

THE ORGANIZATION AS A THREE-DIMENSIONAL LEARNING MATRIX

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INTRODUCTION

As a management consultant for more than 25 years, the author facilitated the transformation of various business organizations, government departments and NGOs into a three-dimensional learning matrix.

In all cases, the organizational functioning became more coordinated and efficient, as well as more strategic, ethos-driven and learning orientated. (*Dostal, et al. 2005*)

Aim

The aim of the paper is to describe the structure and systemic functioning of a three-dimensional matrix organization, as derived from the organizing principles of *Biomatrix Systems Theory*.

Problems

The traditional organizational hierarchy and the two-dimensional organizational matrix are legacy systems of the industrial age. They are fraught with problems in various areas of organization, such as

Environment:

- Lack of procedures to detect and understand environmental changes
- Failure to detect and interpret environmental changes
- Inability to adapt to the environment

Ethos:

- One-dimensional ethos (*e.g. profit-driven; exclusively quantitative orientation*)
- Ignoring the multi-dimensionality of ethos
- Unethical behavior
- Ignoring research and science
- Unauthentic organizational behavior (*e.g. incoherence between saying and doing*)

Aims:

- Inconsistent aims between different parts of the organization
- Failure to implement aims
- Lack of strategic focus (*e.g. operations driven*)
- Aims subverted or driven by financial interests

Process:

- Lack of coordination
- Blockages / delays / discontinuities in the processing flow
- Failure to adequately manage processing by-products
- Unsustainable use of processing resources

The Organization as a Three-Dimensional Learning Matrix

Processing Structure:

- Inappropriate acting and support structures
- Duplications
- Maintenance problems
- Problems with discarding processing structures at the end of their life-span

Governance

- Lack of coherent regulation of internal value / supply chains
- Incoherence between internal and external value / supply chains
- Bureaucracy
- Power struggles
- Sub-optimization (*e.g. optimizing organizational functions can lead to the sub-optimization of the organization as a whole*)
- Governance problems after mergers and acquisitions
- Loss of control after outsourcing and geographic relocation

Substance (resources)

- De-motivated / untrained staff
- Un-even resource distribution
- Outdated / insufficient / uncoordinated equipment

amongst others.

Solution

Based on the management consulting experience of the author, these and other problems dissolve, as soon as the organization begins to restructure into a three-dimensional matrix and functions as an environmentally aware and self-reflective learning organization that practices systemic strategic performance management.

Underlying Theory

The design and functioning of an organization as a *three-dimensional learning matrix* is derived from the application of generic organizing principles of *Biomatrix Systems Theory*. (*Járos and Cloete, 1987; Cloete, 1999.*)

This theory is a w/holistic, fractal, process-based, integrative meta-systems theory that describes the organizing principles of systems in the *naturu-sphere, psycho-socio-sphere* and *techno-sphere*.

The relevant organizing principles that give rise to the structure and functioning of a learning organization (*Dostal, 2005*) are described in more detail in the according following sections.

THREE-DIMENSIONAL MATRIX DESIGN

Underlying Theoretical Concepts

Biomatrix Systems Theory distinguishes two types of systems. Analogous to a fishing net consisting of strings and knots, the biomatrix (*i.e. universe, or web of life*) is composed of string-like activity systems (*such as the functions of a person, organization, society, or cell in the body*)

The Organization as a Three-Dimensional Learning Matrix

and knot-like entity systems (*or organismic systems, such as a planet, society, organization, individual, cell or atom*). (See Figure 1.)

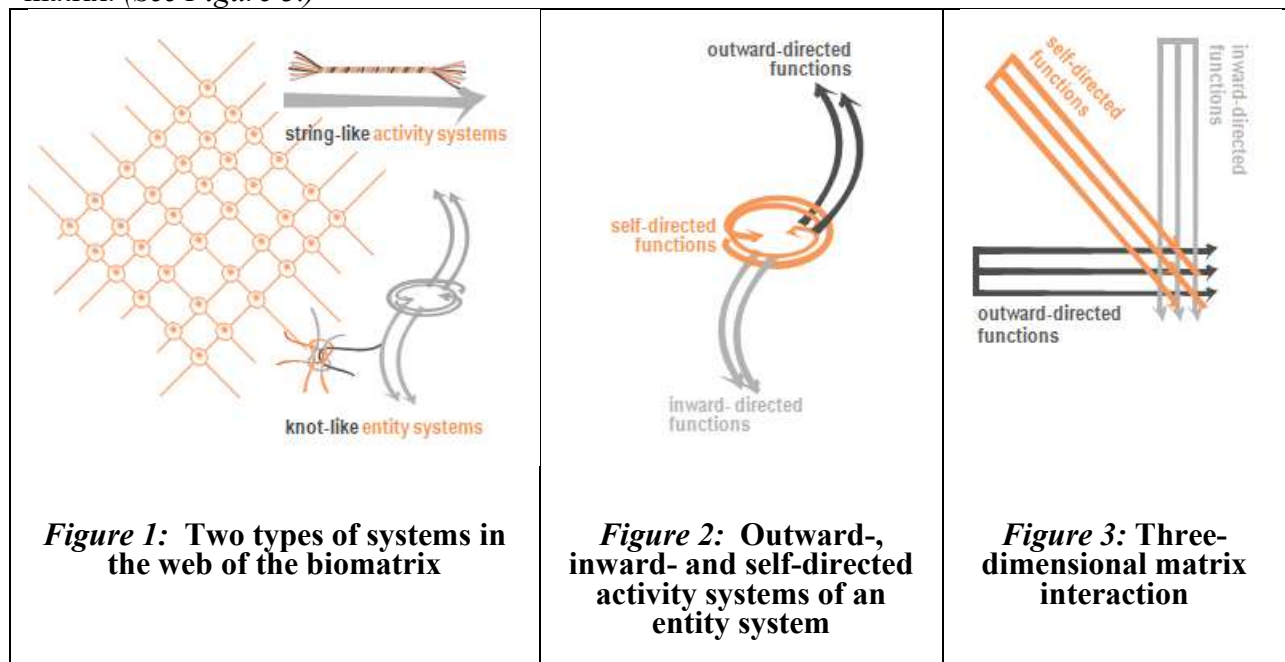
Analogous to viewing a knot as a solid whole or as consisting of intertwined strings, one can view an entity system (*such as an organization*) as a coherent social organism, or as a web of interacting functions (*such as a production, HR and marketing function*). Or, analogous to light being a wave or particle, one can view an organismic system from a functional (*i.e. string or wave*) perspective, or from an organismic (*field or particle*) perspective.

From the functional perspective, an entity system consist of bundles of outward-, inward- and self-directed activity systems (*see Figure 1 below*), whereby the directedness is determined by the purpose of the activity system (*i.e. if it serves the outer or inner environment or the self*). More specifically, an activity system (*or function*) is defined as a purposeful and structured process that is regulated to achieve its aim.

From the organismic perspective, an entity system is viewed as consisting of a bounded core body that arises from the interaction of its activity systems (*or functions*). This interaction is organized by an ethos (*i.e. a field of values and beliefs*) that is focalized around a self. The reason why we speak of a core body is that the activity systems of an entity system can reach into the outer and inner environment beyond its body to where its outputs are tapped. For example, as an entity (*or organismic*) system, this author reaches beyond her physical body to where her writing is tapped (*e.g., by your eyes, as you read this article*).

Through its outward-directed and inward-directed activity systems, the entity system (*e.g. organization*) interacts with its outer and inner environment respectively. Through its self-directed activity systems, the entity system coordinates and supports its outward and inward-directed activity systems to form a coherent organizational whole. (See Figure 2.)

The three types of activity systems interact in a matrix manner, forming a three-dimensional matrix. (See Figure 3.)



The Organization as a Three-Dimensional Learning Matrix

Designing the Matrix Structure

A three-dimensional matrix organization consists of outward-directed activity systems or **business functions**, inward-directed activity systems or **business support functions** and self-directed activity systems or **organization support functions**.

Each function, as well as their interaction involves **governance functions**.

Business functions

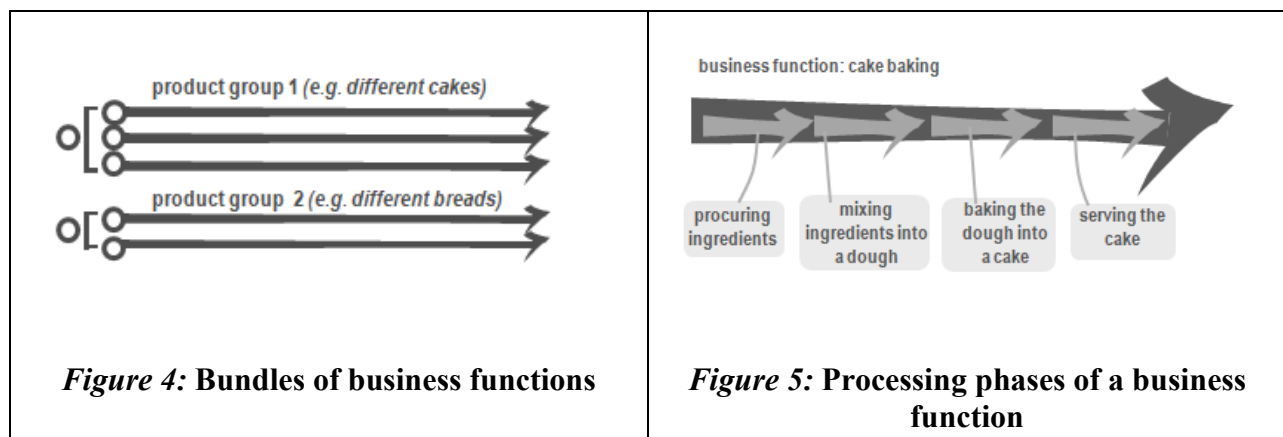
The design of a three-dimensional matrix starts with firstly identifying the business functions of the organization which are concerned with production of goods or delivery of services for external customers (*i.e. its outward-directed activity systems*). In a management context they are often referred to as business processes.

Secondly, it involves identifying the processing phases of each business function (*see bakery example in Figure 5*). They can be sequential or parallel (*see also later process section and Figure 19*). They represent the sub-functions of the system which link up with each other to form an internal value / supply chain (*whereby value chain refers to the conceptual, or information reality of the chain and supply chain implies its physical reality of the actual*).

Typically, an organization has more than one business function, which can also consist of several sub- functions that produce different types of a product or services (*e.g. the bakery can produce different types of bread, cakes and biscuits*). (*See Figure 4*)

In a manufacturing organization it is usually quite easy to identify its business functions and sub-functions based on their products. It is less easy in organizations that manages a variety of projects (*e.g. research organizations*). Differentiating criteria have to be found according to which the diverse projects are clustered into different business processes (*whereby criteria could be based on product / services or on the type of client / customer that is being served*).

The concern of managing a business function is to create the desirable product or service.



Business support functions

The business support functions are derived from connecting the processing phases of the different business functions (*see vertical arrows in Figure 6*). In the management literature they are also called line functions.

A phase in the business processes (*e.g. making a component for an assembly line*) which is coordinated by a business support line, can also be offered as a product / service in its own

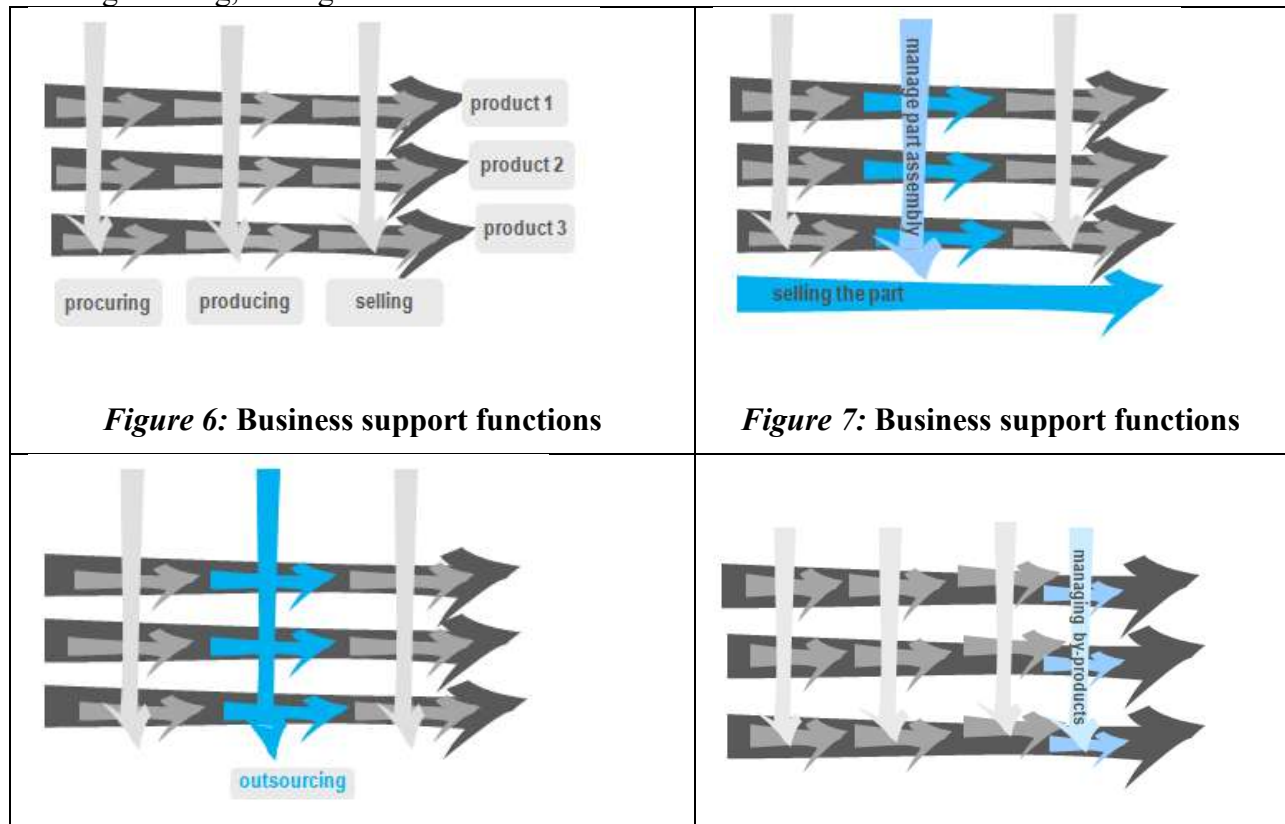
The Organization as a Three-Dimensional Learning Matrix

right (e.g. being sold as a spare part), thereby becoming a business function. (See Figure 7) For example, forming dough into a bread before baking is a phase in the bread-baking business function. This can also be sold as pre-baked bread as the product of a business function. Of course, the two functions need to be managed differently. In the one case, the semi-finished product (or component) serves to create a finished product, while in the other case it is the finished product. Such considerations are especially important in considering the modularization of systems. Likewise, a service or infrastructure item of an organization support function can also be offered as part of a business function. For example, one of our client organizations had a particularly advanced and customized IT system, which – on customer demand – was also installed in some of its turnkey projects.

Also, many organizations outsource a phase in their production or service delivery. Although the integration of the outsourced phase within a business functions needs to managed, the coordination of all outsourcing also ought to be managed through a business support function. (See blue arrows in Figure 8)

The processing that occurs in each phase produces products and by-products (e.g. waste and pollutants), whereby products and by-products typically continue in different supply chains. (See also Figure 18 and later discussion in the process section.) In an organizational context, dealing with by-products could imply an additional processing phase in each business phase, albeit coordinated by a business support function (see blue arrows in Figure 9).

The concern of managing a business support function is to coordinate the same (or similar) phases of the different business functions. This coordination can involve standardizing of processing procedures, sharing of processing structures, ensuring quality standards and sharing learning, amongst others.



The Organization as a Three-Dimensional Learning Matrix

Figure 8: Outsourcing

Figure 9: By-product processing

Organization support functions

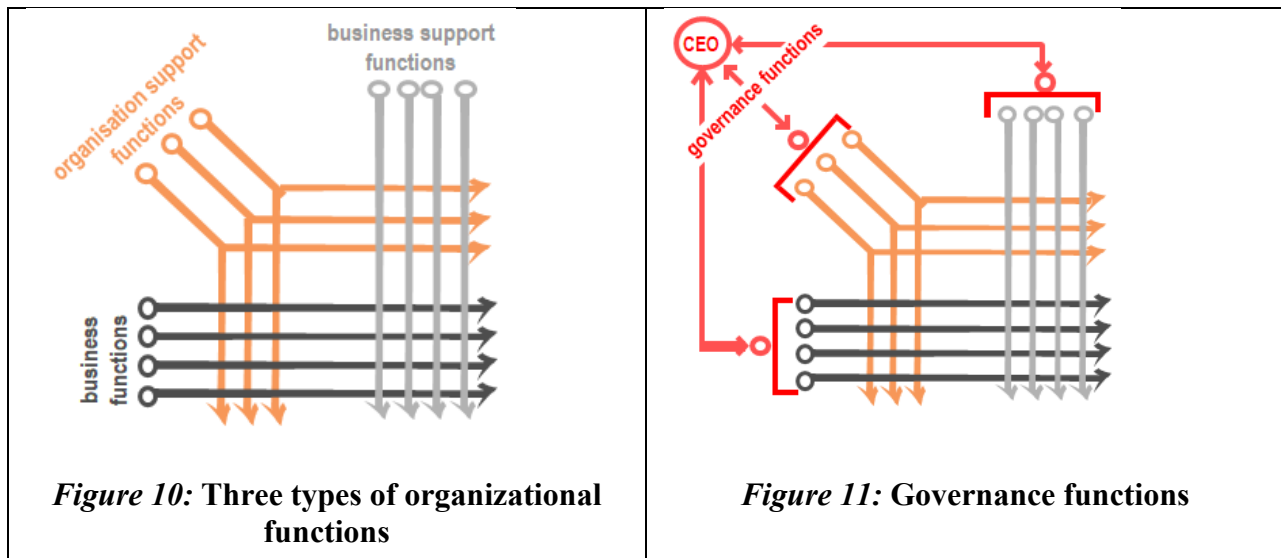
The organization support functions are functions that are not directly involved in the production or service delivery, but they provide the infrastructure for it (e.g. HR, training and education, IT, property management, maintenance). They also serve the organization, ensuring its functioning as a coherent whole (e.g. administration, finance, legal services, brand management). In the management literature these functions are also referred to as central services functions.

Each organization support function interfaces with all other functions. (See orange arrows in Figure 10)

In praxis, a particular function could be both, an organizational support function and / or a business and support function. For example, in many organizations maintenance is a central services (i.e. organization support) function. However, if regular maintenance is a phase in the business function it can also be coordinated by a business support function. Likewise, in finance related businesses there are financial transactions and regulatory requirements which are part of a business and business support function, as well as an organization support function. The different types of functions need to be managed separately, the one in the interest of the organization and the others in the interest of its business.

Part of an organizational function could also be provided as a service to external customers, thereby becoming (part of) a business function which also needs to be managed separately (as previously discussed and illustrated in Figure 7).

The concern of managing an organization support function is to serve all functions (e.g. through providing infrastructure) on the one hand and on the other hand coordinating them in the interest of the organization as a whole.



Governance functions

Each function (i.e. activity system) of an organizational matrix is governed, whereby governing is a sub-function. It consists of aims setting (i.e. feed-forward) and regulation (i.e. feedback and adjustments). (This is discussed in the later governance section and illustrated in Figure 21.)

The Organization as a Three-Dimensional Learning Matrix

There is also governance of the organization as a whole (*i.e. as entity system*) which coordinates the governance of all functions. The organizational governance functions are illustrated by the red arrows in Figure 11. Through these organizational governance functions, the governance information is cascaded (*top down*) into each business -, business-support – and organization support function in a coordinated manner. By the same token, feedback (*e.g. from planning and implementation*) and feed-forward (*e.g. proposals and regulatory requirements*) flow from each function to the organization (*i.e. bottom-up cascading*).

This dual flow of governance is referred to as strategic performance management (*see later governance section for more detail*).

MATRIX MANAGEMENT

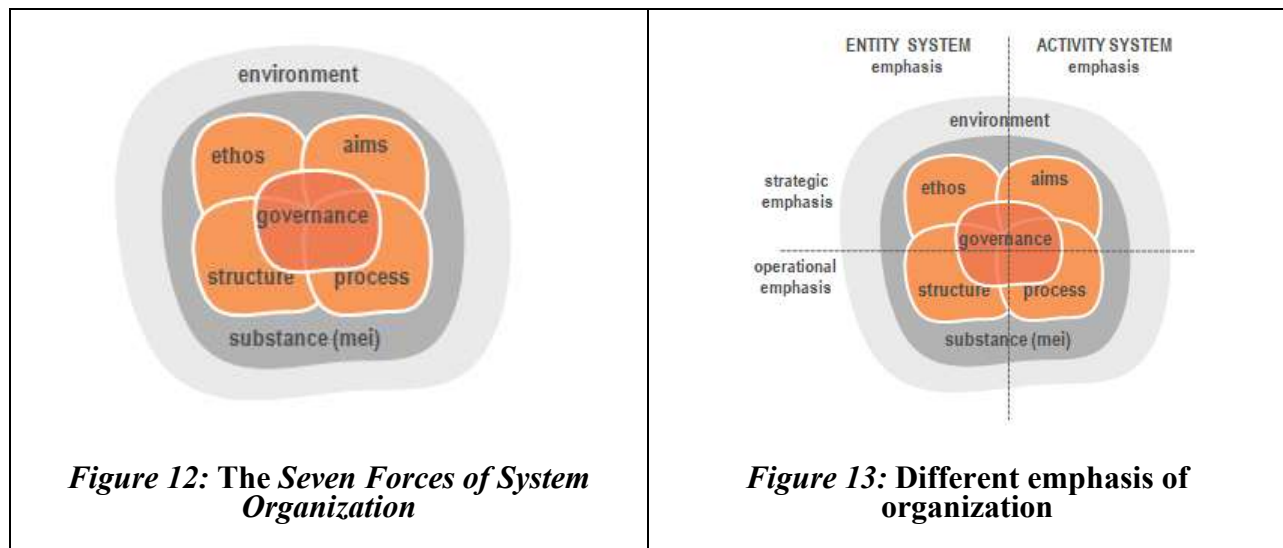
Relevant theoretical concepts

An entity system and each of its activity systems are organized by seven forces of system organization, namely (1) environment, (2) ethos, (3) aim (4) process, (5) structure, (6) governance and (7) substance. (*See Figure 12.*)

These forces interact with each other. As one force changes, it impacts on the others prompting them to change accordingly. Thereby they co-produce the ongoing change and development of a system.

From an activity system perspective the (3) function-specific aim, (4) process, (5) processing structure and the (6) regulatory aspect of governance are emphasized, while from an entity system (*or organismic*) perspective the (2) ethos, (3) overarching aims, (4) organization structure and the (6) coordinating aspect of governance are emphasized. (*See Figure 13.*)

From a strategic perspective, the ethos, overarching aims and coordinating governance are emphasized, while processing, processing and its regulatory governance are emphasized in an operational context. (*See Figure 13.*)



The Organization as a Three-Dimensional Learning Matrix

Environmental Perspective

Each function is part of an overarching supply chain. Thus an organization can also be seen as a central web of interacting supply chains. (See Figure 14.)

Through environmentally aware strategic planning, each function can take advantage of opportunities and innovations in its functional environment (*e.g. its industry*) and bring those into the organization, making it more effective, efficient and creative.

It is also useful to distinguish between a transactional and contextual environment. The stakeholders in the transactional environment can be influences, while the organization has to adapt to its contextual environment. Thereby through each of its functions, the organization can contribute to and co-develop the systems in its outer and inner environment in different ways.

Ethos and Aims Perspective

At the core of an entity system is its ethos. (See Figure 15) In social systems, like an organization, ethos refers to its values, beliefs, guiding principles and worldview.

It represents the conceptual reality of a system which in-forms (*i.e. puts form into*) its physical reality. Thus a system develops according to its ethos and the transformation of a system requires a transformation of its ethos. For example, to transform a traditional organizational hierarchy (*which tends to be based on an ethos that emphasizes competition*) into a matrix organization and to successfully manage it, requires an ethos based on a systemic worldview (*i.e. based on cooperation, win / win, an understanding of emergence, learning and knowledge management*). It should also be noted, that the organizational ethos should be multi-dimensional and not merely be based on a one-dimensional financial and product-related ethos. This implies that it should include cultural (*e.g. ethical, aesthetic and scientific*), economic, political and ecological values. For example, the COVID pandemic highlighted the lack of an ethical and scientific ethos of the pharmaceutical industry.

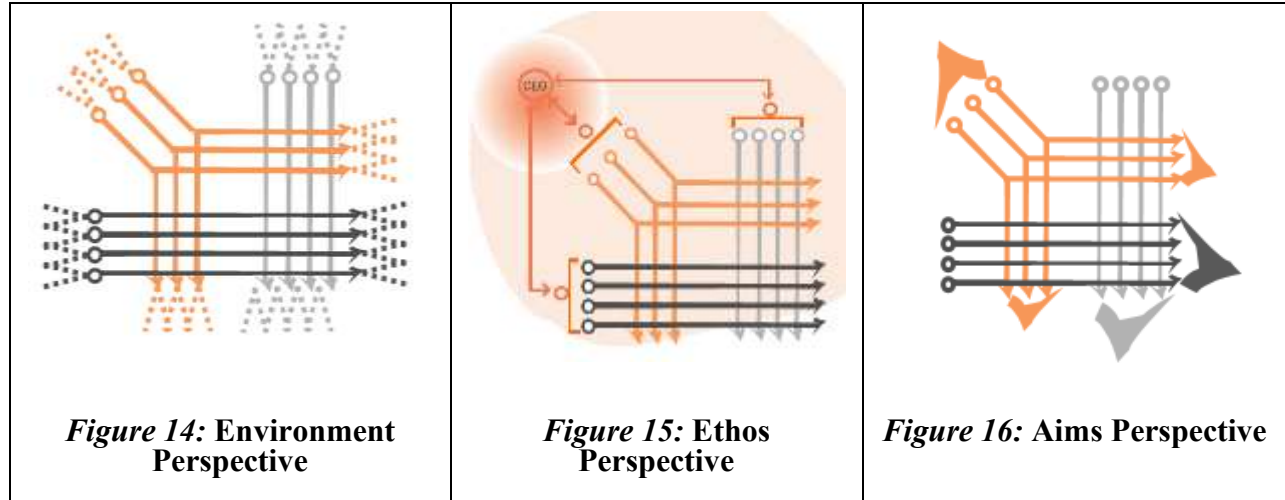
In societal systems the core ethos is typically enshrined in a constitution. In an organization the core ethos is often associated with its brand.

The ethos is focalized around a self (*i.e. an overarching governance body*) which is responsible for selecting, interpreting and upholding the ethos.

The purpose of the organization is its overarching aim and reason (*derived from its ethos*) for its existence. The mission of an organization is three-fold and embodies its overarching aims, namely of what it wants to do and achieve for itself and its systems in the inner and outer environment. (See Figure 16)

The mission inspires a cascading of aims through all levels of the system. (See also later Figures 23 and 24) Cascading involves an ends-aim / means-aim interchangeability, whereby the end (*i.e. the intended outcome*) at one level gives rise to a means (*i.e. the strategy or course of action to achieve the end*) at the next level, etc. For example, the intended organizational aim of “being customer orientated” gives rise to according strategies in the production and marketing departments, according training programmes in the HR department and the creation of customer-focused databanks in the IT department, etc. These in turn become the ends-aim of the members of the departments for establishing and managing those programmes.

The Organization as a Three-Dimensional Learning Matrix



Process, Structure and Substance Perspectives

Systems have substance – i.e. they consist of “things” or “stuff” that embody matter, energy and information. *Biomatrix Systems Theory* defines substance as fields of interacting matter-energy-information, abbreviated as mei. Substance can be material “things” (i.e. *Mei* or things), energy “things” (i.e. *mEi*, like electricity), or information “things” (*meI*, like knowledge). (See Figure 17 depicting substance as mei-dot.)

Process refers to the flow and transformation of substance. (See Figure 18 depicting process flow as an orange line flowing through the mei dots.)

The processing occurs through an acting substance which does the processing (such as people, machines or robots) and support substance (such as infrastructure and tools). They represent the processing structure, such as the work -stations in which the processing occurs. (See Figure 18 depicting the processing structure as orange triangles structuring the acting and support mei dots.)

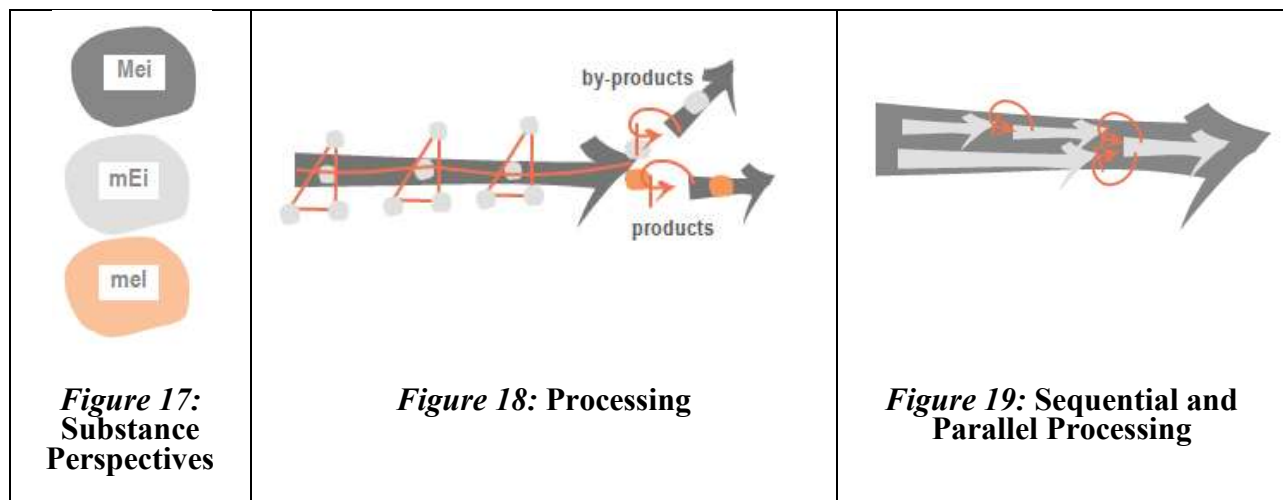
During processing the substance is broken up and reassembled into desirable products and (usually undesirable) by-products. Such a transformation of substance constitutes a processing phase and is typically a sub-function. (See cake baking phases / sub-activity systems in Figure 5 above). The processing phases / sub-functions can be sequential or parallel. (See Figure 19) In business processes the phases are mostly sequential, although some are also parallel (e.g. one can pre-heat the oven for baking while mixing the dough). In the case of business-support and organization support functions, the sub-functions tend to be parallel, because they provide services that are available at all times, as for example recruitment, evaluation, training and employee-relations are typical sub-functions of the human resource management function of an organization.

The by-products generated through processing can differ according to type of substance. The processing of material and energy substance typically also produces material or energy related by-products (e.g. waste, pollution, heat, radiation), while the processing of information substance tends to produce information related by-products (e.g. mistakes, misunderstandings, mis-interpretations, confusion, fake information, de-motivation, propaganda, power issues). The products and by-products continue along different supply chains in which they are further processed. (See also Figure 18). In the context of sustainable management a key issue is who is responsible for dealing with the by-product processing. In the current economic paradigm the

The Organization as a Three-Dimensional Learning Matrix

material and energy by-products are often dumped (*with impunity*) on the planet and society to deal with, while in the cultural context the causing of hurtful information or fake news is increasingly blamed on the originator (*e.g. through legal persecution and censorship*).

Biomatrix Systems Theory emphasizes that the continuity of process involves tapping (*see orange tapping arrows in Figure 19*). Tapping implies that the output of a processing phase is taken up by the following phase. According to our management consulting experience, many organizations neglect tapping considerations. Typical issues are spatial problems (*e.g. incompatibility, discontinuity, lack of capacity to absorb, non-availability, mis-match of output and input substance in terms of quantity and quality criteria;*) and temporal issues (*e.g. delays*). From a functional coordination perspective, it is typical that business functions fail to tap relevant information from support functions (*e.g. tapping function-specific learning from the experience of another business function*), thereby perpetuating existing problems. These problems are typically dissolved through learning-based strategic performance management in a three-dimensional organizational matrix.



Governance Perspective

Governance frameworks

As illustrated in Figure 11, governance is one of seven forces of organization. Moreover, it is in the centre overlapping with the other forces. It provides the governance framework (*e.g. values, rules, criteria and procedures*) for how the organization as a whole and each of its functions need to manage each force. It determines how to deal with the environment, ethos, aims, process, structure, substance, as well as governance (*i.e. how governance throughout the system should be done, implying a governance of governance*).

The governance frameworks represent the context, within which the activities of the organization and its functions develop. Obviously, a system will develop differently, if its governance framework enforces the cascading of aims (*from strategic to operational*) and learning (*from doing and planning*), than an organization that plans ad hoc and doesn't learn.

The overarching governance framework also inspires specific frameworks for each force, such as a framework for environmental scanning, determining an ethos hierarchy, framework for how to set aims (*i.e. strategic and operational planning procedures*), how to do processing (*e.g.*

The Organization as a Three-Dimensional Learning Matrix

selection of processing substance, method, structure and regulation), determining the organizational structure in order to guide functional interaction (*e.g. traditional hierarchy versus two or three-dimensional matrix organization*), function-specific governance frameworks, as well as frameworks for managing different types of resources.

Self-governance

Systems theory advocates the self-governance of systems, because a system has most information and knowledge about its own situation. Nevertheless, there is always some governance from other levels in the system (*i.e. the top-down and bottom up cascading of governance*), as well as governance from external systems (*e.g. industry regulations*) that needs to be adhered to. Thus one should rather speak of maximizing the self-governance of systems.

The concept of self-governance implies that there is a governing “self”. In a person the governor is the “I”, in an organization the CEO (*and the governance boards*) and in society it is the government.

Depending on the size and legal set-up of an organization, there could be different governing structures. Besides the CEO there could be a top management board (*e.g. a Board of Directors*). It contains typically some senior executives of the organization and representatives from external systems (*e.g. finance and industry*). In a matrix organization representative for each type of function (*i.e. business, business-support and organization-support functions*) should also be part of the top management board.

From an organizational perspective, the CEO and the top management board are concerned with the governance of the organization as a whole (*i.e. they govern from a strategic entity system perspective*). Issues include the ethos, mission and purpose of the organization and the nature of its business, besides the generating of key strategies that are relevant for the organization as a whole.

From a functional (*i.e. activity system*) perspective, there should also be a wider management board, in which the heads of all functions participate (*i.e. the function heads are represented by the circles in the Figures 10 and 11*). The purpose of this wider board is strategic functional development as derived from the overarching organizational governance, as well as ensuring the coordinated and coherent planning and execution of all functions.

Besides the top management governance boards, each function has a planning forum consisting of the head and members of the function. The forum engages in regular strategic and operational planning meetings, to ensure strategic performance management.

The forum membership could vary between strategic and operational planning. In strategic meetings representatives of business-support and organization-support participate, while operational forums could also involve sub-forums to deal with more detail.

All sub-forums, functional forums and top management forums are coordinated through overlapping membership (*e.g. through the function and sub-function heads*).

Entity versus activity system governance

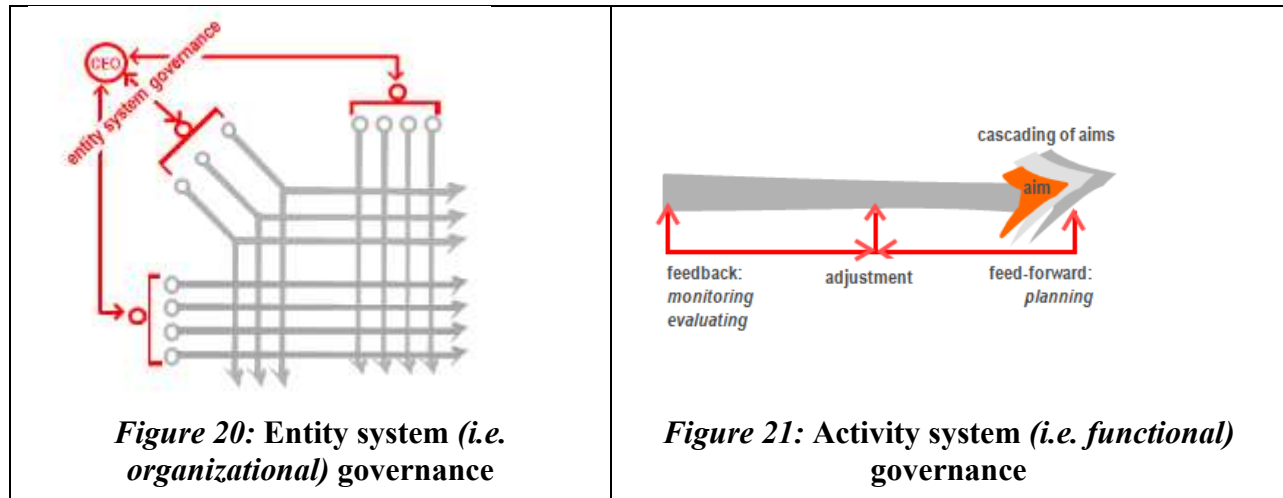
The difference in nature of an entity system (*e.g. organization*) and its activity systems (*i.e. functions*), also implies differences in how they are governed.

The entity system governance is concerned with the organization as a whole and informed by its ethos and mission. It is aimed at optimizing the whole organization, not one of its function. It is also concerned with coordinating and balancing its functions in such a way that

The Organization as a Three-Dimensional Learning Matrix

their interaction gives rise to the organization as an integrated and coherent whole. This governance involves mostly strategic planning by the CEO and his / her top management board, symbolized by the red circles and red governance arrows in Figure 20 (which is a replication of Figure 11 in order to highlight the difference to activity system governance in Figure 21.)

The activity system governance (see Figure 21) is concerned with aims setting (whereby aims are cascaded from the organizational aims) and regulation (which should ensure aims achievement). If this governance is ongoing (i.e. circular), it is referred to as performance management. (See Figure 22.)



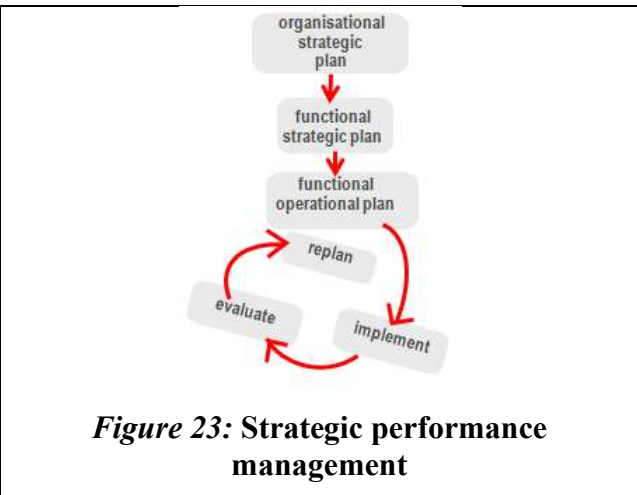
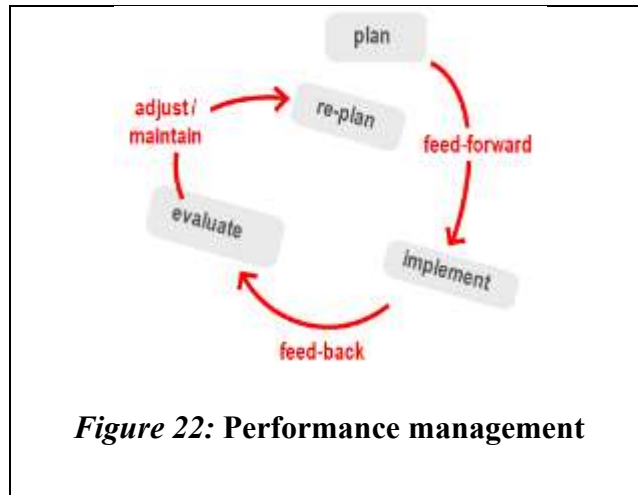
Strategic performance management

In the management literature the ongoing plan (i.e. feed-forward), implement, monitor / measure / evaluate outcomes (i.e. feedback) and re-plan (adjust or maintain) cycle is referred to as performance management. (See Figure 22) It is derived from the functional governance depicted in Figure 21.

One speaks of *strategic performance management*, if the aims are cascaded from the overarching organizational aims into the functional strategic aims (i.e. objectives and strategies) and into the operational aims of the function (i.e. goals and action steps). (See Figure 23).

Strategic performance management occurs in every function and sub-function of an organization, as well as at the level of the organization as a whole. In a three-dimensional matrix this leads to perfect coordination between all (sub-)systems. This ensures ongoing governance, which implies ongoing in terms of space (i.e. cascading through all levels of a system) and ongoing in terms of time (i.e. a continuous governance cycle).

The Organization as a Three-Dimensional Learning Matrix



Aims setting

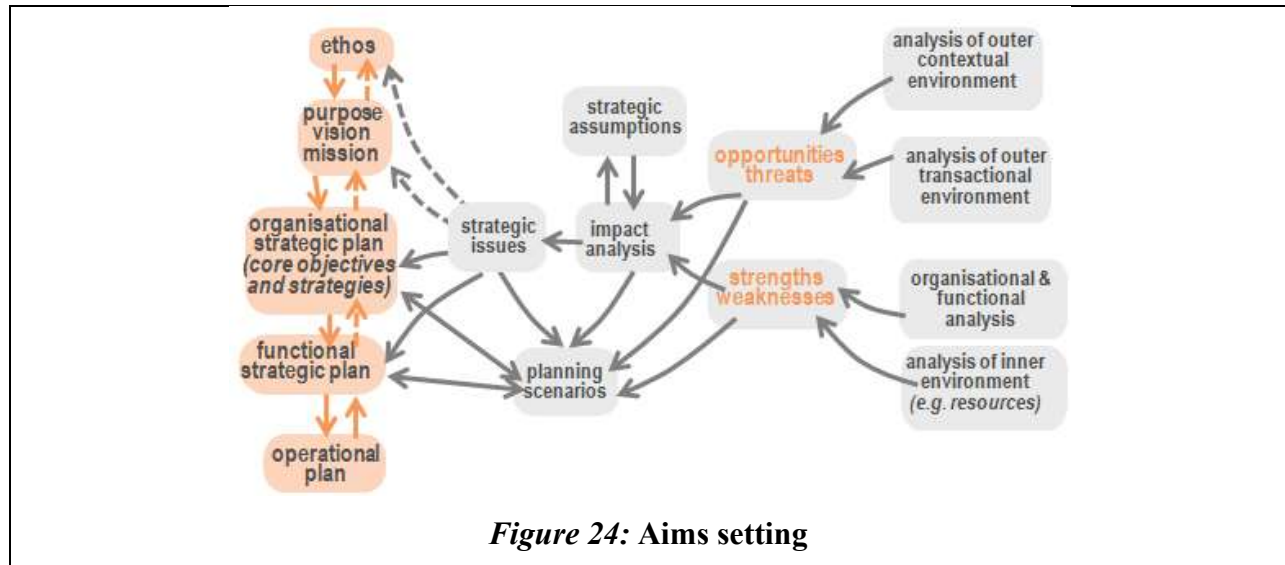
Aims setting involves planning the intended activities of the system and their outcomes, whereby evaluation criteria can refer to both (*i.e. how the activities are conducted and what outcomes are achieved*). The same cycle is followed in both, strategic and operational planning, albeit in different planning meetings.

The aims are cascaded throughout the organization (*i.e. the purpose, mission and long-term organizational objectives and strategies of the organization are cascaded into strategic and operational aims of each function and sub-function*), thereby ensuring its coherence throughout. This cascading implies that each function interprets the overarching organizational aims according to its own strategic and operational realities in such a way that they co-produce the organizational aims. In formulating the aims changes in the functional environment are considered. Figure 24 depicts a typical strategic planning method used for this.

Although the cascading is predominantly top-down (*i.e. from the organizational aims to functional strategic and operational aims*), there is also operational and strategic information flowing back to the organizational level where it could cause changes to organizational governance. Typical examples are changing industry regulations and major technological developments in one of the functions.

After each (*strategic and operational*) planning cycle, the aim of that cycle is reviewed by measuring and evaluating the outcomes that were actually achieved. Then re-planning occurs which can involve the maintaining of the existing aim or the formulating of a new aim.

The Organization as a Three-Dimensional Learning Matrix



Strategic aims setting at the organizational level also requires a deeper reflection on the relevance of the strategic aims in relation to the organizational ethos and the mission of the organization, as well as observed and anticipated changes in the environment that could affect the organization as a whole.

Likewise at the functional level, aims setting involves reflection against the organizational ethos and mission, as well as against the generic functional ethos and aims, also in relation to environmental change.

If such fundamental strategic reflection calls into question the relevance of the ethos, mission, or major strategic aims, the organization or affected function is likely to require a fundamental transformation. An organizational or functional transformation always involves a major change in the organizational and / or functional ethos.

Regulation

Regulation is concerned with managing the system in such a way that its aims are achieved.

As illustrated in Figures 21 and 22, this involves feedback (*i.e. monitoring, measuring and evaluating the activities and their actual outcomes and comparing them with the intended ones*) and adjusting (*or maintaining*) the performance of the system, involving re-planning.

Learning based knowledge management

Ideally, the strategic performance management involves learning at all levels (*from the organizational to the strategic and operational functional and sub-functional levels*), both in terms of the organizational perspective of being (*i.e. what the organization wants to be, how it wants to develop as an entity*) and functional perspective of doing (*i.e. what the organization wants to do for the systems in its outer and inner environment and for itself and thereby develop*).

Self-reflective learning

The basis of all learning is self-reflection, which implies thinking about external events and one's actions and their outcomes in relation to one's ethos and aims.

The Organization as a Three-Dimensional Learning Matrix

The self refers not only to the self of an individual member of the system, but also to a collective self of the system as a whole, whereby the organizational self is typically represented by the CEO and the functional heads represent the different roles of the organizational self (*analogous to a person having different roles, as parent, worker, spouse, thinker, tennis player, or whatever*). Thus in a learning organization, self-reflection implies reflection in relation to a collective self (*i.e. that of the organization, or one of its functions or sub-functions*).

Any significant new learning is deposited into the strategic or operational knowledge repository of the (sub) function which can deal with it. (See Figure 25.)

NOTE on terminology: Although self-reflective and self-reflexive are sometimes used synonymously, there is actually a fundamental difference between the two. Self-reflective implies thinking by reflecting thought back to the self, while reflexive implies an unconsidered, automated (*or learned*) response to a stimulus.

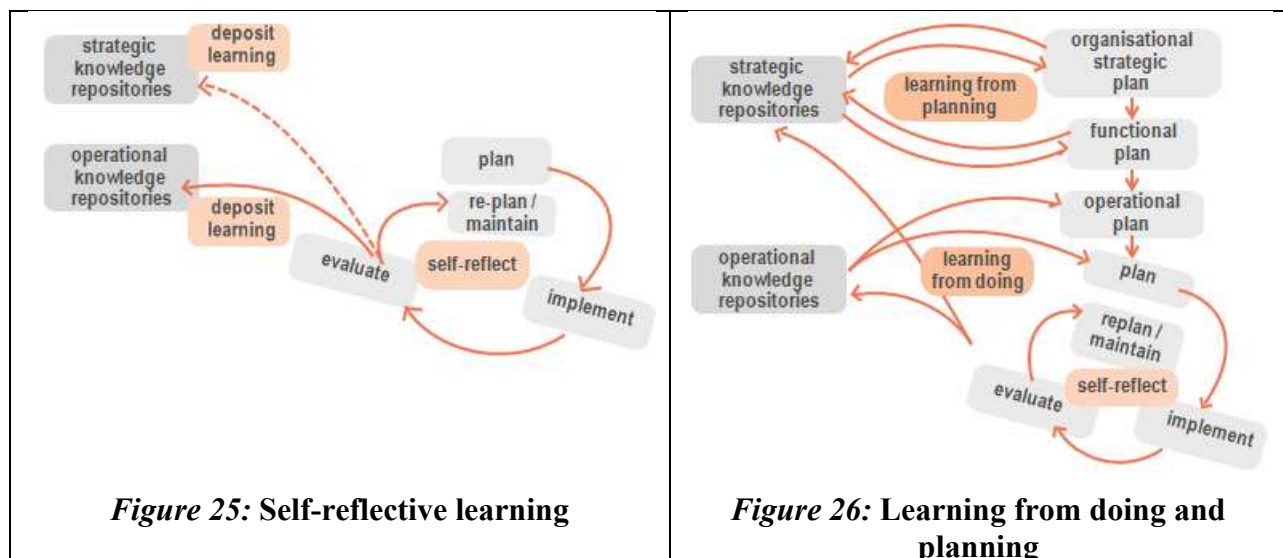
Learning from doing

Figure 26 illustrates learning from doing, which is derived from answering the question: “What should we have done differently to achieve our aims?”

This learning typically arises in operational planning meetings and is aimed at improving the performance of the system, identifying the causes of performance related problems and exploring possible solutions.

If new insights refer to changes in the way the system acts, they are deposited into the operational knowledge repositories of the (sub) function which can translate the learning into action.

However, occasionally, there could arise issues which involve more fundamental changes and need a change in strategy. Those insights are deposited into the strategic knowledge repositories of the (sub) function that can act on and needs to deal with them.



Learning from planning

While most organizations learn from doing, not all of them practice learning from planning (*according to our management consulting experience*). Many start a strategic planning cycle of

The Organization as a Three-Dimensional Learning Matrix

both organizational and functional planning without comparing the previous strategic plan in relation to the outcomes that were achieved and the learning that was recorded in the strategic knowledge repositories and reflecting on what can be learned from this. (*See Figures 26*)

Learning from planning answers the question “What did we not consider in our previous plans and thereby co-produced the current results?” It involves the exploration of the previous planning cycle, its strategic aims, the assumptions on which they were based and how they were derived against the reality of what did happen and why this was not anticipated.

Knowledge repositories

The three-dimensional matrix is also the structure for knowledge management, whereby the organization as a whole and each of its functions and sub-functions have their own strategic and operational knowledge repository. This facilitates functional, as well as cross-functional knowledge development.

If a system has a problem that it can fix, it will usually do so during the next performance cycle. However, there are systemic problems which are co-produced by other systems. For example a manufacturing (*or marketing, or HR*) problem could be co-produced by the IT system. In this case, the learning about how IT co-causes the problem will be forwarded by the manufacturing (*or marketing, or HR*) system to the IT system and recorded in the IT knowledge repository. Thereby an issue can be dealt with in interaction with the co-producing systems. (*The Biomatrix Problem Dissolving Methodology can assist in this. Dostal, 2005*)

Likewise, the multi-dimensional co-factors of success experiences can be recorded and distributed to other systems who can replicate it or benefit by it.

The knowledge repositories of the organization and each of its (sub) functions are divided into a strategic and operational section, whereby each section is further structured according to generic categories. We have found it useful to structure the strategic section according to the *Seven Forces of System Organization* (*see Figure 12*), while the operational repository is typically structured according to its processing phases (*i.e. its sequential or parallel sub-functions*).

The aim of the strategic knowledge repositories is to record information that serves the dissolving of strategy related systemic problems and the ongoing development of the organization and its functions, while the operational knowledge repositories are mostly concerned with dissolving operational problems and improving the efficiency and excellence of their performance.

The information is recorded in the repositories within the relevant category in an add-on manner (*i.e. in the sense of completing and enlarging the already existing information in the repository*) and not in a chronological manner.

Ideally, a repository contains sufficient information to allow the continued performance of the system in the same quality, even if all its members would be replaced with other, similarly qualified persons.

CONCLUSION

Three-dimensional matrix management ensures the maximization of self-governance of every (sub-) system, as well as the perfect coordination between them, because all (sub) functions interface with each other - not merely in a general manner, but also in an issue specific one.

The Organization as a Three-Dimensional Learning Matrix

Coherence within the organizational matrix is achieved through adherence to a shared ethos and the cascading of aims throughout the organization.

The ongoing development of an organization and each of its (sub) functions is achieved through ongoing self-reflective learning at all levels (*i.e. organizational, functional, sub-functional, team, etc.*) from a function-specific as well as cross-functional perspective.

Successful three-dimensional matrix management depends on cooperation in a functional as well as cross-functional (*i.e. multi-dimensional*) setting, as well as understanding the (dis)solving of function-specific as well as multi-functional problems and achieving a desirable emergence from the cross-functional interaction. To achieve this, requires an organizational ethos that is grounded in systems thinking.

Thus systemic and learning-based three-dimensional matrix management facilitates the ongoing development of the organization and all its functions as an emergence that is in accordance with the ethos, purpose and mission of the organization.

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