A Systems Perspective on Organizations and People

integrating micro and macro motives

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Presentation to Business Information Systems

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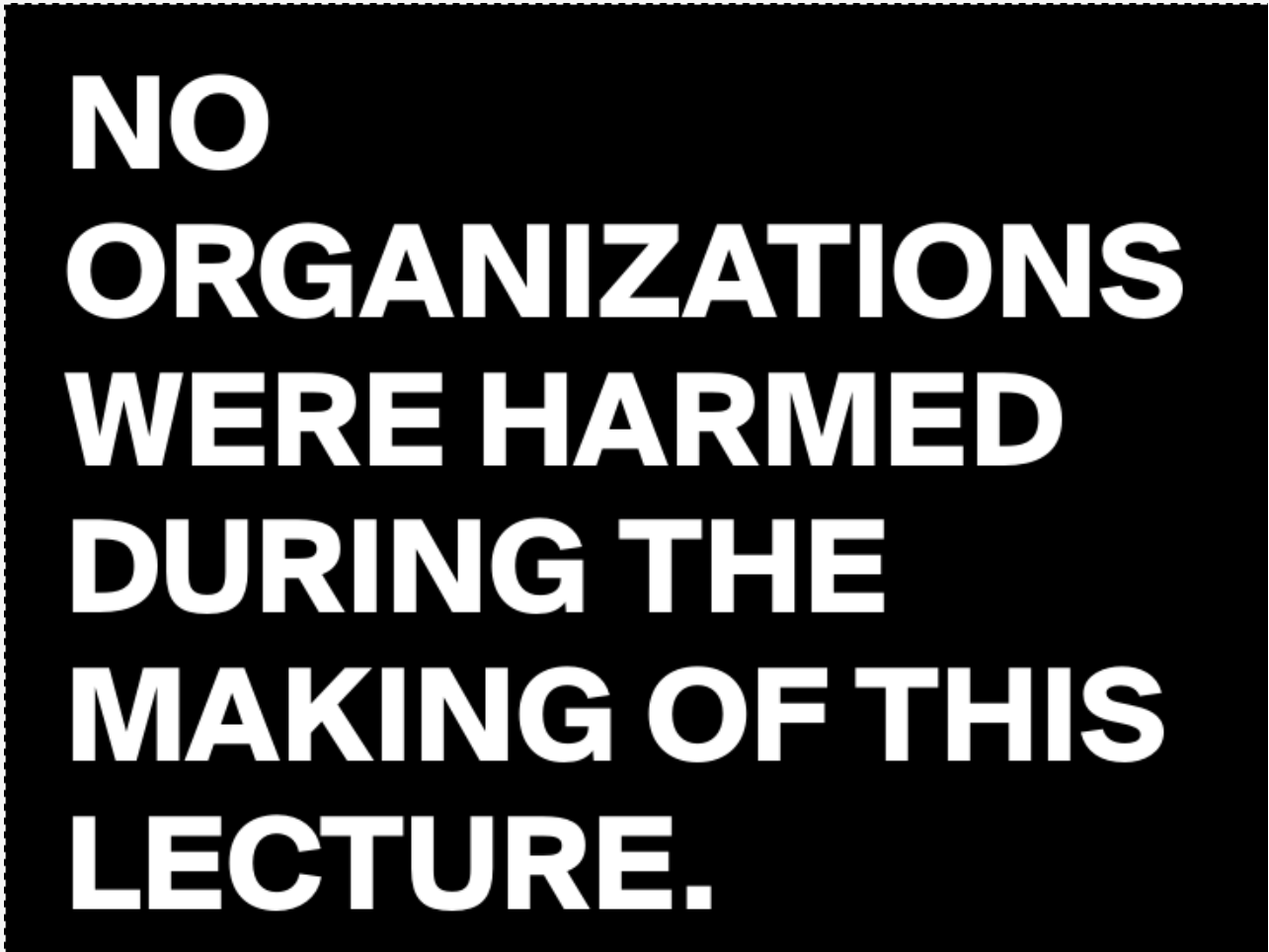
Preliminary statement

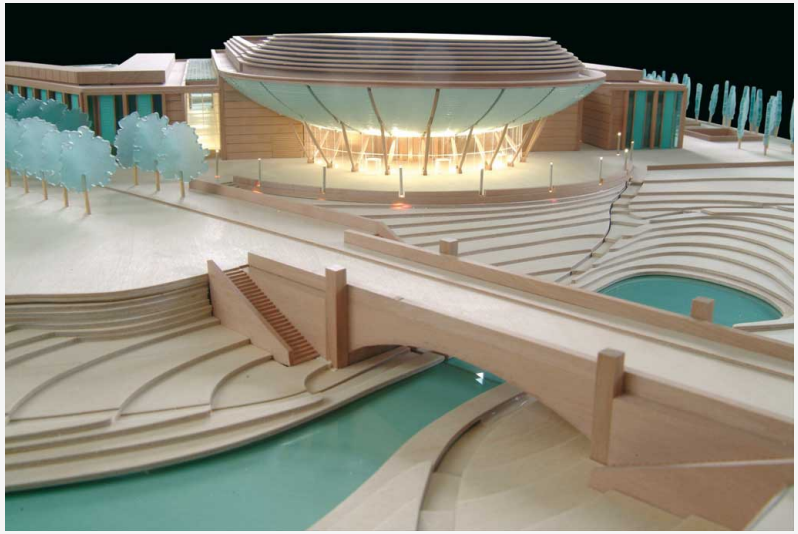
- In this lecture we will present, introduce and work with *models*.



Why Modeling? (1)

- Modeling can guide exploration:
  - figure out what questions to ask
  - reveal key design decisions
  - uncover problems

e.g. physical models



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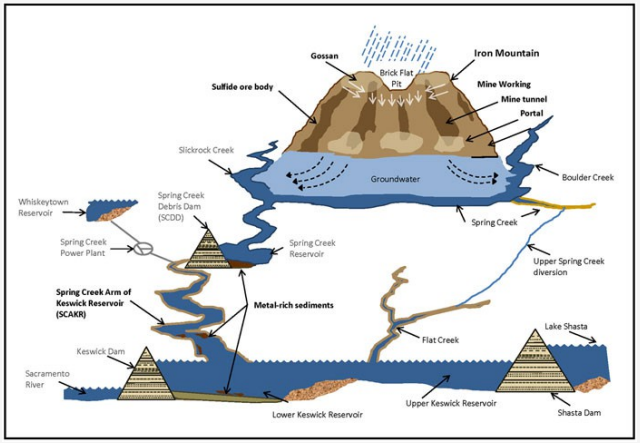
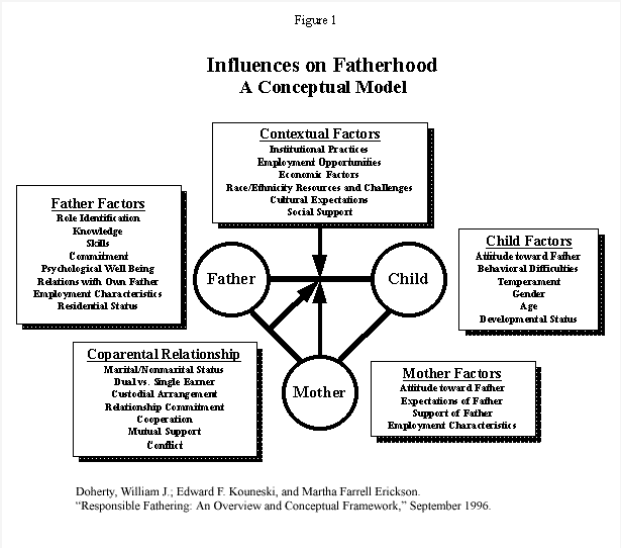
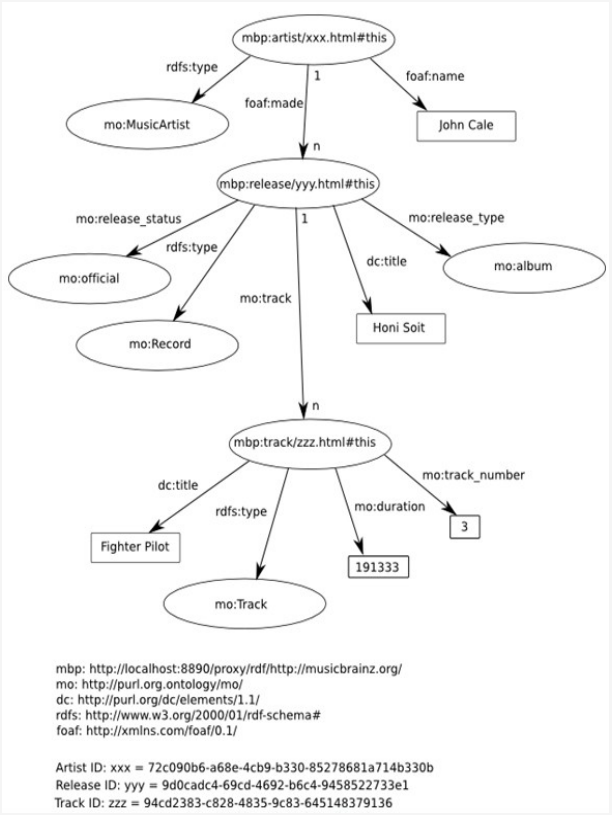
e.g. conceptual models







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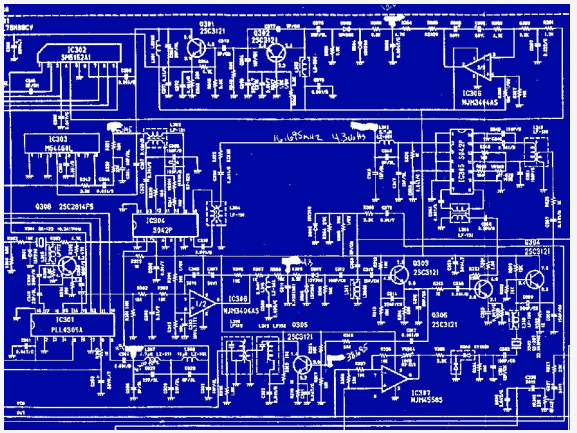
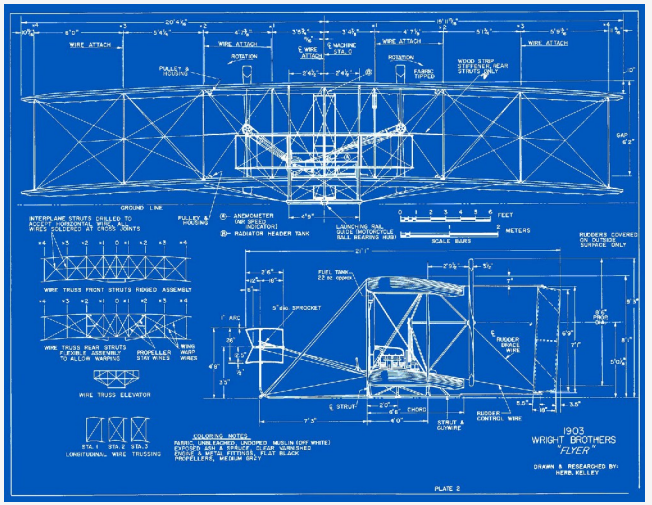




Why Modeling? (2)

- Modeling can be used to check understanding
  - reasoning about the model to understand its consequences
  - checking expectations
  - animating the model to help us visualize/validate behaviour (**simulation**)

Market Arena – an experiment

Market Arena – an experiment

- 15 groups of BIS students
- Each group had a buyer and a seller
- Three prizes: best buyer, best seller, best trader.
- All moves possible (non compliance, informational passing, etc.)!!

Market Arena – last year experiment

There were also NPC:

- Zero Intelligence (ZI): random pricing
- Zero Intelligence Plus (ZIP): basic pricing rationality

  e.g. buyer, −1 for each offer received higher than desired price, +1 for less
- Enforcer

Market Arena – last year experiment

The results?

Market Arena – last year experiment

TOP10	Top buyer		Top seller		Top trader	
	@5000	@10000	@5000	@10000	@5000	@10000
1	buyer_3B	buyer_3B	seller_2F	seller_2F	_2G	_3D
2	buyer_3C	buyer_3C	seller_1E	seller_1E	_3D	zi_4
3	buyer_2B	buyer_2B	seller_1F	seller_1F	_2F	_2F
4	buyer_2A	buyer_2A	zip_seller3	zip_seller3	zi_4	_1E
5	buyer_2F	zip_buyer9	zip_seller2	zip_seller2	_1E	_1F
6	zip_buyer9	buyer_2F	zip_seller12	zip_seller12	zip_9	zip_9
7	zip_buyer8	zip_buyer8	zip_seller9	zip_seller9	zip_4	zip_4
8	zip_buyer6	zip_buyer6	seller_1D	seller_1D	_1F	zip_2
9	buyer_1E	buyer_1E	zip_seller5	seller_3E	zip_2	_2G
10	zip_buyer10	zip_buyer10	zip_seller1	zip_seller5	zip_3	zip_3

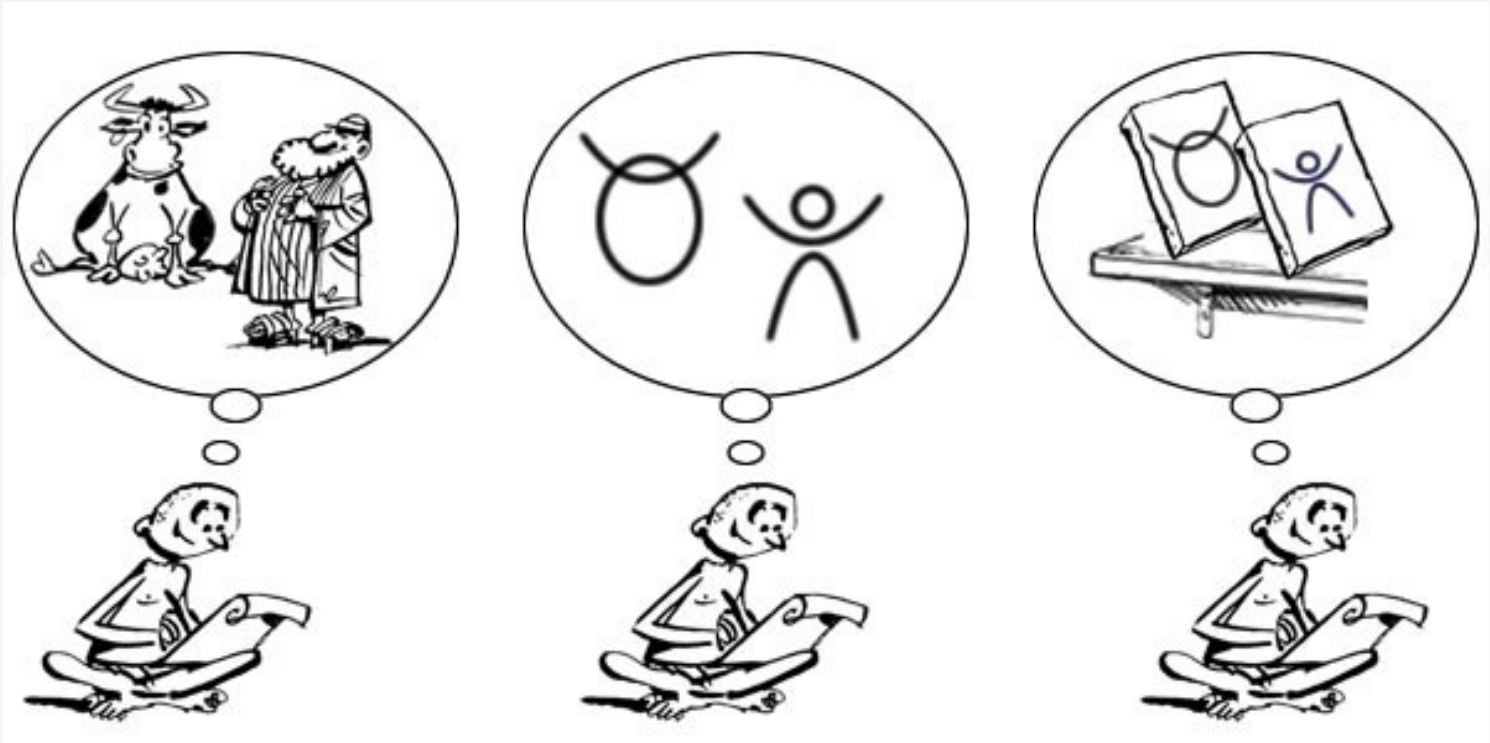
Why Modeling? (2)

- Modeling can be used to check understanding
  - reasoning about the model helps us to understand its consequences
  - checking expectations
  - animating the model helps us to visualize/validate behaviour (**simulation**)

- Modeling can be used as prescription:
  - Model actualization (**execution/implementation**)

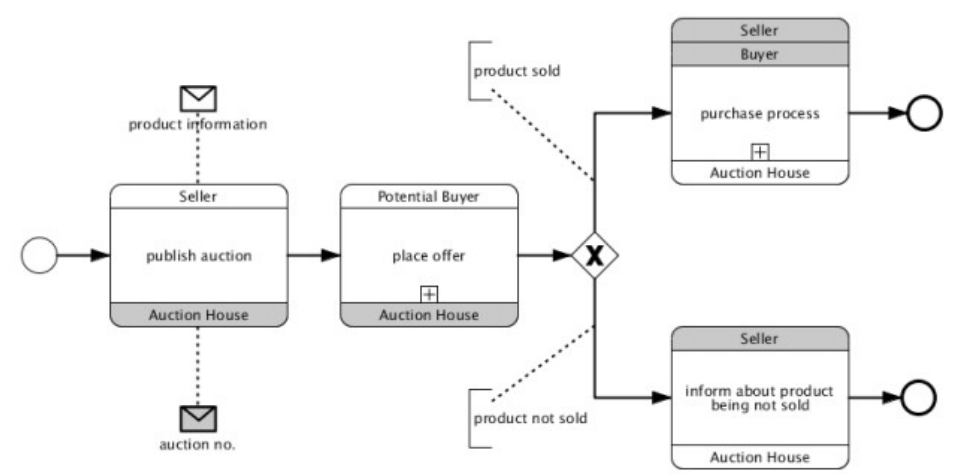
Why Modeling? (3)

- Modeling can help in communication
  - requires abstractions with the right focus
  - neglects unnecessary details

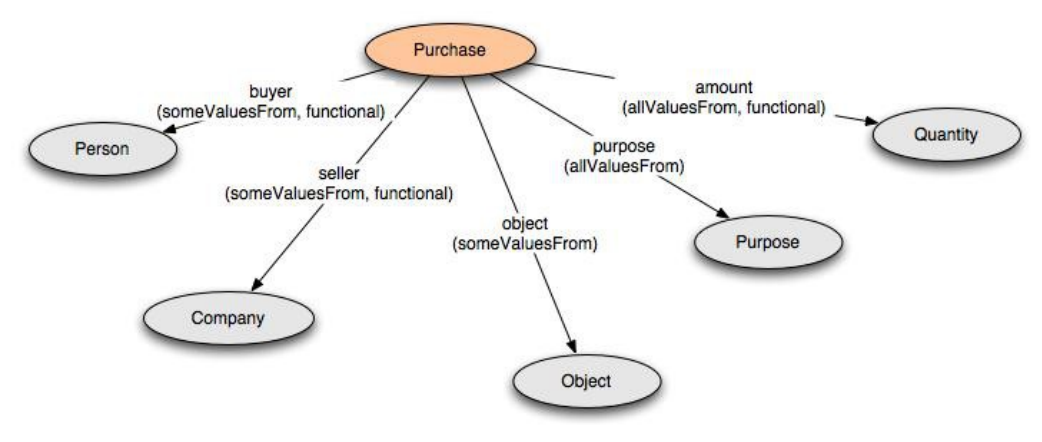


Types of *formal* models used in organizations

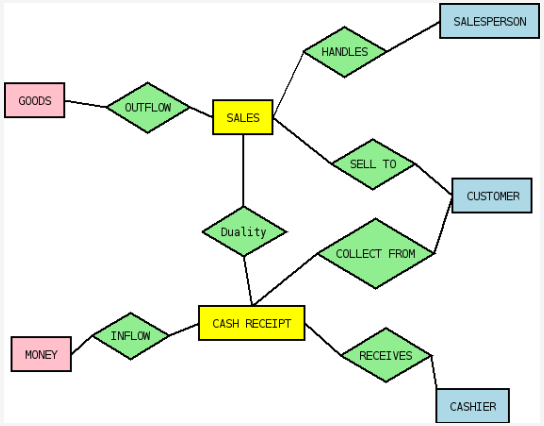
Business process models



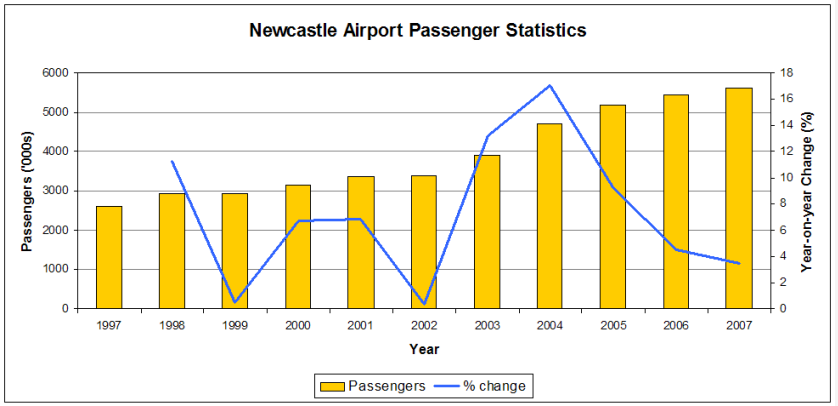
Knowledge models



Accounting models



Statistical models

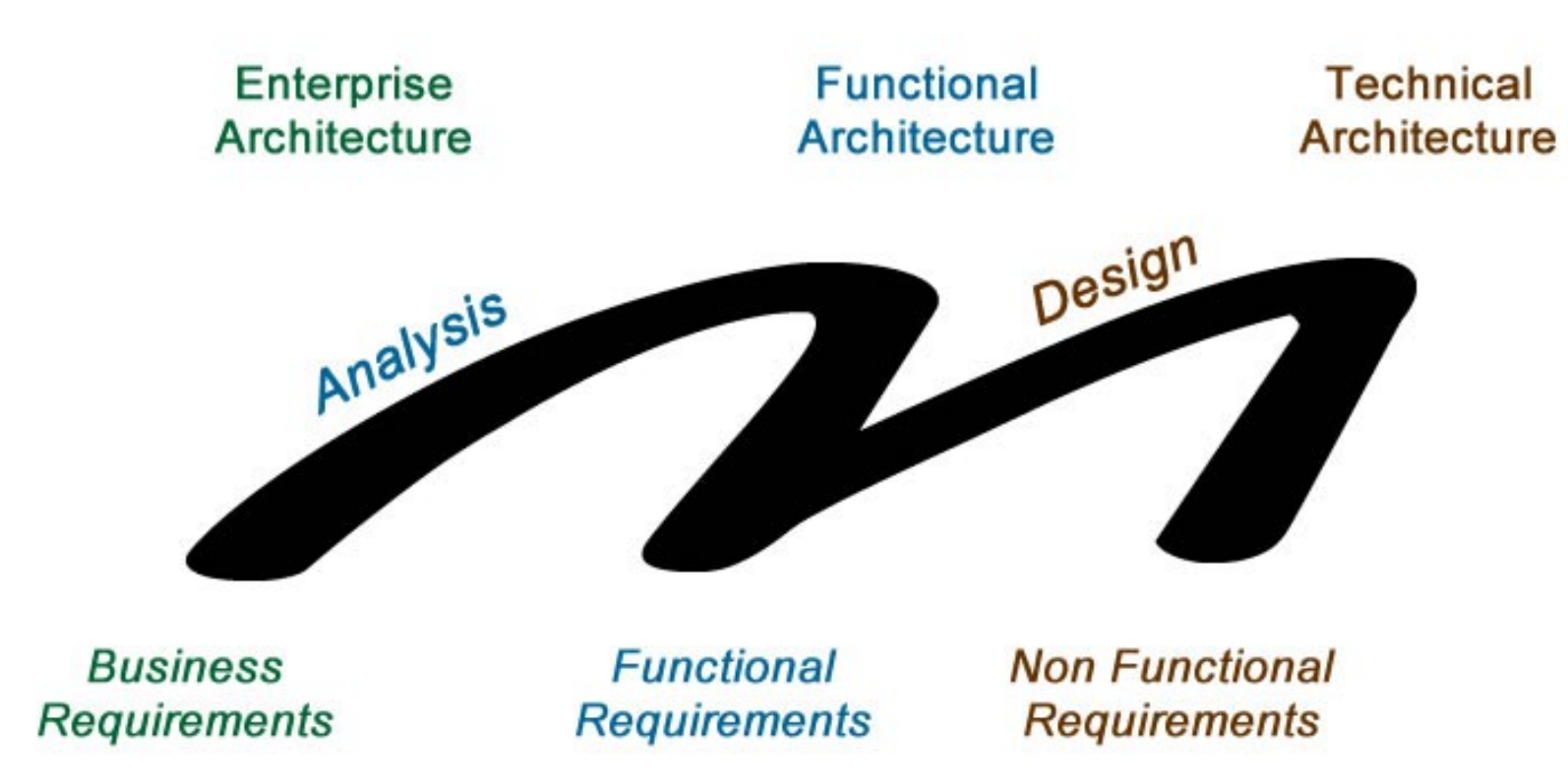


Types of *informal* models used in organizations

experts' conceptualizations and knowledge

- prototypical cases
- failure modes
- best and bad practices
- non compliance scenarios
- ...

M for modeling



source: http://caminao.wordpress.com

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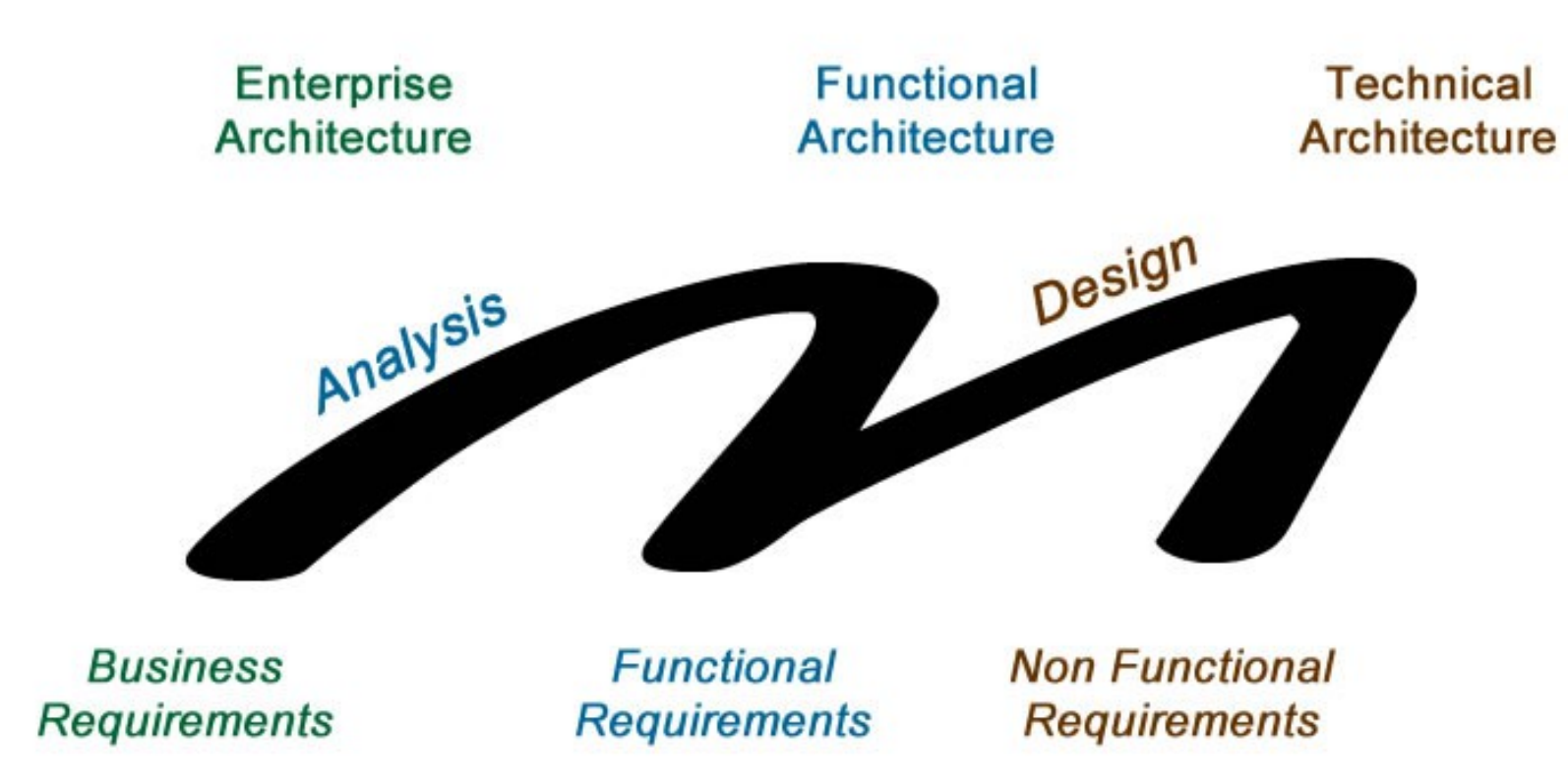
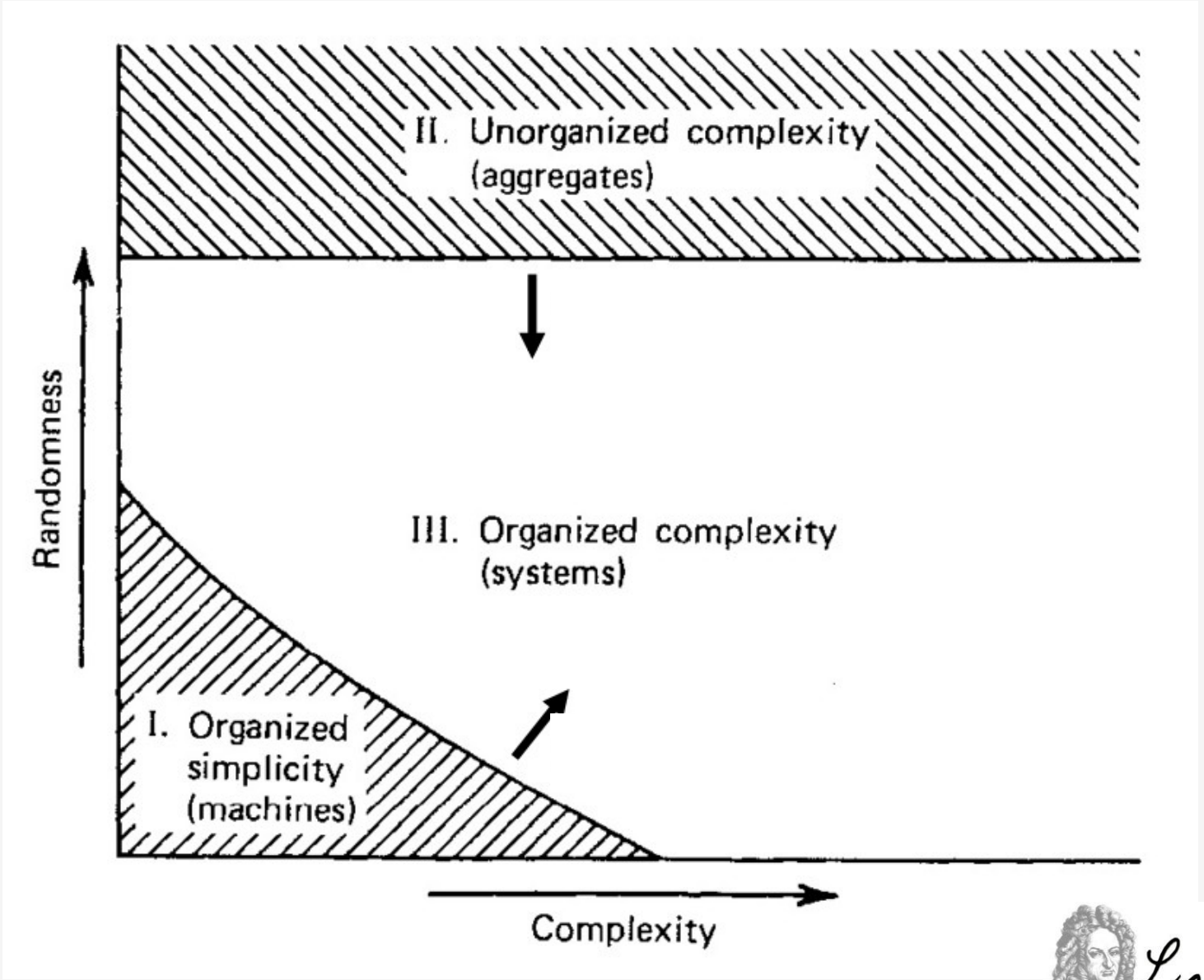


Why? **What?** **How?**

source: http://caminao.wordpress.com

Making sense of reality



VanRoy 2009,
Weinberg 1977

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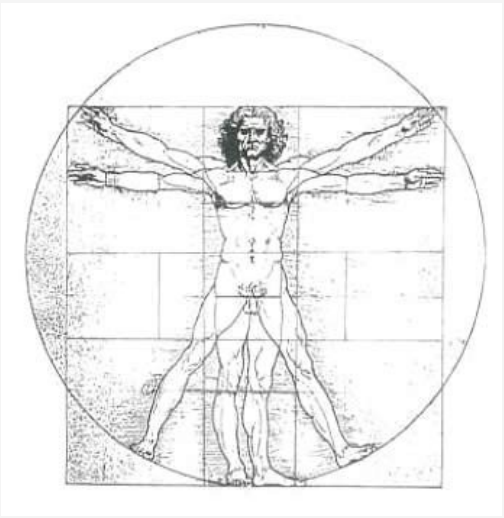
BIS: S as Systems

Systems

- A system is a set of interacting or interdependent components forming an integrated whole.

  Examples:
  - operating systems
  - biological organisms (e.g. the body)
  - theoretical systems (paradigms)
  - organizations…

Cybernetic view on Organizations



- Cybernetics is the study of *control* and *communication* in the **animal** and the **machine** (Norbert Wiener)
- The word cybernetics comes from Greek κυβερνητική, meaning *governance*, or the *art of steering*.

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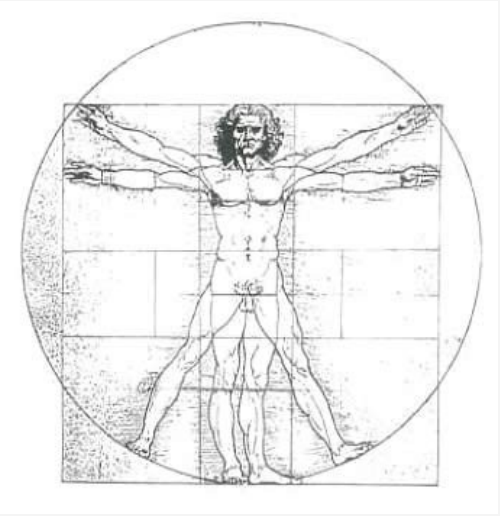
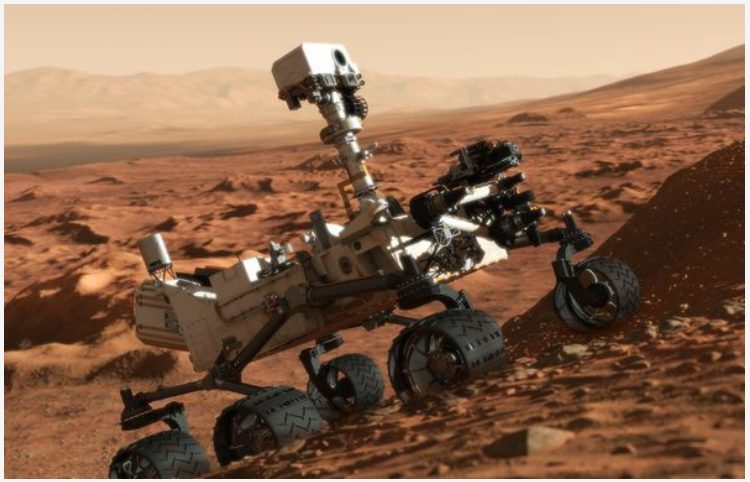
Focus on: *Viable Systems*



Viable means that the system aims to continue to **exist**.

In case of an artefact, at least until the time when its purpose has been achieved.



SAMSUNG

NOKIA

Microsoft

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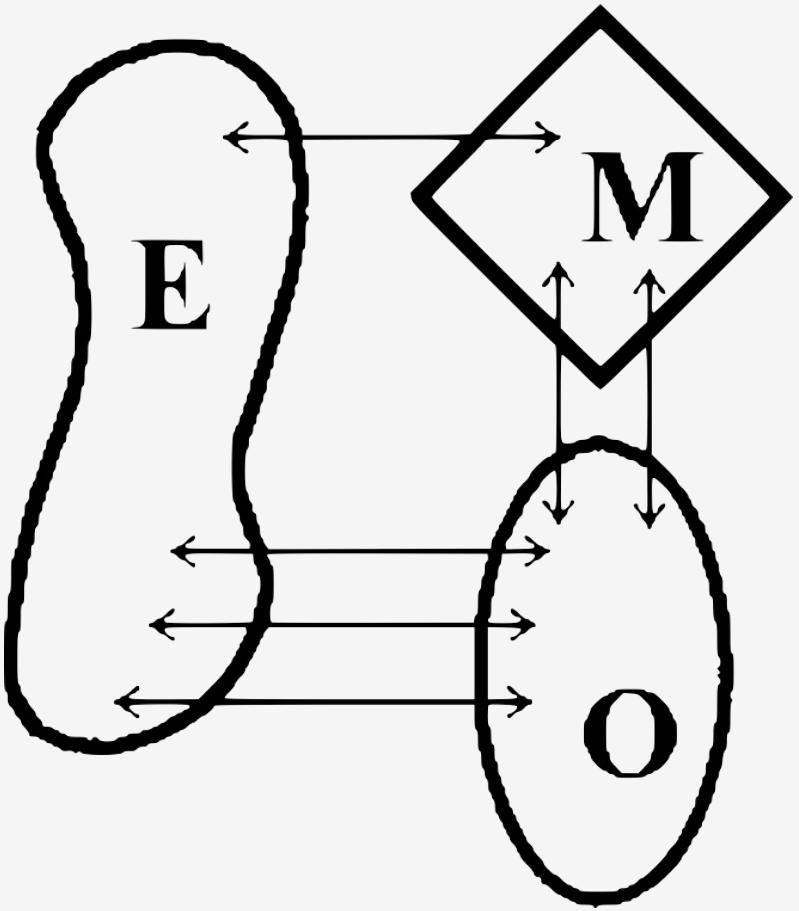
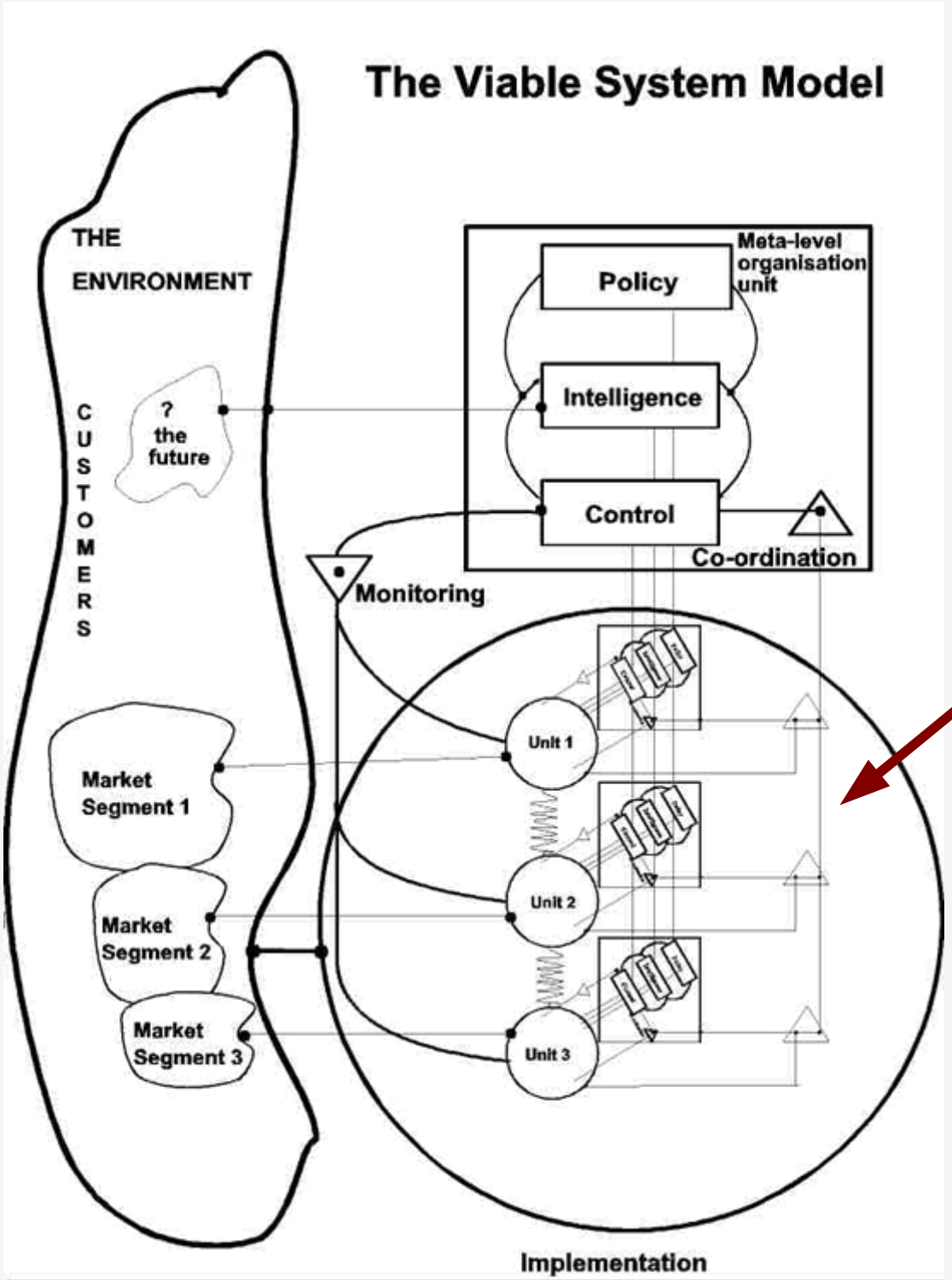
Viable System Model

- Three main components:
  - *Operation*: responsible of the primary activities.
  - *Metasystem*: hold the whole thing together.
  - *Environment*, the outside world which is of direct relevance to the system.



cf. Stafford Beer, Brain of the Firm, 1981



System 1:

Operations

Primary activities, operations, project teams, quasi-autonomous

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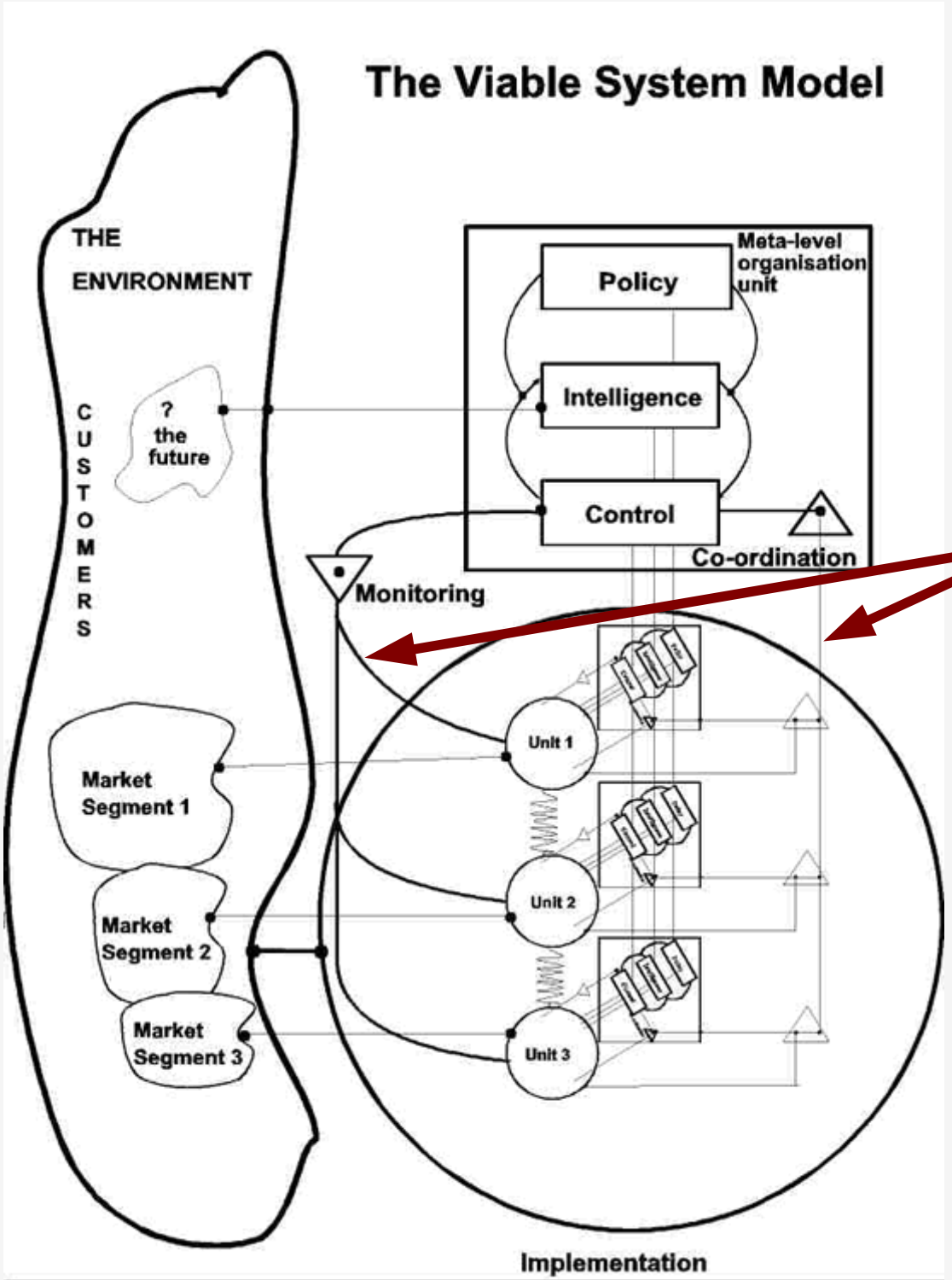

System 2

Connection

Communication, conflict resolution, stabilisation

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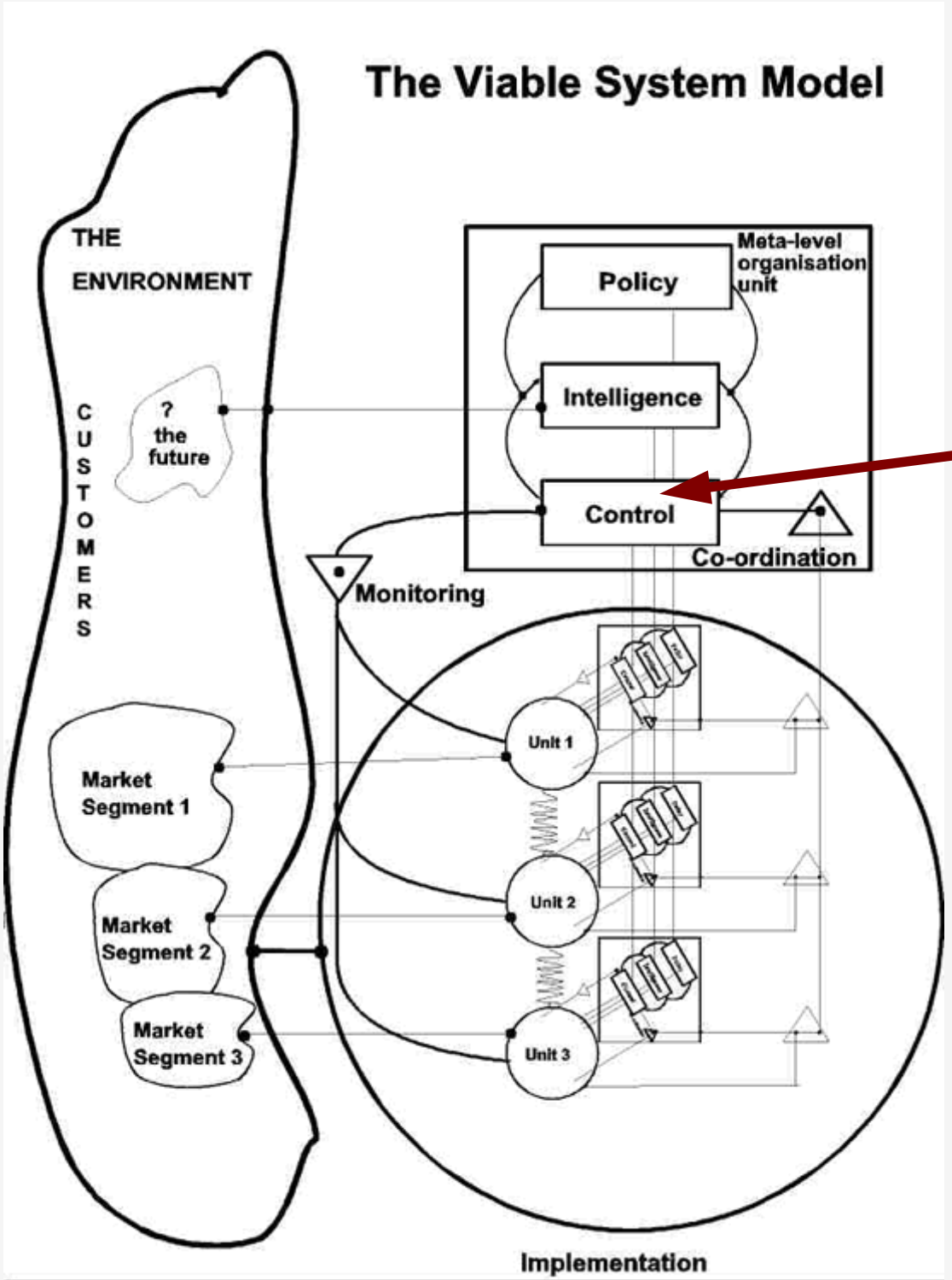

System 3

Cohesion

Internal regulation, optimisation, synergy

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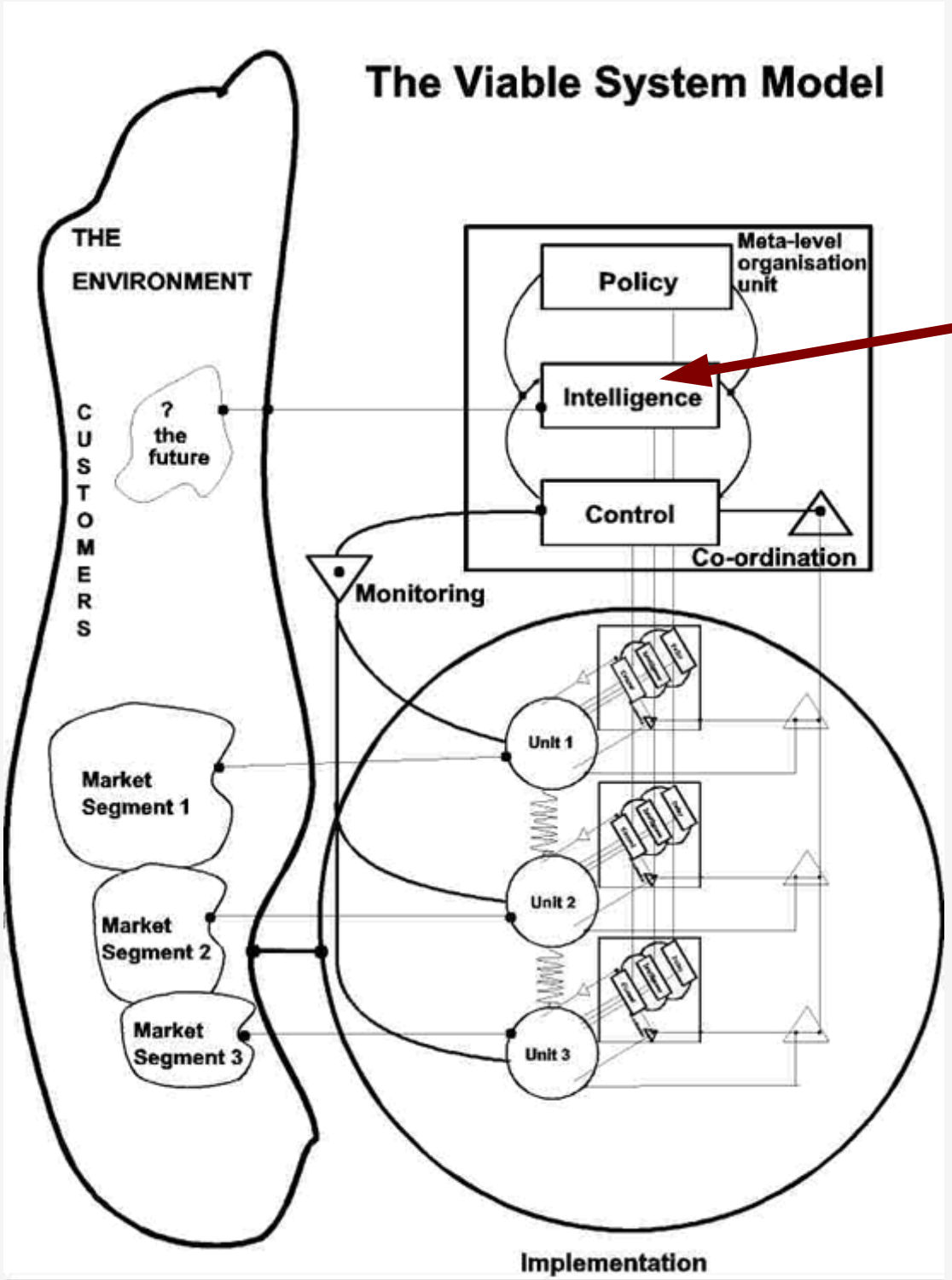

System 4

Intelligence

Forward planning, strategy, innovation

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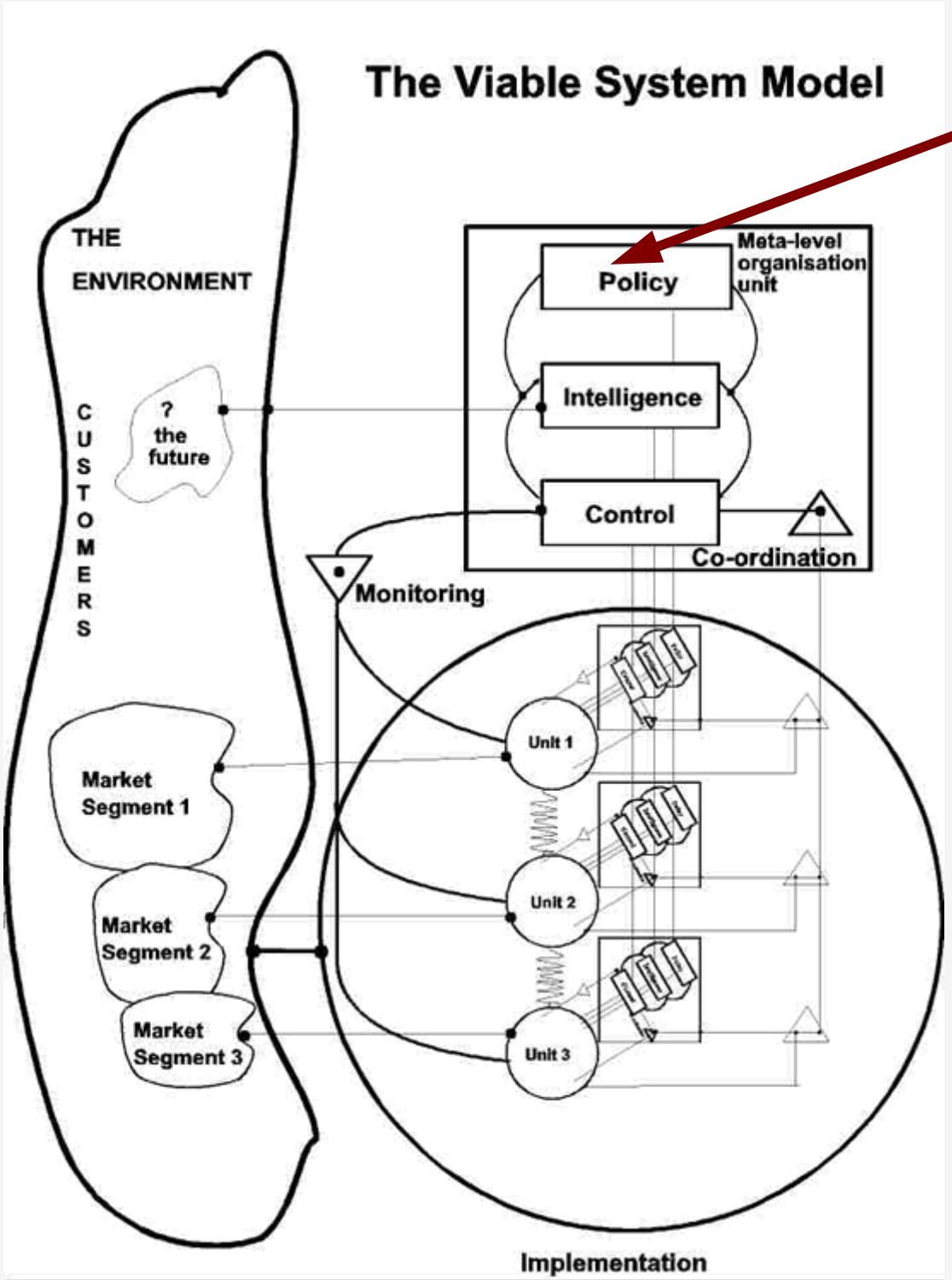

System 5

Policy

Ultimate authority, governance, identity

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BIS: B as Business

A practical example: call center

- "A manager of one of the world's largest banking operations told me that if he could reduce the average handling time in his call centres by 30 seconds he could deliver millions to the bottom line."

John Seddon, Systems Thinking in the Public Sector (2011)

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A practical example: call center

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- Common managerial thinking focuses on **cost**!

John Seddon, Systems Thinking in the Public Sector (2011)

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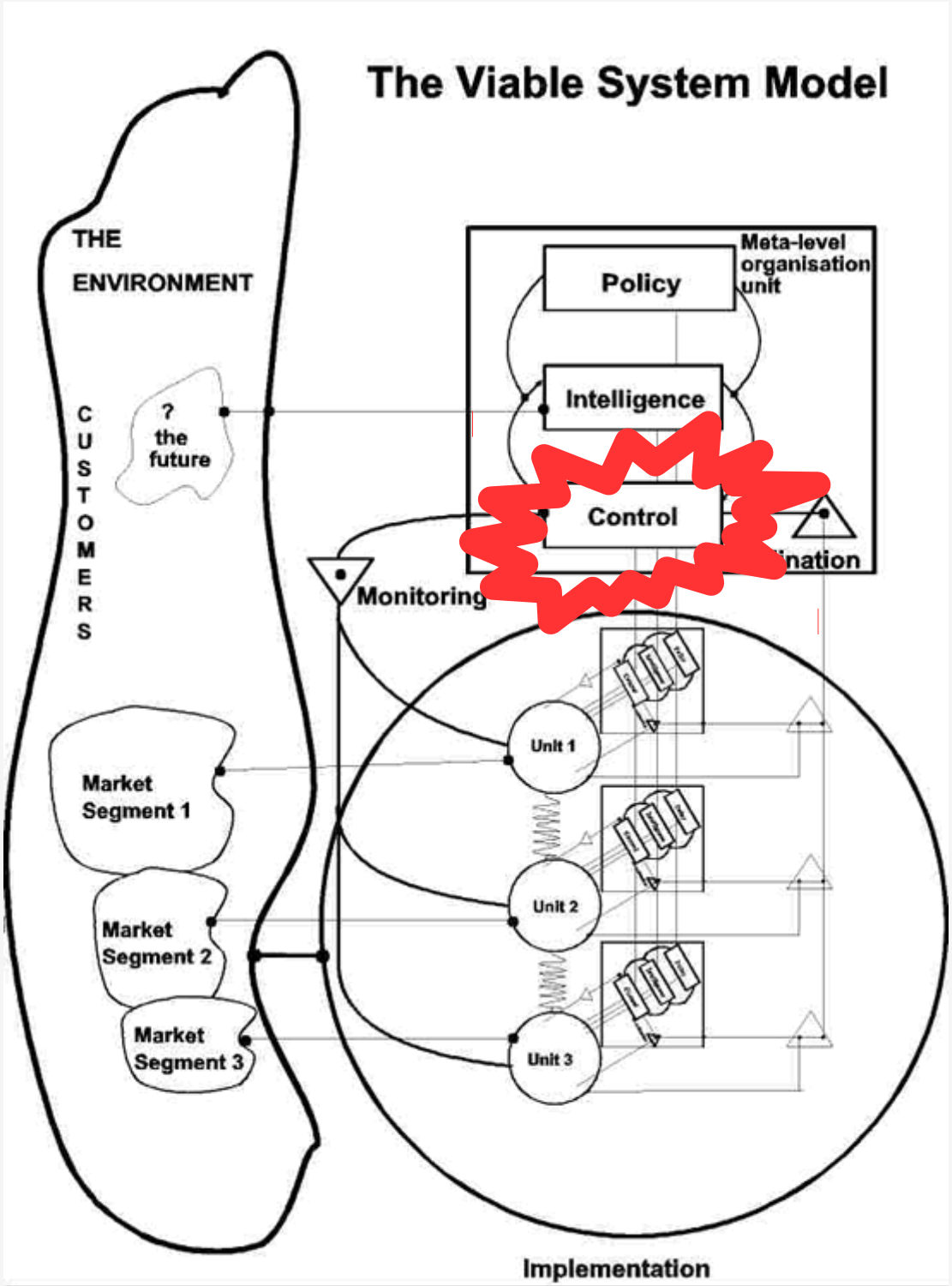

- consequence of the position in which management is placed!

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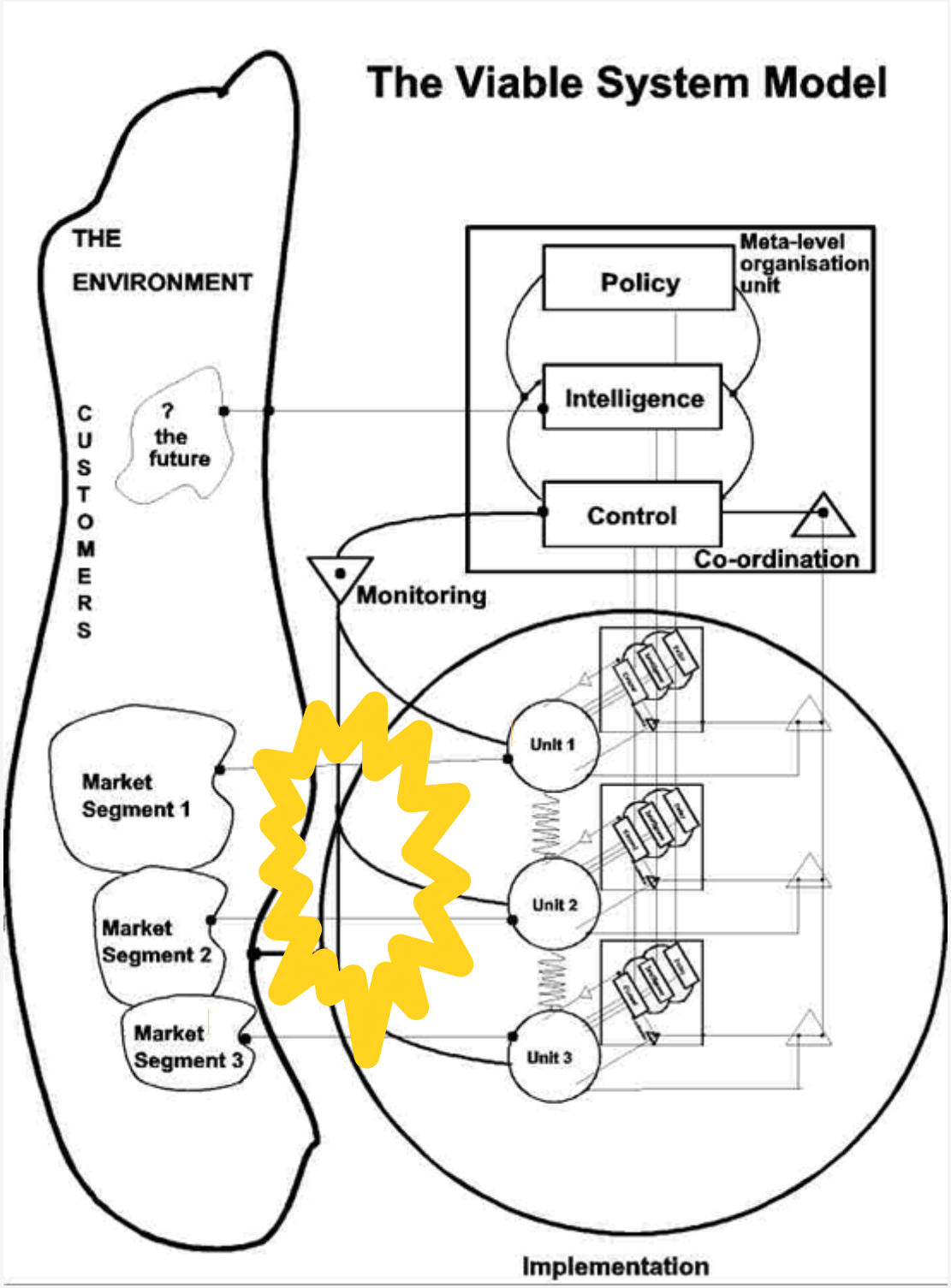
$$\text{Profit} = \text{Income} - \text{Cost}$$

Cost covers only half of the picture!

Profit = Income − Cost



- what happens at the system boundaries?

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A practical example: call center

- "A manager of one of the world's largest banking operations told me that if he could reduce the average handling time in his call centres by 30 seconds he could deliver millions to the bottom line."
- Type of *value demand* questions:
  - Can I have a loan?
  - Can you help me pay the bill?

John Seddon, Systems Thinking in the Public Sector (2011)

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BIS: B as Business

- Business driven by ***value demand***

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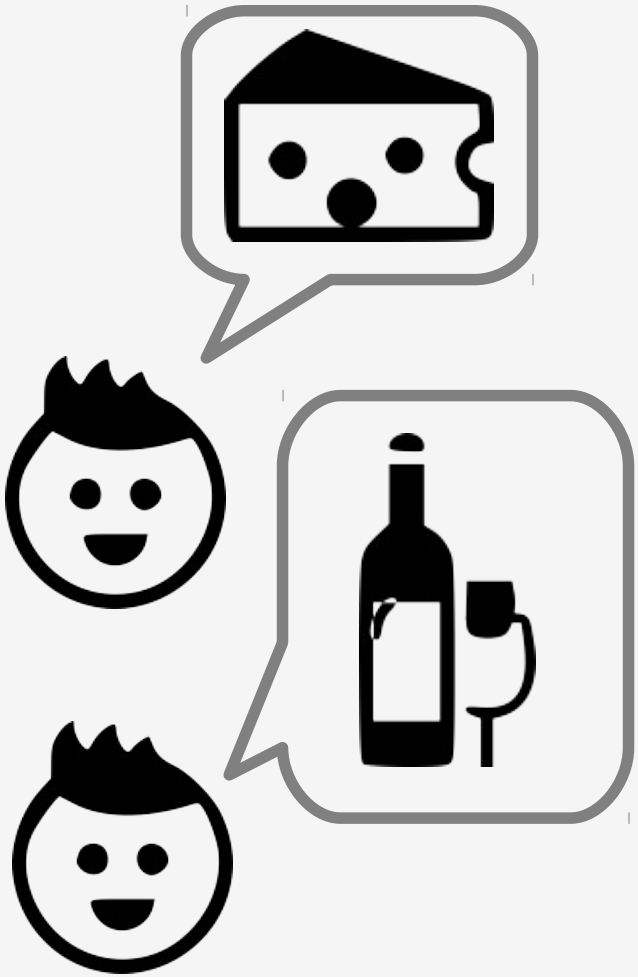

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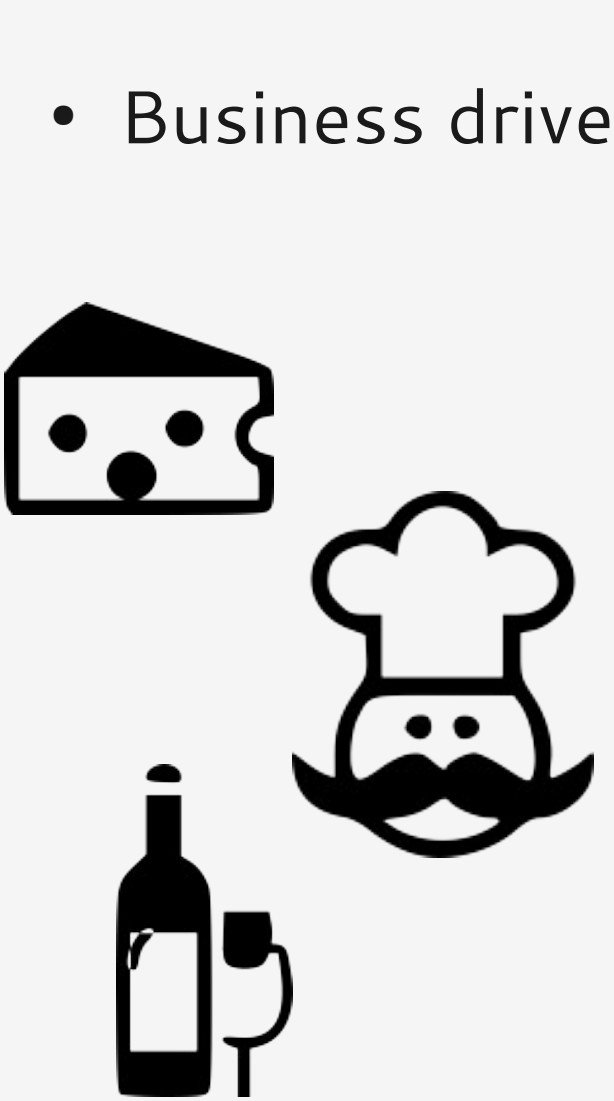

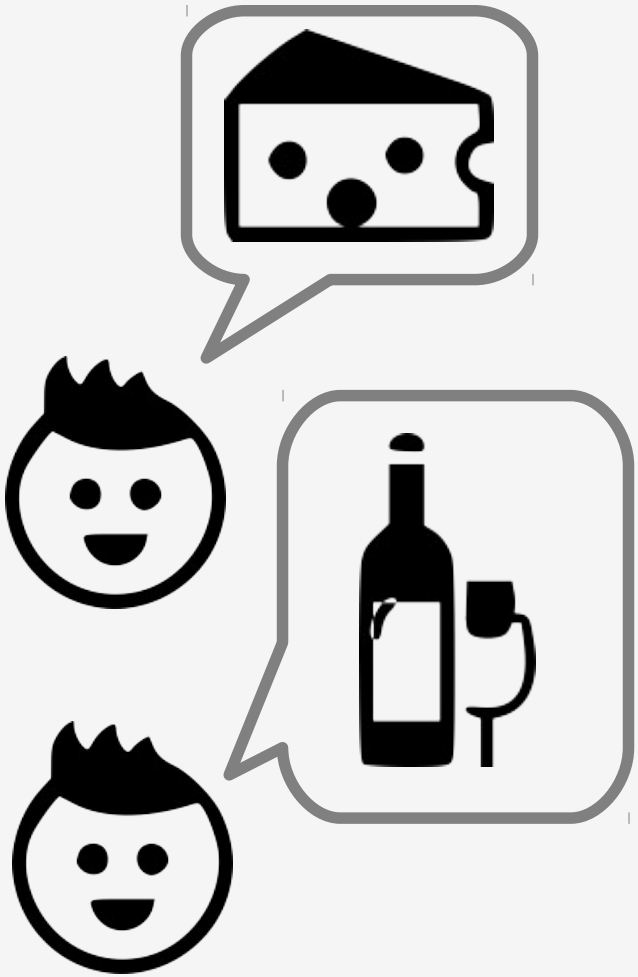

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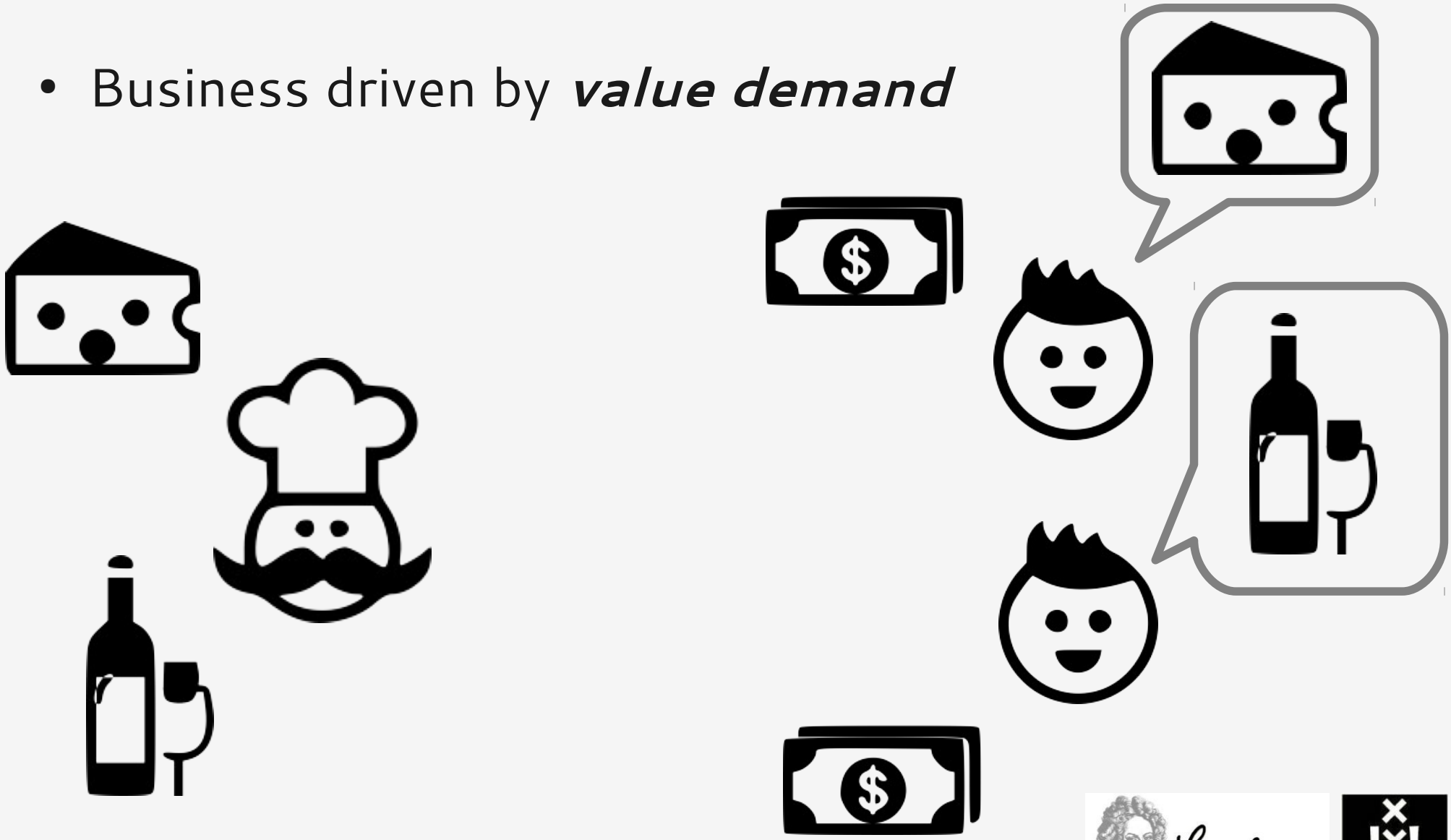

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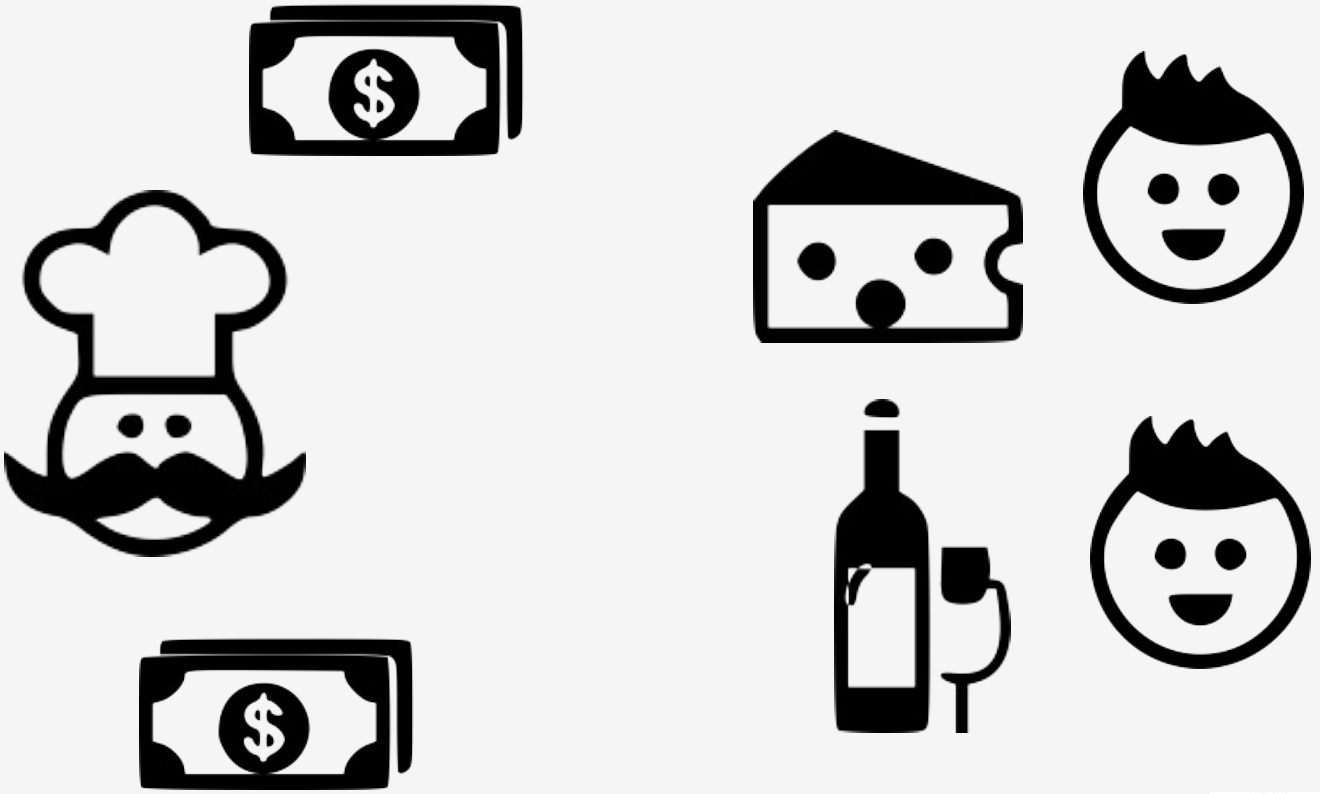

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BIS: B as Business

- Business "haunted" by ***failure demand***

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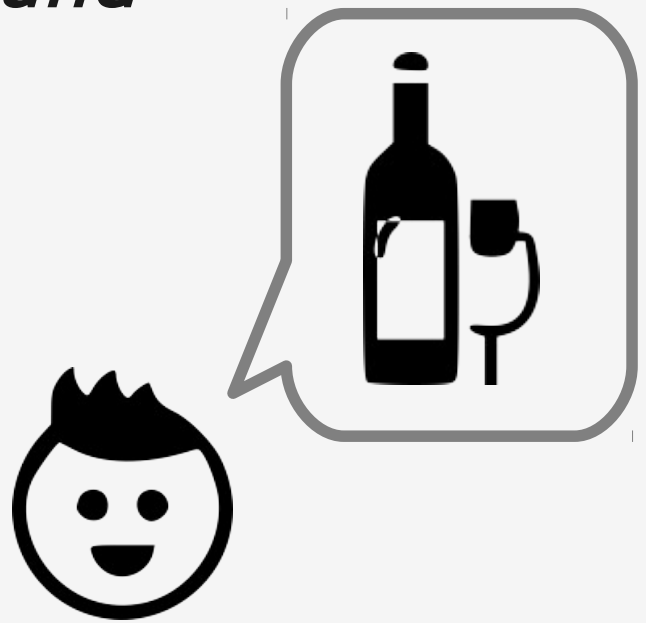

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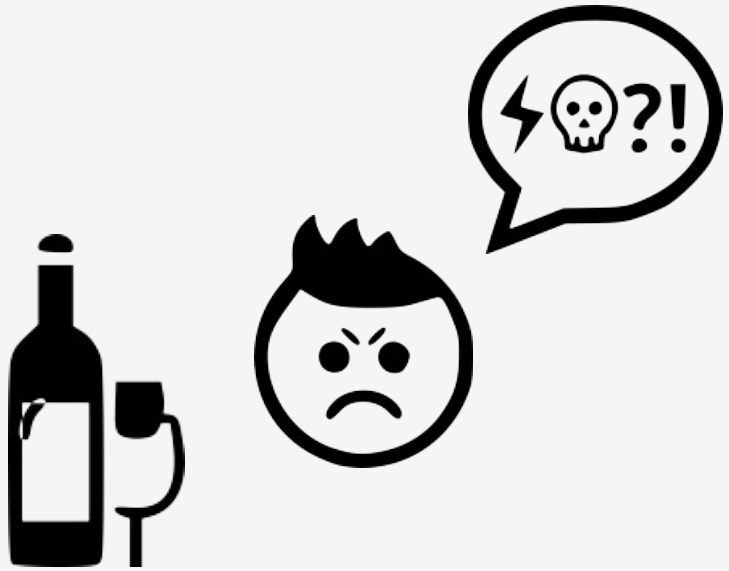

misalignment with expectations of the consumers

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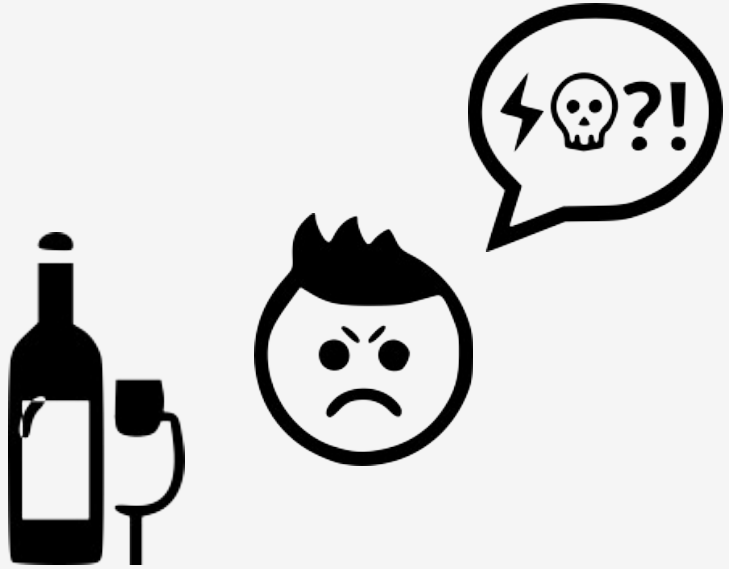

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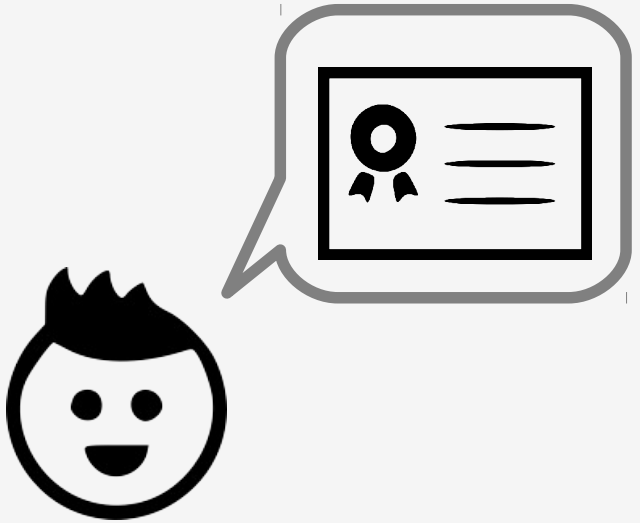

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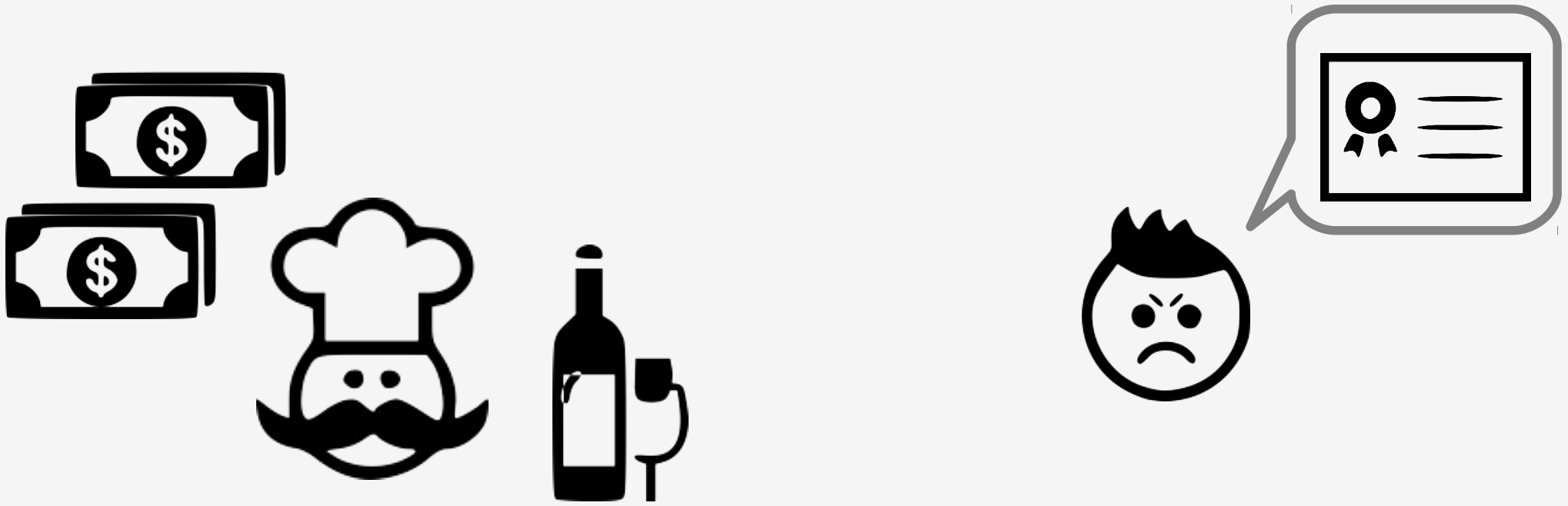

misalignment with legal requirements

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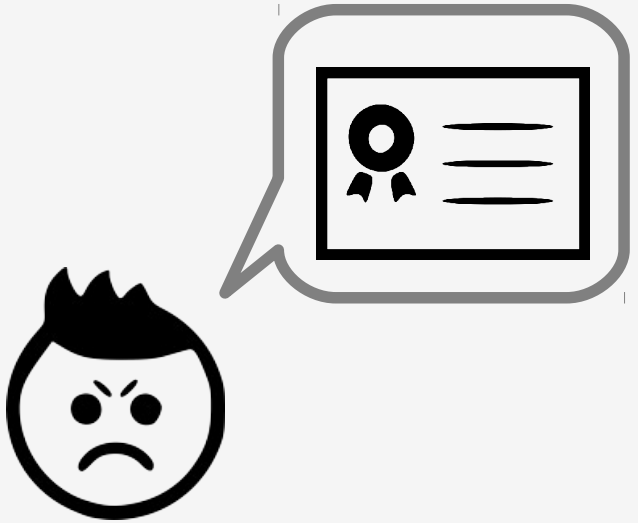

misalignment with legal requirements

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A practical example: call center

- "A manager of one of the world's largest banking operations told me that if he could reduce the average handling time in his call centres by 30 seconds he could deliver millions to the bottom line."
- Type of *failure demand* questions:
  - I don't understand this charge.
  - Why haven't you paid my direct debit?

John Seddon, Systems Thinking in the Public Sector (2011)

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Is failure demand only a cost?

- "A manager of one of the world's largest banking operations told me that if he could reduce the average handling time in his call centres by 30 seconds he could deliver millions to the bottom line."
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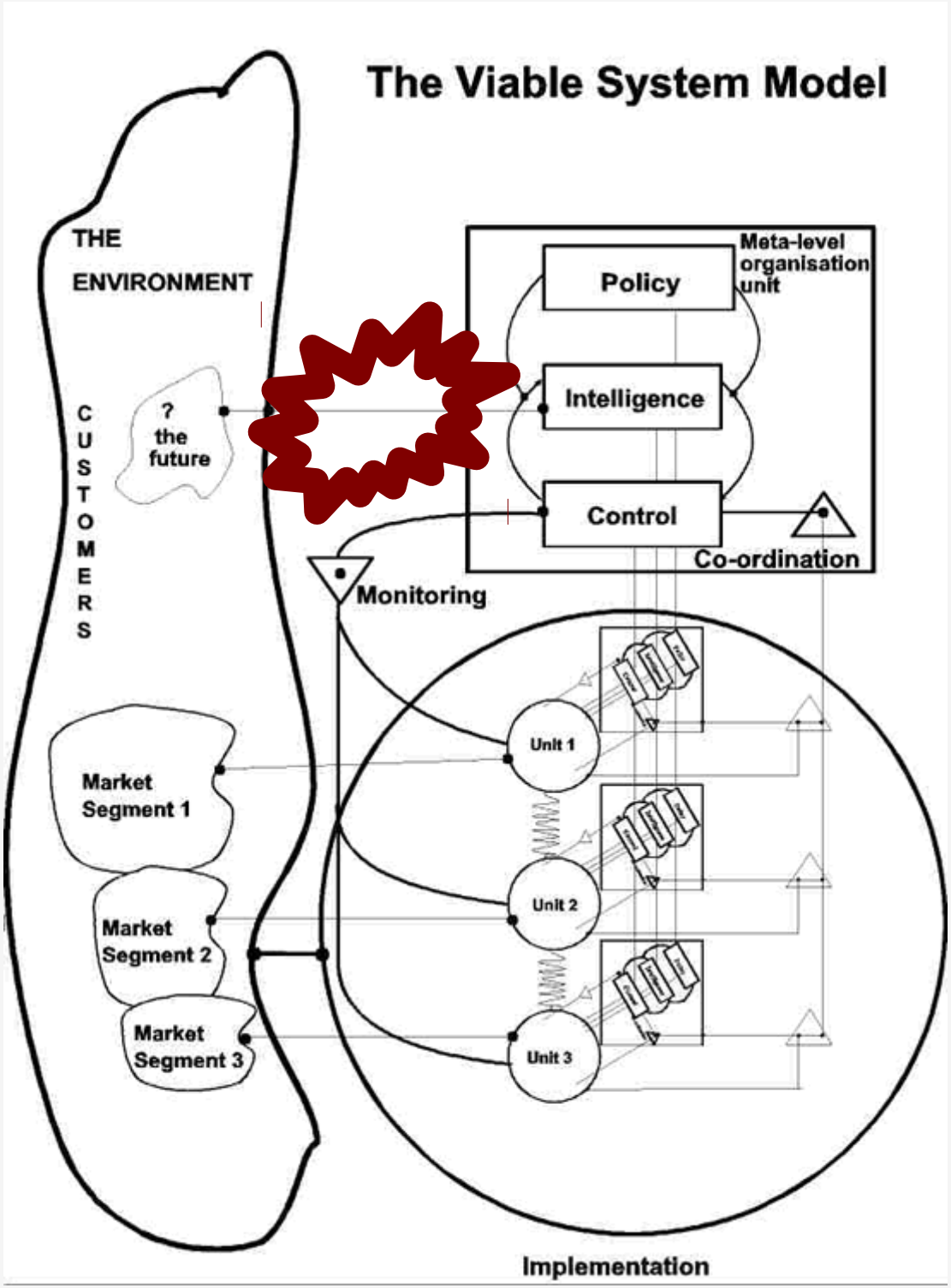

Market research and marketing practices necessarily take a higher level perspective!

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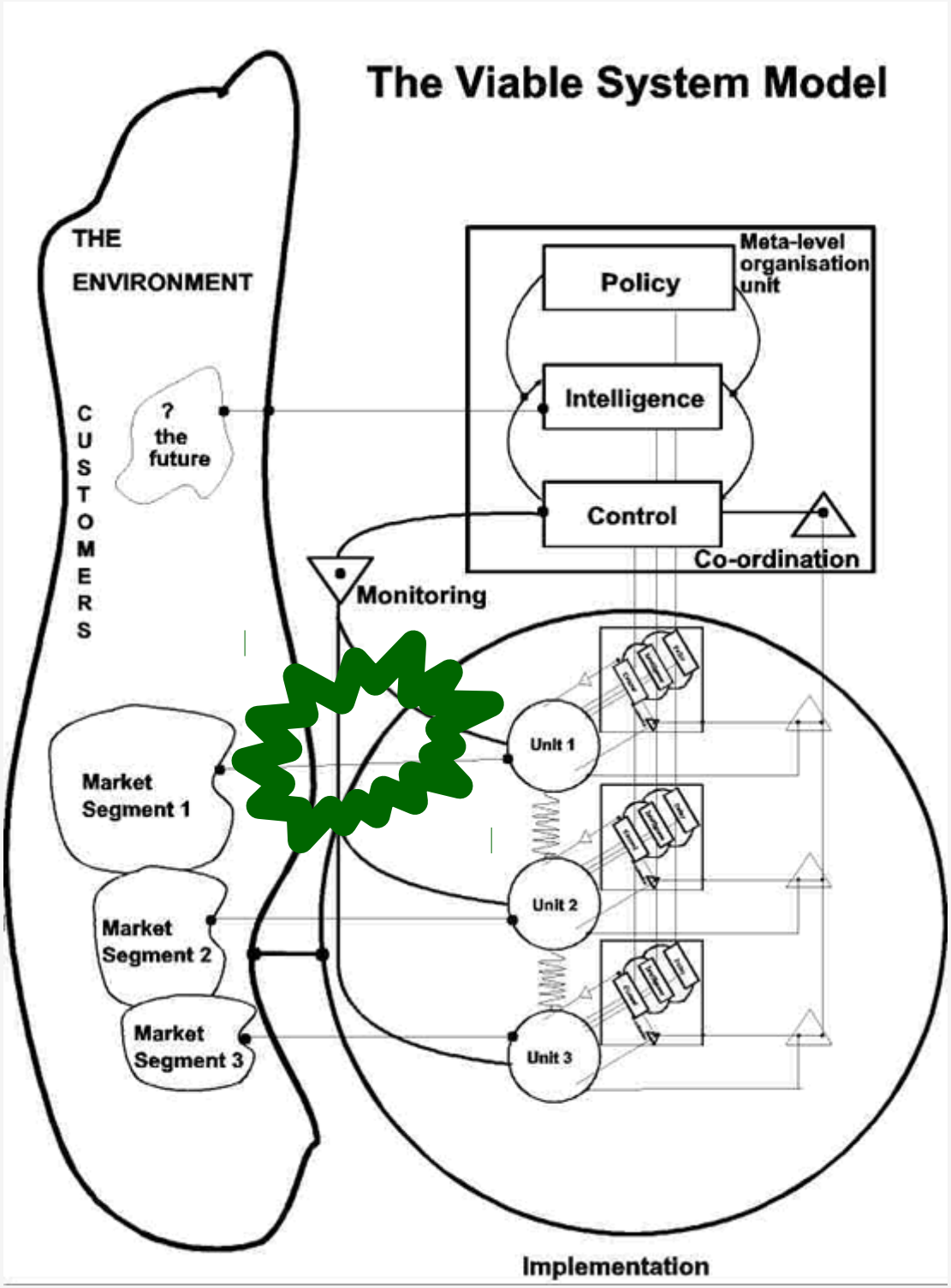

Missing something: knowledge of people at operations level.

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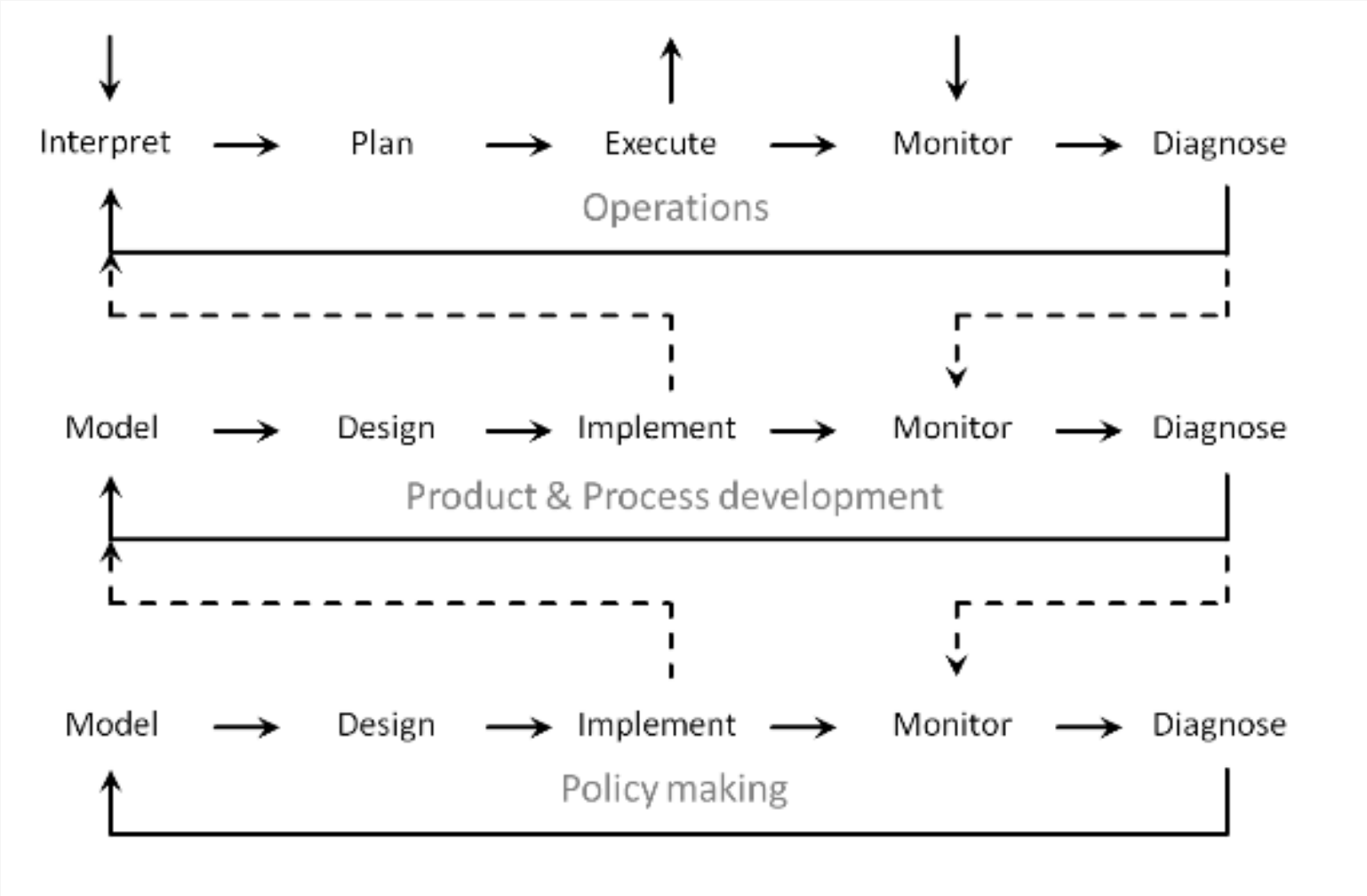
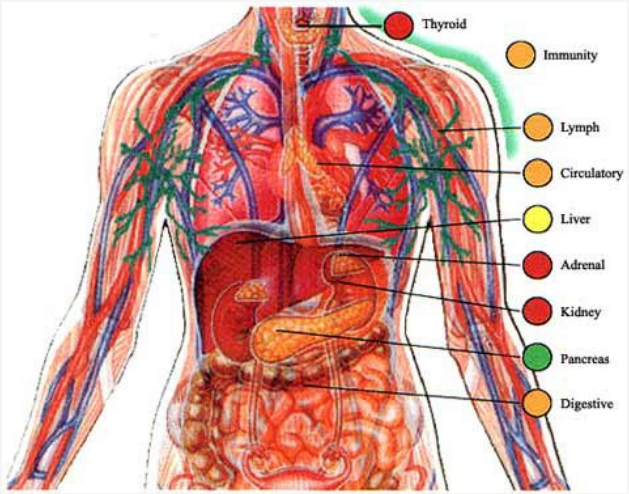
Three spheres of activities view



Missing something: knowledge of people at operations level.

Something is missing...

Systems conceptualizations: *Totality* vs *Assemblage*



- **organicist** metaphor
- components defined by relations of interiority
- connections logically necessary
- world of necessity

- **symbiosis** metaphor
- components defined by relations of exteriority
- connections contextually obligatory
- world of possibility

Basic assemblage

- If we take a simple grain of sand..
- it has a certain structure (mass/volume), forming its individual shape
- which is subjected to certain physical laws (among which the law of gravity)

- Imagine now to drop grains of sand from the same fixed position...

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Basic assemblage

- A pile of sand is a whole, composed by interacting grains.
- Its macro-characteristics are a consequence of the micro-characteristics of the components
- Landslides occur in critical points, when the system attempts to go beyond the maximum threshold of the structure

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Assemblage: a characterization

- Organization from individual to collective entity requires **coordination capacities** (ex. the piling up of the grain of sands)
- Maintenance of the collective entity requires **reparation capacities** (ex. the strengthening after landslides)

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Social (human) systems

Human communities can be seen as systems of interacting components (subsystems or system aggregates) defined by structure and behaviour → e.g. organizations

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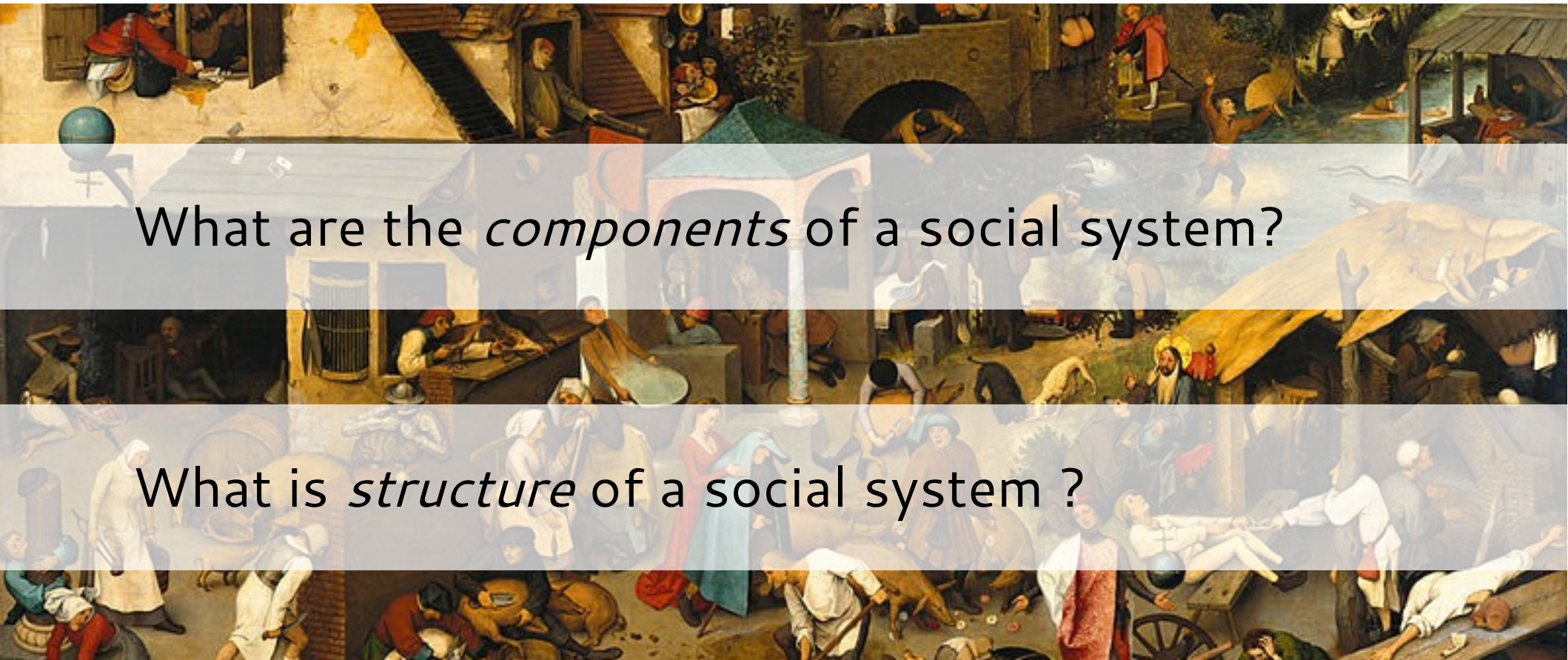

What are the *components* of a social system?

What is *structure* of a social system ?

Going further: Complex Adaptive Systems (CAS)

- **Aggregate behaviour**
  - A collective behaviour emerges from the interactions of the parts

cf. John H. Holland, Complex Adaptive Systems (1992)

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Going further: Complex Adaptive Systems (CAS)

- **Evolution**
  - The parts evolve in a Darwinian fashion: there is a ***selection***, and in general they improve the ability to survive in their interactions with the surrounding parts.

cf. John H. Holland, Complex Adaptive Systems (1992)

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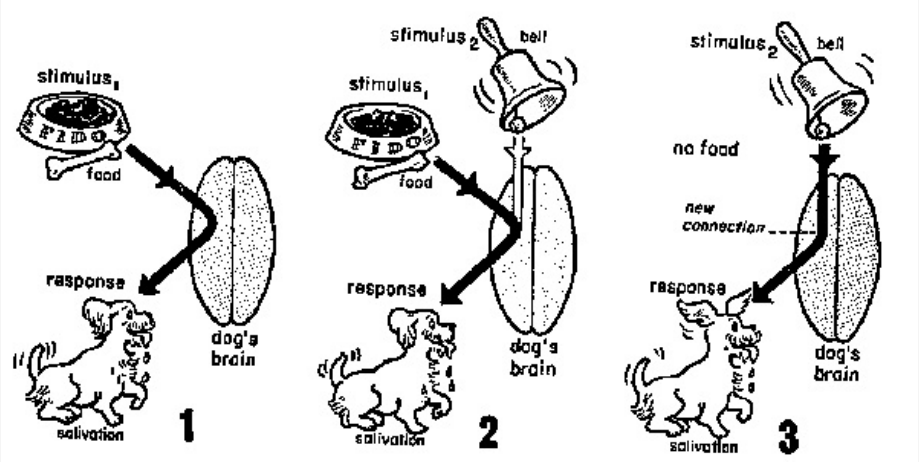
Going further: Complex Adaptive Systems (CAS)

- **Anticipation**
  - The parts develops rules that anticipate the consequences of certain responses
    - e.g. Pavlov's studies



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Going further: Complex Adaptive Systems (CAS)

- **Anticipation**
  - The parts develops rules that anticipate the consequences of certain responses
    - e.g. Pavlov's studies
    - e.g. Oil, water shortage

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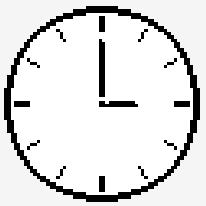
Anticipation and *teleological* thinking: how we model that?

physical stance

interpreting using
the physical laws



design stance

physical stance

interpretation related to what the entity is supposed to do (i.e. has been designed to do)

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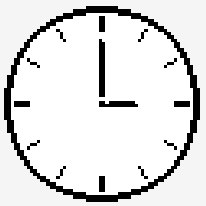

sometimes it breaks!

design stance

physical stance

interpretation related to what the entity is supposed to do (i.e. has been designed to do)

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intentional stance

design stance

physical stance

interpreting an entity as an ***agent***, ascribing him **beliefs, desires, intents** and *enough rationality* to do what he *ought to do* given those beliefs and desires

cf. Daniel Dennett, The Intentional Stance (1987)

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- institutional stance
- intentional stance
- design stance
- physical stance

interpreting an entity as a member of a social collective entity, and ascribing him **institutional powers**, **duties** and **prohibitions**.

Agency

As humans, we tend to think of groups, organizations, countries, cultures and other entities as agents.

Agentic characterization

Therefore, an agentic characterization (intentional and institutional) provide the key for **models of social behaviour**

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Therefore, an agentic characterization (intentional and institutional) provide the key for **models of social behaviour** → *stories, user cases, hyp. scenarios!*

Views available in narratives

	agents have behaved	agents usually behave	agents should behave
How	occurrence description	pattern description	normative specification
Why	occurrence explanation	behavioural mechanism	norm-creating mechanism

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Our current research concerns a representational *alignment* of these views.

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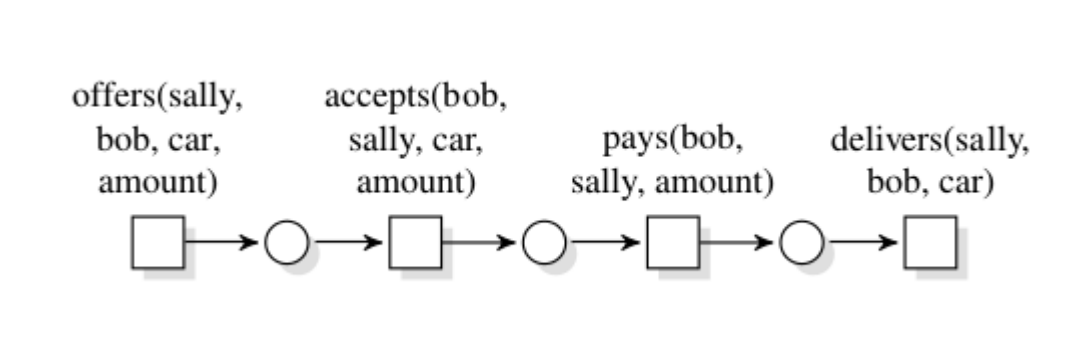
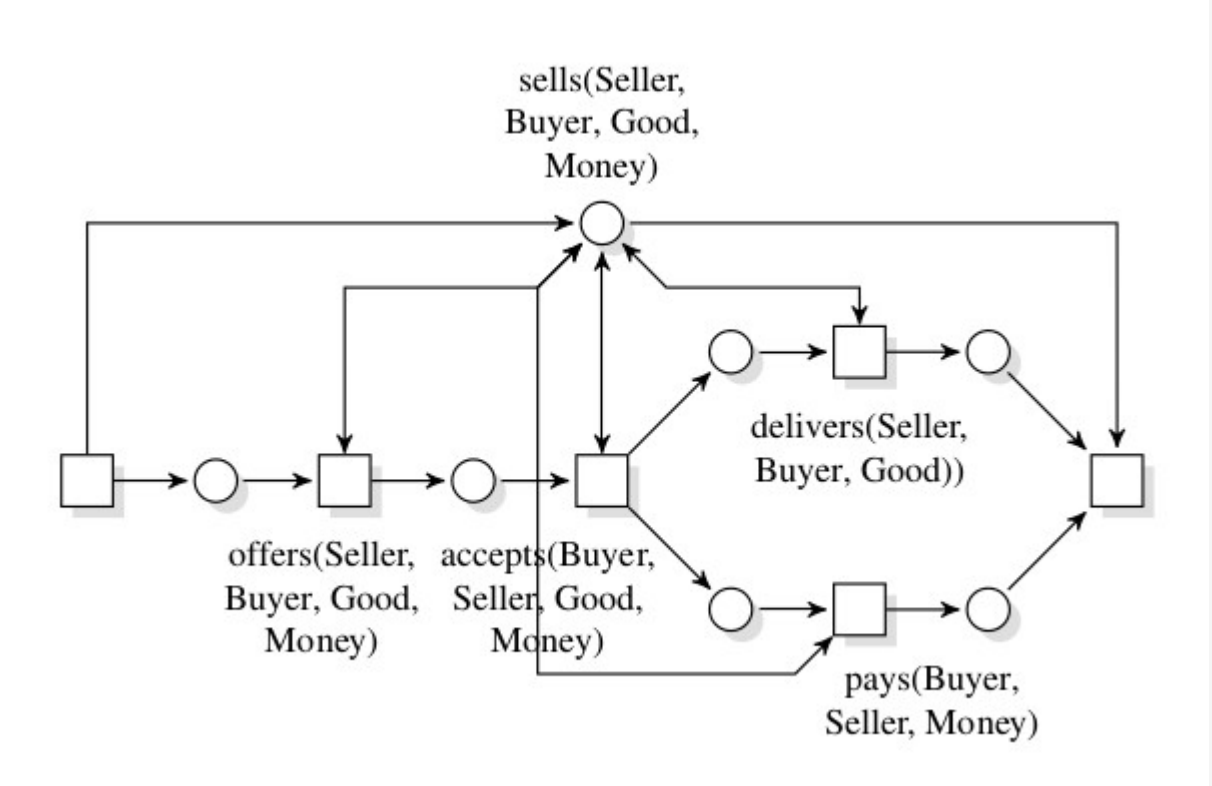
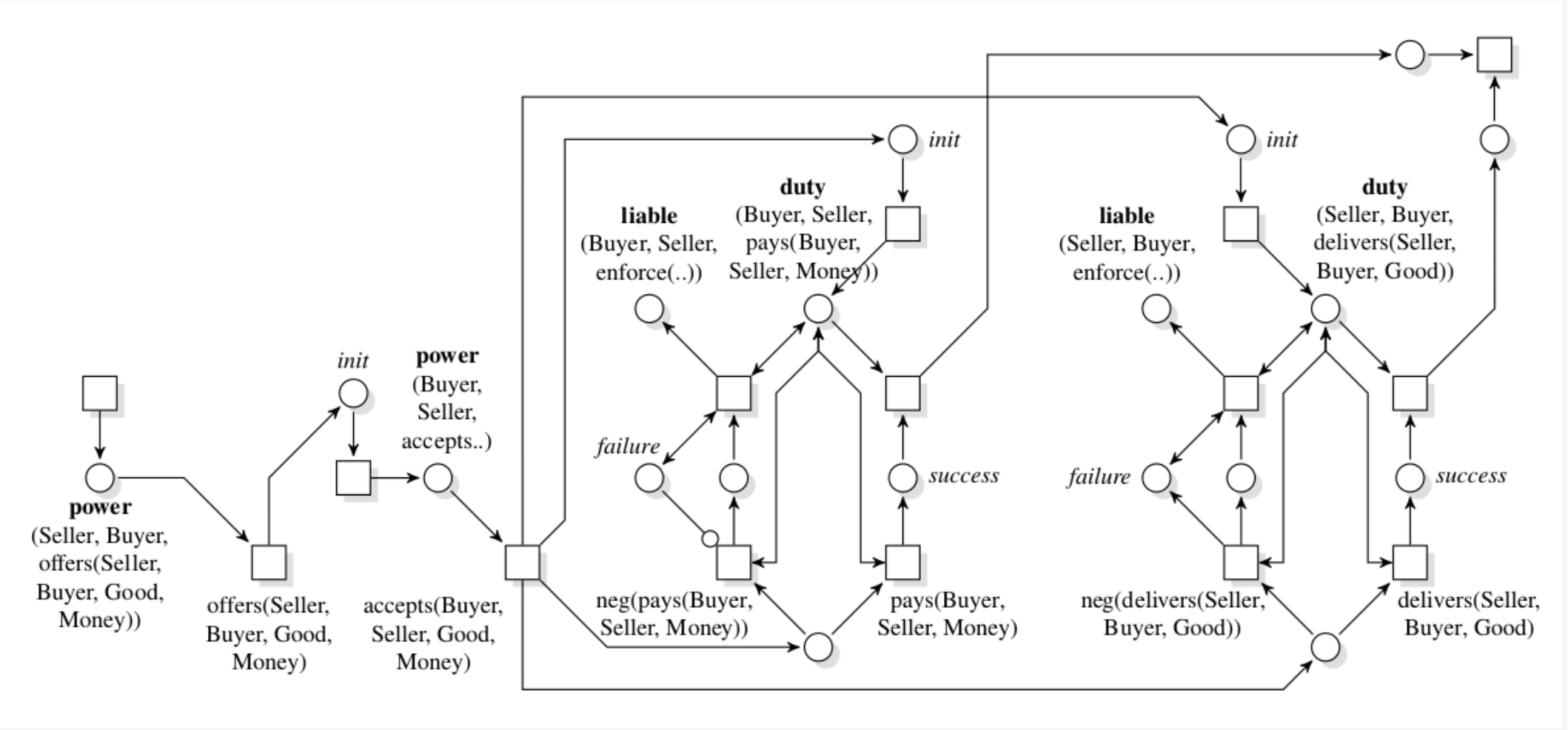
Example: occurrence description



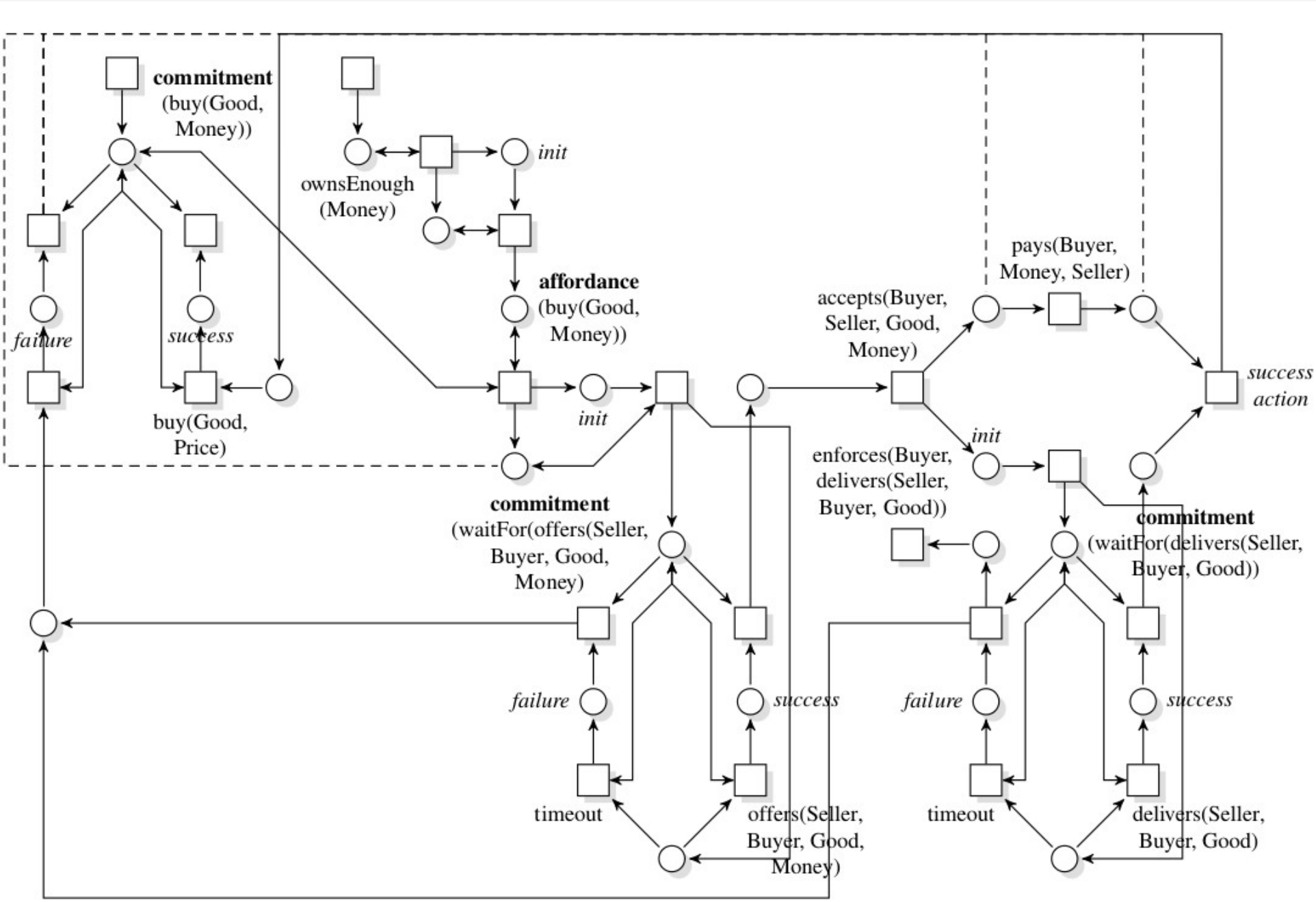
Example: pattern description



Example: normative specification



Example: agent-role script



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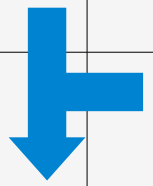

- Occurrence intepretation, Model-based diagnosis

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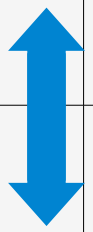

- Occurrence intepretation, Model-based diagnosis
- Validation of design against environmental models

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- Occurrence intepretation, Model-based diagnosis
- Validation of design against environmental models
- Verification of compliance

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Conclusions

Conclusions

An adequate computational framework should support an organization in:

- **responding** to a problem, testing the case available data against a database of known scenarios
- **adapting** to a problem/opportunity, transmitting to the designer/policy maker prototypical scenarios not yet accounted

Conclusions

Most of the economic, decision-making theoretical models starts from **closed-world assumption**.

The *closure* of the system comes by design or as strict assumption → basis for all analytical tools.

Similarly, business process practices tend to consider the human factor an *accident* rather than of an essential operational characteristic of the system.

Conclusions

However

guidance != control

as institutions/organizations influence agents, agents influence institutions/organizations

→ we need a ***constructivist*** approach toward organizations, i.e. considering that the components and the environment are adapting as well