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*Industrial Operations / Information Processing Convergence*

*Control Chain Management Body Of Knowledge*

# MI - Make intelligence actionable VSM (preliminary)

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# Agenda

- Short overview

# Fractal model to describe a complex world

- Benoit Mandelbrot's fractals are a graphical tool to describe complex nature's shapes
- The same approach is relevant to the systemic view of the world
- A complex system – like an enterprise – is part of other systems, themselves embedded in larger systems
  - The Universe
    - The Milky way galaxy
      - *The solar system*
        - The Earth system
          - The multinational company
            - The main business entity
              - The main departments : R&D, sales, marketing, production,
                - A given facility...

# What is a system?

- **The definition of the boundary of a system is mainly up to the observer**
  - Common sense suggests some breakdown as exposed before
  - In all cases, this breakdown has the only purpose and relevancy in the context of our search of understanding and controlling our environment
- **Actually, the chosen breakdown establishes**
  - Hierarchy levels
    - Normally consistent
    - Level might be skipped for simplification purposes
  - Selected boundaries
    - There are often gray area between interacting systems, with possibly shared components

# Viable System Model (VSM)

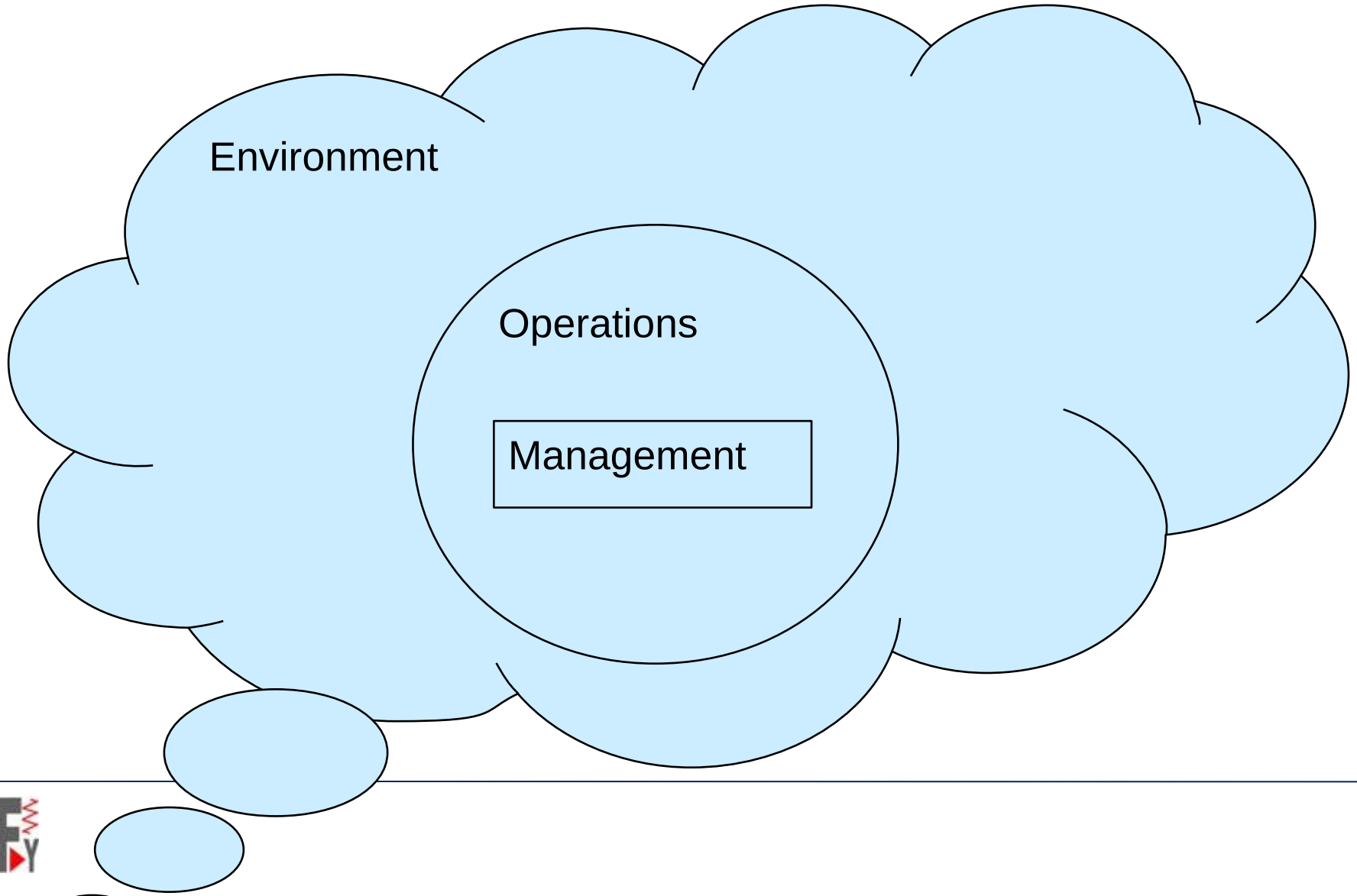
- **Developed by Stafford Beer until 1972**
- **The VSM, as any attempt to satisfy our thirst of truth has no intrinsic, absolute value**
  - Beer himself presents VSM as a guideline for checking systemic constituency for a viable system
  - It is yet a valuable map to capture more understanding
- **The VSM was build upon the well recognisable systemic patterns of biological organisms.**
- **The VSM model is valid at any level of recursion that is considered**
- **The VSM model defines 5 “systems” (or more exactly layers/facets) in a given “system recursion”**

# Viable System Model

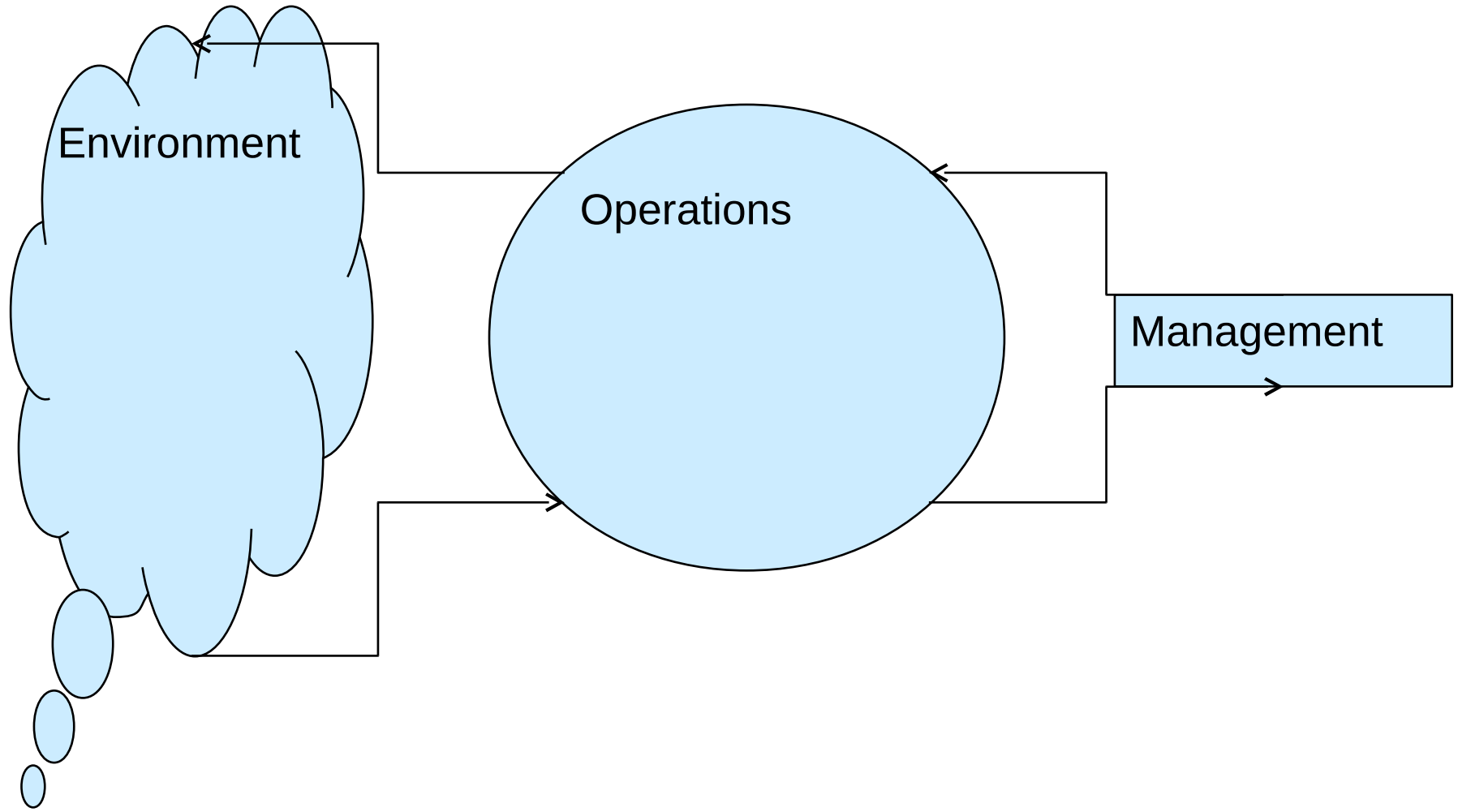
VSM	Beer	Other	Operational department
System 5	Higher Management	Policy	Steering
System 4	Environment of decision - War room	Development	Transformation
System 3	Directorate	Delivery management & monitoring	Planning
System 2	Regulatory center	Coordination	Coordination
System 1	Activity	Operations Implementation	Implementation Support Operations

# Management unit

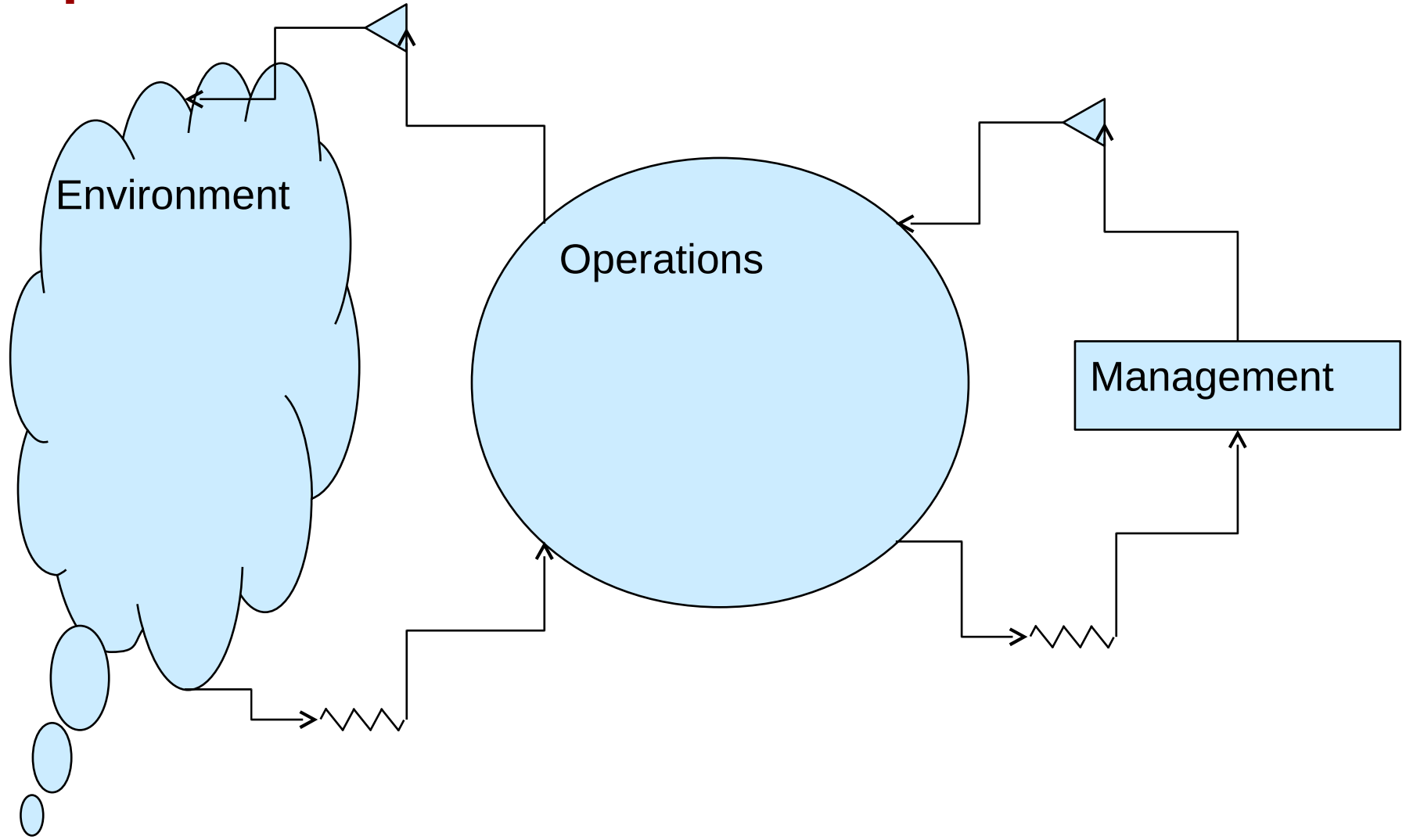
Variety increases from Management -> Operations -> Environment



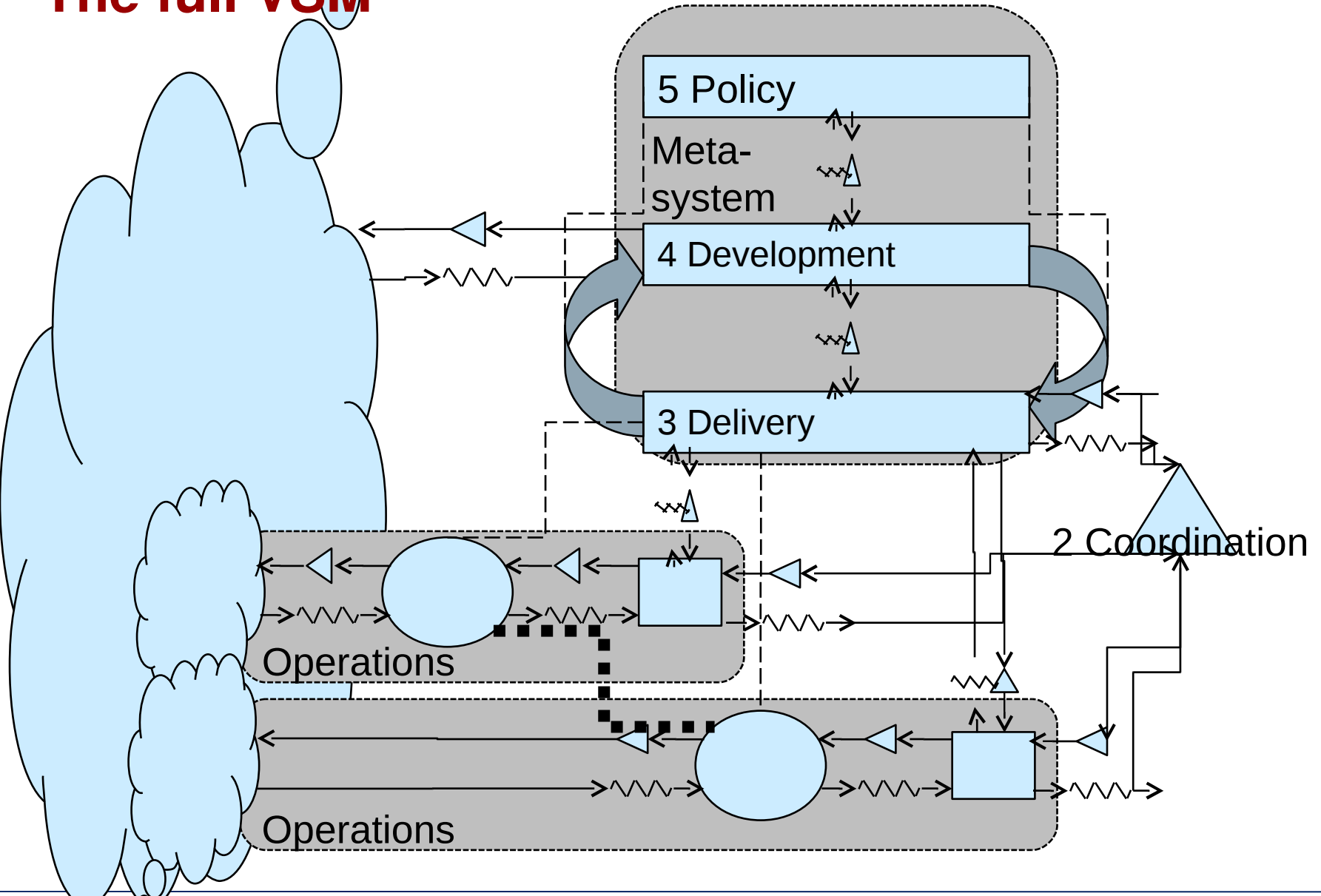
# Separate the 3 domains



# Introducing variety/complexity control: filters and amplifiers



# The full VSM



# From "The Heart of The Enterprise"

ch of the three divisions. If each division has three operational companies, there will be nine company models. By the same token, there will be twenty-seven plant models. The total number of departmental models will be eighty-one. But it is very necessary to resist the 'family tree' impression of this expansion, which is reductionist: that leaves us with a hundred and twenty-one models strung up the side of the building, which is too many — even if the models are structurally identical. These models are nested; therefore each level of recursion is connected only with four models: its own, and its three models contained operational elements.

to the diagram well exhibits the *idea* of structural recursion — a word generalized because it is no more than it says: an imagining. The connectivity of the logic, that is to say the isomorphic mapping itself, is not shown. The same is true of the depiction of the total model portrayed at Figure 27 in *Brain of the Firm*, in which again the *idea* of recursion is conveyed by implanting the total model within each operational circle of the next higher level of recursion. (This device is of course equivalent to that used in Figure 51, which amplifies that very operational circle into the total model.) It is well to mention that these devices are not more than indications of recursiveness, since both have been widely reproduced by other workers — some of whom have been misled to incorrect conclusions about the mapping that is strictly involved.

please think through what the difficulties of iconic representation are, because they are concerned with dimensionality: and dimensions (which are conditions of existence) offer the enrichment of this model which its full comprehension requires. The fact is that each recursive step moves the model into a new dimension; so that a model involving six dimensions, representing six recursions, is impossible to depict geometrically. Indeed, it is difficult to represent a model of even two recursions, although this page has two dimensions available, as we shall now see.

We need to illustrate how one viable system is embedded within another, so that its logical connectivity is preserved. The problem became vivid for me during work some years ago for the Government of Alberta in Canada. This government, like any other, is traditionally divided into departments — which are its operational elements. But, also like any other government, its practical agencies for communal activity are grouped territorially. This is the meaning of the two-dimensionality of recursiveness. The first problem, which ought to be mentioned in passing, was that there were too many departments and too many constituencies — as is usual. 'Too many'? Oh yes: the proliferation of variety determined by a matrix of departments-by-constituencies was way beyond the capacity of the human brain, however redoubtable the chief ministers undoubtedly were. Some variety engineering was needed, before any kind of sense could be made of *any* model. The departments of government were grouped into categories which I called 'foci of concern'.

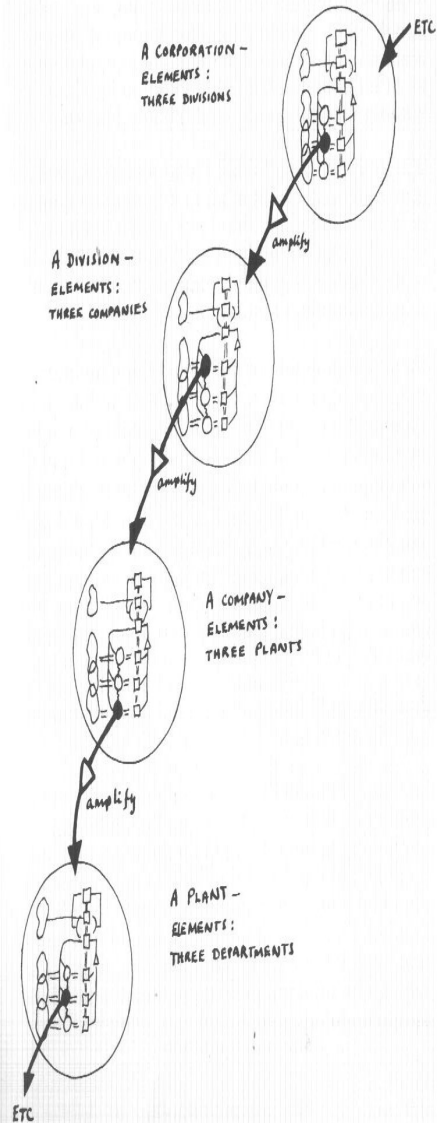


Figure 53. The organization of the information conceived of as a recursive process.

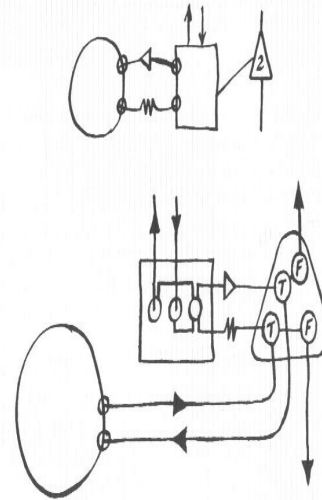


Figure 54. Replacing the familiar convention for System Two with a more elaborate one

the two small circles inside the regulatory centre marked with T are the managerial transducers of information to and from the operation itself; and the circle in the management box to which they are connected stands for that part of the managerial function that is concerned with directing operations (it is the System Three of the next level of recursion down). The other two circles in the box (its inward System Five) are shown as maintaining this box and its horizontal operations in the vertical domain on the central axis of the model (see System One) it is. The small circles in the regulatory centre marked with F are filters of the information flow, which feed only such information as is needed for systemic damping purposes into the vertical domain of System Two.

In using this device, we now redraw the general model that has been twice emptied already. The familiar picture is called Recursion x: it is the one on which we are focussed. Then Recursion y is the contained viable system. By drawing y at right-angles to x, it proved impossible to embed the y environments in the x environment. By drawing y in the same dimension as x, thereby embedding the environments, two images of the operational circles were created, and could not be forced into alignment. In the next diagram, then, Recursion y is included at an angle of 45°. Because of the new presentation of System Two, it is possible to make the isomorphic mapping between the levels of recursion complete.

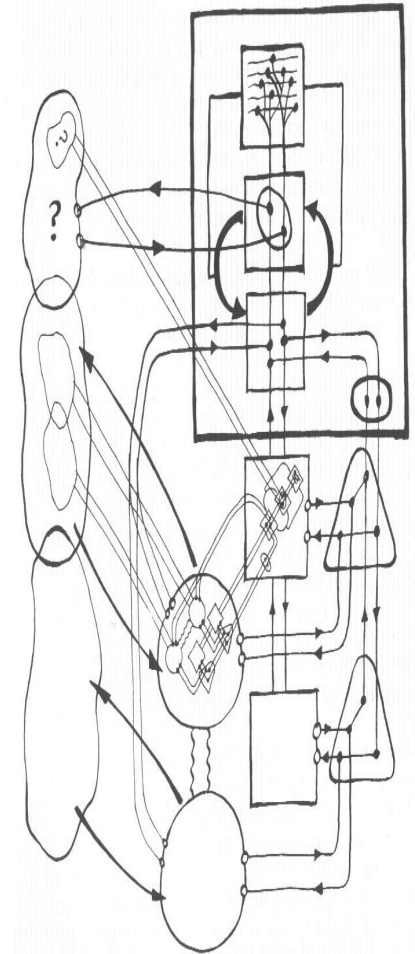
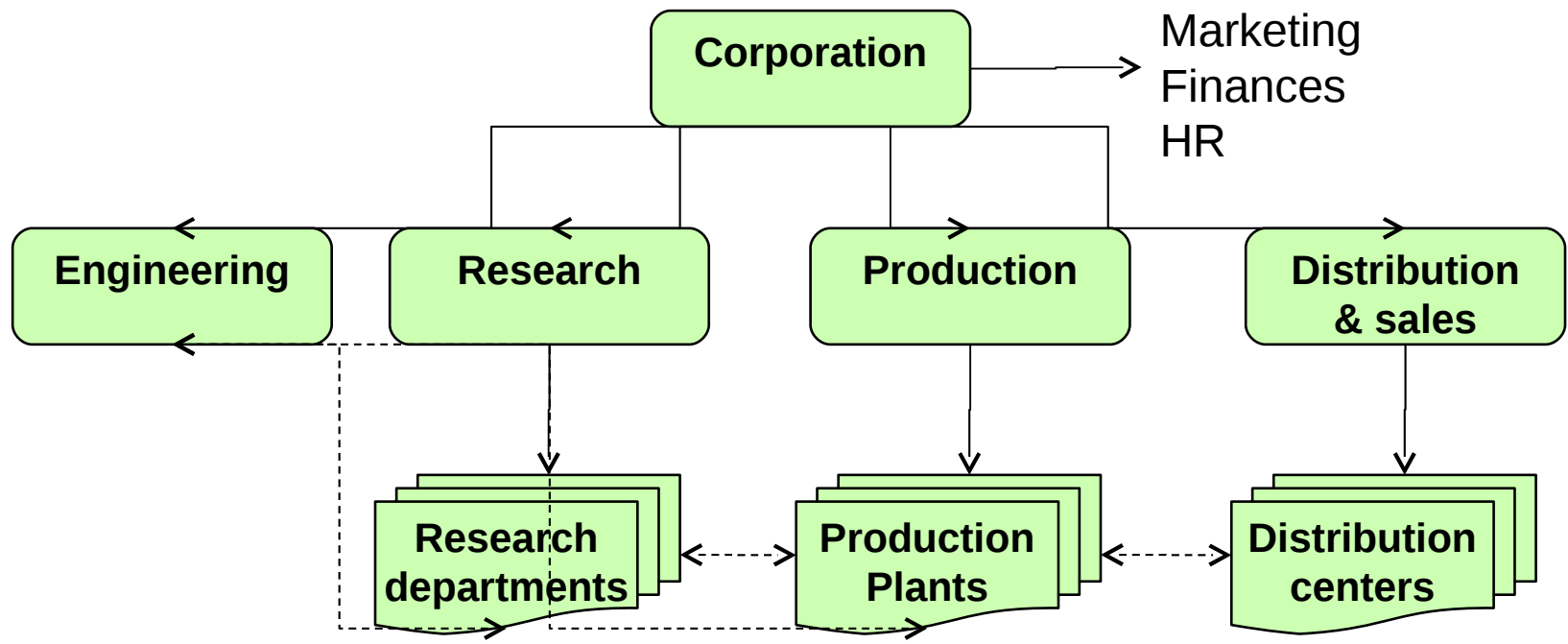
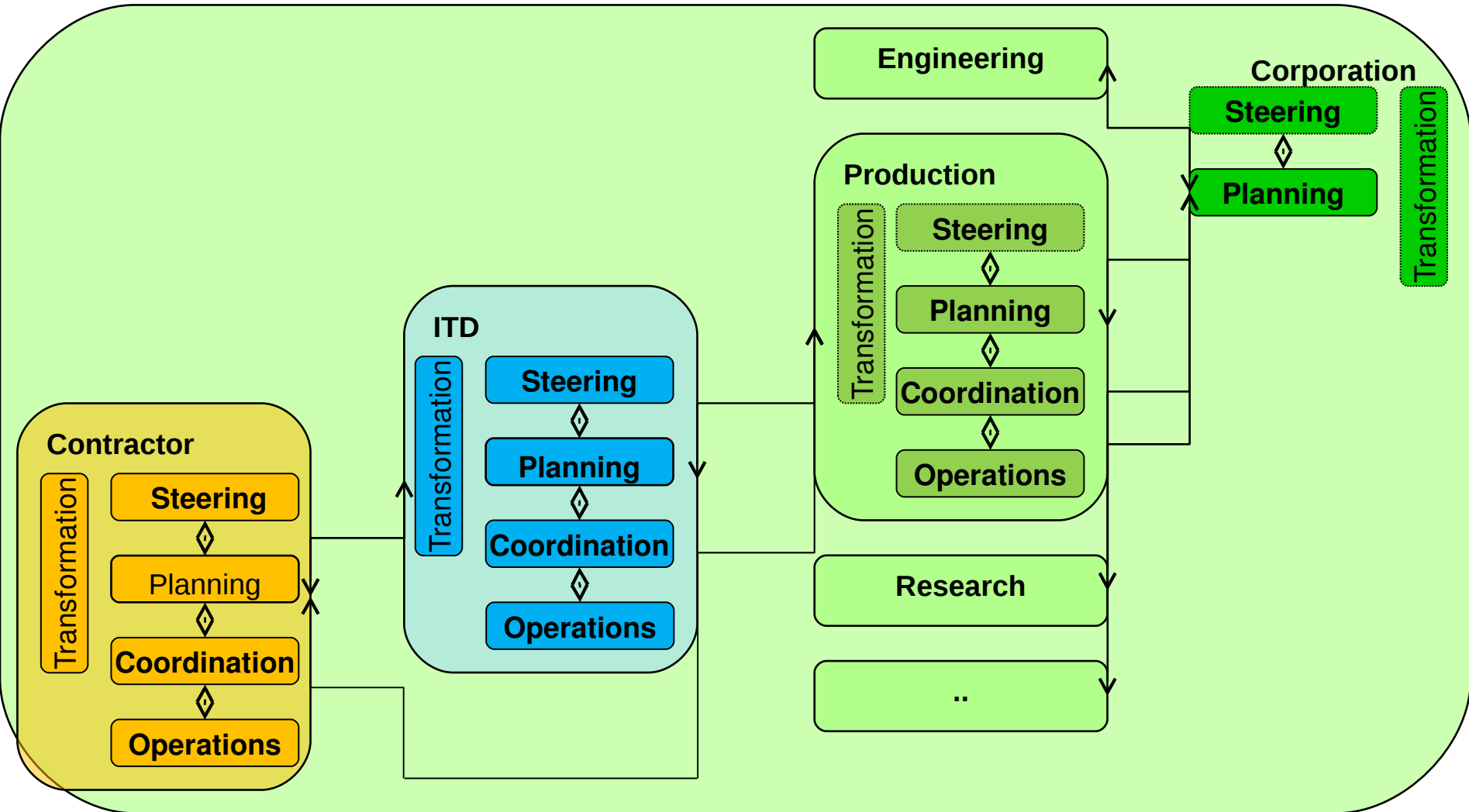


Figure 55. Definitive model of two recursions of the viable system (the diagonal of the page being used as the second dimension)

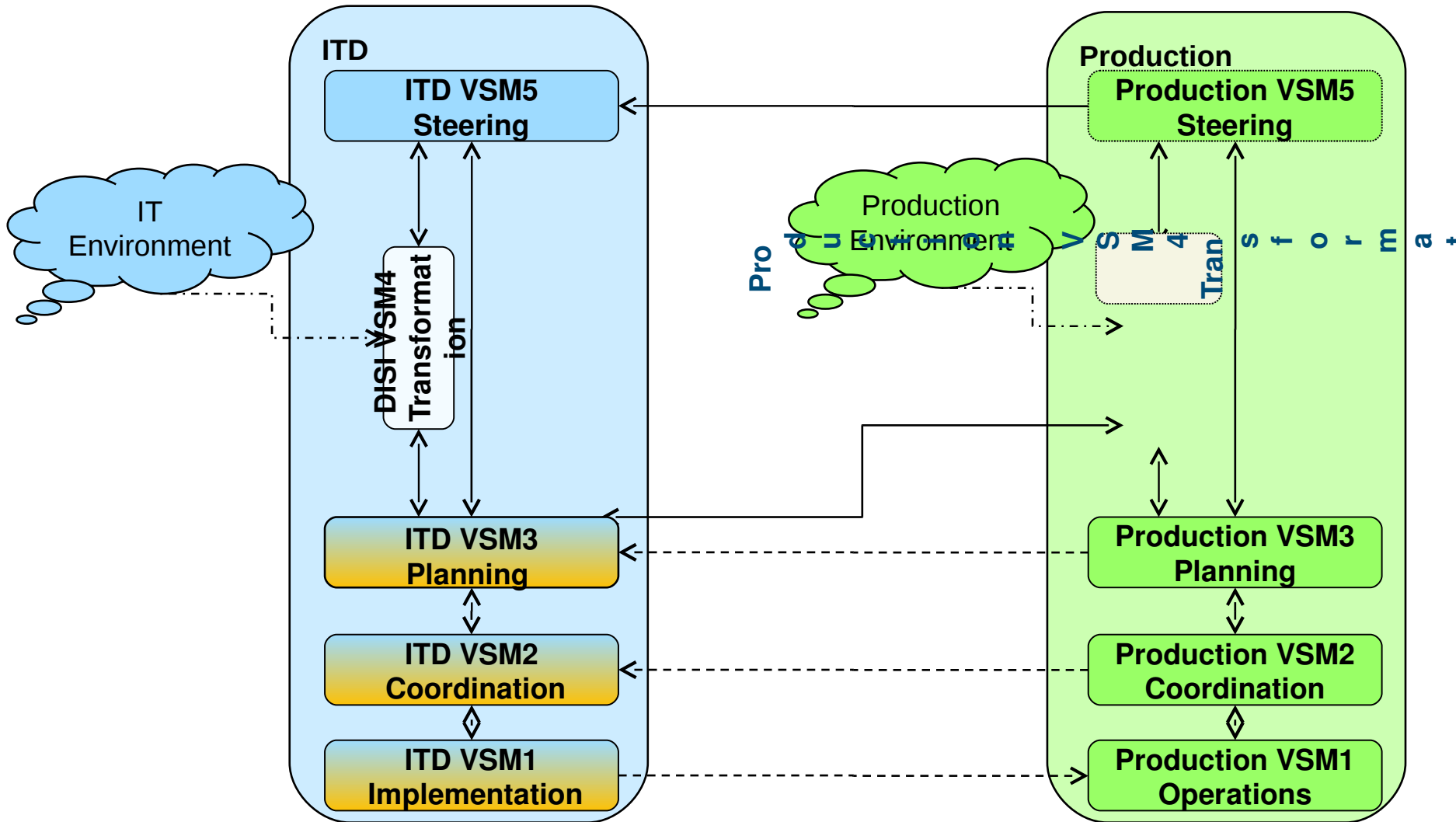
# Example: General structure of an industrial enterprise



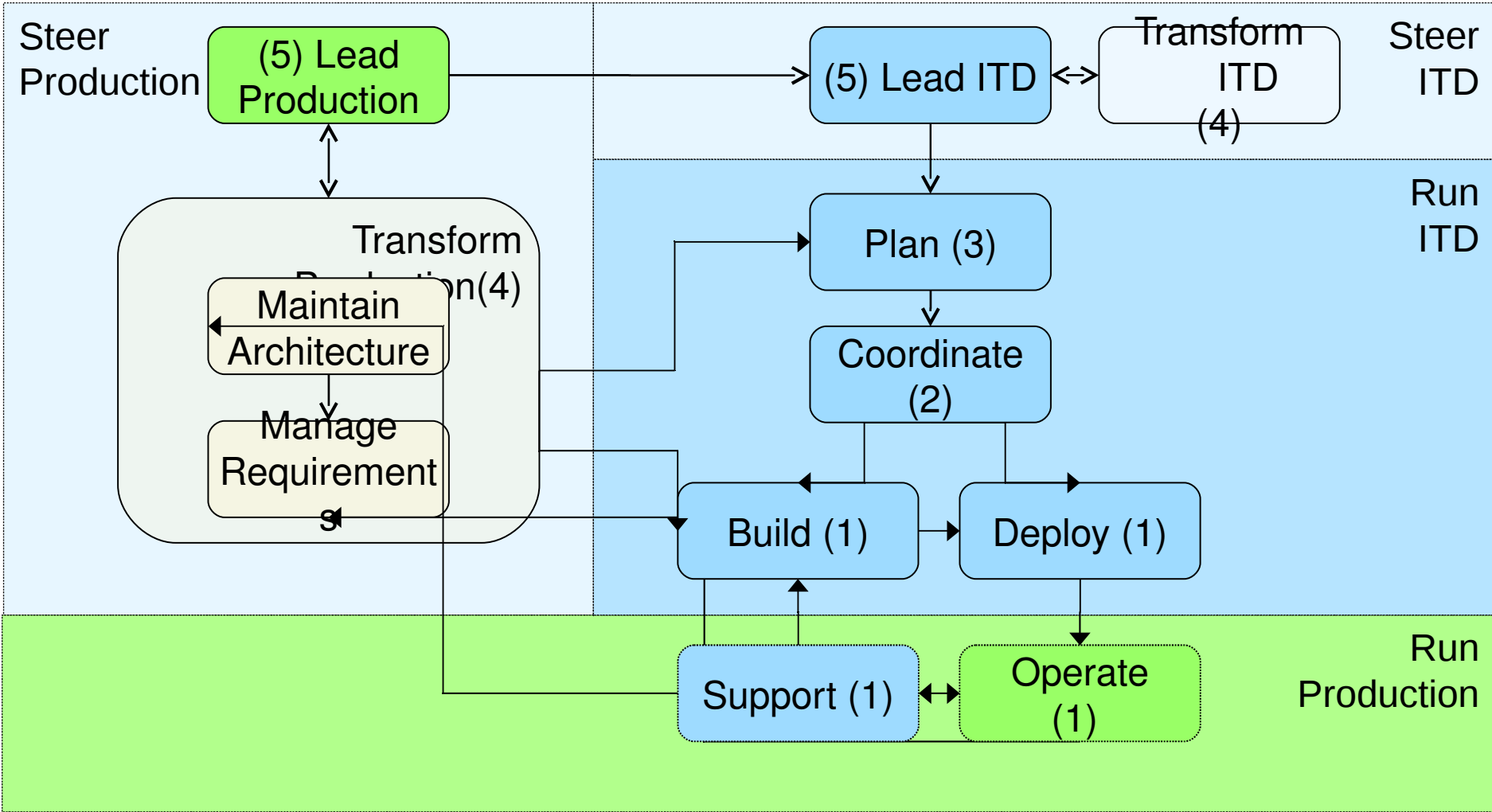
# Example: IT support to Production - detail



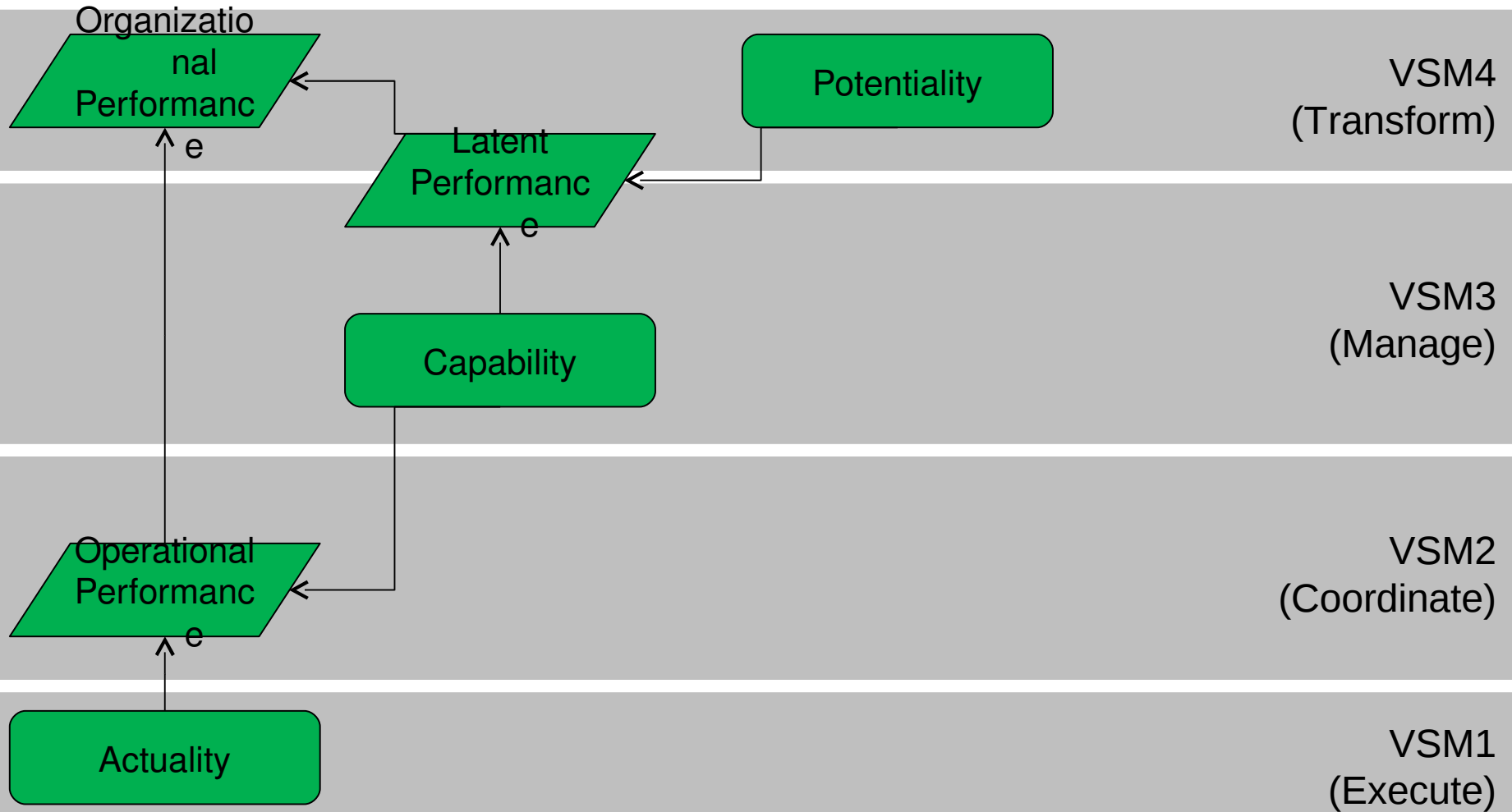
# IT support to Production – VSM relationships



# VSM fit with Business/IT CCM Convergence Processes



# VSM Dynamic performance management



# VSM performance metrics

Metrics	Calculation	Level	Meaning
Organizational performance	Latent / Operational performance	VSM 2/3/4	Ability to close the strategic gap
Latent Performance	Capability / Potentiality	VSM 3/4	Willingness to close the strategic gap
Operational Performance	Actuality / Capability	VSM 2/1	Actual Efficiency
Potentiality	Any metrics	VSM 4	What we could deliver with willingness +realistic changes
Capability	Any metrics	VSM 3	What we are capable to deliver in the current conditions
Actuality	Any metrics	VSM 1	What we currently deliver

# Further reading

- **Stafford Beer (1926 – 2002)**
  - The Brain of the Enterprise
  - The Heart of the Enterprise
- **Patrick Hoverstadt**
  - The Fractal Organization