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Information systems in organizations – epistemological discussion about reality vs model

1 Epistemology

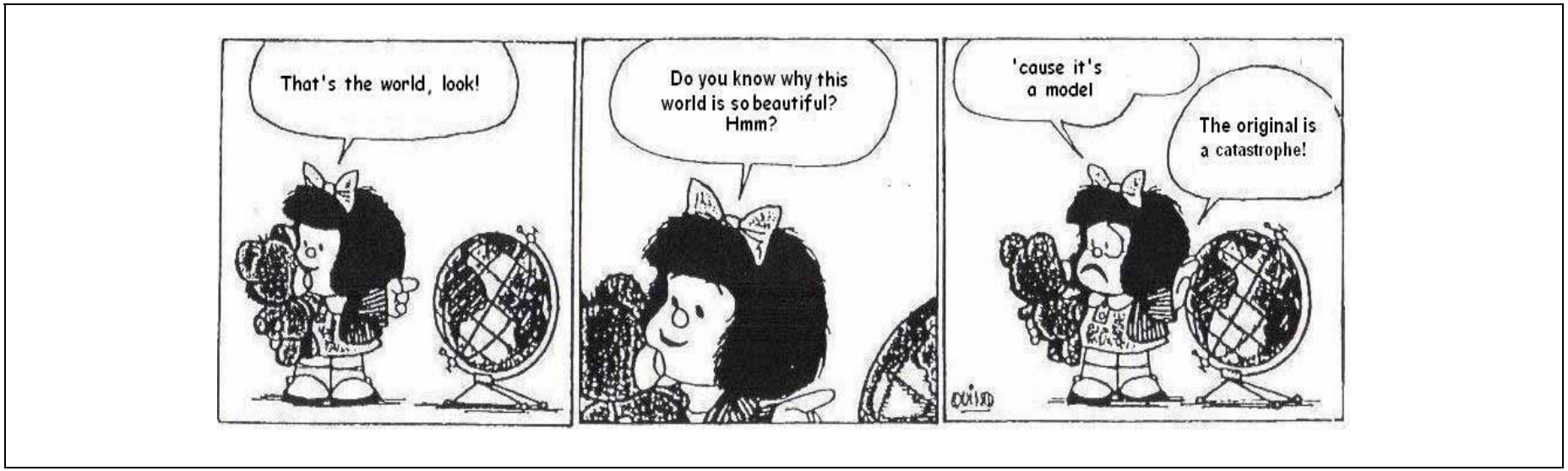
Formal models are the essential knowledge of information systems.

The formal models have to be designed
using methods of empirical sciences
such as observation, induction, abstraction, type construction.

As formal models are a sort of scientific knowledge,
we have to examine them with the theory of knowledge, i.e. epistemology.

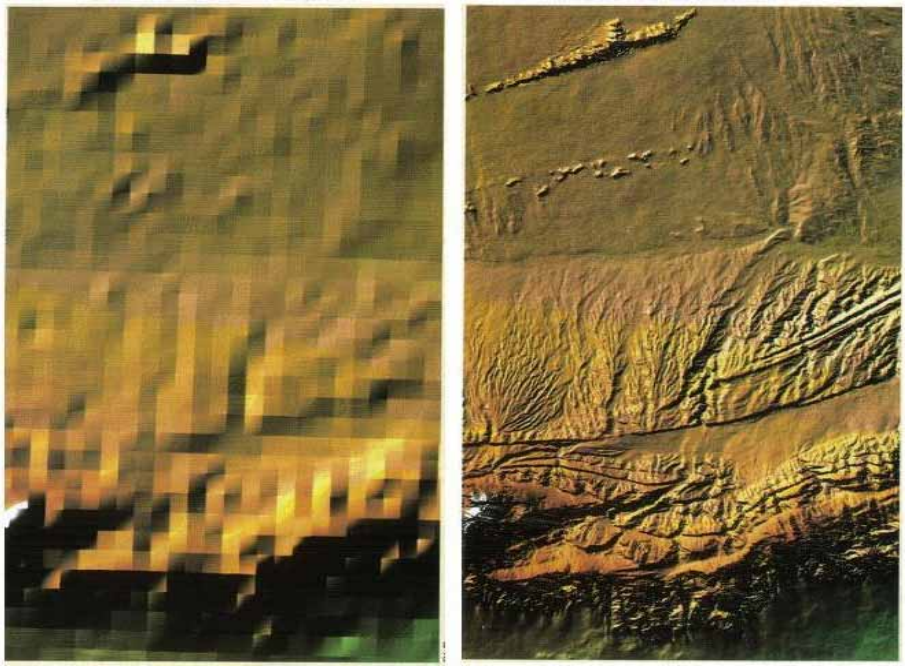
Objects of epistemology
Acquisition of knowledge (cognitive methods)
Nature/quality of knowledge, relation to reality
Limitations of knowledge (truth, correctness)

2.1 Lack of isomorphism (reality – model)



Computers are formal technical systems,
they don't understand anything but formal language and models represented in formal language, i.e. formal models,
but reality is not formal,
can only partly be described in terms of formal language.
Only formal aspects of reality are accessible to computers.

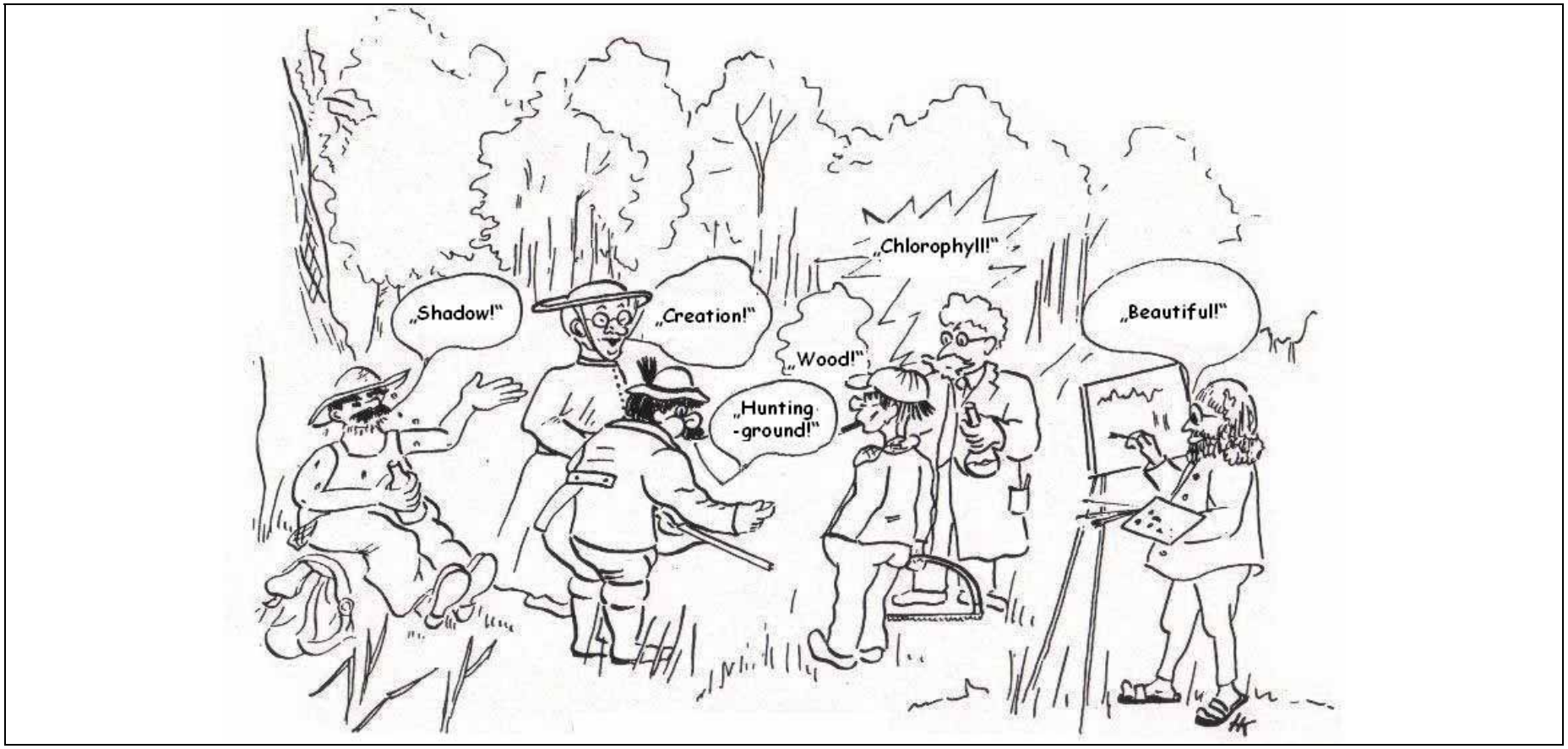
2.2 Circumstances of the formalization of organizations



Organizations are social (information) systems constituted by humans who are not accessible to formalization. The formalization depends on

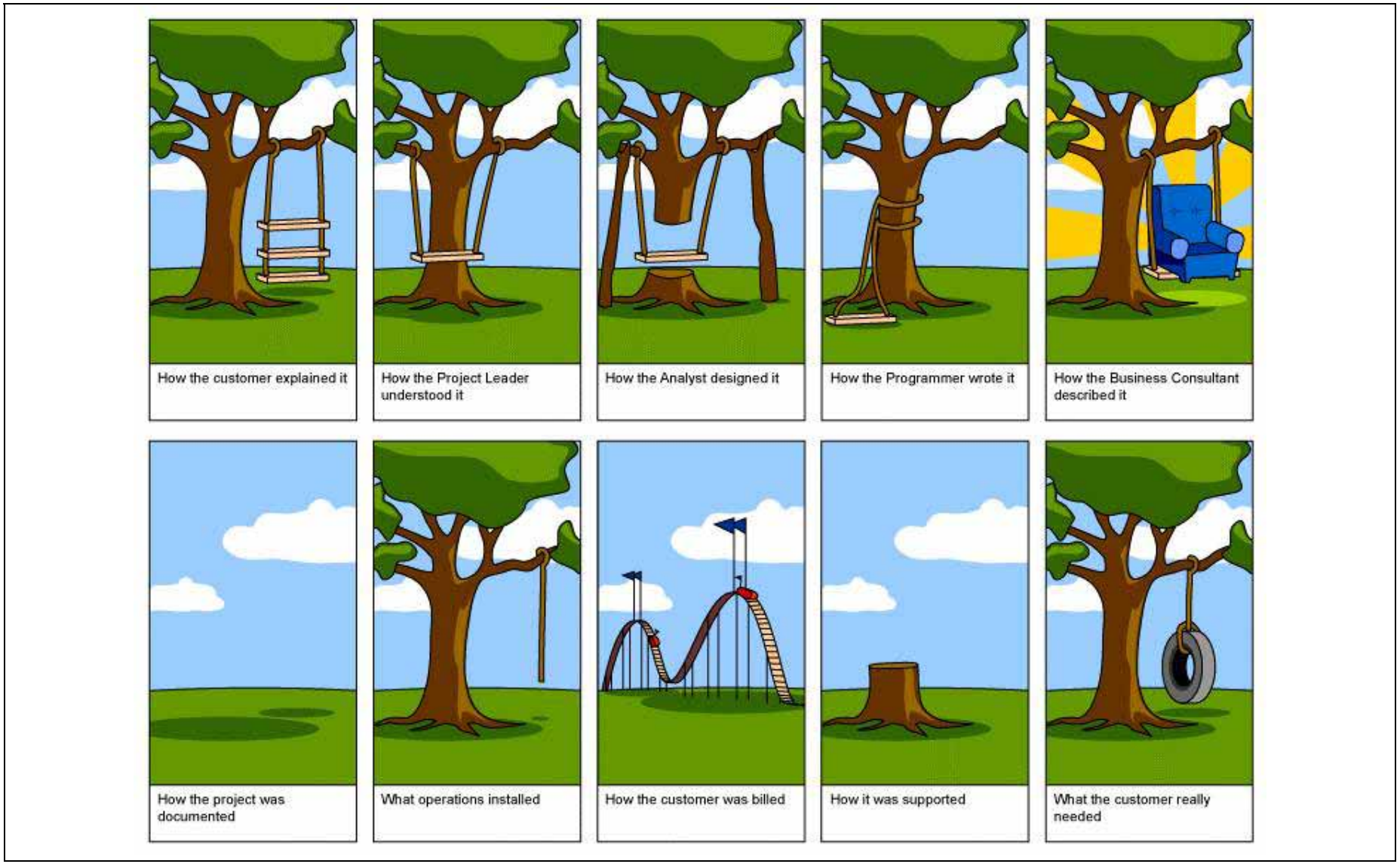
- the degree of pre-formalization
- the degree of accessibility to / suitability for formalization
- time, effort and thus costs necessary for formalization

2.3 The influence of model designers on their models

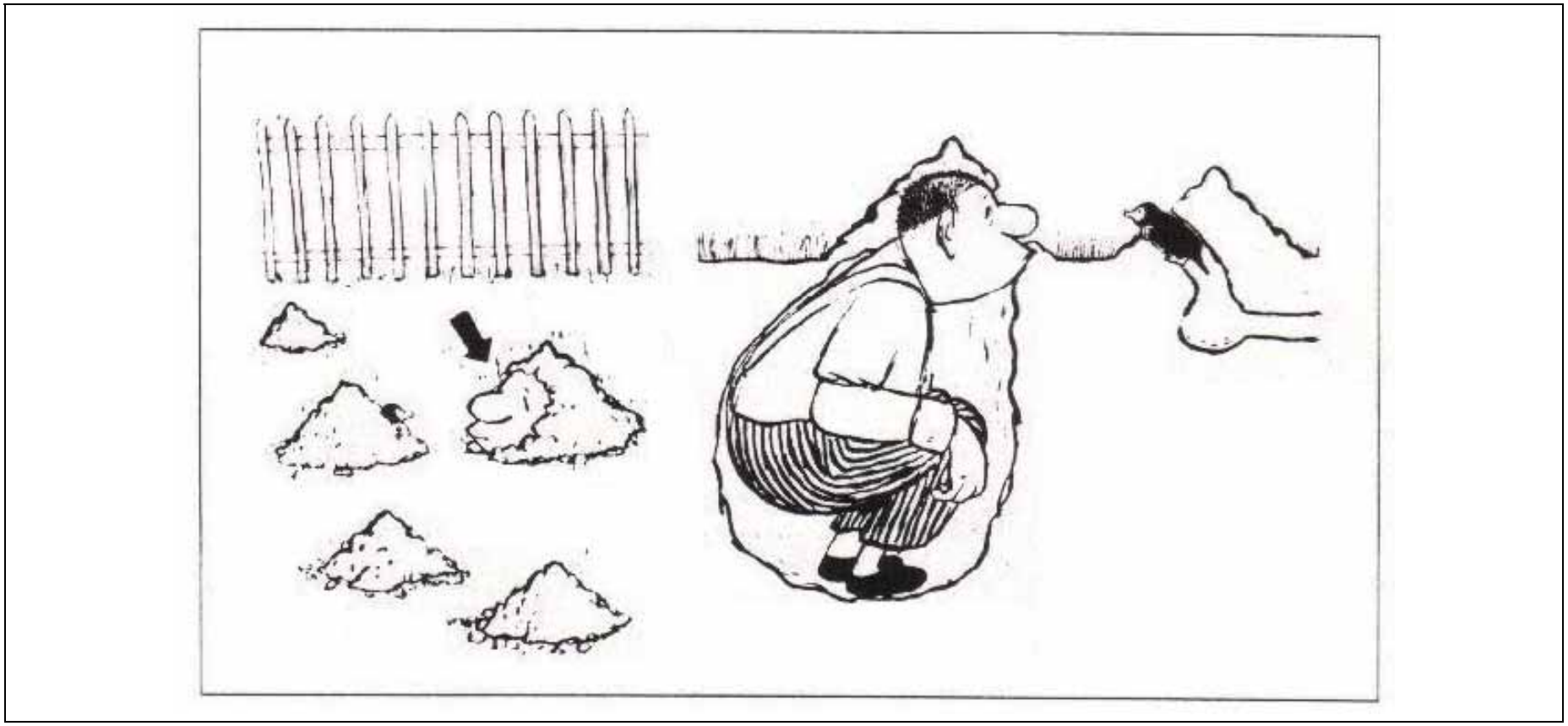


There aren't any models without model designers.
Models are the result of cognitive processes
where model designers unconsciously use cognitive strategies.

2.3 The influence of model designers: multi-perspectivity

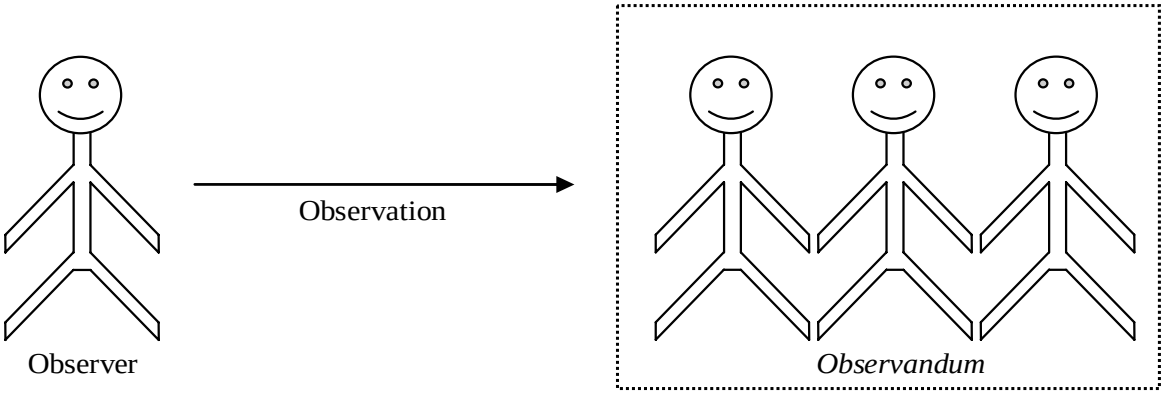


2.4 The influence of model designers on the organizations observed

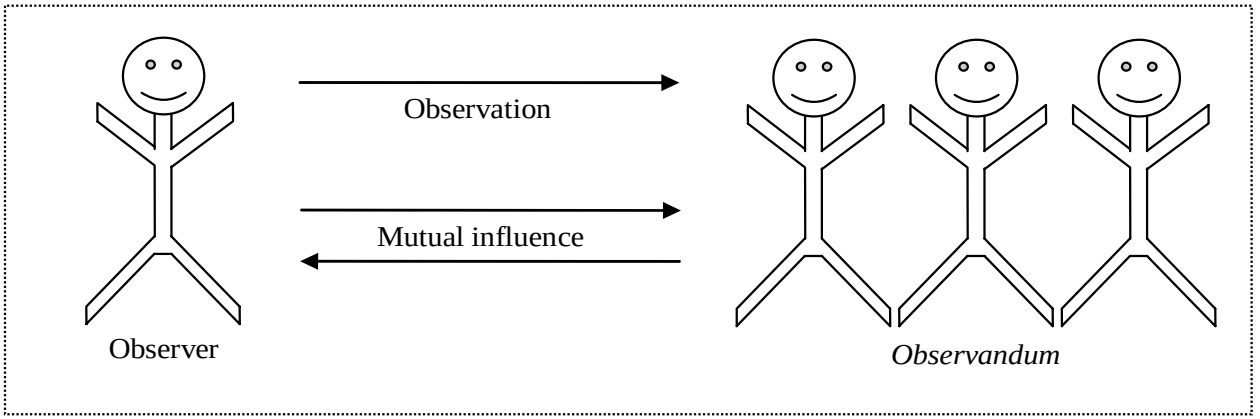


Organizations are open, temporally dynamic, complex,
social (socio-technical) information(-processing) systems
which change their behavior under observation.

2.4 The mutual influence of observers and the organizations observed

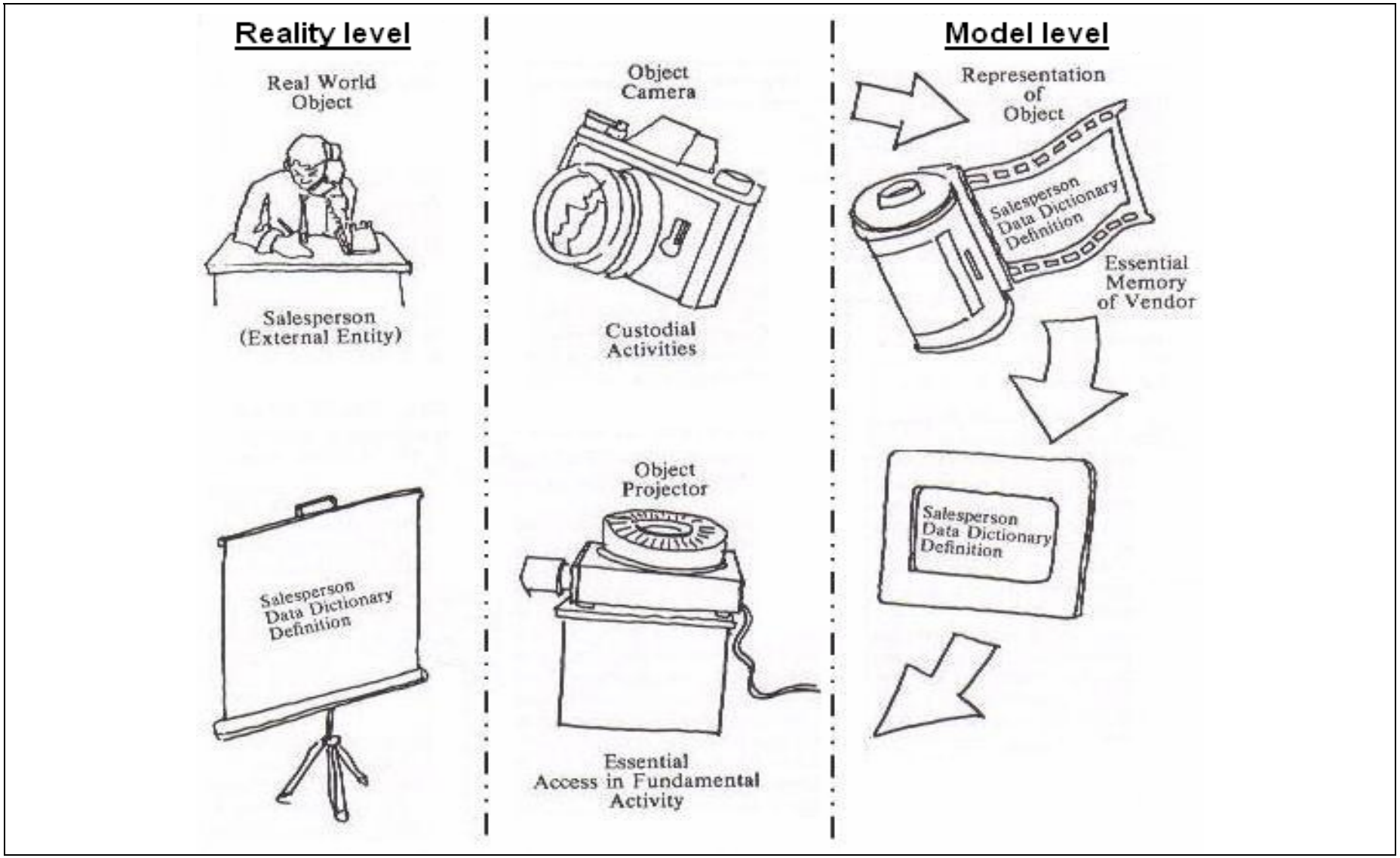


1. Naïve-realistic view: separation of observer and *observandum*

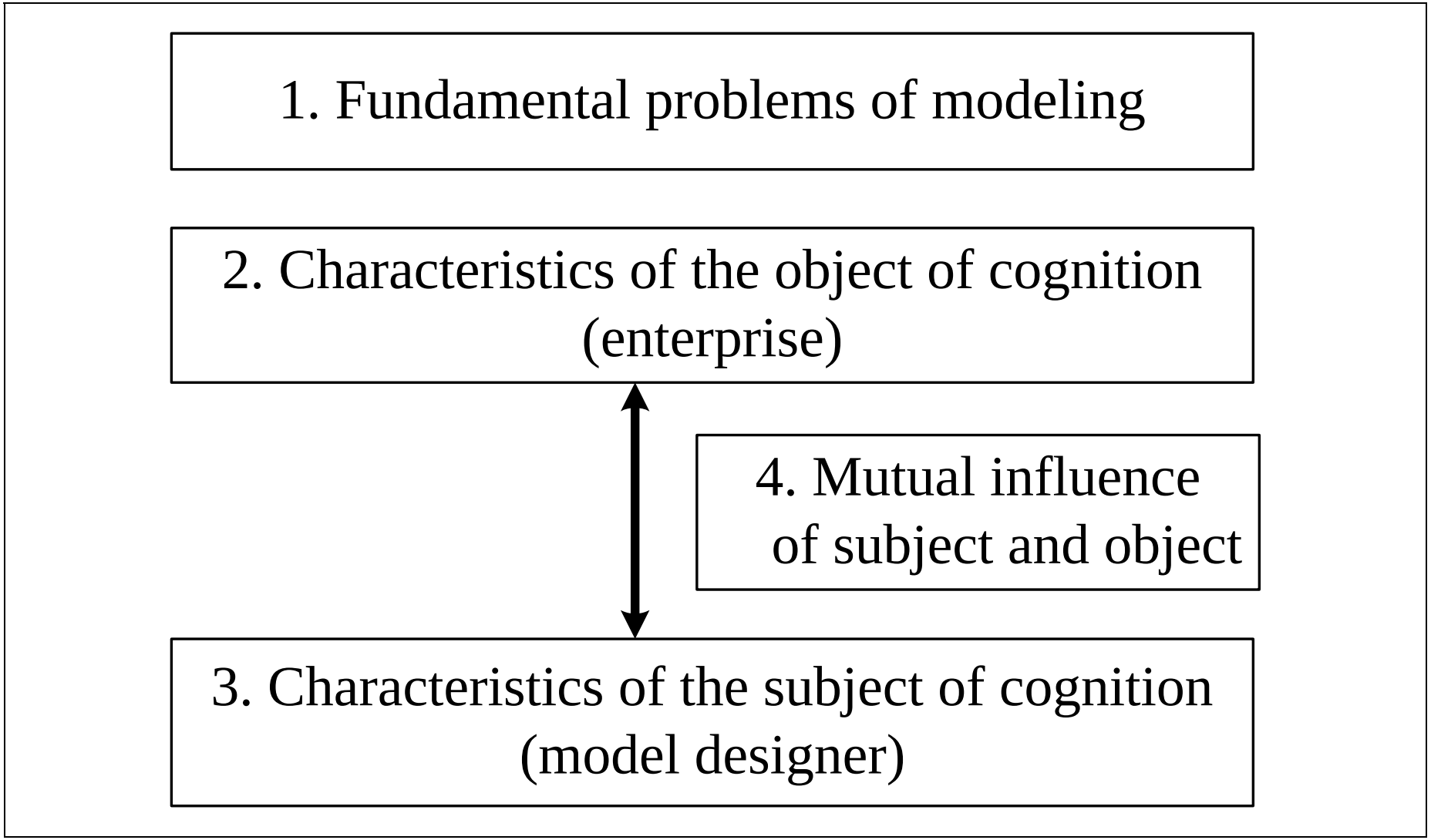


2. Critical-realistic view: mutual influence of observer and *observandum* described as a new system consisting of observer and *observandum*

2.5 Modeling without epistemological reflection



3 Structure of the research field



4 Widespread wrong opinions

1) Models are one-to-one images of segments of reality and every kind of information can be described in formal models.

2) Every segment of reality (each department of an organization) can be modeled completely and with the same precision and the same effort.

3) Models are objective descriptions of segments of reality and appear after some creative process which cannot be described.

4) Subject and object of cognition are strictly separated: You can observe an organization like a table.

Ignorance of the fundamental problems with regard to models and naive and wrong expectations towards formal models are important reasons for projects going wrong.

5 Conclusion: type and effect of the results

The epistemological problem field is independent of
model representations, notations, technologies and implementations.

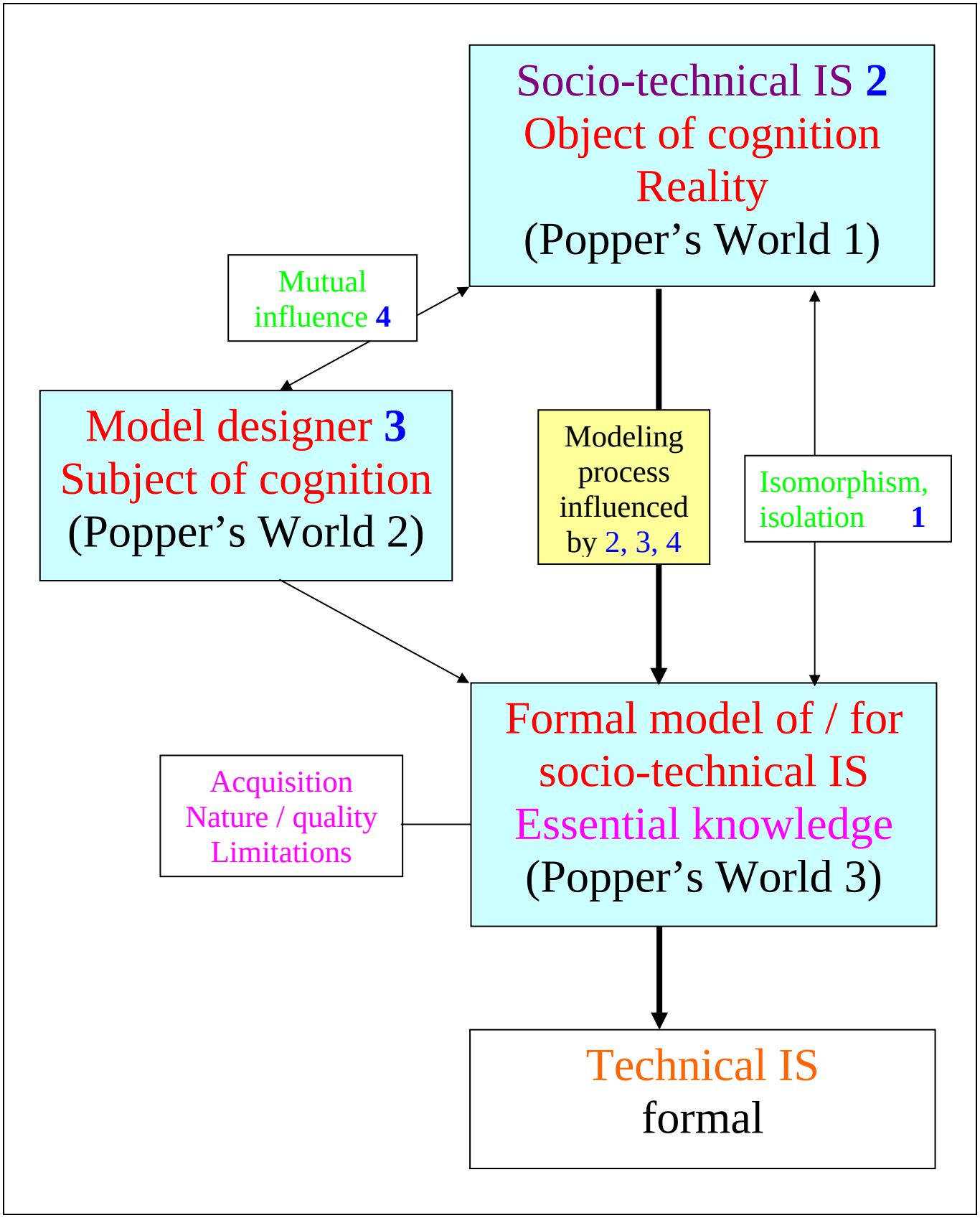
Many aspects of the epistemological problem field are
essential problems which are not solvable.

If model designers are aware of those problems,
undesired effects can be reduced considerably.

In order to exhaust this potential of improvement
it is necessary
to investigate and understand the epistemological problem field
in a lot more details beyond the known aspects.

This is a wide research field and a great research challenge.

6 Summary


Socio-technical IS 2
Object of cognition
Reality
(Popper's World 1)
Mutual influence 4
Model designer 3
Subject of cognition
(Popper's World 2)
Modeling process influenced by 2, 3, 4
Isomorphism, isolation 1
Formal model of / for socio-technical IS
Essential knowledge
(Popper's World 3)
Acquisition
Nature / quality
Limitations
Technical IS
formal