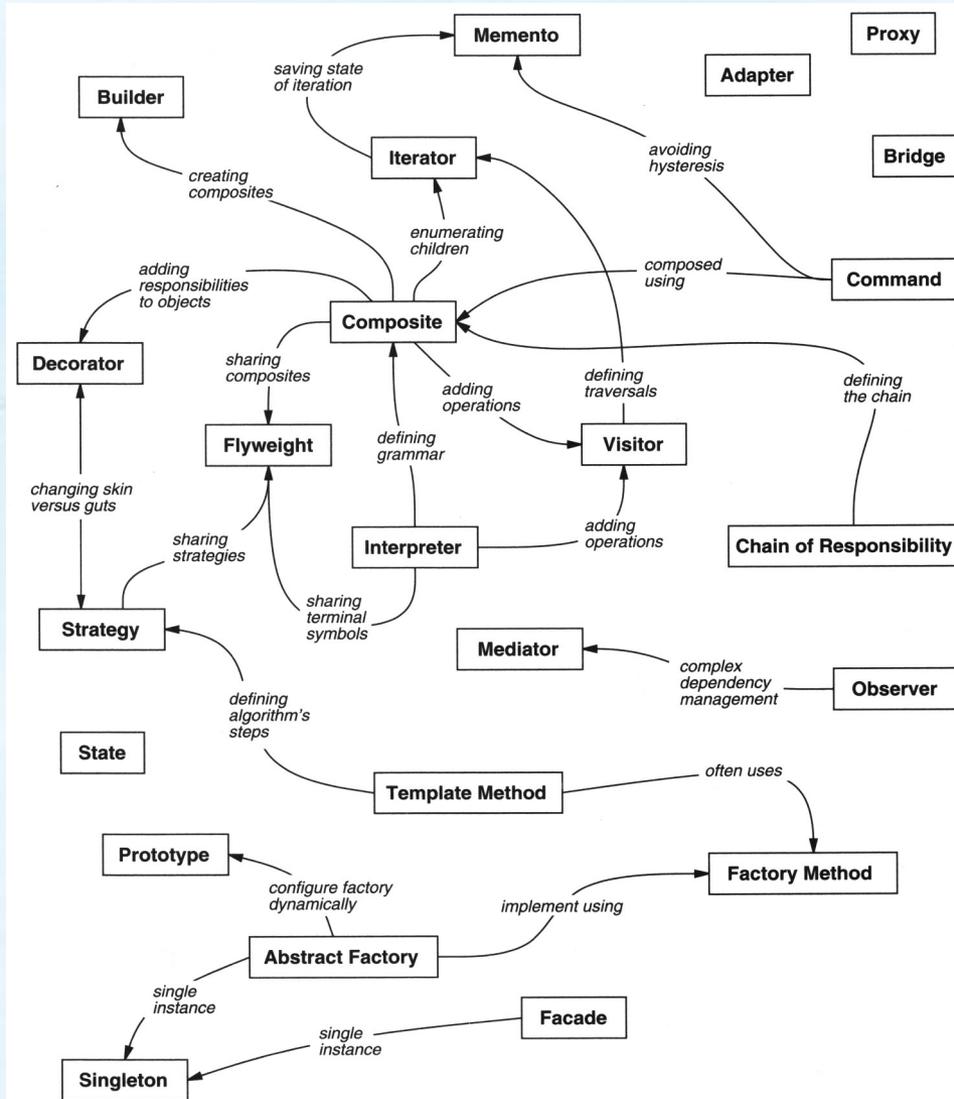
Pattern-Oriented Software Architecture

- Summary
- Example
- Context
- Problem
- Solution
- Structure
- Dynamics
- Implementation
- Example resolved
- Variants
- Known uses
- Consequences
- See also

Patterns of Enterprise Application Architecture

- How it works
- When to use it
- Examples

Design Patterns (Catalog)



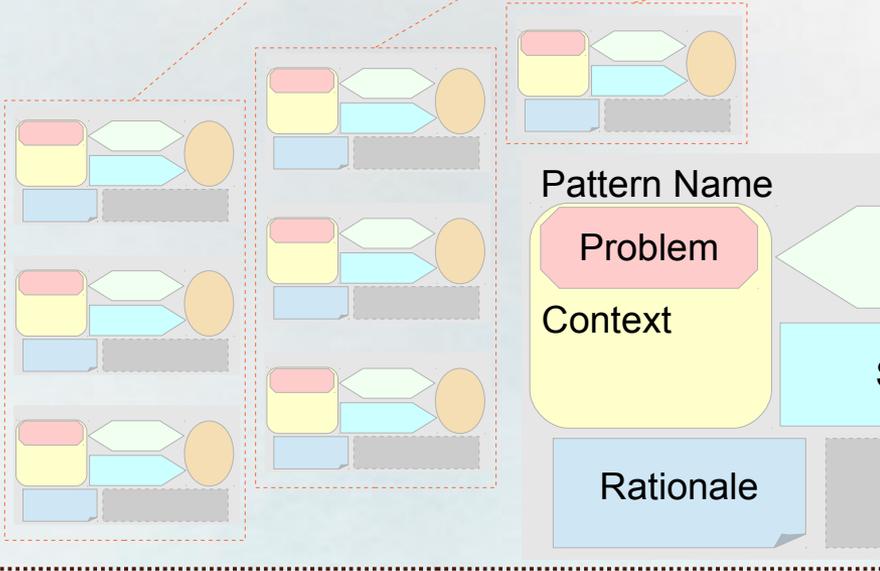
Source: Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides. 1995. *Design Patterns: Elements of Reusable Object-Oriented Software*. <http://books.google.ca/books?id=6oHuKQe3TjQC> .

Purpose	Design Pattern	Aspects That Can Vary	
Creational	Abstract Factory	families of product objects	
	Builder	how a composite object gets created	
	Factory Method	subclass of object that is instantiated	
	Prototype	class of object that is instantiated	
	Singleton	the sole instance of a class	
Structural	Adapter	interface to an object	
	Bridge	implementation of an object	
	Composite	structure and composition of an object	
	Decorator	responsibilities of an object without subclassing	
	Facade	interface to a subsystem	
	Flyweight	storage cost of objects	
	Proxy	how an object is accessed; its location	
	Behavioral	Chain of Responsibility	object that can fulfill a request
		Command	when and how a request is fulfilled
		Interpreter	grammar and interpretation of a language
Iterator		how an aggregate's elements are accessed, traversed	
Mediator		how and which objects interact with each other	
Memento		what private information is stored outside an object, and when	
Observer		number of objects that depend on another object; how the dependent objects stay up to date	
State		states of an object	
Strategy		an algorithm	
Template Method		steps of an algorithm	
Visitor	operations that can be applied to object(s) without changing their class(es)		

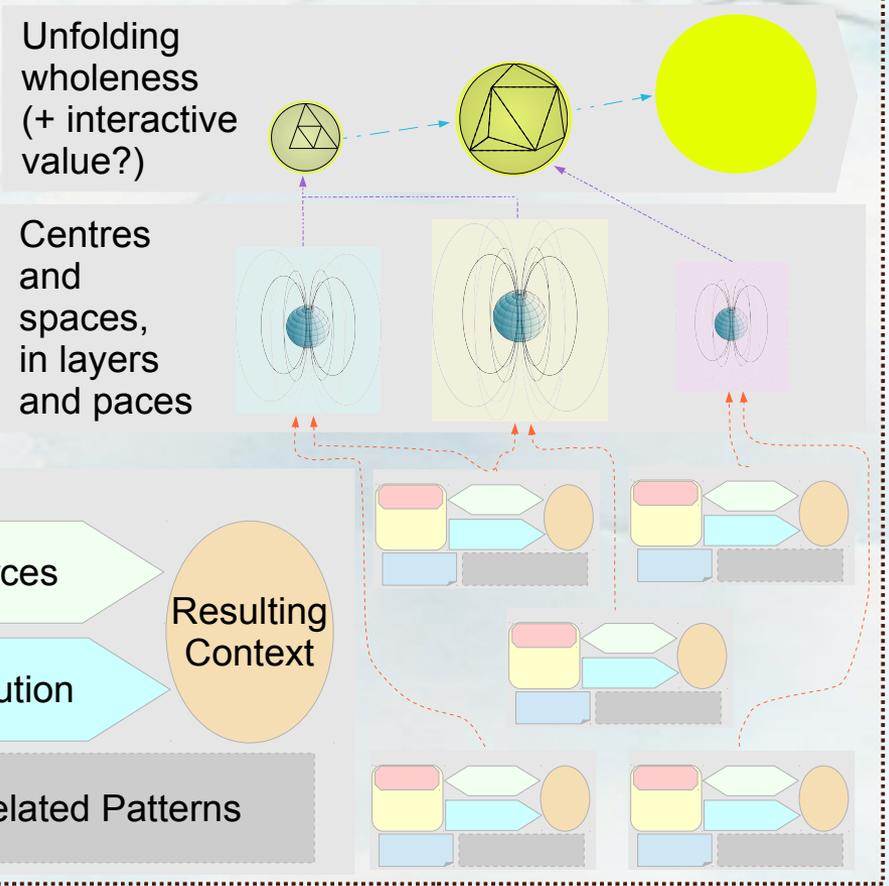
To appreciate service systems, can we aspire beyond a (Design) Pattern Catalog to a Generative Pattern Language?

(Design) Pattern Catalog

SCOPE	PURPOSE		
	Creational	Structural	Behavioral
Class	Factory Method	Adapter	Interpreter Template Method
Object	Abstract Factory Builder Prototype Singleton	Factory Method Bridge Composite ...	Chain of Responsibility Command Iterator ...



Generative Pattern Language



The Hillside Group – Design Patterns



Site Search
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- Patterns**
- Vision
- Wiki

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- Writing
- Tools
- Links

You are here: [Home](#) > [Patterns](#)

DESIGN PATTERNS LIBRARY

Welcome to the patterns home page. It is a source for information about all aspects of software [patterns](#) and [pattern languages](#). If you are new to patterns, James Coplien and Richard Gabriel have created a succinct [pattern definition](#).

Patterns and Pattern Languages are ways to describe best practices, good designs, and capture experience in a way that it is possible for others to reuse this experience. The Hillside Group takes pleasure in sponsoring many different [PLoP conferences](#) that are provided for the betterment of the pattern community.

Fundamental to any science or engineering discipline is a common vocabulary for expressing its concepts, and a language for relating them together. The goal of patterns within the software community is to create a body of literature to help software developers resolve recurring problems encountered throughout all of software development. Patterns help create a shared language for communicating insight and experience about these problems and their solutions. Formally codifying these solutions and their relationships lets us successfully capture the body of knowledge which defines our understanding of good architectures that meet the needs of their users. Forming a common pattern language for conveying the structures and mechanisms of our architectures allows us to intelligibly reason about them. The primary focus is not so much on technology as it is on creating a culture to document and support sound engineering architecture and design.



Generative Pattern Language

While the label "pattern language" has been appropriated for a variety of contexts, the label of "generative pattern language" can be used for the "purer" thinking originating from the Center for Environmental Structure at U.C. Berkeley.

Christopher Alexander and his colleagues have a significant body of artifacts since the formation of the CES in 1967.

Pattern Manual (1967) is a charter for the CES.

A Pattern Language Which Generates Multi-Service Centers (1968) demonstrates how a pattern language could become instantiated differently for a variety of sites and circumstances.

"*Systems Generating Systems (1968)*" articulates the ties between a pattern language and systems thinking.

The Battle for Life and Beauty of the Earth (2012) is a history of a development project for the Eishin campus in Japan, demonstrating the CES vision from start to finish.

The variety of [Current Applications of Pattern Languages](#) often don't reflect the full vision of

Current Applications of Pattern Languages

[Global Village Constructor Set Pattern Language for Open Source Ecology](#)

[Group Pattern Language at the Group Works Project](#)

[Liberating Voices Pattern Language for the Public Sphere Project](#)

[Patterns in Federated Wiki by Michael Mehaffy](#)

[Scrum \(Organizational\) Patterns by the Scrum Patterns Community](#)

[Transition as a Pattern Language in the Transition Movement](#)

In addition, there are some communities exploring Federated Wiki.

[The Hidden History of Online Learning](#) led by [Mike Caulfield](#)



Wiki was invented to support pattern language collaborations



[Front Page](#)

This [ContentCreationWiki](#) is focused on [PeopleProjectsAndPatterns](#) in [SoftwareDevelopment](#).

The idea of a "Wiki" may seem odd at first, but dive in, explore its links and it will soon seem familiar. "Wiki" is a composition system; it's a discussion medium; it's a repository; it's a mail system; it's a tool for collaboration. We don't know quite what it is, but we do know it's a fun way to communicate asynchronously across the network.

To find a page on any specific topic, go to [FindPage](#). To see an auto-generated list of pages which have changed recently, try [RecentChanges](#). If you want a short list of randomly-selected pages, try [RandomPages](#). [CategoryCategory](#) is the top level of page categorization; you can use it to delve deeper into the site.

Edit pages by using the [EditText](#) link at the bottom of the page you wish to edit. Don't worry too much about messing up, as the original text is backed up and can be easily restored (meaning, everyone can see the changes made, and will be able to correct mistakes, erase, and so on, if necessary).

The [TextFormattingRules](#) are quite simple, and the [TipsForBeginners](#) will help you learn to apply them gracefully. You'll probably want to start by editing pages that already exist. The [WikiWikiSandbox](#) is set aside for editing practice. Go there now to try it. (Please don't edit this page; changes here will likely be reversed within a few minutes).



[Design Patterns](#)

Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice. --
[ChristopherAlexander](#)

A design pattern systematically names, motivates, and explains a general design that addresses a recurring design problem in object-oriented systems. It describes the problem, the solution, when to apply the solution, and its consequences. It also gives implementation hints and examples. The solution is a general arrangement of objects and classes that solve the problem. The solution is customized and implemented to solve the problem in a particular context. - [DesignPatternsBook](#)

Some topics that categorize [DesignPatterns](#) into the [GangOfFour](#) categories:

Given that patterns could be applied to many different disciplines, I would suggest that we talk about [SoftwareDesignPatterns](#), to differentiate from [ArchitecturalDesignPatterns](#) or other kinds. Then the question is, are there any design patterns that work across specific disciplines? I doubt it, although there may be some "meta" patterns...

Why it is easier to find an [AntiPattern](#) than a [DesignPattern](#) or an [AmeliorationPattern](#) in this Wiki?

Agenda

1. What could Service Systems Thinking be?

2. The practices of Christopher Alexander

3. Extending to service systems?

4. An invitation

→ Ap. Orientation

A.1 Systems thinking

A.2 SSMED

(Service Science, Management, Engineering and Design)

A.3 Generative Pattern Language

A.4 Multiple Perspectives
Open Collaboration ←

C2 Portland Pattern Repository → Hillside Group

c2.com/ppr/ ☆ portlar hillside.net/patterns/



Portland Pattern Repository

We're writing about computer programs in a new stylistic form called [pattern languages](#). The form has many internal references which map well to hypertext links. We've added links to published (or soon to be published) documents. Short summaries appear in the...

- [Pattern Language Catalog](#)

We've also created a space for exploring the not-quite-yet patterns we all carry around in our heads...

- [People, Projects & Patterns](#)

The Hillside Group's [Patterns Home Page](#) lists other pattern resources including papers, books, conferences.

New [survey results](#) are in. This form tallies survey responses as they are made. Have a look to see what people like about



THE HILLSIDE GROUP

Hilltop Books Contact Conferences **Patterns** Vision Wiki

MAIN MENU

- ▶ Hilltop
- ▶ Books
- ▶ Contact
- ▶ Conferences
- ▶ **Patterns**

- Books
- Patterns Catalog
- About Patterns
- TPLoP
- Education
- Mailing Lists
- Writing
- Tools
- Links

- ▶ Vision

Home You are here: Home Patterns

DESIGN PATTERNS LIBRARY

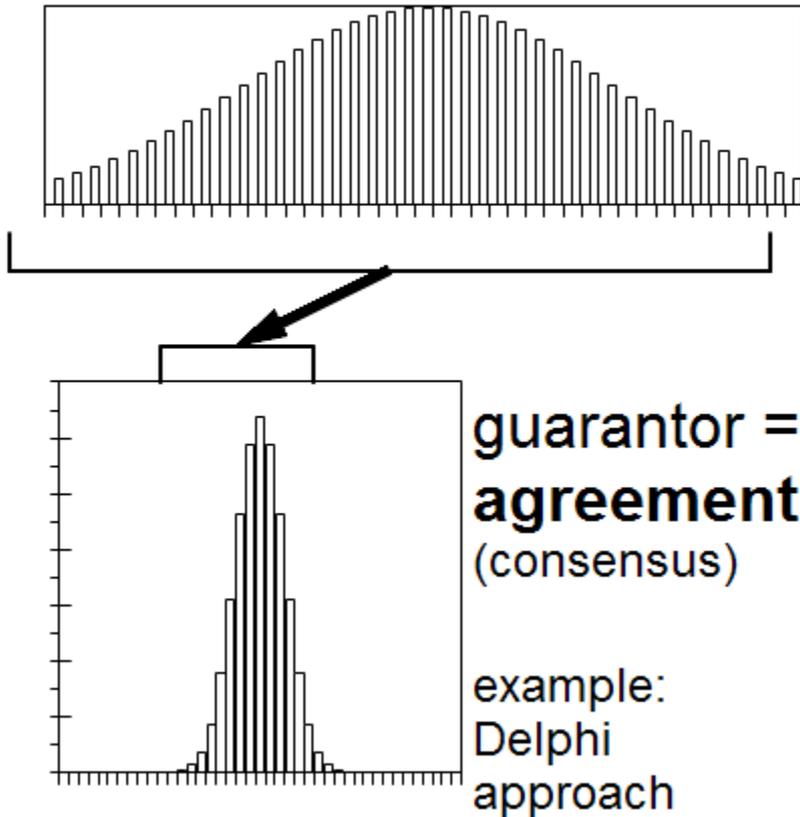
Welcome to the patterns home page. It is a source for information [languages](#). If you are new to patterns, James Coplien and Richard

Patterns and Pattern Languages are ways to describe best practice designs, and capture experience in a way that it is possible for others to share this experience. The Hillside Group takes pleasure in sponsoring [PLoP conferences](#) that are provided for the betterment of the pattern community.

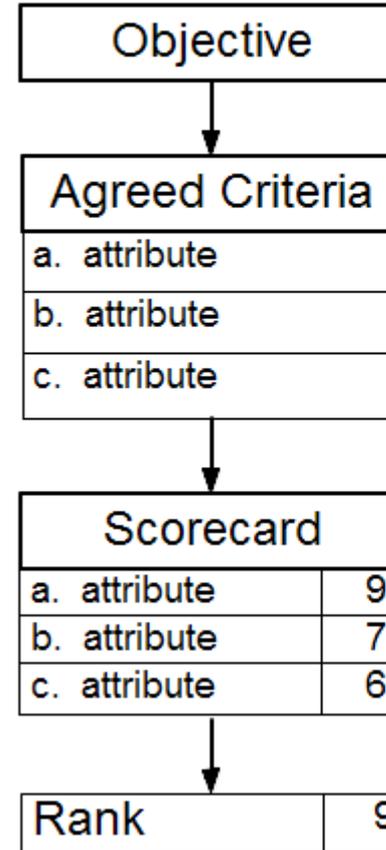
Fundamental to any science or engineering discipline is a common vocabulary for expressing its concepts, a shared language. The goal of patterns within the software community is to help software developers resolve recurring problems in software development. Patterns help create a shared language. The experience about these problems and their solutions, and the relationships that let us successfully capture the understanding of good architectures that meet the needs of the pattern language for conveying the structures and relationships, let us intelligibly reason about them. The primary focus is on creating a culture to document and support software development.

Design of inquiring systems: Ways of knowing (1, 2)

The first way of knowing Inductive-Consensual IS



The second way of knowing Analytic-Deductive IS

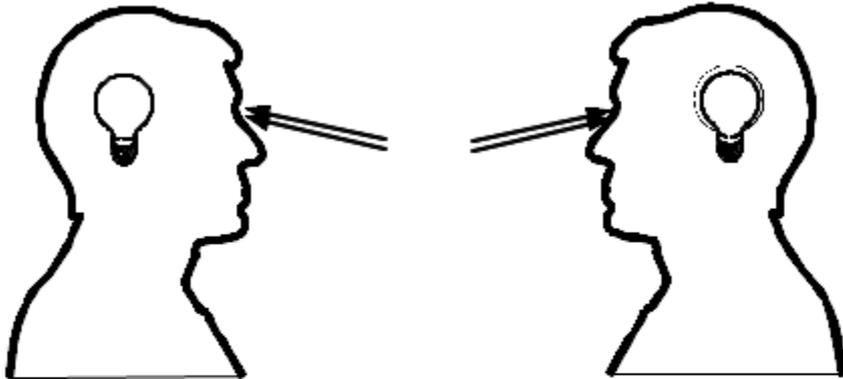


guarantor =
logical consistency
(fact nets)

example: finding
the "best man"
for the job

Design of inquiring systems: Ways of knowing (3, 4)

The third way of knowing Multiple Realities IS

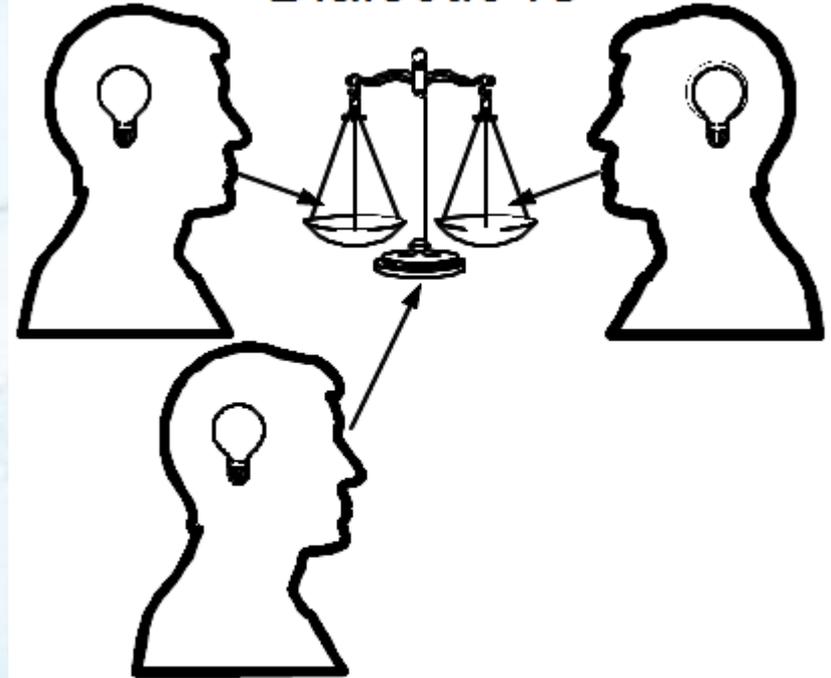


model + data as inseparable whole
For human beings to have experience or gain knowledge about the external world, something must be built into the internal structure of their minds ...

guarantor = (ability to see)
range of views (representations)

example: disciplinary views of the causes of the drug problem

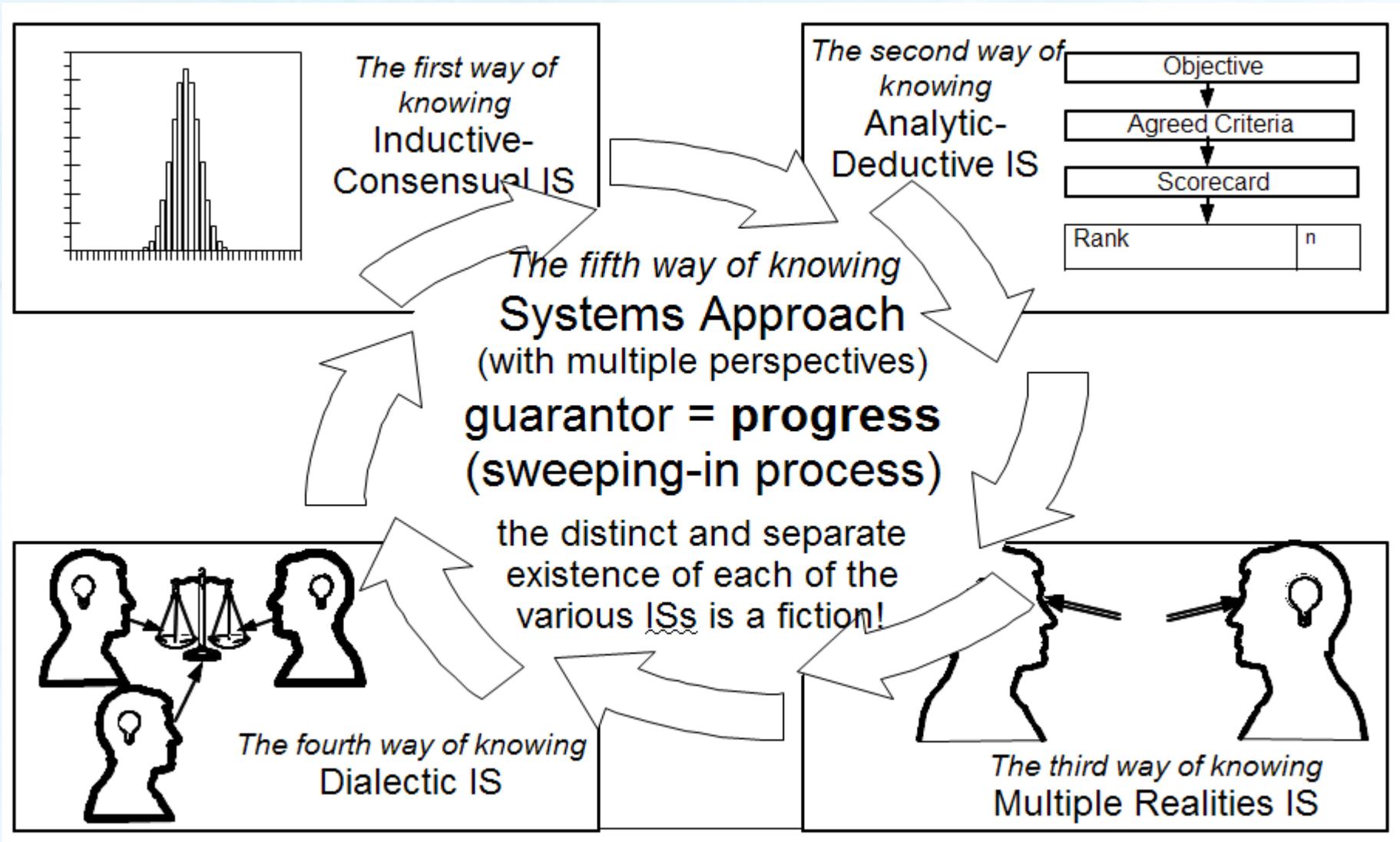
The fourth way of knowing Dialectic IS



guarantor = conflict

example: challenging assumptions of what skid row housing should be

Design of inquiring systems: Ways of knowing (5)



Source: Ian I. Mitroff, and Harold A. Linstone. 1993. *The Unbounded Mind: Breaking the Chains of Traditional Business Thinking*. Oxford U Press.

■ Conversations for Possibilities on Service Systems Thinking

With Service Systems Thinking at its inception, community participants can discuss potential futures for their collaborations.

For [Multiple Perspectives Open Collaboration](#),

1. We could have [Federated Authored Content](#) on open source platforms.

For [Generative Pattern Language](#),

2. We could be reoriented for [Unfolding Wholeness, Layering Systems of Centers and/with Creating Interactive Value](#).

For [Service Science, Management, Engineering and Design](#),

3. We could have [Transdisciplinary Cooperation on Service Systems Improvement](#).

For [Systems Thinking](#),

4. We could have service systems [Evolving from the Systems Thinking Tradition](#).

■ Federated Authored Content

The [Smallest Federated Wiki](#) technology enables authors to easily:

- (i) reference the work from other authors (with a [Page Drag Link](#) ↗);
- (ii) curate a neighborhood (see [Search Neighborhood Curation](#) ↗);and
- (iii) amend content on a personal version in the federation (see [Journal Fork Cache](#) ↗).

Each author has or her own wiki site in the federation. The [Wiki OpenShift Quickstart](#) outlines (i) an easy installation procedure on the rhcloud.com domain; or (ii) a slightly more complicated procedure for authors who have registered their own web domains.

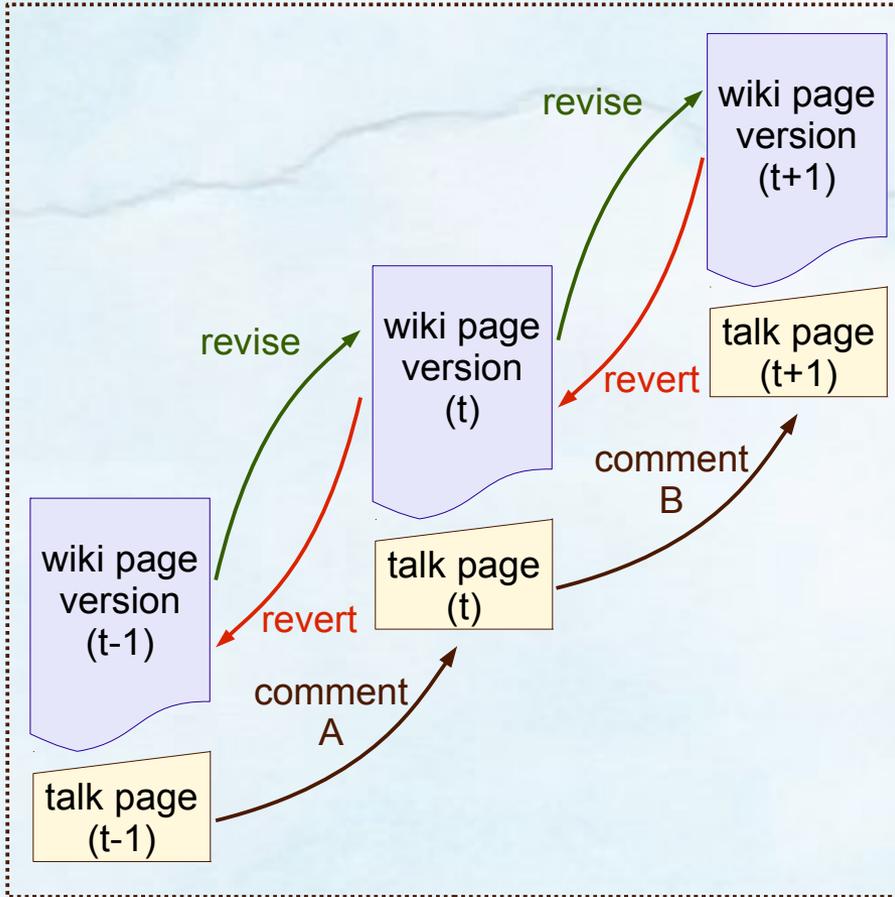
Authors may first want to experiment with [How to Wiki on a Sandbox](#) ↗ (that periodically gets restored to its original state).

As an alternative to reading, [Federated Wiki Videos](#) ↗ show the technology in use.

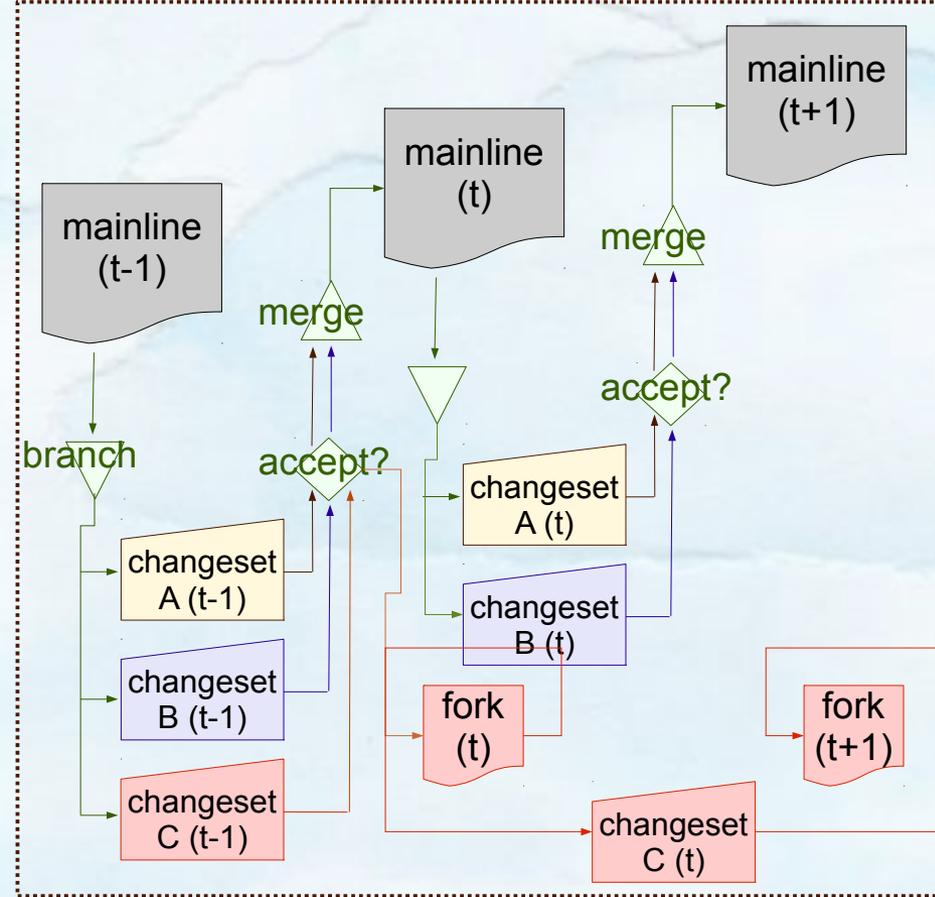
The open source community around Smallest Federated Wiki is relatively small. Contributing questions and sharing with others is managed through [an issues list on Github](#) ↗.

Inductive-consensual Wiki revise-revert cycles become Federated Wiki perspectives, branch-merge or fork

Wiki as Inductive-Consensual



(Federated) Wiki as Multiple Perspectives



Source: Mitroff, Ian I., and Richard O. Mason. 1982. "Business Policy and Metaphysics: Some Philosophical Considerations." *The Academy of Management Review* 7 (3) (July 1): 361–371. doi:10.2307/257328. <http://www.jstor.org/stable/257328>.



newer, older

Welcome Visitors

Welcome to the [Smallest Federated Wiki](#). This page was first drafted Sunday, June 26th, 2011. The pages on this particular site have been edited to describe how to get things done on many of the federated sites.

Featured Sites

[sites.fed.wiki.org](#)

A catalog of federated wiki sites with domain names for page titles and brief descriptions tuned to look good in search results. Know your federation.

Topic Based Subsets

We pick topics that have been of lasting interest and subset them into their own federated wiki sites. We've built this feature into c2 wiki's [Subset Wiki](#) bridge and only use it here. [github](#)

Learn More

Read a little bit of [How To Wiki](#). Then move on to our [Sandbox](#) and give your new knowledge a workout. Still confused? Look for answers in our [Frequently Asked Questions](#), updates in [Recent Changes](#).

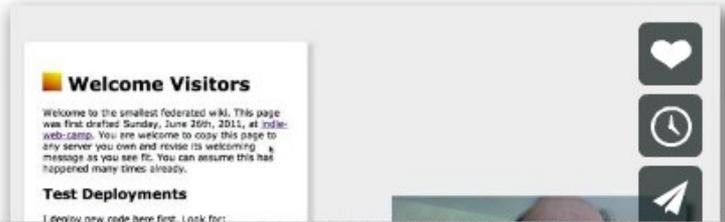
		+			+			+			+			↑
+		↑	+		↑			+	↓			+		
x	x	x	x	x	x	x		+	+	+	+		+	

Smallest Federated Wiki

Our new wiki innovates three ways. It shares through federation, composes by refactoring and wraps data with visualization. Follow our open development on GitHub or just watch our work in progress videos here.

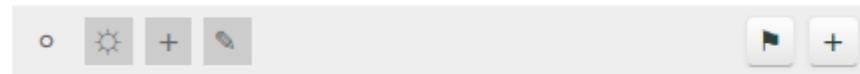


We introduce the parts of a Federated Wiki page. The "story" is a collection of paragraphs and paragraph like items. The "journal" collects story edits. Should you take my page and edit it as yours, I can see what you've done and may decide to take your edits as my own.



Transdisciplinary Cooperation on Service Systems Improvement

While we are having conversations for possibilities, initial engagement has been to [Seek Concurrence Across Professional Communities](#)



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Seek Concurrence Across Professional Communities

Preliminary interest in Service Systems Thinking has been expressed by leaders of associated organization, in conference presentations.

[INCOSE Systems Sciences Working Group](#) 
(International Council on Systems Engineering)

[ISSIP](#)  (International Society of Service Innovation Professionals)

- [2nd International Conference on The Human Side of Service Engineering, July 2014](#) , Krakow, Poland

[ISSS](#)  (International Society for the Systems Sciences)

- [58th Meeting of the International Society for the Systems Sciences, July 2014](#) , Washington, DC

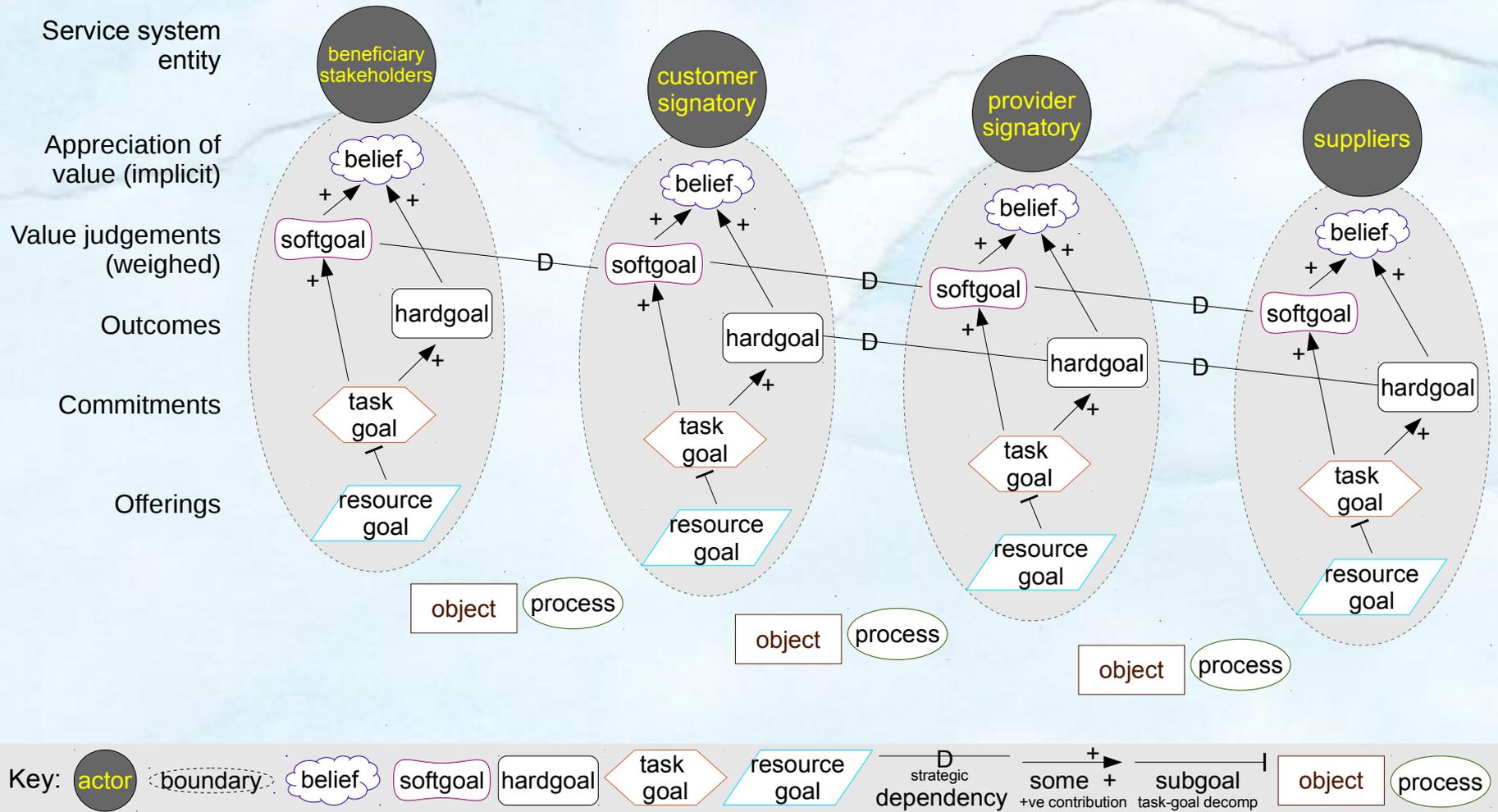
[The Hillside Group](#) 

- [21st Conference on Pattern Languages of Programs, September 2014](#) , Allerton Park, Monticello, IL

[Systemic Design Research Network](#) 

- [Relating Systems Thinking and Design 3 Symposium, October 2014](#) , Oslo, Norway

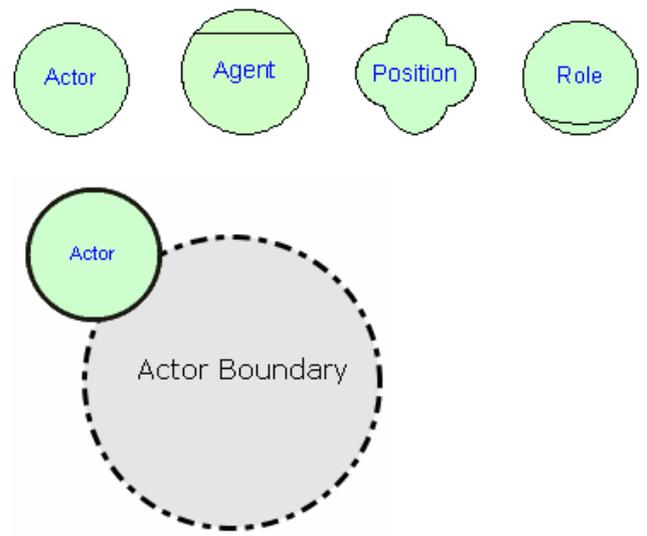
Could we model value constellation ontology synthesizing iStar and OPM representations?



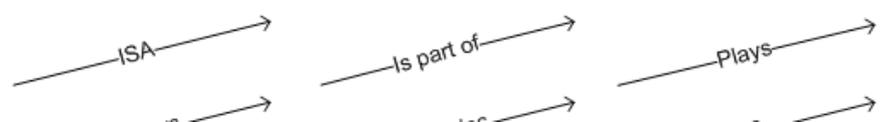
2. Basic i* Notation

This section provides only the graphical notation of i* syntax. An explanation of each notation can be found in the i* Glossary Section. Note that as i* models can be created by a variety of software tools, there can be small variations in notation appearance, mainly pertaining to color and line size.

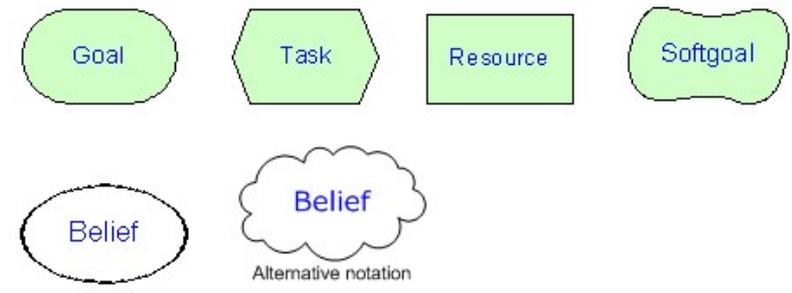
2.1 Actors



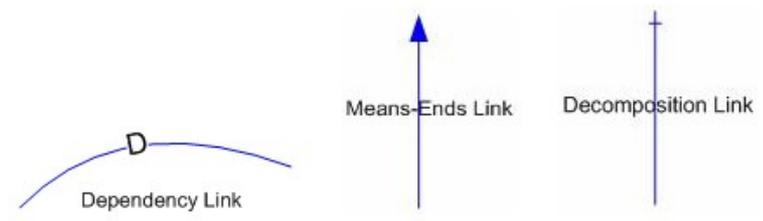
2.2 Actor Associations



2.3 Elements



2.4 Links



2.5 Contribution Links





ENTERPRISE SYSTEMS MODELING LABORATORY

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- Projects
- Publications
- OPM
- Conferences
- People
- Gallery

OPM

ESML Events

August 2014

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					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Links

[MIT SDM Webinar presentation, 2014](#)

[MIT SDM Webinar recording, 2014](#)

[OPCAT Download](#)



[Faculty of Industrial Engineering and Management](#)

[Lab Head - Prof. Dov Dori](#)

[OPCAT - OPM's support software](#)

system design and management

The Maturation of Model-Based Systems Engineering: OPM as the ISO Conceptual Modeling Language Standard



Dov Dori

Massachusetts Institute of Technology
Technion, Israel Institute of Technology

SDM Webinar

June 2, 2014

Object-Process Methodology (OPM)

Things: **Objects** and **Processes**



Object

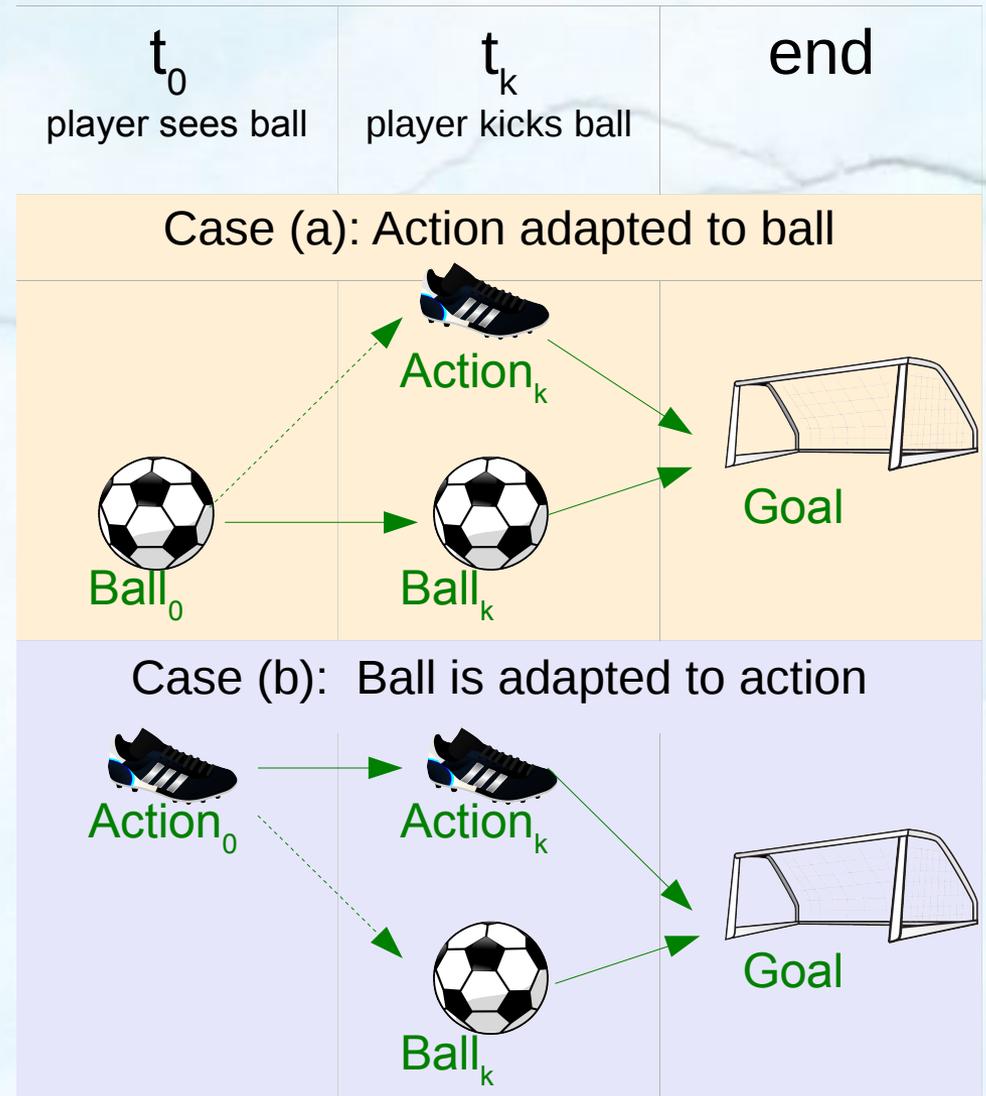
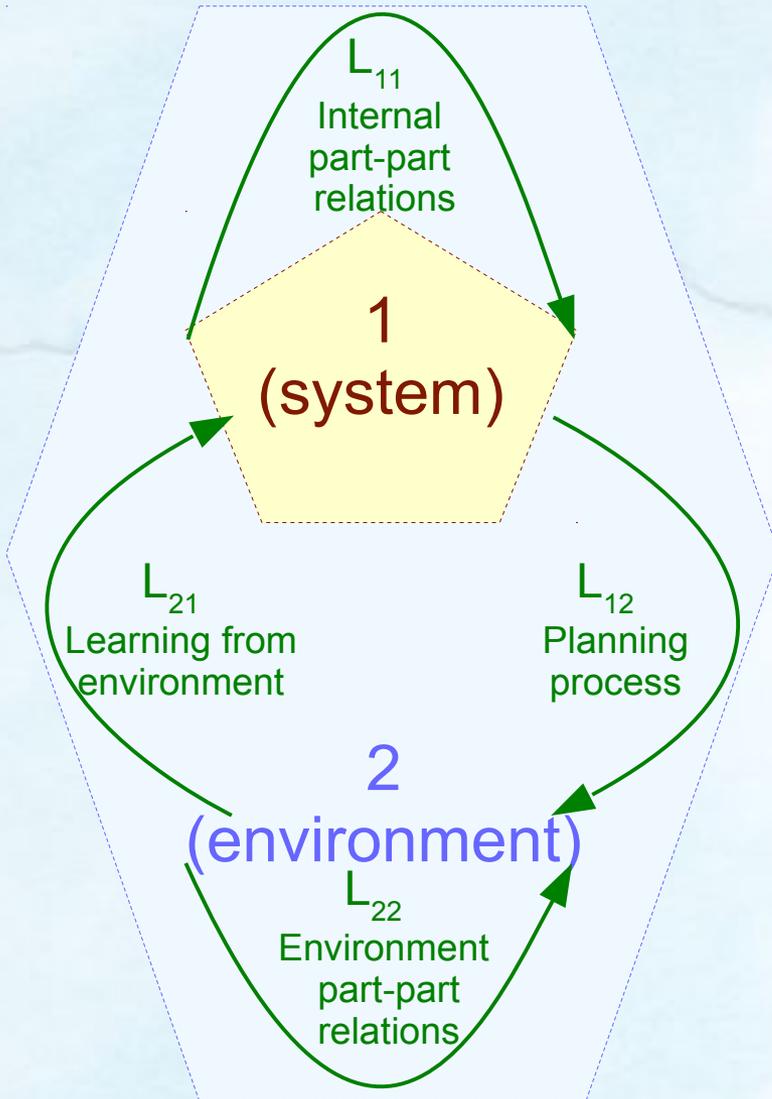
A thing that exists or might exist physically or informatically



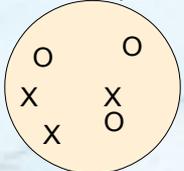
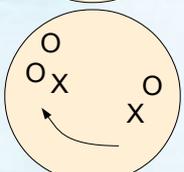
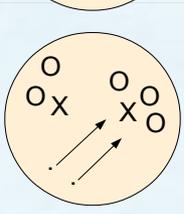
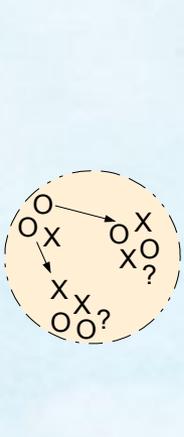
Process

A thing that transforms one or more objects

Open systems (Emery and Trist), directive correlation (Sommerhoff)



The Causal Texture of Social Environments – Extended fields of directive correlations (Emery and Trist)

Where O = goals (goodies), X = noxiants (baddes)		Elements to know	Ideals	Forms of learning	Forms of planning
<p>Type 1. Random Placid</p> 	<p>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.</p>	system	Homonomy – sense of belonging	conditioning	tactics
<p>Type 2. Clustered Placid</p> 	<p>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".</p>	system, action	Nurturance – caring for	meaningful	tactics / strategies
<p>Type 3. Disturbed Reactive</p> 	<p>Type 2 with two or more systems of one kind <i>competing</i> 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 instruments 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 – strategy becomes a power game.</p>	system, action, learning	Humanity – in broadest sense	problem solving	tactics / operational strategies
<p>Type 4. Turbulent</p> 	<p>Dynamic, not placid/stable. Planned change in type 3 triggers off unexpected social processes. Dynamism arises from the field itself, creating unpredictability and increasing <i>relevant uncertainty</i> and <i>its continuities</i>. Linear planning impossible, e.g. whaling disrupted reproduction, people react to being treated as parts of machine. Birth of open systems thinking, ecology, and catastrophe theory.</p>	system, action, learning, environment	Beauty – includes fitting together naturally	puzzle- solving	active adaptive planning

Social Systems Fields as three perspectives: socio-psychological, socio-technical, socio-ecological

[... the] socio-psychological, the socio-technical and the socio-ecological perspectives ... emerged from each other in relation to changes taking place in the wider social environment. One could not have been forecast from the others. Though interdependent, each has its own focus. Many of the more complex projects require all three perspectives. [Trist & Murray 1997, p. 30]

Socio-psychological

... in Institute projects, the psychological forces are directed towards the social field, whereas in the the Clinic, it is the other way around [with social forces directed toward the psychological field].

[Trist & Murray 1997, p. 31]

Social-technical

... the best match between the social and technical systems of an organization, since called the principle of joint optimization

... the second design principle, the redundancy of functions, as contrasted with the redundancy of parts.

[Trist & Murray 1997, p. 32]

Socio-ecological

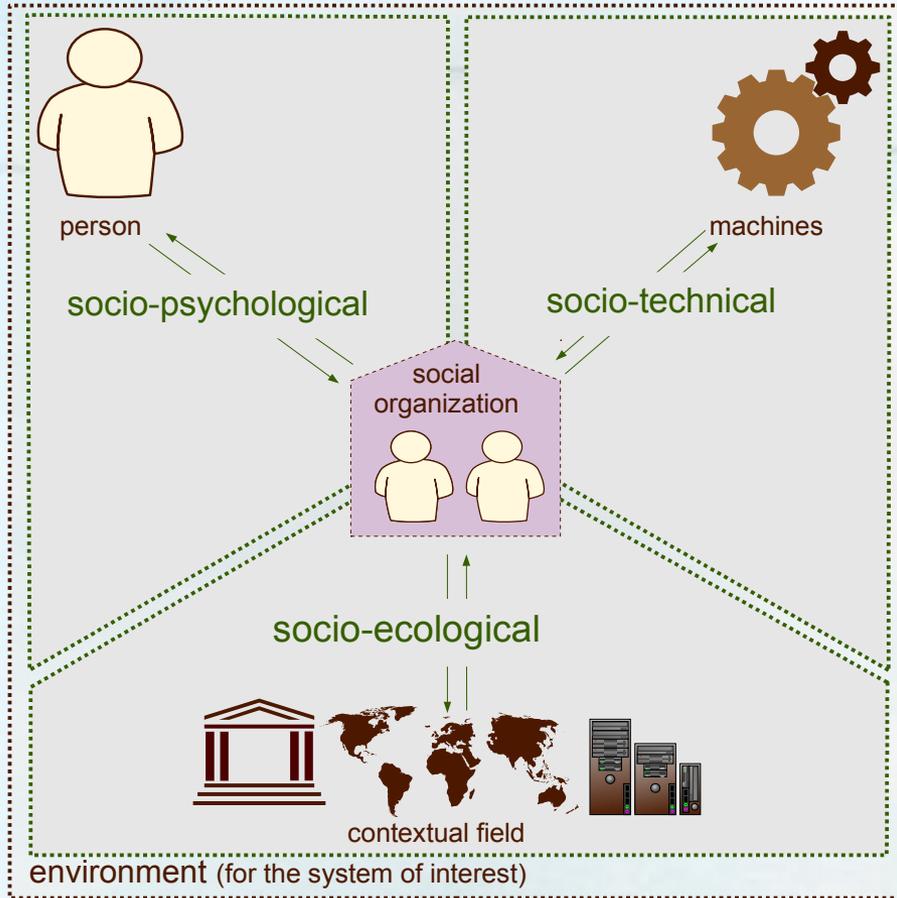
... the context of the increasing levels of interdependence, complexity and uncertainty that characterize societies a the present time.

... new problems related to emergent values such as cooperation and nurturance.

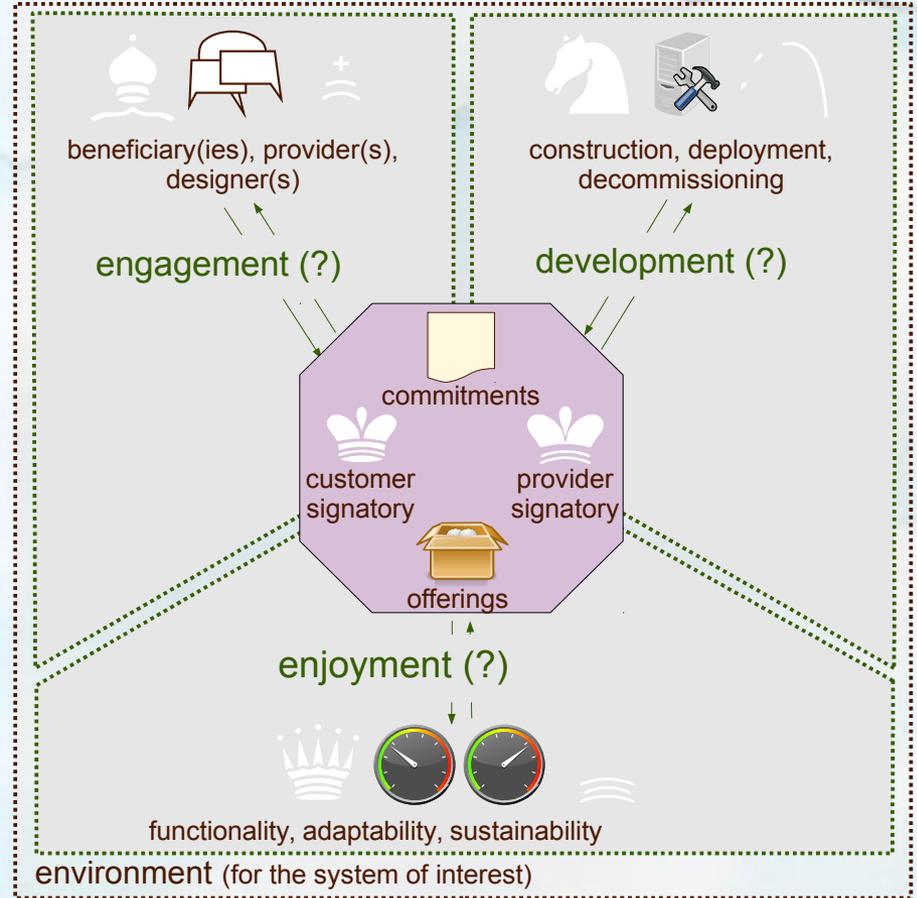
[Trist & Murray 1997, p. 33]

Can we build on Social Systems Science towards a new Service Systems Science?

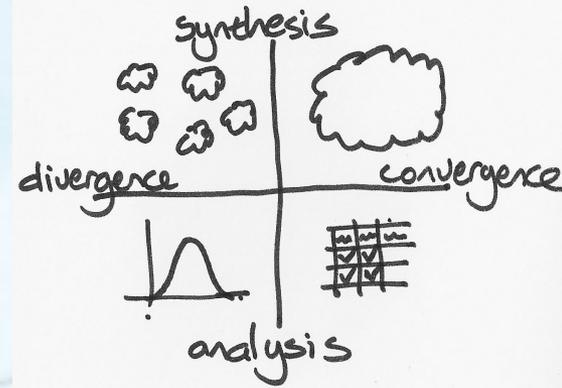
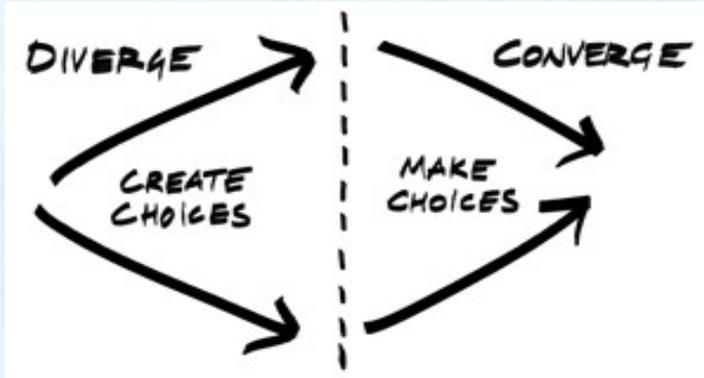
Social Systems Science Perspectives



Service Systems Science Perspectives (?)



Design Thinking: Divergent-Convergent, Synthesis-Analysis



Design thinking is different and therefore it feels different.

Firstly it is not only convergent. It is a series of divergent and convergent steps. **During divergence we are creating choices and during convergence we are making choices.**

For people who are looking to have a good sense of the answer, or at least a previous example of one, before they start divergence is frustrating. It almost feels like you are going backwards and getting further away from the answer but this is the essence of creativity. Divergence needs to feel optimistic, exploratory and experimental but it often feels foggy to people who are more used to operating on a plan. Divergence has to be supported by the culture.

The second difference is that design thinking relies on **an interplay between analysis and synthesis, breaking problems apart and putting ideas together.** Synthesis is hard because we are trying to put things together which are often in tension. Less expensive, higher quality for instance. [...]

Designers have evolved visual ways to synthesize ideas and this is another one of the obstacles for those new to design thinking; a discomfort with visual thinking. A sketch of a new product is a piece of synthesis. So is a scenario that tells a story about an experience. A framework is a tool for synthesis and design thinkers create visual frameworks that in themselves describe spaces for further creative thinking.

Source: Tim Brown "What does design thinking feel like?" *Design Thinking* (blog), Sept. 7, 2008 at <http://designthinking.ideo.com/?p=51> ; "Why Social Innovators Need Design Thinking", *Stanford Social Innovation Review*, Nov. 15, 2011 at http://www.ssireview.org/blog/entry/why_social_innovators_need_design_thinking .

Agenda

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