

***DISCERNING THE QUALITY OF ORGANIZATIONAL
LEARNING***

Theme: The Social Processes of OL and KM

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Abstract

This study presents a coherent and fine-grained conceptualization of organizational learning quality based on a comparison of successful and unsuccessful episodes of post-accident reviews in an elite combat unit of the Israel Defense Force. The results show that (1) the outcomes of high-quality organizational learning are effective lessons-learned that are assimilated into the organization's mode of operation. (2) Assimilation is contingent on gaining the hearts and minds of the organization's members, i.e., persuading them that the lessons-learned are appropriate and feasible, and engaging their commitment to the latter's persistent implementation. (3) The processes of high-quality organizational learning are systematic and mindful, enlist internal and external sources of knowledge, and engage members in active participation. In addition, such processes embedded in a culture of learning, that is, they are predicated on the assumption that learning is useful, and are guided by shared values of inquiry, integrity, transparency, issue orientation, and accountability. (4) The immediate context of high level organizational learning consists of a receptive and supportive leadership that induces psychological safety.

The diverse literature on organizational learning, learning organizations and knowledge management, addressed the subject of organizational learning quality only obliquely. This study presents a coherent and fine-grained conceptualization of organizational learning quality based on a comparison of successful and unsuccessful episodes of post-accident reviews in an elite combat unit of the Israel Defense Force. The study proceeded in 3 phases. Phase 1 established that the unit engaged in organizational learning through observations, interviews, and the administration of an organizational learning questionnaire. Phase 2 diagnosed the organizational learning mechanisms that existed in the unit and identified two episodes each of perceived high- and low-quality learning. The principal phase of the study consisted of in-depth analyses of the four episodes through semi-structured interviews of key participants and analysis of archival material. The results show that (1) the *outcomes* of high-quality organizational learning are effective lessons-learned that are assimilated into the organization's mode of operation. (2) Assimilation is contingent on gaining the hearts and minds of the organization's members, i.e., persuading them that the lessons-learned are appropriate and feasible, and engaging their commitment to the latter's persistent implementation. (3) The *processes* of high-quality organizational learning are systematic and mindful, enlist internal and external sources of knowledge, and engage members in active participation. In addition, such processes embedded in a culture of learning, that is, they are predicated on the assumption that learning is useful, and are guided by shared values of inquiry, integrity, transparency, issue orientation, and accountability. (4) The *immediate context* of high level organizational learning consists of a receptive and supportive leadership that induces psychological safety. In addition, the results offer interesting implications for the role of leadership in organizational learning and the nature of organizational culture that promotes learning.

Discerning the Quality of Organizational Learning

A growing interest in organizational learning in the past two decades produced an exponential growth in the number of publications on the subject (Crossan & Guatto, 1996). Fuelled by the insight (which is by now a truism) that organizations cannot hope to survive or thrive in increasingly dynamic and competitive environments without acquiring a capability to learn, this literature is addressed to audiences in academia who wish to understand how, when, and why organizational learning occurs, and to practitioners – managers and consultants – who wish to improve organizations in this respect. Given that organizational learning has both descriptive and prescriptive facets, it is puzzling to note that the topic of what is high-quality organizational learning, which is relevant to both, received only scant and indirect attention in the prolific literature on organizational learning and learning organizations. Our purpose is to narrow this gap in knowledge by presenting an empirical investigation of the differences between high and low quality organizational learning. The importance of this distinction is suggested by the following episode concerning one organization's failure learn from its experience, which appeared in the Israeli daily Maariv on July 2, 1997:

On June 31, 1996, a foot soldier carrying wireless set was electrocuted to death when the set's antennae made contact with an overhead high tension electric cable. This was the sixth accident of this kind in the Israel Defense Force. A committee appointed to investigate two identical accidents two years prior to the present accident discovered that specific instructions that were issued as lessons-learned from previous accidents (e.g., indicating high tension

overhead cables in terrain analysis) had not been followed. Despite the Military's apparent attempts to learn from its experience, the same failure repeated itself on several occasions.

As the episode shows, the Israel Defense Force "failed to learn" even though it went through the motions of conducting post-accident reviews and appointing of an investigative committee. Thus, "failing to learn" has two meanings, failing to engage in learning altogether, and learning in an ineffective or unproductive fashion. Miner and Mezias (1996, pp. 93-94) discussed the latter possibility as follows:

Although "learning" carries a positive connotation in many cultures, research on organizational learning clearly shows it may or may not produce good outcomes. Organizations can learn to do bad things, from society's perspective...learn things that are incorrect...incorrectly conclude [that their] actions caused a valuable outcome and repeat [them] producing harmful outcomes. Organizations may also be myopic, overvaluing information from the current period, local situation, or past success.... It is also clear that practices learned in current environmental configurations may prove disastrous in later configurations.

The distinction that we draw between high and low quality organizational learning pertains, thus, to differences between high quality organizational learning which can be regarded as effective, productive or valuable and low quality organizational learning which cannot be regarded this way. The ability to make such distinctions is interesting from a theoretical perspective, given the normative stance of some of the literature on organizational learning (e.g., Argyris & Schön, 1996) and much of the literature on learning organizations (e.g., Senge, 1990, a). It is also interesting from an applied perspective, given the need to guide prospective interventions and to evaluate the outcomes of implemented interventions.

How can the quality of organizational learning be conceptualized? Three possible avenues that suggest themselves are to devise notions of quality from existing conceptualizations of organizational learning, survey and systematize available notions of organizational learning quality and to develop a bottom-up conceptualization by examining differences between processes of organizational learning which clearly differ along a roughly conceived dimension of "quality," "effectiveness," or "productiveness." Because of the great diversity of conceptualizations of organizational learning (Barnett, n.d.; Easterby-Smith, 1997; Friedman, Lipshitz, & Popper, 2002; Prange, 1999) hampers efforts of integration, we used the literature to search for clues to what constitutes high-quality coupled with an empirical investigation of high- and low-level organizational learning efforts.

Previous attempts to conceptualize organizational *effectiveness* (Goodman & Pennings, 1977) and product and service *quality* (Reeves & Bednar, 1994) indicate that producing a single generally applicable definition for these concepts is probably unattainable. It is therefore not surprising to find that examination of the literature reveals (a) that there are no direct treatments of the issue of organizational learning quality and (b) that the literature that is relevant to the subject indicates that a conceptualization of organizational learning should include three aspects of this phenomenon: The outcome of learning, the process of learning, and the context of learning.

The outcome aspect of organizational learning quality is entailed by the fact that organizational learning is generally assumed to produce some change in the organization. For example:

Weick (1991) proposed that learning has taken place if there is a *shift in performance* when the stimulus remains essentially the same. With regard to organizational learning, Ackoff and Emery (1972) submit that learning is the ability of a system to *improve its efficiency* under constant environmental conditions. Argyris and Schön (1974) define organizational learning as involving the determination and *correction of error*, and as the testing and *restructuring of*

the organization's theories of action. Levitt and March (1988) suggested that an organization learns by *encoding* influences from history into *routines that guide behavior*. More recently, Huber (1991) postulated that an entity learns if, through processing information, its *range of potential behaviors is changed* (Smith & Tosey, 1999, p. 73, italics added).

More generally, it is possible to divide organizational learning outcomes into cognitive outcomes (e.g., knowing a new procedure or developing a new mental model), behavioral outcomes (e.g., knowing to produce a new behavior), and normative outcomes (e.g., acquiring a new set of basic assumptions and shared outcomes). Regardless of the type the outcome, the association of organizational learning with some outcome implies that high-quality organizational learning should differ from low-quality learning in its probability to produce a desirable outcome or avert the occurrence of an undesirable outcome.

Recall Miner and Mezias' observation, quoted above, that organizational learning does not necessarily produce desirable outcomes. Determining a desirable outcome is, therefore, a necessary but not sufficient step for conceptualizing high quality organizational learning. To this it is necessary to add the identification of a process that is likely to produce this particular outcome. Argyris and Schön's (1996) discussion of productive learning is a case in point. Briefly (for more detailed exposition see Lipshitz, 2000), Argyris and Schön suggest that organizational learning occurs when members of the organization, acting as its agent, inquire in order to "detect and correct error," thereby presumably contributing to the organization's well being. Argyris and Schön distinguish between two processes of inquiry, single loop learning which is limited to improving the probability of goal achievement within existing framework of assumptions, values and goals, and double loop learning which includes critical examination and possible reframing of this framework. Although both processes can be productive in the sense of contributing to the functioning of the organization, double loop learning can be considered to be of higher quality for two reasons. The first reason is its wider scope, since effective solution of some problems require the examination of sensitive "undiscussable" issue, and the reframing of assumptions, values and goals. The second reason is that its governing values of valid information, free and informed choice, and internal commitment to the choice and constant monitoring of its implementation ensure the continuation of inquiry by reducing the likelihood disruptive self sealing "defensive routines" which tend to appear when single-loop learning is driven by governing values of maximizing winning and minimizing losing, unilateral control, and minimal generation and expression of negative feelings.

Similar to Argyris and Schön (1996), Lipshitz, Popper and Friedman (2002) have also attributed the likelihood of productive learning (broadly defined as a systematic process which yields valid information, and results in actions intended to produce new perceptions, goals, and/or behavioral strategies) to the existence of shared values that promote learning. The five values which they posited were transparency (the willingness to expose one's thoughts and actions to others in order to receive feedback), integrity (the willingness to seek and provide information regardless of its implications), issue-orientation (focusing on the relevance of information to the issue under consideration regardless of the social standing or rank of source or recipient), inquiry (persisting in investigation until full understanding is achieved), and accountability (the willingness to assume responsibility for learning and for the implementation of lessons-learned). This particular set was elected based on the following line of reasoning: Two basic requirements for productive learning as defined above are valid knowledge and corrective action. Assuming that organizations face difficult problems in complex and dynamic situations, obtaining valid knowledge requires persistent investigation which can be helped by the value of inquiry. In the social contexts in which organizational learning takes place inquiry requires transparency without which input from others will be

limited or flawed. Since transparency entails the risk of exposing one's own failures and mistakes, it is likely to raise anxiety and defensiveness which, in turn, can block inquiry or subvert its dependability. The values of integrity and issue orientation help people proceed with inquiry despite the threat that it involves by helping people to prefer the loss of face to missing an opportunity to learn and by the sending of person-directed offensive messages. Finally, the value of accountability increases the likelihood that learning will take place and that its lessons-learned will be implemented.

Other distinctions between different types or levels of organizational learning have been proposed in the literature. These include Fiol and Lyles' (1985) distinction between low-level organizational learning, which aims at changing behaviors and modes of operations and high-level organizational learning which also aims at changing rules and norms; Dodgson's (1991) distinction between strategic and tactical learning; and the similar distinctions between adaptive and generative learning (Senge 1990, a) learning by exploitation vs. learning by exploration (March, 1991) and adaptive vs., transformational learning (Applebaum and Goransson, (1997) which denote a difference between gradual or incremental processes and processes that are more revolutionary or discontinuous. The common denominator between Fiol and Lyles (1985), Dodgson (1991), Senge (1990, a), March (1991), and Applebaum and Goransson (1997) is that in spite of the connotation of differences in organizational learning quality associated with their distinctions (e.g. strategic or discontinuous changes are more fundamental than tactical or incremental changes), they all refrain from spelling out the relationship between their distinctions and organizational learning productiveness in the manner of Argyris and Schön (1996) or Lipshitz et al. (2002).

Finally, numerous authors linked the likelihood of organizational learning (and by implication is ability to produce useful outcomes), to the operation of facilitative factors (or the absence of disruptive influences) in the context of learning or to the existence of appropriate "organizational capabilities (Dodgson, 1993; Lipshitz, Popper & Friedman, 2002; Huber, 1991; Leithwood, Lawrence, & Sharatt, 1998; Levitt & March, 1988; McGill, Slocum, & Lei, (1993; Nevis, Dibella & Gould, 1995; Shaw & Perkins, 1991; Yeung, Ulrich, Nason, & Von Glinow, 1999). The elements of the psychological, policy and contextual facets of Lipshitz et al.'s (2002) multi-facet model are fairly representative, albeit not exhaustive, of the factors identifies by these authors. They include a sense of psychological safety, reciprocal commitment between the organization and its members, the commitment of the organization's leadership to learning and its tolerance for error, appropriate task structure and proximity to the core tasks of the organization, high costs of potential error, and environmental uncertainty.

In conclusion, the ability to discern between organizational learning that is likely to produce useful outcomes (high-level organizational learning) and organizational learning that is intended to do so but is unlikely to succeed, or that is carried out as a form of ritual or public relations effort (low-level organizational learning), is important for theoretical and practical purposes. The literature which deals directly with this issue is relatively scarce and fails to converge on compelling and useful definitions of the antecedents, processes and outcomes of high-quality organizational learning. In the absence of a leading theory we decided to narrow this gap by working inductively, designing a model of the antecedents, processes and products of high-learning organizational learning by capturing the differences between high- and low-level episodes of organizational learning in an organization that systematically operates organizational learning mechanisms (Lipshitz et al., 2002).

Method

Research site

The basic research strategy was grounded theory (Charmaz, 1995; Glaser & Strauss, 1998). The organization in which the study was conducted was an elite combat unit in the Israel Defense Force in which the first author served as an internal consultant. The unit was selected for three reasons: (1) According to the first author's impression the unit maintained systematic organizational learning activities, principally in the form of after-action reviews. (2) The unit was responsible for combat operations as well as for developing its unique operational doctrine and for training its recruits and combat sub-units, thereby permitting to observe the complete chain of antecedents, processes and consequences of organizational learning in a compact, self contained, organizational entity. (3) The first author's service as an internal consultant provided her with an intimate knowledge of the unit and a unique degree of accessibility to and cooperation of the unit's commander and members.

Preliminary studies

The study was preceded by two preparatory phases. The purpose of the first phase was to ascertain the existence of systematic organization learning processes in the unit. To this end, a representative sample of 69 officers and NCOs in the unit (who did not participate in the main study) were asked to respond to a 46 item questionnaire which measures the intensity of organizational learning activities in the organization (Ellis, & Globerson, 1996). Consistent with the first author's impressions, comparison of the results with those obtained in 5 different organizations (another unit in the Israel Defense Force, a bank, and three high-tech organizations) showed that the unit to be studied had the highest over-all score on the questionnaire as well as the highest score on 3 of its 5 subscales and second-highest score on the remaining two subscale. Thus, this pilot study firmed the feasibility of observing organizational learning processes in the unit.

The second phase which was designed was to explore the learning mechanisms operating in the unit and to identify the high and low quality episodes which were studied in depth in the main phase of the study. Nineteen officers at different levels in the unit were interviewed. The semi-structured interview pertained to learning mechanisms operating in the unit, their frequency of use, output, and processes, the unit's culture of learning, and listing of specific episodes which the interviewees regarded as examples of high- or low-level organizational learning. Eleven additional officers were asked to respond only to the latter question. The interviews revealed that operation of six organizational learning mechanisms in the unit: After action reviews, review of lessons learned during planning, periodical reviews of various subjects, professional workshops, ad-hoc "think teams," and review of exemplary cases from the unit's history which were conducted as part of trainees socialization process. Performed routinely after every operational and training activity regardless of its success or failure, after-action reviews were by far the unit's dominant organizational learning mechanism. The activities, review processes, lessons learned and follow-up activities are recorded in extensive documentation whose relevant aspects are routinely reviewed as part of operational planning. The unit's culture, according to the interviewees, emphasized continuous improvement and frankness and veracity of operational and post-operational reports.

Design

The 30 officers who were asked to do identify high- and low quality learning episodes referred to 6 high-quality and 4 low quality episodes of organizational learning. Two episodes

of high-quality and 2 of low-quality learning were selected for in depth analysis based on the frequency of reference (14, 3, 9 and 5 interviewees), and on security restrictions. All episodes concerned training accidents in the unit's training facility. The episodes' chronological arrangement (L, H, H, L) allowed to compare between aggregate features of the high- and low-quality episodes and to track the short term implementation and longer term resilience of lessons learned.

Data Collection

Interviews: Six officers who were involved in episode 3 and 4 and seven officers who were involved in episode 1 and 2 were interviewed by the first author. Two interviewees participated in two episodes and the rest participated in one episode each. All interviewees did not participate in the preliminary phases of the study. Some, but not all interviewees, were involved in more than one episode. Informed that the study was not part of the author's consulting duties, and that they were free to refuse to participate if they wished, 1 intended interview in episode 1 and 1 in episode 2 refused to participate. The semi-structured interview protocol consisted of the following questions: (1) "In a preliminary study interviewees mentioned the after action review following incident X as an episode of organizational learning. What was your position at the time of the incident, and when and how did you first learn of it?" (2) "Please recount what happened in the incident." (3) "How was information collected following incident?" (4) "Which learning mechanisms (or learning activities) were used after the incident and what was the function of each mechanism?" (5) "How was each mechanism operated and who participated in their operation." (6) "What was the atmosphere in each mechanism?" (7) "What can be learned about the unit from the operation of these mechanisms?" (8) "How were the subjects for investigation determined?" (9) "How was each subject investigated?" (10) "Which conclusions and lessons-learned were derived and how?" (11) "Were the appropriate conclusions and lessons learned derived, in your opinion?" (12) "How were the conclusions and lessons-learned disseminated throughout the unit?" (13) "Was there a systematic follow-up of the implementation of lessons-learned? How, and for how long, was it continued?" (14) "Were lessons learned absorbed in the unit?" (15) "Was the learning process of high or of low quality in your opinion? Why?" (16) "What is high-quality organizational learning in your opinion?" (17) "Did an external committee investigate the incident?" (18) "Did the external committee's investigation affect the unit's own learning process?" (19) "Describe the process of the external investigation." (20) "What role did the commander play in the entire process?"

Archival data: All documentary data available in the unit on each episodes were collected for analysis. These included documents regarding the incident that was investigated, documents regarding the after-action review process (e.g., minutes of meetings, reports of committees and inspections), and documents regarding changes in standard operating procedures emanating from the after-action reviews.

Data Analysis

Basically analysis followed Weiss's (1994) sequence of (1) line by line coding (2) local integration (constructing a model for each episode) and (3) general integration (constructing an overall model of high-quality organizational learning.)

Interview coding: Coding was performed by the first author in an iterative process in conjunction with intensive discussions with the second and third authors who read the interviews and reviewed the selection of codes, their assignment to specific text segments, and the products of each intermediate phase of the analysis outlined below. Sixty seven codes

were generated corresponding to the interview questions (e.g., external investigative committee), Lipshitz et al.'s (2002) model (e.g., learning values), or to the unit, its organizational learning process, and to high- vs. low organizational learning in general (e.g., fighting sub-units; areas of specialization.) The number of codes was reduced by clustering the codes relevant to high- vs. low-quality organizational learning in 22 bi-polar codes representing general attributes (or criteria) of organizational learning quality. These were partly inspired by the literature, and partly derived literally from the transcripts and formed 5 clusters corresponding to the different phases of the organizational learning process. (See Table 1 for representative quotes from each episode to which the criteria applied): (1) General aspects: The extent to which learning is designed systematically; executing information search, conclusion drawing and decision making as distinct stages; the centrality of the learning (i.e., post-accident review) process in the organization; involving the organization's members in the learning process; the extent to which organization members perceive the external committee's contribution as legitimate; mindfulness (i.e., attention to details and warning signs, Weick & Sutcliffe, 2001; the commander's receptivity to suggestions; relaxed atmosphere during learning; the commander's support of learning activities. (2) Information search and analysis: The breadth of subjects selected for investigation; the values of inquiry (Lipshitz et al., 2002); integrity (as in Lipshitz et al, 2002, to which interviewees refer as veracity in reporting); transparency (Lipshitz et al., 2002); and issue orientation (Lipshitz et al., 2002); (3) Drawing conclusion and lessons-learned: The extent to which conclusions and lessons-learned are deemed correct and appropriate by the organization's members; the commander's ability to take decisions; the extent to which the commander's conclusions and decisions are impartial; double-loop learning (Argyris & Schön, 1996). (4) Implementation: The value of accountability (Lipshitz et al., 2002); documentation of lessons-learned and the learning process; dissemination of lessons-learned to relevant units. (5) Assimilation (the long term absorption of lessons-learned in the organization's culture and modus operandi). It is important to note that the identification of criteria in specific episodes relied not only on interviewees' explicit references such as those illustrated in Table 1 but on their reports of observable behaviors consistent with them.

Table 1: Criteria of organizational learning quality

	Criterion	Representative quotes (Case number in parentheses)
General aspects		
<i>1</i>	<i>Non-systematic vs. Systematic design of the review process</i>	“The learning process after this episode was a text-book example for deriving lessons-learned from an accident and served as a model for later episodes.” “I (the commander) took responsibility for the whole process and set up committees to deal with the various aspects of the case, composed by experts from within and outside the unit each headed by a commander accountable for its output.” “The division of labor was very logical and the sequence of issues to be investigated down to their root causes was very clear.” [positive exemplar, 2.]

2	<i>Distinctiveness of the stages of the review process</i>	<p>“The commander made clear that the purpose of the initial debriefings immediately following the accident was to gather information and that no lessons-learned will be drawn at this stage of the process“ [positive exemplar, 2.]</p> <p>“The decision to change the relevant operating procedure was made on the spot right after the incident” [negative exemplar; 1.]</p>
3	<i>Marginality vs. Centrality of the post incident review process</i>	<p>“The process was perceived as good and our participation was perceived as moral and professional obligation although except for one officer who was assigned to rewrite the doctrine we all had to continue with the unit’s operational schedule which was very hectic at that period” [positive exemplar, 2]</p>
4	<i>Member’s involvement</i>	<p>“No one argued with the commander on the special combat technique that was exercised because he ‘wrote the book’ on this subject” [negative exemplar, 1.]</p> <p>“How decisions were made? The commander announced his decisions without any consultation whatsoever and from then on they bound the unit” [negative exemplar, 3]</p>
5	<i>Credibility of the external committee</i>	<p>“External committees are objective entities. 90% of the committee’s recommendations were wholly adopted and the rest were partially adopted because they did a through job” [positive exemplar, 2.]</p> <p>“The unit’s representative on the committee did not specialize in the relevant combat techniques and two external members did not understand it. We did not appreciate them or their ability to impress their conclusions on the unit” [negative exemplar, 1]</p>
6	<i>Mindfulness</i>	<p>“The search method during the search phase [of the episode] was changed when after action reviews carried out during this phase showed that the original method was ineffective” [positive exemplar, 3]</p> <p>“Relevant lessons-learned from previous exercises were not implemented in later exercises” [negative exemplar, 1]</p>
7	<i>Commander’s receptivity</i>	<p>“Whenever we suggested new ideas or novel technologies the commander would say that ‘we already tried it,’ ‘it will not work’” [negative exemplar, 1]</p>
8	<i>Psychological safety</i>	<p>The atmosphere was very open and composed. Based on the preliminary debriefings everybody was certain that we followed the procedures [even though an accident happened” [positive exemplar, 3.]</p> <p>“The atmosphere during the post-incident review meetings was very unpleasant. Immediately after the accident the training facility’s commander was discharged in front of everybody....we would meet and reprimand people and scream about different issues....it had negative impact on people’s willingness to share their thoughts and expose their feelings” negative exemplar, 4].</p>

9	Commander's support	<p>“The learning process was exemplary owing to the commander who insisted that it will be carried out properly and who enabled people to work and to speak freely” [positive exemplar, 2]</p> <p>“I do not like to work with commanders who do not back me...Had I felt more support from the commander I would have put more effort into the post-incident review process” [negative exemplar, 3]</p>
10	Commander's decisiveness	<p>“The fact that the commander was not an authority on the specific combat technique which was exercised impeded his ability to come to a decision. He continued to seek additional ideas and opinions, extending [the post incident review] and producing uneasiness among the unit's commanders” [negative exemplar, 3.]</p>
11	Commander's partiality	<p>“Because the accident occurred shortly after a serious operational failure his conduct and decisions sent a message of panic” [negative exemplar, 4]</p>
Information gathering		
12	Breadth of investigation	<p>“We unpacked the [training] process to and analyzed how to improve each of the components. We did not limit ourselves just to remedying the immediate causes of the accident” [positive exemplar, 2]</p>
13	Inquiry	<p>“The process was very thorough. People would report their findings and conclusions and the commander would summarize or send them back to continue in the investigation. Investigation of one topic would lead to the investigation of others” [positive exemplar, 2]</p> <p>“Some aspects of the incident were not examined. My room mate who gave OK to the exercise was no investigated. On other topics we were asked 2 1/2 questions and that was it” [negative exemplar, 1]</p>
14	Integrity	<p>“My principal conclusion is that I do not know why the accident happened. I should have checked the training course better before the exercise” (the exercise commander reporting to the external commission) [positive exemplar, 1]</p> <p>“People speak openly, admitting their errors – I do not think anyone dares to cover up evidence. No one thinks about the negative implications of his report” [positive exemplar, 3]</p>
15	Transparency	<p>“All the material accumulated in the unit's internal process was passed on to the external committee” [positive exemplar, 3]</p> <p>“The findings and recommendations of all the sub-committees were passed on to higher echelons” [positive exemplar, 3]</p>
16	Issue orientation	<p>“If a soldier voiced a correct opinion there would be a discussion, but the commander did not sit there to say ‘ignore it’ since it was said by a soldier and not by ourselves” [positive exemplar, 2]</p> <p>“All the material collected by the internal learning process was transferred to the external committee” [positive exemplar, 2]</p>

Conclusion drawing		
17	<i>Appropriateness of lessons-learned</i>	Remembering that the decision following incident 1 were undoable, we took care that our decisions will be realistic and feasible. [positive + negative exemplars, 2.]
18	<i>Double loop learning</i>	“We realized that our existing sent a double message to the soldiers, [requiring them at the same time to take risks in order to accomplish the mission and to observe safety regulations]. We began therefore to educate them that to be a ‘professional fighter’ is to be a ‘careful fighter’” [positive exemplar, case 2.] “Solutions were purely technical with no attempt to address the essence of the issues” [negative exemplar, 4]
Implementation		
19	<i>Accountability</i>	“We clearly understood that the incident and the implementation of changes was our responsibility, and that if would not do it, no one else would” [positive exemplar, 1.] Although I was in charge on the exercise, I do not feel that I did not function properly. Do you know that a soldier has just recently suffered the same injury? As long as we will continue to train these injuries will always happen” [negative exemplar, 4]
20	<i>Documentation of lessons-learned and the learning process</i>	“At the end of the process one officer was assigned exclusively to the task of writing a book documenting the new combat procedures” [positive exemplar, 2.] “All the post-incident review is documented. Volumes containing them can be found in the training facility and the commander’s office” [positive exemplar, 3.]
21	<i>Dissemination of lessons-learned</i>	“As soon as a new procedure was decided upon it was implemented in the combat units and the training facility. If a soldier or a trainee raised objections they were passed back to the consideration of the relevant committee. There was a tight coupling between the operational units and the committees. [positive exemplar, 2.]
Assimilation		
22	<i>Assimilation</i>	“During the investigation it became clear that the lessons-learned [of episode 2] were assimilated well in the unit” [positive exemplar, the external committee’s report, 3.] “The commander’s decisions were so ridiculous that shortly afterwards they simply, let’s say, dissolved” [negative exemplar, 4.]

Local integration: Following the initial coding of all interviews a single version of each episode was reconstructed, first in the form of a detailed script studded with verbatim quotes from the interviews and archival material, and then in the form of a chronological table detailing the sequence of activities comprising the post-accident review process, its purpose, participating parties and output which were next converted to chronologically ordered flow chart that summarized the episode’s principal events. (The flow charts are presented in the Results section below). Archival documentation was considered more reliable in case of inconsistent reports regarding the order of events, lessons-learned, decisions etc. Finally, a

model of the learning process in each episode was constructed in the form of a chronologically ordered cause map. The method of map construction was similar to Snook's (2000), i.e., backward folding of the elements of the episode's flow chart, asking for each event in the episode's flow chart which criteria of organizational learning quality could plausibly account for the transition from one event to the other. (This backward folding method is further elaborated in conjunction with the cause maps' presentation in the Results section below).

Overall integration: Overall integration was achieved by combining the common elements of the 4 models constructed separately for each episode into a general model of organizational learning quality.

Consistency checks: Two tests procedures were used to test the consistency of the analysis process. The reliability of coding was tested by training an analyst who was blind to the research question and the episode's designation as representing high or low-quality learning, to code the entire set of interviews using the final 22 code set. The principal author also recoded 4 particularly rich interviews using the same code set. Inter-judge agreement between the two analysts was a satisfactory 87%. The coherence of the coding and case designation was tested by examining the frequency distributions of positive and negative criteria of high- and low quality learning (as coded by the second analyst) in the episodes of high- and low-quality organizational learning. The significant Wilcoxon test of the difference between the two distributions ($P < .05$) which were in the hypothesized direction showed that the designation of the episodes as representing high or low-quality learning by unit members who participated in the pilot study and the independent analyst' coding of interviews conducted in the main study were consistent with one another.

Results

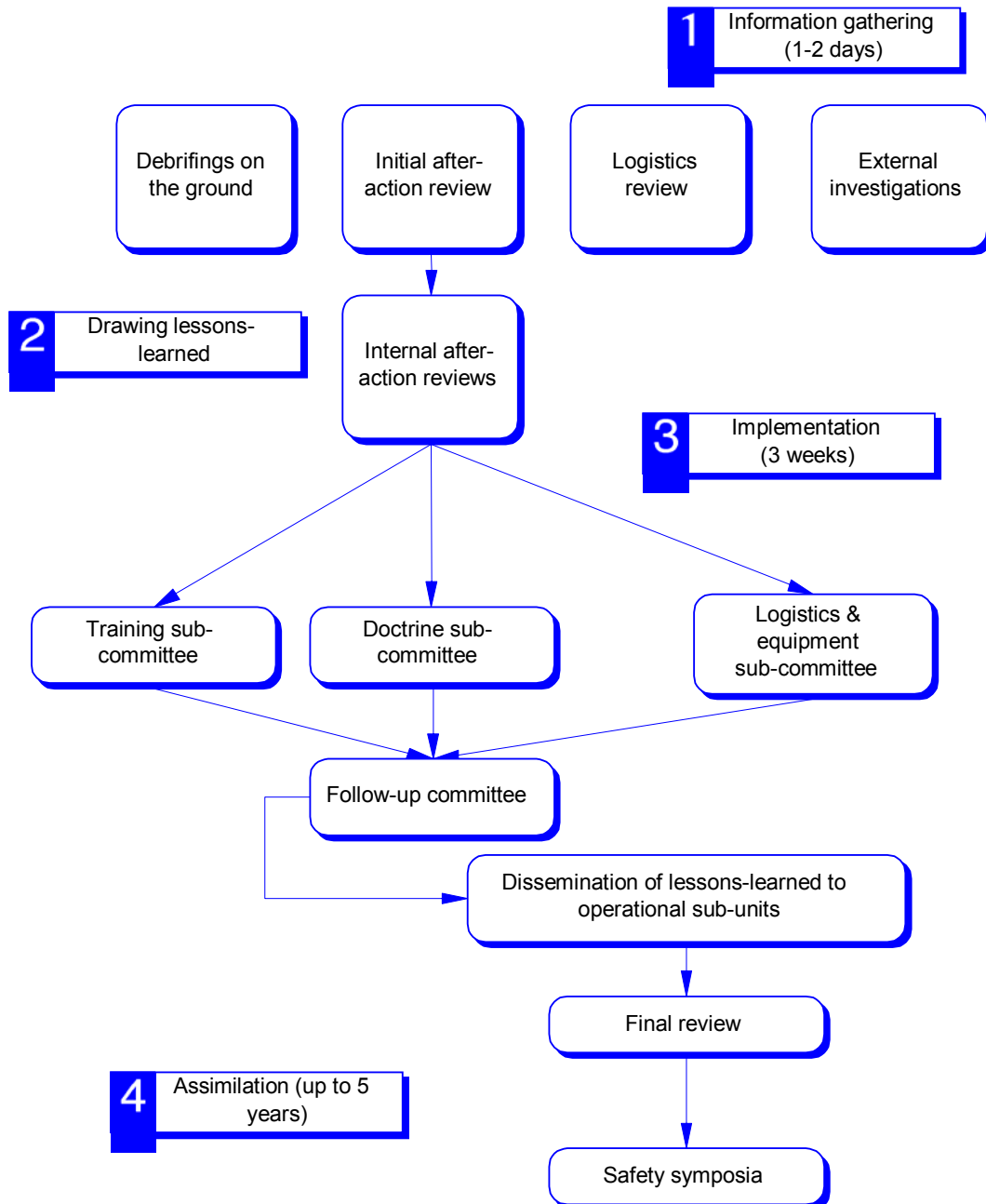
The findings regarding each episode are organized around a flow chart that outlines the events comprising the learning process and a cause map that representing their explanation by the quality criteria identified in the interview transcripts.

Episode 1

Episode 1 concerned the death of a soldier during a training exercise. Another soldier was accidentally injured during the search for the missing soldier. The approximately one month post-accident review is presented in Figure 1 which is divided into four phases: information gathering, the determination of lessons-learned, implementation, and assimilation (i.e., activities designed to ensure their long-term resilience.) Several debriefings were conducted as soon as it was realized that a soldier was missing in order to assess the situation and direct the search. These were followed by a more systematic review in the presence of the unit's commander and his deputy. An investigative committee was appointed by the commander of the Corps to which the unit belonged and began its work four hours after the accident, interviewing officers and soldiers who participated in the exercise and (later on) relevant members of the unit. The military police also began an investigation, according to Army regulations. The unit followed up its initial after-action review with a more extensive review. No details are available on this process. Assuming that it followed the regular format of such processes in the unit, the commanding officers and other participants described the objectives, planning, and execution of the exercise from their different perspectives, and answered follow up questions by other participants in the review which was concluded by the commander's decisions on lessons-learned regarding changes in training procedures, combat doctrine, and logistics. These largely overlapped with the external committee's conclusions

which were presented three days later. Three internal committees were appointed to work out the details of the lessons-learned and translate them into changes in training procedures

Figure 1: Episode 1 flow-chart



(including after accident search activities), combat doctrine, and logistics. Three weeks after the accident the unit held a final review conference attended by all high and middle rank officers. At the end of the conference participants received a document summarizing the lessons-learned from the accident. There is also evidence that refresher “safety symposia” were held later on.

Figure 2: Episode 1 cause model
[criteria numbers in squared parentheses]

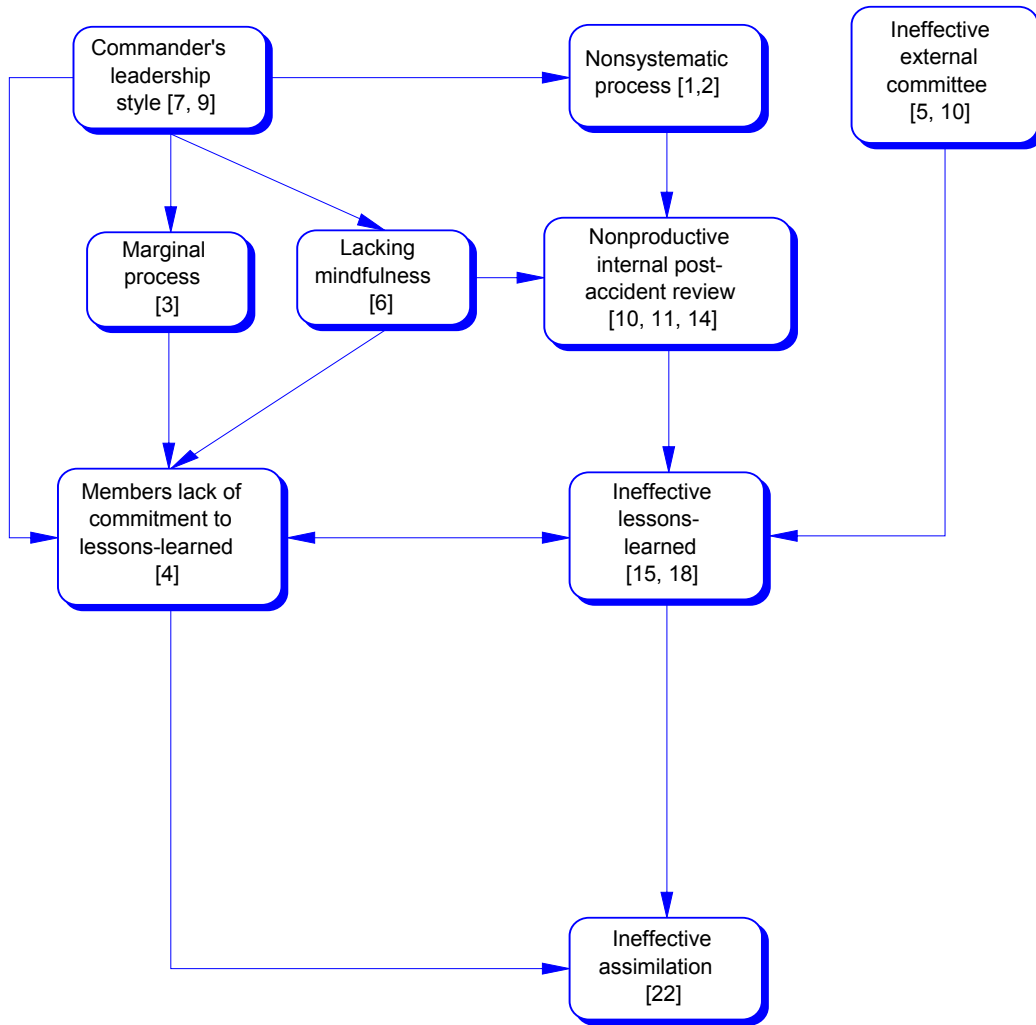


Figure 2 is a cause map representation (Weick, 1976) of Episode 1 in terms of the quality criteria identified in the interview transcripts. The map was constructed by identifying the final outcome of the episode and working out the sequence that links it to its root cause by looking for evidence regarding the working of quality criteria that can account for each step in the sequence. Element labels are intended as common denominators of the criteria which they contain. Criteria that appeared in the interviews that were irrelevant to the episode's causal account were not included in the cause maps (i.e., low-quality episodes occasionally manifested positive criteria and vice versa.)

Tracing the episode backward from its final outcome to the latter's root causes, the episode concluded with faulty assimilation: A second soldier died under almost identical circumstances in a later accident (episode 2) because the key lesson-learned of episode 1 was not implemented at that time (criterion 22). Two factors can account for this outcome. First, the lessons-learned apparently provided ineffective solutions to the causes of the accident, as they were hotly contested both during and after the review process (criterion 15). Furthermore, simplistically conceived (criterion 18), they stressed safety at the expense of operational suitability, ignoring the fact that the unit's macho culture which emphasized mission accomplishment even in face of small odds and great risks virtually ensured that this solution would gradually erode. The second factor is members lack of commitment to the lesson-learned. This may have partly resulted from the perceived inappropriateness of the lessons-learned (as shown by the dashed line linking the two factors) and, given the well known relationship between participation and ownership (Heller et al., 1998) from the marginal involvement of the unit's members in the in the post-accident process (criterion 4).

Tracing the causes of each factor in turn, members lack of commitment to the lessons-learned can be traced to their perceived inappropriateness (criterion 15) and to the commander's leadership style which was marked by low receptivity to other's suggestions (criterion 7) and lack of support (criterion 9 -- he was regarded by himself and by others as The Expert on the relevant combat technique and was generally disinclined to change the status quo). The influence of this factor on members commitment was partly mediated by its two other products -- the marginality of the after-accident review process (criterion 3) and a general lack of mindfulness in the unit which manifested itself manifested in somewhat blasé attitude to signals of possible malfunctions, persistent following up of the implementation of lessons-learned, and reluctance to invest in costly safety measures before accidents occurred (criterion 6). The ineffectiveness of the lessons-learned can be attributed to several factors: the commander's lack of receptiveness; the non-productive internal post-accident review process which was relatively brief and narrow in scope (criterion 12), shortchanged analysis while focusing on implementation (Figure 1); and lacked the values of inquiry (criterion 13) and issue-orientation -- the degree of attention that was paid to information was related to the rank of its source (criterion 16). It can also be traced to the ineffectiveness of the external committee, whose investigation was likewise hasty and narrow in scope (Figure 1), and which lacked credibility owing to the perceived low expertise of its members which prevented them from diagnosing the accident properly and from proposing effective solutions. The non-productiveness of the internal post-accident review process can be attributed to its flawed design -- overemphasis on implementation (criterion 1) which can be attributed to the commander's leadership style who took charge of directing the process and thus was responsible for it formally and factually.

In conclusion, the identification of episode 1 as an example of low quality organizational learning in the preliminary phase of the study was confirmed by the chronological and causal reconstruction of its post-accident review based on participants' and documentary data. The chronological and causal reconstruction are mutually consistent. The process was ill-

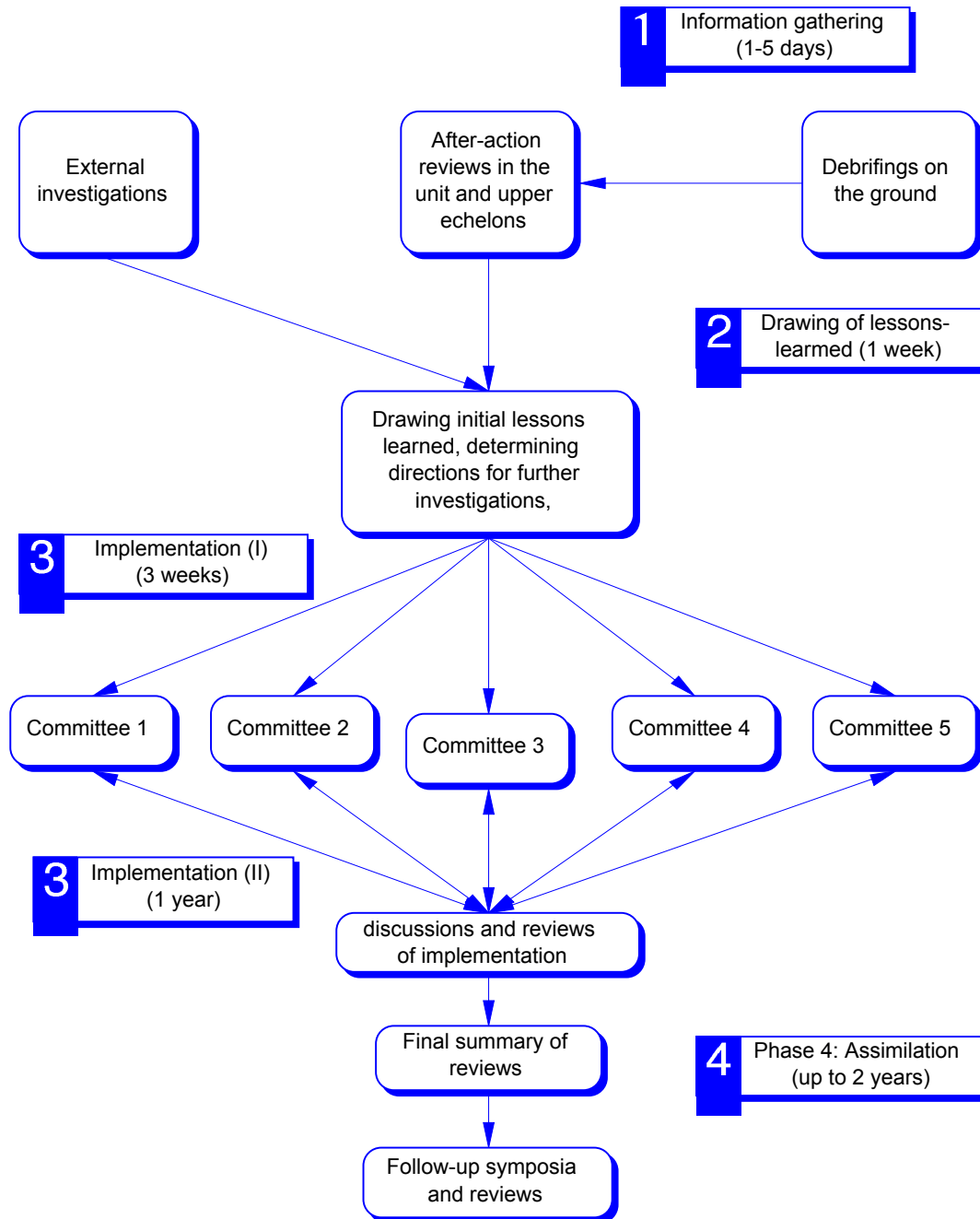
designed, brief and superficial, produced ineffective solutions and failed to gain both the minds and the hearts (i.e., commitment) of the unit's members. The chronology of the review reveals a relatively brief process that was short on analysis and with strong emphasis on implementation of lessons-learned. Its causal reconstruction reveals that lesson-learned were not assimilated into the modus-operandi of the unit, with the result that the same accident recurred. The root cause of this failure was the commander's leadership style which can be linked to this failure by a plausible causal chain consisting of a subset of the organizational learning quality criteria identified in the interviews. Fixing the assimilation of lessons-learned (as distinct from short-term implementation) as the bottom-line criterion of the post-review process is reasonable because it tests both their suitability to the unit's operational requirements and their ability to withstand changes in personnel. Analysis of episode 2, whose after-accident review of the recurring problem and death of a soldier was designated as an exemplar of high-quality organizational learning in the preliminary study, produced a mirror image of these findings.

Episode 2

This episode occurred under the commander that succeeded the commander during episode 1. The accident involved the disappearance and death of a soldier in a nighttime exercise of the same combat technique as in episode 1. The flow chart of the after-accident review process is presented in Figure 3. The deputy commander, who arrived on the scene when the soldier was declared missing, debriefed the officers and soldiers to assess the situation and direct the search. Additional debriefings were held later on during the search on the grounds and in the commander's office. No lessons-learned were drawn in these activities which aimed solely at gathering information. Two external investigations were also started that night, one by the Military Police, and the other by an external committee appointed by the Corps commander and chaired by a senior officer on leave from the unit and about to return to it. An initial after action review was held in the unit four days after the accident. Its findings were passed on to an after-action review which was held by the Corps commander on the same day, and an after-action review by the I.D.F. Chief of Staff a day later. The external committee submitted its report a week after the accident. The report did not identify the cause of the accident but proposed three hypotheses of which one was considered as more likely. It also presented 22 recommendations of which two were also recommended by the external committee in episode 1 but were not implemented. This time the commander accepted "90% of the recommendations as is and made changes consistent with the remaining 10%." Eight days after the accident the unit began an in-depth processing of the conclusions and lessons-learned of the first phase of the post-accident review process. This was performed by five subject-matter committees on weaponry, doctrine, training, standard operating procedures, and medicine. The committees were not limited to subjects immediately relevant to the accident. Rather, they were instructed to conduct extensive and thorough studies of their purviews of investigation. Each committee was headed by the most senior officer knowledgeable in the subject matter in the unit. Another senior officer headed a steering committee which coordinated the work of the subject-matter committees. Committee met first weekly and then once every two weeks. The committees prioritized their agendas so that subjects required for its routine operation were resolved first. The committees' work proceeded simultaneously with the unit's regular operational and training activities and interacted with them: lessons learned were put to a test and the results of their implementation were fed back to the committees for further improvement or final acceptance. The extensive lessons-learned and operational decisions as well as the review process were summarized and documented. Detailed implementation instructions were passed on to the

relevant subunits and relevant elements in the Corps command. Follow-up symposia on the lessons-learned and inspection of their implementation were carried out during the two years

Figure 3: Episode 2 flow-chart



following the accident to ensure their assimilation into the unit’s routine mode of operation.

Figure 4: Episode 2 cause model
 [criteria numbers in squared parentheses]

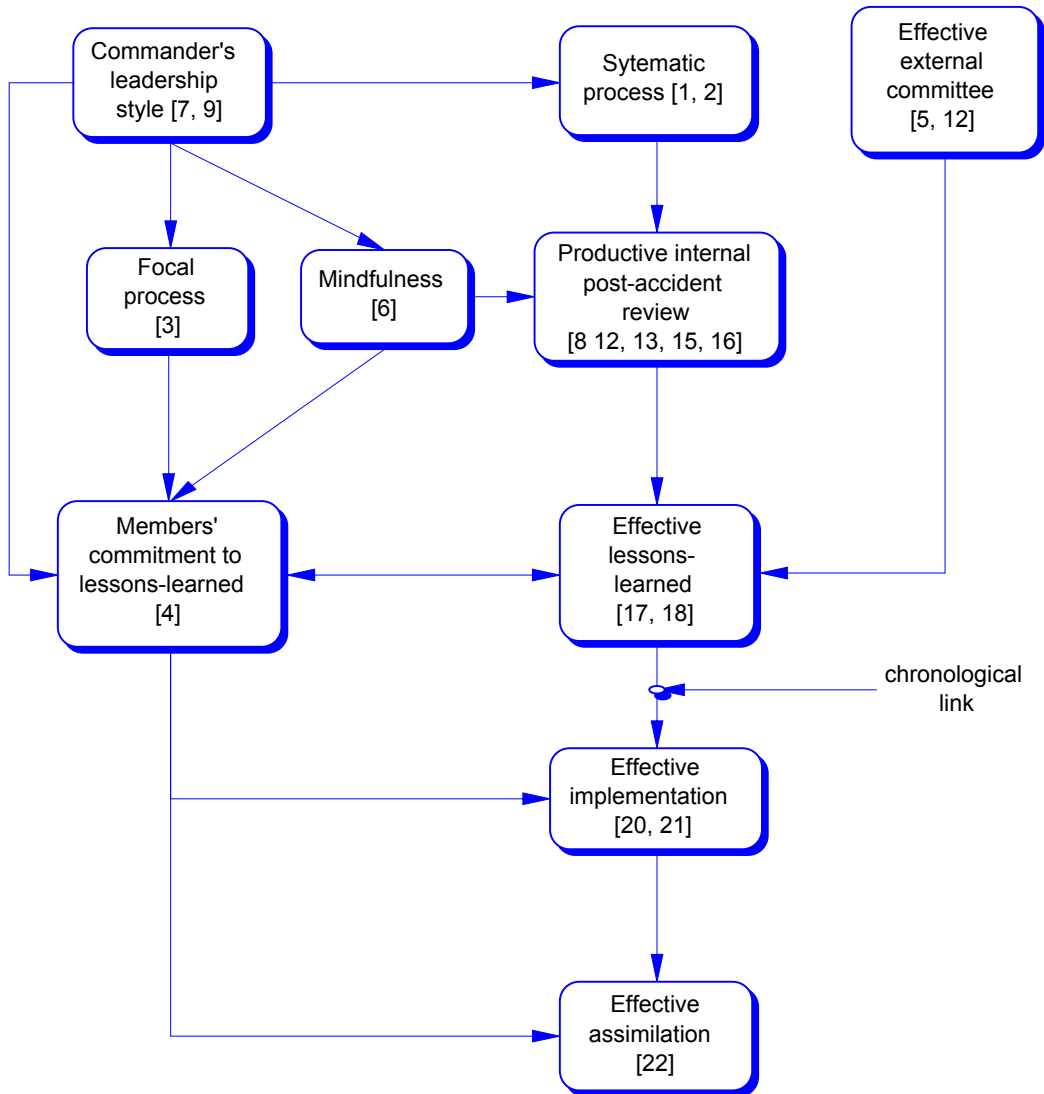


Figure 4 presents a causal model of episode's 2 post-accident review process. Except for certain dissimilarities that are noted below, Figure 4 is a positive mirror image of Figure 2. Three years after the accident, an inspection by the Corps command revealed that all the lessons learned in the post-accident review were implemented and practiced (except for certain long-range equipment changes that were still in process (see also episode 3) [22], partly, no doubt, owing to activities specifically designed to facilitate assimilation such as extensive refresher activities (e.g., symposia in which the episode 2 was reviewed) and consistent long-term inspections of the lessons-learned application, and, partly, prior to that, active implementation that included extensive documentation (20) and careful dissemination (21) that included intensive interaction between the post accident review committees and their "clients" -- the operational units.

Moving one level up we posit again that the antecedents of active implementation were a motivational factor – member's commitment – and cognitive-pragmatic factor, the perceived effectiveness of the lessons-learned (15, 18). Regarding the latter, the learning teams' ability to identify the double bind that trapped unit members between, on the one hand the macho norm of risk taking for mission accomplishment and, on the other hand safety requirements, is particularly noteworthy. Exemplifying double-loop learning the unit set out to instill in the combat unit a norm that "the truly professional fighter is a cautious fighter."

The effectiveness of the lessons-learned can be primarily attributed to the productiveness of the internal review process which was characterized by a relaxed, non-blame-seeking atmosphere (8), wide scoped investigation (12), and the values of inquiry (13), integrity (14), and issue orientation (16). This, in turn, was facilitated by the well organized post-accident review process (1) which was relied on extensive gathering of information, the thorough processing of this information by several subject area committees, and careful separation between information search, conclusion drawing, decision making, implementation and monitoring of implementation. It was also helped by the credibility of the external committee whose contributions were explicitly acknowledged and accepted by the unit, and which helped to set the agendas of the 5 committees which performed the bulk of the work in the post-accident review process. Members commitment can be attributed to the centrality of the post accident review process (which involved a good number of unit members even as the unit had a heavy operational workload), the commander's participative and empowering leadership style, and the mindfulness which he instilled (manifested by many instances of noticing of irregularities and learning from experience in the interview transcripts). The commander's pervasive influence on the process led us to posit him, again, as the root cause of the episode's, this time positive, final outcome.

In conclusion, the chronological and causal analyses of episode 2 confirm its designation in the preliminary study as an exemplar of high quality organizational learning. Indeed, the episode was hailed by our interviewees as a bench-mark for post-accident reviews. The bottom line criterion of successful assimilation was achieved through assimilation enhancing activities, systematic dissemination, double-loop learning that enlisted both internal and external resources of knowledge available to the unit, and a policy of widespread participation and empowerment that won the hearts, as well as minds, of the unit's members. The post-accident review was taken as an opportunity for in depth review of a broad range of subjects in the unit's mode of operation. Explicit references to the commander's role in designing the process and empowering the people involved justify, again, positioning his leadership style as the root cause of the successful outcome of this episode's post-accident review process.

Episodes 3 and 4 to which we turn next were designated as examples of high quality and low quality organizational learning, respectively. Since the results of their analysis replicated, to a large extent, those of Episodes 1 and 2, we condense their presentations and focus them on those aspects that are noteworthy or different from the two first episodes.

Episode 3

Episode 3, which involved the deaths of 2 soldiers in a similar (but not identical) exercise to episodes 1 and 2, occurred 2 years after the latter Episode. It was a the transition period between unit's commanders and the new commander gradually assumed responsibility for the post-accident review. The initial search for the missing soldiers, which began a few hours after they were declared missing, followed the procedures established based on the lessons learned of Episode 2. Debriefings conducted on the grounds aimed at assessing the situation and directing the search with no attempt to draw lessons-learned. The search was thorough, and the people involved did not withhold any information although they knew that the Military Police was already working at uncovering possible negligence and liability for disciplinary infractions. The external committee presented its conclusions one week after the accident. Despite a thorough investigation it failed to identify a single definite cause for the accident. The committee also noted that all the relevant lessons-learned from Episode 2 were implemented in Episode 3. Five days after the accident the commander set the agenda for further investigation and appointed subject-matter committees for this purpose. The committees worked intensively for six months, using the opportunity to review a broad range of subjects in their areas of investigation rather than focus only on the causes of the accident. The steering committee that coordinated the subject-matter committees continued its work for 4 additional months. A routine safety inspection by the Corp's headquarters, 4 months after the accident, found that most of the lessons-learned of the present and two preceding accidents have been implemented. Five months after the accident two previous Episodes (3 and 1) were reviewed in a symposium for all the combat personnel of the unit who were invited to suggest recommendations for and additional subjects for the committees' attention. The basic causal chain set down in Figures 1 and 2 applies to episode 3. The episode's causal sequence reads as follows:

Systematic process: Owing to the commander's indecisiveness (10), (attributed by the interviewees the fact that he had just assumed command over the unit and that he was not an expert in the particular combat technique that was practiced), the root cause in the Episode 3 was the well organized process (1) which moved in distinct phases from fact finding through analysis to implementation and assimilation (2).

Productive internal post-accident review: The positive side of the commander's indecisiveness was his receptivity to other's ideas (7) which engendered a generally open-minded relaxed atmosphere (8). Other factors which contributed to the productiveness of the internal learning process included the breadth of investigation (11) and the values of inquiry (13); integrity (14) transparency (15) and issue orientation (16).

Effective external committee: The external committee lacked credibility because two of its three members were on leave from the unit and destined to return to and hence were perceived as unable to conduct a fair minded critical investigation (4).

Mindfulness: This criteria was manifest in the thoroughness of the learning and of the implementation process.

Focal process: The review was very much in the center of attention owing to the shock of losing two soldiers and the widespread participation in the learning process (3).

High commitment to lessons-learned: There was extensive participation of higher level commanders and officers in and peripheral participation of lower level officers and soldiers in the learning process (4).

Effective lessons-learned: The interviewees perceived the lessons-learned to be exhaustive and appropriate (15) despite a contentious conclusion drawing process and the commander's indecisiveness.

Active implementation: Copious detailed documentation of both the post-accident review process and the lessons-learned decided by the subject-matter committees were available in the commander's chamber and the training facility during the time of the study (20). Similar to episode 2, lessons-learned were promptly disseminated to the relevant sub-units and their implementation was sustained by symposia and field inspections (21). The interviews show that throughout the post-accident review process unit members felt accountable for learning from this experience (19).

Effective assimilation: A document on "near misses" (narrowly missed accident) published two years after the episode and our interviews which were conducted 18 months later show that all the lessons-learned, except for a minority that pertained to equipment changes (which are outside the unit's jurisdiction) were effective in those time periods (22).

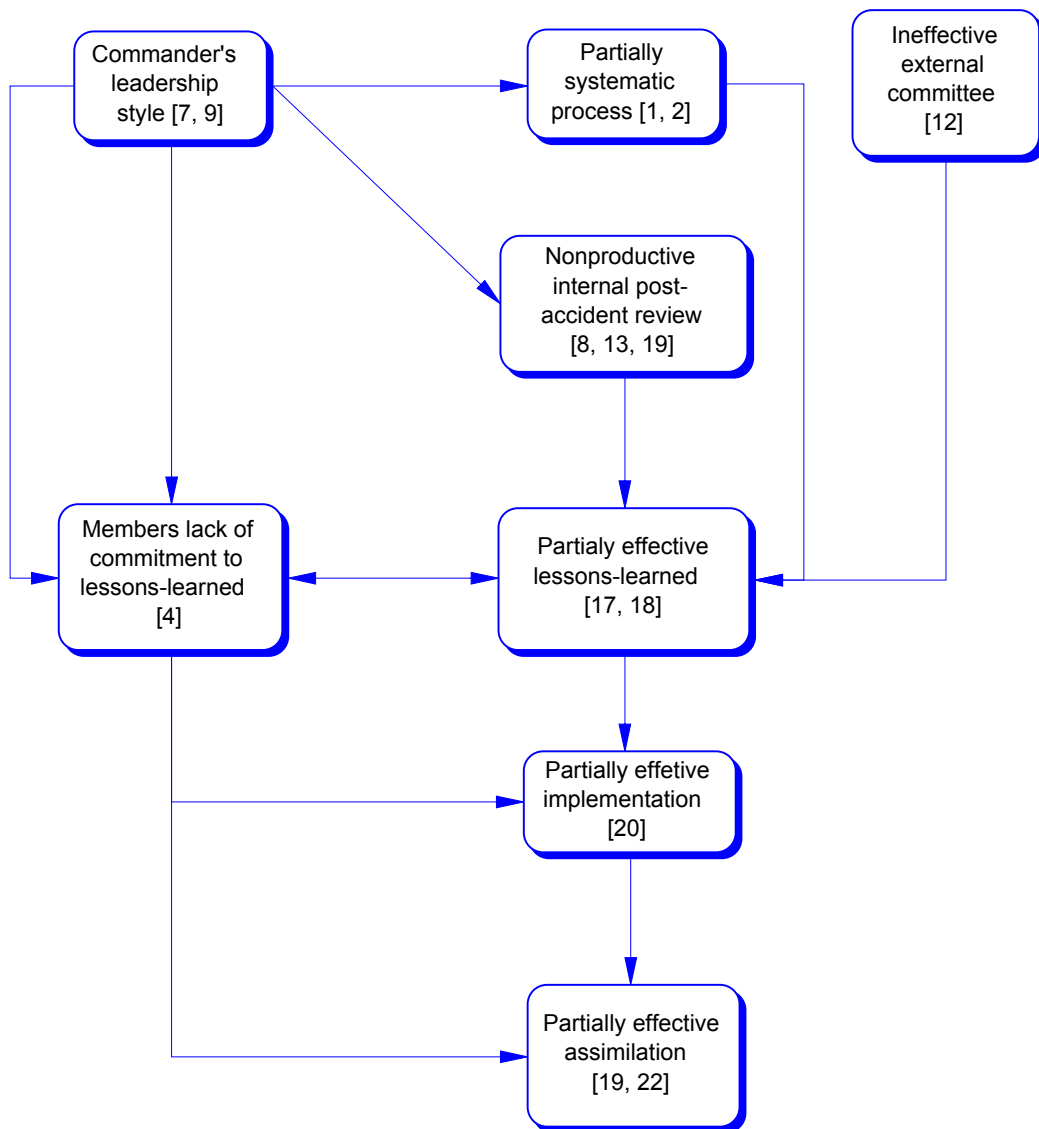
In conclusion, episode 3 replicated episode 2 with two important distinctions: The root cause of its success was not the new commander's leadership style by the legacy of the previous commander in the form of systematic and productive internal review process which compensated for the absent contribution of the external review process.

Episode 4

This episode involved the dehydration of a soldier during a stressed two day summer march in which the commander decided to shorten the resting periods in order to finish the march before the high temperature hours in which exercises are prohibited. The details of the incident were clarified in a series of debriefings held at the day of its occurrence. The commander issued a document detailing the list of safety rule infractions unearthed by the debriefings and consequent instructions. Four responsible officers, including the training facility's commander and its physician, were suspended for 10 days. An external committee began its work two days later and submitted its report 10 days later. The report, which was redundant according to our interviewees, included recommendations regarding safety procedures and a recommendation to prosecute the four officers. Two after action reviews were held two and three weeks after the incident, respectively. After the latter review the commander issued a detailed task list based on the lessons learned of the first review. The principal cause for the incident was attributed to faulty assimilation of safety regulations and lessons-learned from previous incidents in the training facility. Consequently the facility performed various activities (e.g., revision of procedures and safety symposia) to remedy this situation. A third after action review which was held approximately 6 months after the incident, found that the new procedures (restrictions on the hours of training) decided upon in the second after action review were effective in the unit.

The interviewees' held mixed opinions regarding the quality of the learning process. The first part of the process (up to the first after-action review) was regarded as of low quality in terms of both the conduct of the process and its outcomes. The after-action reviews and consequent activities were regarded as of fair quality in terms of both parameters. The causal structure underlying the process is presented in Figure 5.

Figure 5: Episode 4 cause model
[criteria numbers in squared parentheses]



The assimilation of lessons-learned was partially effective because the restrictions on training imposed by the commander immediately following the incident were lifted as soon as his replacement assumed command over the unit (22). In contrast, the lessons-learned drawn in the later stages of the process in regard to preparation for marches and the early detection and treatment of dehydrated soldiers, with which unit members agreed and to which they felt accountable (19), were still effectively implemented at to the time of the study. These results are attributable to the unit members' lack of commitment (discussed below) and to a partially effective implementation process (likewise affected by low commitment). While lessons-learned regarding preparation for marches and treatment of dehydration were codified as standard operating procedures (20), those regarding restrictions on training issued as temporary measures. The ineffective implementation of the commander's restrictions were caused by the perceived inappropriateness of their substance and the hasty manner in which they were conceived (15) (according to the interviewees they reflected "the commander's

hysteria and wish to prevent additional ‘bad news’ on top of a serious operational failure that shortly preceded Episode 4). Lack of commitment can be attributed to narrow members involvement (4) and to the commanders leadership style which we discuss below.

The partial effectiveness of the lessons-learned, manifested in the perceived inappropriateness of the restrictions on training (17), can be attributed to the redundant contribution of the external committee (12), and to a non-productive internal review marked by low inquiry (13), shallow and narrow-scoped investigation (12), and, most damagingly, lacked psychological safety (8) -- participants were reluctant to divulge damaging information in the wake of the punitive measures taken by commander in the early stages of the process. Thus, the commander’s leadership style, i.e., his lack of support, unreceptiveness to the ideas of others (7) and, above all, his defensiveness and partial judgment (11), which interviewees attributed to the effects of the operational failure that preceded the episode, emerged again as the root cause of the present Episode.

Discussion

The prolific literature on organizational learning includes scant conceptual discussion, and no empirical investigation, of the context, process, and products of high quality organizational learning. This lacuna is surprising, given that organizational learning has clear normative and prescriptive underpinnings, and that as a field of study has been traditionally split between practitioners, who take the benefits of organizational learning for granted, and researchers, who doubt the prospects of valid learning in organizational settings (Argyris & Schön, 1996). The present study was designed to begin closing this lacuna by in depth analyses of two successful and 2 unsuccessful episodes of organizational learning in a military unit with a record of intensive engagement in after-action reviews, a well documented form of organizational learning (Baird, Henderson, & Watts, 1997; Carrol, 1995, 1998; Cusumano & Selby, 1995; Lipshitz & Popper, 2003). We conclude the paper with a discussion of our findings and their plausibility and implications, a critique of the study’s limitations, and suggestions for further research.

Our basic research strategy was to identify criteria of high quality organizational learning and then test if these can account for difference in outcome quality of different organizational learning episodes. The findings obtained this way suggest three general propositions on the outcomes, process and context of high-quality organizational learning: (1) The *outcomes* of high-quality organizational learning are effective lessons-learned that are assimilated into the organization’s mode of operation. (2) Assimilation is contingent on gaining the hearts and minds of the organization’s members, i.e., persuading them that the lessons-learned are appropriate and feasible, and engaging their commitment to the latter’s persistent implementation. To this end, *processes* of high-quality organizational learning are systematic and mindful, enlist internal and external sources of knowledge, and engage members in active participation. In addition, such processes embedded in a culture of learning, that is, they are predicated on the assumption that learning is useful, and are guided by shared values of inquiry, integrity, transparency, issue orientation, and accountability. (3) The *immediate context* of high level organizational learning consists of a receptive and supportive leadership that induces psychological safety. We turn to examine each of these components in some detail.

High quality organizational learning outcomes

While there is general agreement that organizational learning produces change, there is no agreement as to which kinds of change signify learning. In particular, are changes in cognitive structures (e.g., mental models) sufficient indicators of learning (e.g., Kim, 1993;

Senge, 1990, a) or are changes in observed behavior (excluding verbal utterances) required, (e.g., Epple, Argote, & Devadas, 1991)? Our interviewees opted for the latter interpretation: High-level organizational learning is distinguished by durable changes in observed behavior that prevent the problem, or maintain the goal, that triggered it. The novelty of this proposition, which consistent with the behavioral approach to organizational learning as well as with Argyris and Schön's (1996) definition of organizational learning as the detection and correction of error, is that it set the assimilation of learning, namely, its long range resilience coupled with non-recurrence of problems that were addressed) as the litmus test organizational learning quality. We believe that this proposition, which emphasizes the importance of the refreezing phase in Lewin's change model (Lewin & Cartwright, 1952) is plausible for three reasons. First, as any person who has gone on a diet knows, the challenge is not to loose weight but to remain slim over the long haul. Second, long range survival of lessons-learned indicates that learning was practiced "for real" and not as a ritual, and non-recurrence of problems attests to effectiveness and robustness of its products. Finally, since assimilation requires first and foremost an on-going commitment of the organization's members, this criterion acknowledges the inherently social nature of this organizational learning.

The high quality organizational learning process

The criteria of quality which were identified in the interview transcripts and distinguished between high and low level post-accident reviews confirmed the observation that organizational learning is, first and foremost, a social process geared to solving organizational problems and furthering organizational goals. Consistent with this conceptualization, the findings suggest that process of high quality organizational learning attend simultaneously to obtaining valid and useful knowledge and to generating member's commitment to the production and utilization of this knowledge. Valid knowledge is obtained by enlisting external and internal sources of information and expertise, and by designing mindful (Weick & Sutcliffe, 2001), systematic and comprehensive (Carrol & Edmondson) 2002) processes that are embedded in a culture predicated on the basic assumption (Schien, 1985) learning is beneficial and consists of the shared values posited by Lipshitz et al. (2002). The key to generating commitment to the implementation and assimilation of lessons-learned (or, more generally, to the utilization of newly acquired knowledge) is to bring the learning process to the attention of members, persuade them of its appropriateness, codify it in accessible forms, take steps to insure its dissemination and implementation, and, above all, engage the organization's members actively in the learning process.

The context of high quality organizational learning

Lipshitz et al. (2002) identified numerous contextual factors that facilitate organizational learning and increase the likelihood of its high quality. In general, these factors (e.g., environmental and task structure) are distal and stable with respect to a single organization, lending the present design inappropriate for detecting their influences. One contextual factor in Lipshitz et al.'s model that did emerged as crucial for achieving high quality learning was the leadership style of the person in charge of the learning process. Several authors in addition to Lipshitz et al. (2002) noted that the leader's style and support are important factors that facilitate organizational learning (Davenport & Prusak, 1998; Senge, 1990, b). Confirming this proposition our findings show that the quality of organizational learning is contingent on the extent to which the leader who manages it ensures that the phases of information search and analysis and the implementation of lessons-learned are performed systematically, to encourage his subordinate's participation and ensure their psychological safety (a facilitative factor emphasized by Edmondson, 1999; Lipshitz et al., 2002; and

Schein, 1993). To this end he should exercise a leadership style characterized by deliberateness, receptiveness to the ideas of others, impartiality, and, particularly when learning from failure, emphasize his own accountability and refrain from blaming of others. The particular significance of these findings is that they were found in different episodes of learning *that occurred in the same unit within relatively short time periods*. This offers some interesting insights on the role of leaders in organizational learning and on the interaction between organizational learning and organizational culture.

According to one influential treatment of organizational culture, its constitutive elements, basic assumptions and shared values, are stable and held by all organization members (Schein, 1985). A different view of organizational culture suggests that it is dappled, with members of different organizational units subscribing to different, possibly incompatible subcultures (Martin, 1992). Consistent with the latter view, Ron et al. (2003) suggested that productive organizational learning is contingent on organizational learning mechanisms that functions as *cultural islands* in which the five values posited by Lipshitz et al (2002) are in use without necessarily being shared by the entire organization. Our present findings go one step further by showed that the assumption that learning is beneficial (manifested by the ingrained practice of debriefings and after action reviews) and the value of integrity (manifested by willingness to divulge potentially self-damaging information in low-quality incidents) were impervious to commanders' change. In contrast, the manifestations of the remaining four values posited by Lipshitz et al (2002) were clearly influenced by the commander's leadership style. Thus, organizational cultures are neither weak nor strong. Rather their effective strength at any given unit or operation resonates to the leadership style of the person in charge.

In conclusion, the present study offers a coherent and fine-grained account of high-quality organizational learning that integrates and expands existing partial conceptualizations of this construct. In addition, the study provides a relatively rich description of how one organization attempts to learn from its experience in circumstances of failure and loss of lives which both stimulate learning (Lipshitz et al., 2002; Wong & Weiner, 1981) and make it difficult (Edmondson, 1996). Our methodology involved the identification of episodes of learning that are presumably representative of high and low quality organizational learning, and then test the plausibility of this identification by constructing their contexts, processes and products in a grounded-up fashion. This method has several disadvantages: The uniqueness of the research site and circumstances and the concentration on one particular form of organizational learning mechanism limit the generalizability of the results, and our familiarity with and ownership of the multi-facet model of organizational learning (Lipshitz et al., 2002) no doubt influenced the outcomes of our grounded-up analysis. (Note, however, that the results of the present study are not subsumed by the model). All theories, no matter how well tested, are hypotheses (Popper, 1976). The principal value of the present results is that they can serve future research hopefully by additional researchers in different organizations and on different organizational learning mechanisms.

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