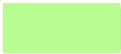


Types of Systemic Relations

Birger Sevaldson 2011

SYSTEMS THAT ARE DEPICTED WITH NODES AND CONNECTORS

STRUCTURAL RELATIONS, HIERARCHICAL SUPRA AND SUB SYSTEMS (GREENS)



Structural relations (Functional relations)

Very often systems are described as the assembly of parts where the sum is more than its parts. This is not a cause effect relationship but structural relationship.

Example: there is not a causal relationship between the wheels and the frames of a bicycle in the sense that e.g the frame decreases if the wheels increase. They are assembled in a structure where they generate together a surplus output. The whole is more than the sum of the parts.

Example: The relation in the air traffic system between the planes and the control system. The amount of plains do not automatically decrease if the control system is reduced. It only happens through institutional regulations.



Macro systemic relations:

Relations that are caused by the entities being subsystems in the same "supra-system" but without necessarily being inn direct contact with each other.

Example: Bikes and cars are related because they are sharing the same macro system: the roads. (They are related in additional ways than this)

Examples: The winter coat and the bikini are both part of the clothing wardrobe of the same person.



Micro systemic relations:

Systems that are related because they share a relation through a sub system:

Example: The rubber in the tires of the cars and the bikes come from the same producer.

Example: A Mixmaster and a hair dryer can share similar electronic parts from the same manufacturer.

ASSOCIATIVE SEMANTIC AND THEMATIC RELATIONS (BLUE)



Thematic relations:

Thematic relations are entities being part of the same thematic field or category. Themes are manmade sorting devices and there needs not necessarily to be e.g. a causal relation between members of a theme.

Example: the relation between Universal Design and Ergonomics

Example: Genres of music. There are many possible relations between genres of music but if we think of the relation between the music of the Australian aborigines and a symphony by Bach we can only think of very few like biological (music being programmed in our genes) and thematic relations (both being music).



Associative relations:

Metaphors and analogies: These are the types of relations that pop up in brain storms by associations.

Example: If two people are very similar to each other in their look there is an associative relation.

Example: If I say bird, you say fish....

SOCIAL RELATIONS (Yellows)



Structural social relations

Example: Family, friends etc



Institutional social relations

Example: Work, municipality, nation, culture, language etc.



Actions

Social relations created through action

Example: Sharing political interests.

HARD RELATIONS, CAUSAL RELATIONS, FLOWS ETC. (REDS)



Causal relations

Cause and effect models: The nodes depict what entities causes an effects and what entities are being affected while the relations (normally arrows) depict the effect.

Example: If the heat is turned on the kettle starts to boil

Example: If the tolls for entering the city by car increases the passengers on public transportation go up.



Flows in human systems:

These are the concrete flows of values in our society. They are driven by needs and economic forces.

Examples related to human society: Material flows, Energy flows, Information flows, Economic flows. Stock markets.

Examples: Traffic flow, crowding of people.



Flows in natural systems

These are driven by pressure differences (field conditions) and/ or by nuclear processes. On the high level these might be understood as causal relations, but on a detailed level they need to be understood as differentiations in uniform fields, like e.g. flows in water. They are caused by heat impact causing internal differentiation of pressure, but the shapes of the flows themselves are generated by internal chaotic principles resisting simple cause effect analyses.

Examples related to natural phenomena: water, air, magma, cosmic particle flows etc.

Variables, stocks and flows

This is the normal way of describing systems in Systems Dynamics. Variables are nodes that might change under the influence of other nodes. Flows are the flows of the content of the nodes from one to the other or the influence from one node to the other. Stocks are the storing capacity of the nodes.

Example: Classic example is a bath tub: if the inflow is bigger than the flow out of the drain the bathtub will be filled and flooded. If the flow out of the tub is bigger the tub will eventually be empty.

Example: The amount of predators and prey will influence each other. If the amount (stock) of rabbits is increasing the amount of foxes will increase which will lead to a decrease of rabbits which will lead to a decrease of foxes which will lead to an increase of rabbits...etc...

Example: the relation between the price of goods and the availability

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Negative relation

If node A increases, node B decreases

Examples: The fox and rabbit example, (this tends to be a self stabilizing system)

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Positive relations

If node A increases, the node B increases or if node A decreases node B decreases:

Example: The increase of profit on the stock market leads to the increase of the amount of traders

Feedback loops

The effect of a chain of causal relations between variables returns to the "starting node"

Positive feedback loop:

The sum of the relations is positive, The system is unbalanced

Example ? (I find these very hard to get right because it is very difficult to interpret and it is all dependent on the variables one makes up) Hostile negotiations accelerating into war.

Negative feedback loop:

The sum of the relations is negative: the system is balanced.

Example? Fox and rabbit.

Example: if the price goes up the sales go down (-) then the price goes down (+) and then the sales goes up (-) and the price goes up (+). This is seemingly a self stabilising system but it's not a negative feedback loop because it's neutral (two - and two +). The model is never quite like reality.

SYSTEMIC RELATIONS THAT RESIST THE MODEL OF NODES AND CONNECTORS

Not all systemic relations can be abstracted to nodes with connections. they will have to be diagrammed with spatial maps, intensity maps or along time lines.

Spatial proximity

Elements sharing the same space within an operational proximity for the agent (e.g, user)

Examples: The relation between a chair and a table. There is of course also a thematic relationship because they both are furniture and also maybe a historic relationship because both belong to the same style. There is also a functional / structural relationship. (Who said this is simple?)

Example: the proximity between a neighbourhood and a park.

Example: the proximity of the Bygdøy museums

Temporal proximity

Elements share a temporal proximity in relation to an agent (e.g. user)

Example: Traffic regulation systems that are timed according to rush hours that again are caused by the working hours which again are influenced by the planetary system (day length).

Example: A cafe serving lunch at lunch hours.

Spatial distribution

Intensity fields, variation and differentiation of the distribution of similar elements in space.

Example: temperature across a room with a stove in one corner.

Example: The density and distribution of sunbathers in a park

Temporal distribution

The distribution of elements over time,

Example: the distribution of intensities in a music composition.

Example: The distribution of traffic density during one day

Timing, rhythms, repetitions

Same elements are appearing in a recognisable pattern.

Example: The repetitions in a music compositions.

Example: The rhythms of intensity in the density of traffic.

Example: the rhythms and patterns of usage of the rooms in a house.

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