An intermediary metasystematics

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1. Introduction

The word system, what does it actually stand for? A naïve realism would simply take system to refer to an objective part of an equally objectively assumed reality. Following social-psychological constructivism, however, typical for (a) system is what a, say, systemizer makes of reality driven by his interest and applying a specific set of structure-forming rules. It is a particular cognitive strategy or approach, then, that should be called systematic.

And what about the result? It inherently carries an equally strong subjective sense. For any time the system approach is practiced, an interest invariably motivates the systemizer. It provides for a focus, directing attention and thus guiding – what is experienced as – selection of a part of the world, recognizing it as an object to be interpreted as-a-system. This includes what other objects the systemizer sees fit to identify as the system's parts (elements and relations) and how he thinks of their arrangement.

A result of a system approach we call a system model, or model, for short.[1] So, depending on the variety of interests and on how each time the choice of elements and relations comes out including how they are supposed to interconnect, different models are arrived at for what we in fact cannot help to naively continue to refer to as an object, that is, roughly, a thing or process believed to exist in reality.

A variety of interests is certainly not something that should be eliminated. On the contrary, a developed/-ing culture (also read: civilization) is critically dependent on dynamics of mutually stimulating differences allowing, if need and/or opportunity be, for synthesis, co-operation, et cetera.
In this paper we aim to show how the system approach may be infinitely extended. Metasystematics supplies a formal framework for professionalizing inter- and transdisciplinary work including coordinated research. We'll be coming full circle concluding that a metasystematics for the system approach as currently predominant dissolves into a systematics proper when the concept of system (approach) qualitatively changes.

2. A critical condition: modeling language with requisite variety

An obstacle to developing a formally comprehensive metasystematics has of course been the lack of a technique for expressing it. We argue that with Metapattern such a tool has now become available.[2]

[1] Then, a model is a sign according to semiotics. As such, it is drawn up to be exchanged, i.e. to facilitate communication. Please note that a sign may also be self-addressed. A modeler usually goes through several model versions before 'sharing' it, if he does so at all. Often, in fact, a model is discarded well before reaching the stage of exchange with other persons. It is the same writing a paper ...
[2] For a recent introduction, see Open conceptual modeling with Metapattern (Wisse, 2012) including a list of previous English-language texts on Metapattern (since 1991). Both English- and Dutch-language texts are

As we shall apply Metapattern below, first the briefest of an outline is sketched in this section. It should be sufficient to catch the drift of the actual models we've designed to establish and explain metasystematics.

Metapattern is a method/language for modeling based on the assumption that only behavior can be unequivocally conceptualized. Indeed, behavior is exhibited by an object. However, an object's behaviors are considered situational, that is, a particular behavior is always (!) attributed to a situated object. So, one and the same object's different behaviors 'require' correspondingly different situations, vice versa.
Deriving a situated object from both a situation and an object may be continued. A result of such differentiation can serve to connect further differentiation. In turn, a situated object may act as the final detail of a situation and/or an object, et cetera. How this recursion works with Metapattern should become clear below.
Metapattern's formalism of behavioral differentiation[3] does not imply a theoretical limit. In the opposite direction, by drawing a horizon Metapattern sets a boundary for a model. A model's horizon also expresses that the modeler's view is necessarily limited, biased, et cetera.

3. A metamodel, or modeling the system approach

Metasystematics implies systematics, or the systems approach. Therefore, we start modeling this approach.

By emphasizing 'approach,' it should be clear that a metamodel should not abstract from the person-performing-the-approach a.k.a. systemizer. Figure 1 shows that we've taken PERSON as situated object for which the HORIZON is both object-to-be-situated and situation. Next, PERSON is taken as object-to-be-situated. With the HORIZON yet again providing the situation, SYSTEMIZER results as situated object. In fact, SYSTEMIZER is still too broad. It is an INTEREST (also read: motive) guiding him.

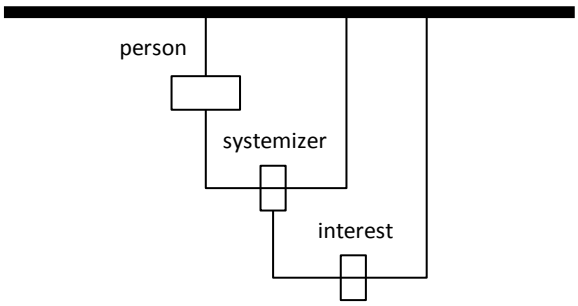

figure 1: recognizing the systemizer with his interests.

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available through Metapatroon, handboek stelselmatig informatieverkeer (Information Dynamics) which is kept up to date.

[3] The label of situational differentiation is equally apt, as an object's behavior varies with situation. When naming is inspired by the sign dimension, rather than the object dimension, contextual differentiation serves to label the systematics of Metapattern (which differs from traditional systematics). Context and situation are both elements, correspondingly positioned in what Wisse has modeled as an extension of the semiotic triad of C.S. Peirce: the semiotic ennead. In the ennead, Peirce's three elements reappear as dimensions, each dimensions 'containing' three more detailed elements. The semiotic ennead was first documented in Semiosis & Sign Exchange: Design for a subjective situationism (Information Dynamics, 2002, dissertation University of Amsterdam).

In our view, a system does not exist as such, but occurs as an interpretation. An INTEREST 'meets' an OBJECT. It being a SYSTEMIZER'S INTEREST, as figure 1 makes explicit, what results when his interpretation is expressed, is a (SYSTEM) MODEL. Figure 2 extends the metamodel to this meeting of SYSTEMIZER'S INTEREST with OBJECT.

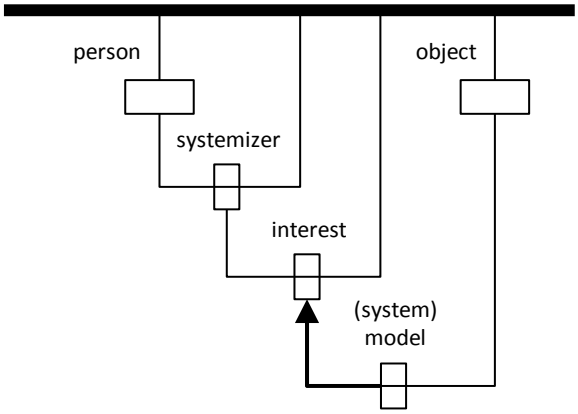

figure 2: a model expresses a systemizer's interest in an object.

We've drawn the (SYSTEM) MODEL as the differentiation of OBJECT[4] as the object-to-be-differentiated[5] with INTEREST as the relevant – final detail of – situation. We admit that our choice is somewhat arbitrary in the sense that we could have changed what here counts as object-to-be-differentiated and situation, respectively.
Such arbitrariness can only be resolved progressively as, say, point of view is more and more included in the model, too. How in this case we've directed the situated object tends to realism, while reversing the direction would have expressed more idealist leanings.
It is precisely a HORIZON that aims to provide a practical boundary for such explicit resolution.[6]
Does it matter for the purpose of the model in question which way the differentiation is assumed? If not, it is a point that need not be elaborated upon. Often enough, though, it helps to open a discussion about relevant interests, model scope, and so on.

For example, when trying to raise 'interest' for metasystematics it might be advisable not to put too much emphasis on the subjective side of the system approach, at least not right from the start. The model of figure 3 appears more neutral and might therefore be more suited for inviting, say, long-standing positivists to recognize variety as they believe it to exist

[4] Please beware of possible confusion here! With this instance of the term object we refer to whatever is believed to exist, tob e modeled as such.
[5] Now the term object is part of a methodological reference that is typical for Metapattern. As goes for all meanings, the two meanings of object are here distinguished on the basis of their respective contexts (with both these footnotes contributing).
[6] It stands for what Wisse calls upward decomposition; see a paper written together with J.D. Haynes, The Relationship between Metapattern in Knowledge Management as a Conceptual Model and Contragrammar as Conceptual Meaning (in: **Proceedings of the First Workshop on Philosophy and Informatics**, Deutsches Forschungszentrum für Künstliche Intelligenz, research report 04-02, 2004). From the perspective of strictly hierarchical classification, upward decomposition is of course paradoxical, to say the least. With Metapattern, one and the same model node can be viewed as constituent, or as constituee. As a constituent, the node 'acts' as either situation or object-to-be-differentiated. Then, downward decomposition results in a situated object, the constituee. The other way around, that is, taking a model node as a constituee, its constituents may not yet be properly specified. Adding constituents is Metapattern's concept of upward decomposition. In practice, modeling the Metapattern way iterates between – designing – down- and upward decomposition, backtracking decompositions when they turn out counterproductive, et cetera.

objectively. Of course, such an idea of variety falls (far) short of the variety when subjectivity in included. But at least a beginning has been made with an organized metasystematics.

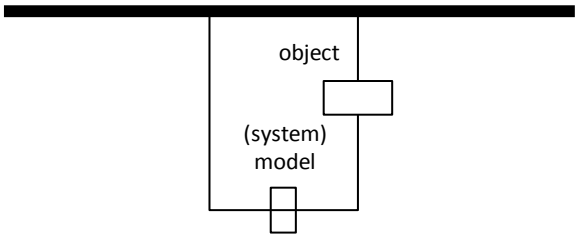

figure 3: curtailing a model to accommodate an audience.

With many model instances, it pays to support access through classification. Please note that the SYSTEMIZER'S INTEREST already provided for a classification 'of sorts.' In figure 4 it is 'replaced' by a classification scheme that looks more objectively positioned. As modeled, CLASSIFICATION ELEMENTS may be hierarchically ordered, hence the capital H, to yield CLASSIFICATIONS.
The term 'subject' as used in figure 4 should not be taken for subjectivism. Its context here is cataloguing; a text, in this case a model, is attributed subjects that it is 'about.'

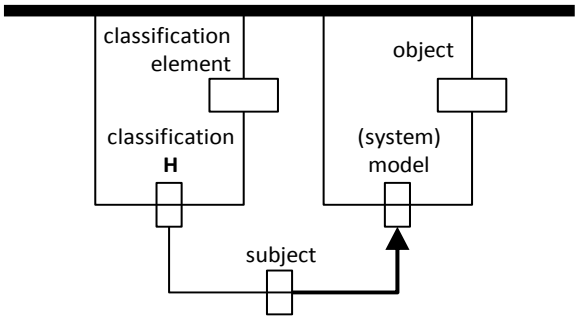

figure 4: classification for model management.

As far as modeling the system approach is concerned, adding subject classification is secondary. The primary feature of an object seen as system is that it 'contains' elements and relations. Figure 5 suggests that such ELEMENTS and RELATIONS do not exist independently. It is the systemizer with his continued interest who selects OBJECTS, that is, who differentiates objects into his (SYSTEM) MODEL'S ELEMENTS and RELATIONS. Abstracting from the systemizer's interest does not influence how the metamodel is extended.

How ELEMENT and RELATION are shown in figure 5 does not imply an order of importance. As far as identifying goes, ELEMENTS and RELATIONS carry equal status. It is not, repeat, not that for example ELEMENTS are identified first to be subsequently 'supplied' with RELATIONS.

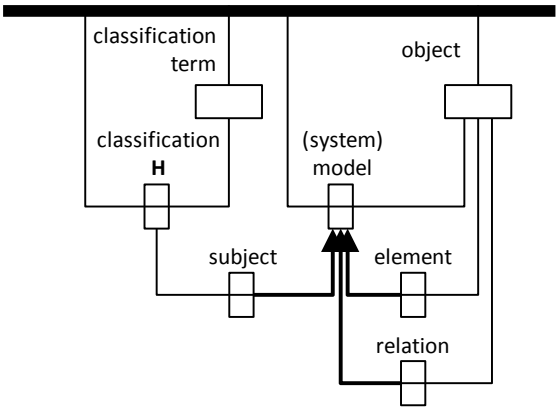

figure 5: including the only – kinds of – inhabitants of an object-as-system.

ELEMENTS and RELATIONS as such don't make out structure, of course. For that part of the system approach, a particular RELATION should be taken as a situation with ELEMENTS as relevant as object-to-be-differentiated. The resulting situated object we call RELATIVE.
Likewise, relevant RELATIONS are object-to-be-differentiated. With an ELEMENT as situation, a situated object results that we call TIE.[7]
In order to highlight this structural specification, the classification has been omitted from figure 6.

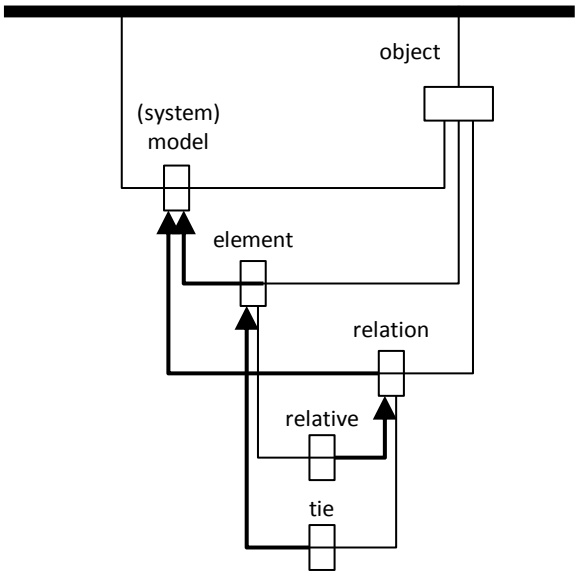

figure 6: adding relative and tie as situated objects for necessary and sufficient structural specification.

At first sight, the metamodel of figure 6 might seem redundant. Don't TIES follow from RELATIVES, or the other way around? Yes, they do, that is, at the general level of structure. But the behavior of an element as a particular RELATIVE might differ from that of another RELATIVE,

[7] In graph theory, an actual node is called a vertex while an actual line between (two) vertices is called an edge. Please note that our concept of element is less specific than vertex and our concept of relative is more specific than vertex. In the same manner, our concept of relation is less specific than edge and our concept of tie is more specific than edge.

not to mention the behavior of the ELEMENT from which they both have been differentiated. The same goes of course for one TIE compared with other TIEs, and the more general RELATION.

4. Multitude of models with the requirement of interdependency

Figure 6 would already be the end of it, and nothing much gained, when the system approach amounted to merely labeling objects. For with objects existing … objectively, there would just be a single, absolutely 'true' way of identifying objects. And each object would be represented with just one model, with other objects just as precisely labeled its elements, relations and their structural properties.

In reality, anything may be taken as object. And an object may be modeled as a system without end. It all depends. One systemizer is not the other. Moreover, his interests vary. Popularly speaking, what does he experience as a problem? His modeling capacities vary over time, too. What solutions is he able to conceive? How can he express his design as a model?

It should be clear that models may exist in multitude. Now the question becomes relevant whether or not those models are exclusive, i.e. mutually independent.
We assume a practical need for models to be treated as interdependent. Hence metasystematics, that is, an approach beyond a single system.

We want to pause at what we've come to recognize as a balance. The system approach is now part of, generally speaking, the scientific method. Negatively put, without a 'proper' model, it cannot be science.
Taking the liberty of personifying science for the purpose of this argument, science is inclined to extend the scope of a model in order to fit the problem it believes to address. What science, and the same goes for a profession, is not sufficiently aware of, however, is that extension runs the risk of counterproductive bias. Already at an early stage of enlarging the scope, a model becomes implicitly incommensurable with other models.
The cause lies with the current concept of system. It consists of elements representing objects as largely fixed wholes. An object's behavior is considered to follow from strictly 'being' an object, nothing else.

This assumption does not hold, though, when the scope is enlarged. While an object remains the same … object, its behaviors may vary. Its behaviors may even appear contradictory … until situation is included as a determining factor.
To recapitulate, widening scope forces the modeler both to acknowledge behavioral variety for one and the same object and to apply a paradigm with a corresponding modeling method/language for ordering relevant object behaviors rigorously.

Necessarily limiting the scope of a model when applying the traditional system approach, of course increases the number of models. For overall rigor and relevance, controlling scope must be counterbalanced with an (additional) approach facilitating the expression of interdependency. It is more specifically this approach that we here call metasystematics.

5. Modeling the system approach to interdependency

The system approach is powerful on account of its compact set of general principles. The same approach should therefore be applicable beyond a single system. How about modeling several such single systems into yet another model? See figure 7 for our metamodel of metasystematics on the basis of the traditional system approach.

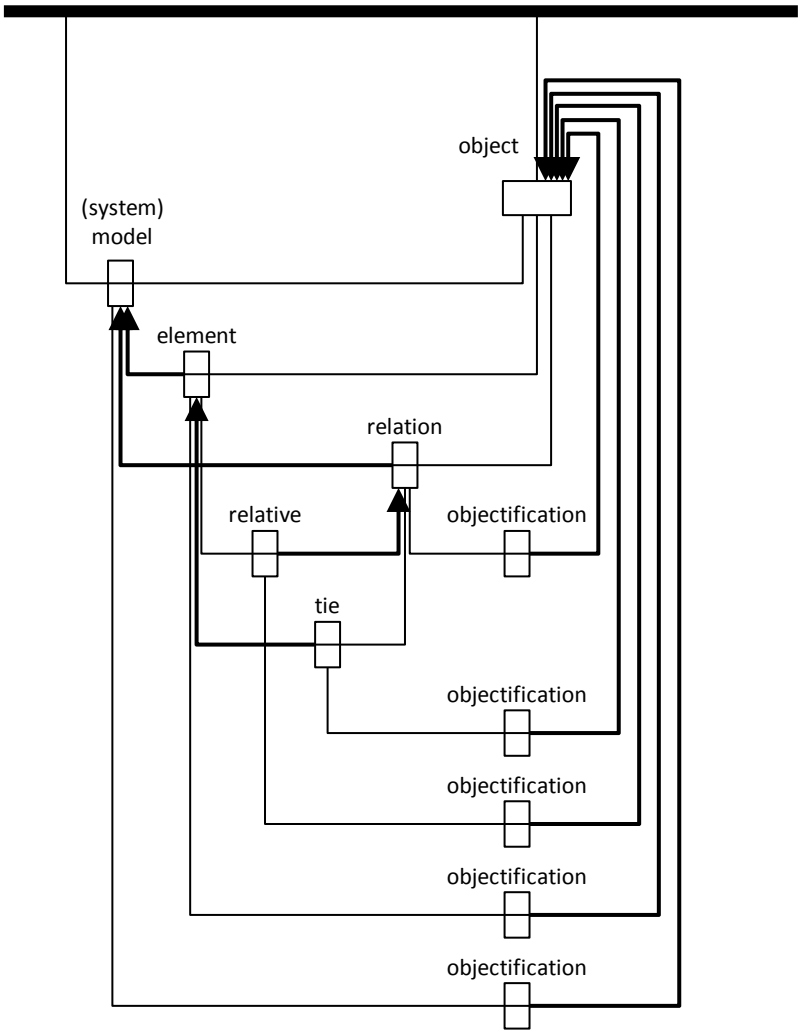

figure 7: recursion of interdependency between models and their parts in additional model.

The metamodel of metasystematics structurally turns out again surprisingly simply with Metapattern. The key idea is that interdependence cannot be operationally specified at the level of the, say, original models as fixed, behaviorally closed wholes. It is some 'part' of one model that should be brought together with some 'part' of another model.

What are eligible as 'parts' is actually quite straightforward. Figure 6 displays everything that may be taken up for a next model addressing some, again dependent on an interest et cetera, interdependency of earlier models. In preparation of the model of model interdependency, relevant model 'parts' should be objectified first. Established as OBJECTS, too, they are

available to be subsequently included in any model[8] as ELEMENTS and/or RELATIONS, and so on as RELATIVES and/or TIES.
This procedure may of course be repeated. What are now parts of the next model can also be objectified for inclusion in the next-next model, and so on.[9]

6. Keeping up a tradition

The system approach has become integral to scientific and professional work to such an extent that practitioners take it more or less for granted. It is difficult, if not impossible, to imagine a different approach, let alone to consider that it might be more productive. It is for this reason that we've designed a metasystematics to remain 'true' to the principles of the system approach that scientists and professionals may be counted upon being familiar with (and appreciating to maintain). Rather than change principles, we've offered a guideline. Limiting the scope of models makes (also) their 'parts' reusable for … modeling. This way, every systemizer may continue to do 'his own thing,' albeit with a broader understanding. He may have to adjust his model in order to supply the relevant parts for (further) derivative models. Otherwise, the modeler can stick to the traditional system approach as a paradigm.

7. An alternative, qualitatively richer systematics

How systematics can develop becomes clear when the reason for systematizing interdependency into a metasystematics is fully acknowledged. Beyond situation, that is, situationally unqualified, object is an ambiguous concept. Situated object holds regardless of scope. Modeling interdependency acknowledging situated objects therefore no longer requires separate models first, their parts included in an additional model next (and so on).

It involves a paradigm shift![10] With Metapattern, the different situated-nesses of an object can all be accommodated in a single model. Incommensurability can be eliminated by shifting the focus to the situated object to which behavior is attributed unambiguously. What a metasystematics for object orientation facilitates in a round-about fashion turns out as a 'normal' systematics with (subjective) situationism.[11] For what qualifies as the system approach has been modified axiomatically.

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[8] This opens the intriguing possibility to include an object resulting from such objectification in the same model (!) from which it is objectified, and so on. We do not pursue this line of inquiry/design in the limited space of this paper. We already do feel, though, that it is yet another recursiveness holding practical promise!
[9] See the previous footnote for our comment that inclusion need not be 'limited' to another model.
[10] Indications of what might now be called the behavioral turn, or situational or contextual turn, for that matter, can already be spotted in how for example H. Schelsky explains what it took for the concept of youth generation to be studied from the perspective of sociology. In **Die skeptische Generation** (Eugen Diederichs, 1963, originally published 1957), Schelsky refers to (p. 12) "Wandelungen des systematischen Denkens." Systematics shifted its orientation to dynamics, i.e. behavior. As separate scientific disciplines underwent this behavioral shift, Schelsky continues, they crossed traditional boundaries, i.e. became increasingly interdisciplinary. He remarks that such blending of disciplines on the basis of behaviors more accurately corresponds to reality but at the same time makes scientific explanation extremely more difficult. In Schelsky's own words (p. 13): "In dieser Verschmelzung der Wissenschaften [...] zu einer allgemeinen [...] Verhaltensforschung sind die alten Wissensdisziplinen und ihre Gegenstände nicht mehr exakt trennbar, was der Wirklichkeit [...] enspricht, aber zugleich die wissenschaftliche Aussage darüber außerordentlich erschwert." Metapattern helps to overcome this difficulty by allowing representation including design of dynamic synthesis-of-differences.
[11] P.E. Wisse, Semiosis & Sign Exchange: Design for a subjective situationism (Information Dynamics, 2002, dissertation University of Amsterdam).

We fully realize the difficulties especially accompanying implementation of a paradigm shift. Already great benefits may result from 'installing' a metasystematics based on the traditional system approach. With success, it should become less difficult to gain acceptance for the inherently interdependent systematics based on the principles underlying Metapattern, i.e. (subjective) situationism.[12] It directs attention at variety. For in an increasingly varied world we really do live.

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[12] P.E. Wisse, Ontology for interdependency: steps to an ecology of information management**,** in: **PrimaVera**, working paper 2007-05, Amsterdam University, 2007.
[13] This article does not represent the opinion, view or policy of Gasunie.