Characteristics of learning organizations

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Introduction: The Organizational Learning Metaphor

The project „LearnSafe“ centers on how nuclear organizations may be able to improve their coping with emergent challenges. Such challenges may originate both from within or without the organizations. We just heard a long list of such challenges as they are perceived by nuclear managers in five countries. The main mechanism to improve individual or organizational coping with novel challenges is through learning. It seems, therefore, necessary to reflect on the conditions for learning. The concept of the “learning organization” is relatively new, however, the body of relevant publications mounts steadily. Since we know relatively much about individual learning I first will address the mechanisms by which individuals learn. In the second part I shall then extend the lessons from individual learning to organizations.

It is by now a truism, of course: errors are constitutive of human nature (“errare humanum est”). And we know that errors are important for individual learning. However, even though also people in high hazard work systems learn, such individual learning does not necessarily imply safer systems. Apparently, more is needed than just individual learning in order to improve systems safety. Nevertheless, we can summarize: *People learn from errors.*

In high hazard systems it is safety which must be considered as the most critical performance parameter. We have two basic analytic strategies to optimize this parameter: *feed-forward control and feedback control* of safety. Feedforward control techniques are considered as state of the art and are commonly employed in improving probabilities of safe systems conduct (Rasmussen, 1991; Kirwan 1997). These are analytic methods such as Probabilistic Safety Analysis (PRA) or Human Reliability Analysis (HRA), commonly used in the nuclear industry, in aviation and space industry.

However, conceptual notions and pragmatic tools of feed-back control, i. e. improved safety control through learning from experience, still remain in dire need of development (Huber, 1991). In this context organization sciences with increasing frequency evoke the metaphor of organizational learning (Dodgson, 1993). Although the metaphor may be liable to questionable anthropomorphic generalizations, casual observations and systematic studies demonstrate that organizations for better or worse do retain knowledge of past experience

(Walsh & Ungson, 1991). Events in an organization's history may thus be attributed to constitute promising material and triggers for organizational learning (Koornneef, 2000).

We define events as

occurrences of unexpected, undesirable system states.

Basically, events are organizational surprises (Koornneef, 2000). The better we understand the factors and their interaction which led to events, the better are the chances to utilize such experience to improve safety. However, the veracity of this conjecture will depend on the organization's success to make valid and reliable inferences from analyzing history, especially small histories, single or infrequent cases which are typical for high hazard – low risk organizations. So we may now summarize: *Organizations learn from events*. In nuclear industry we usually call this learning from operational experience. And please note: this may be again, like the challenges, both experience from within and from without, i. e. learning from events from one's own and those from other organizations.

1. Individual learning

As pointed out above: we note a growing body of literature on organizational learning (Wilpert, 1995). But we must be aware that the term OL is used in a metaphoric sense in analogy to individual learning. Learning is generally defined by psychology as **change of goal directed behavior based on experience.** Special goals of such directed behavior may, of course, be to cope with a new challenge.

What then is required for individual learning?

- Required is an **organism** equipped with
  - sensors to register stimuli from within and outside of the organismic system
  - a sensory afferent apparatus transporting information (processor)
  - a center for storing experience (memory)
  - a center for analyzing stored experience
  - a center for formulating new behavioral goals
  - an efferent apparatus transporting information (effectors)
  - operators implementing the new intended behavior (reactions)
  - afferent feedback to center

Somewhat simplified a model of individual learning in terms of information processing and decision making could be represented like in Figure 1:

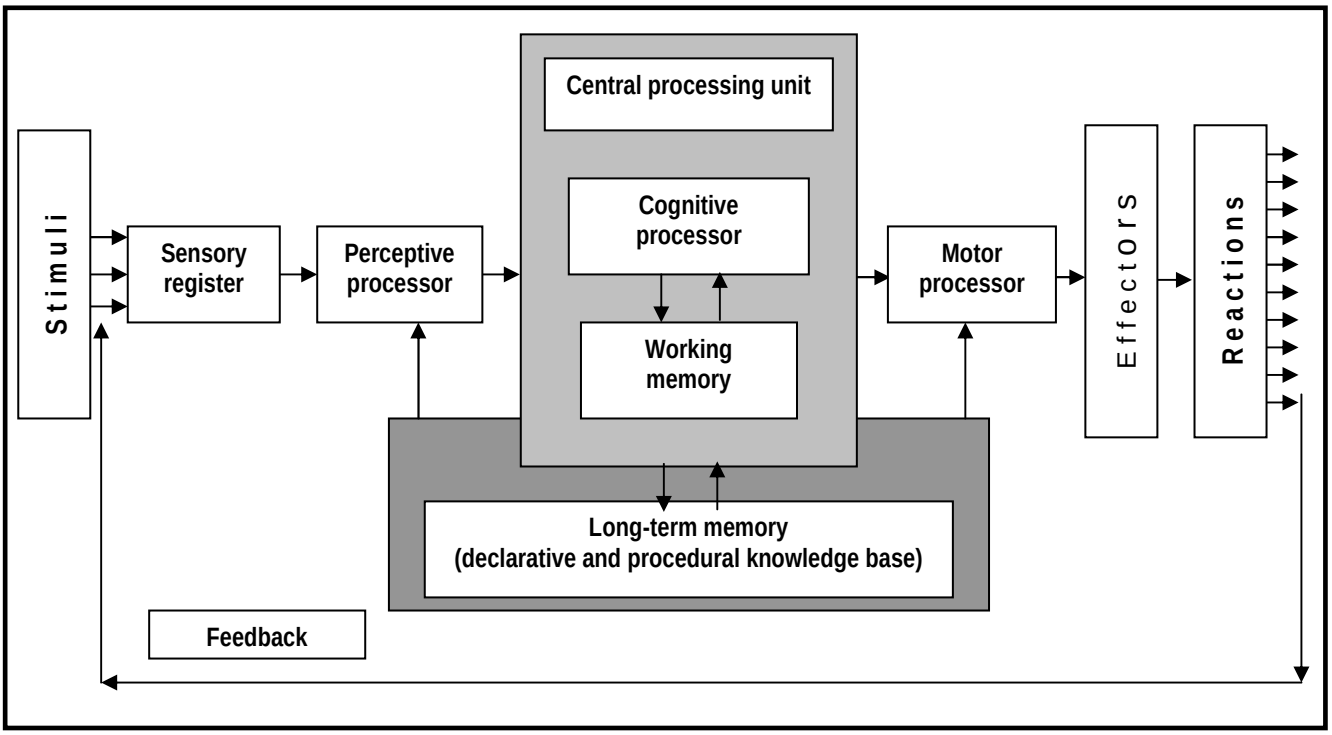

Figure 1: Model of human information processing (Streitz, 1987, p.49)

2. Organizational learning

The metaphor for organizational learning based on individual learning breaks down when it comes to many actors (organization members) sharing their individual memories, knowledge and competencies. This is where the collective knowledge base comes in. Organizational learning is the development of a commonly shared 'available knowledge' base, that builds on past knowledge and experience. The members of an organization act as units/subjects of such learning processes (Pautzke, 1989).

Organizational learning occurs when individuals within an organization experience a problematic situation (a surprise) and inquire into it on the organization's behalf (Argyris & Schön, 1996).

But organizational learning is also the process whereby organizations understand and manage their experiences. We call this process "knowledge management". This view of organizational learning builds upon the information processing perspective (Simon, 1976). Organizations are described as information processing systems, acquiring, interpreting, distributing, and storing information within the organization.

Organizations with such information processing and decision making are also known as 'learning systems'. 'Learning systems' have mechanism, that maintain and institutionalize learning (Shrivastava, 1983). From the notion of collective knowledge base follows that individual learning is insufficient for organizational learning. Individual learning in order to become organizational or even collective needs to be shared. And knowledge sharing requires something we might call the **institutionalization** of (1) certain structures and (2) dynamic processes.

2.1 Structural Aspects

In terms of different over-lapping steps of implementing structural features in the organization the following central aspects of organizational learning may be considered:

(1) The *systematic collection* of experience through event analyses and analyses of practice inside and outside of the focal organization. This requires the implementation of a systematic analysis method of events and near misses, of malfunctions and the encouragement of voluntary reports of safety relevance.

(2) *Regulatory oversight (event reporting systems, periodic safety reviews)* with feedback loops into NPPs.

(3) *Peer reviews* (IAEA, WANO, by representatives of other national NPPs).

(4) The development of a *data base* which facilitates comparisons of experience, i.e. the classification system of events in the collective data base must have a solid theoretical grounding in order to avoid mixing apples and pears.

(5) A *central processing unit* (CPU: the brain) which is able to analyze the gathered experience.

(6) A *decision making unit* (upper management) which evaluates the analyses of the CPU and proposes optimization measures.

(7) A *feedback system* which feeds the decisions of the decision making unit back to relevant groups within and outside the organization who are able to execute the decision.

(8) The *implementation* of the optimizing measures.

(9) *Procedures of evaluating* the effectiveness of optimization measures.

(10) A *feedback system* back to step 1.

The structural aspects may be represented in figure 2, an adaptation from figure 1:

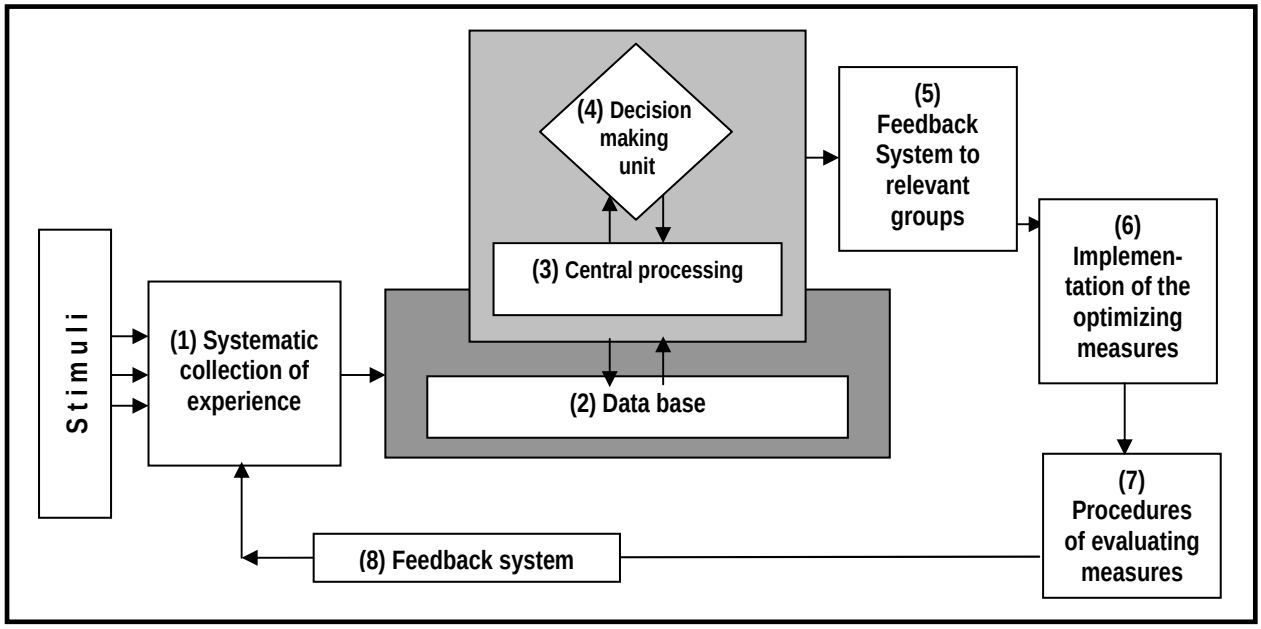

Figure 2: Model of structural aspects of organizational learning

The parts (1) and (2) define organizational learning as the development of a knowledge base (Pautzke, 1989) whereby the organization members use the existing structures for the systematic collection of experience. Various standardized procedures and methods are available to foster the creation of collective knowledge bases (see also Gibbs, 1988) through "communities of practice" ( ):

- Metaplan-exercizes as used in the LearnSafe project leading to a joint understanding of a particular problem area
- Group problem solving exercises such as mind-mapping which helps a group to identify factors that influence undesirable organizational outcomes (e.g. de-motivated personnel)
- Systematic reviewing of experience by comparing action plans with outcomes, keeping diaries, analyzing video and audio recordings of work processes, peer appraisals

Parts (4) to (8) build on the models of Simon and of Streitz reconstructing information processing of individuals and organizations. Furthermore the different learning forms by Argyris & Schön are included in this model as well to underline the depth of the acquiring, interpreting, distributing, and storing processes.

2.2 Dynamic Aspects

Organizational learning and, as an integral part of it, the learning of individuals, are dynamic processes over time. They occur in the context of different and changing environments, of certain cultural characteristics, of organizational strategies and structures. Individuals are engaged in processes of interaction, socialization and individuation. Thus, next to structural aspects we need to consider dynamic aspects which relate mainly to requisite psychological **characteristics of the organization and its staff.** The effective promotion of organizational learning will, therefore, depend on such factors as:

(1) Development and use of a common language among organization members
(2) Mutual trust among members in the organization
(3) An adequate error culture (no blame culture)
(4) Willingness to challenge old practices on all levels
(5) A thorough and shared understanding of the needs of the company and industry
(6) Analytical skills to predict how challenges will influence the organization
(7) Identifying and removing existing blocks and hindrances to learning and the sharing of knowledge
(8) Intellectual mobility or flexibility to think across divisions and functions

Mumford (1992) highlights some of the conditioning features of individuals for organizational learning:

- The capability of being dissatisfied with current levels of performance, knowledge, skills or attitudes
- The capability of recognizing that activities can have more than one purpose

- The belief that it is possible to learn by planned direction rather than only by accident
- The belief that the culture in which they work, and particularly their boss, will give them some support and some reward
- The belief that recognizing learning opportunities will lead to an improvement which they desire to make.

If all these aspects which we have mentioned so far should remind you of features which we usually associate with the notion of safety culture, this effect is entirely intended.

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