

Reflecting in and on Action

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Abstract

This article is an introductory description about the way we deploy our cognitive resources for dealing with practical situations in naturalistic conditions and how we can become aware of that. It explains how we combine tacit and explicit knowledge for creating mental models of the objects of our actions and how we use those mental models. It also describes very briefly two of the most effective methodologies for drawing lessons from experience: the critical moments reflection methodology and after action review.

Introduction

We learn everyday. Everything we do confirms, changes or challenges our beliefs. However most of that learning is invisible for us. Focused in the actions and their results we leave most of these cognitive elements out of our sight. These notes aim to contribute to a better understanding of these processes of learning and how to rescue the knowledge we have generated in the process of the action. They refer to the learning that happens when we are in naturalist conditions addressing real-world problems, but also can be used for the learning that happens inside classrooms.

Our cognitive resources

Throughout the twentieth century we were educated with the idea that when we face a situation we want to change we define the problem and solve the problem. The assumed process is (1) we identify the problem; (2) having the problem, we go to our portfolio of theoretical knowledge and select the theory that better fits with that problem; (3) having identified the adequate theory, we apply it and its set of methodological tools, for solving the problem. It sounds logical and clear. However there are evidences that what we do in naturalist situations, addressing real-world problems, is more complex than that. Frequently the problem is not clear or controversial and the theory for dealing with that concrete case does not exist or is very limited.

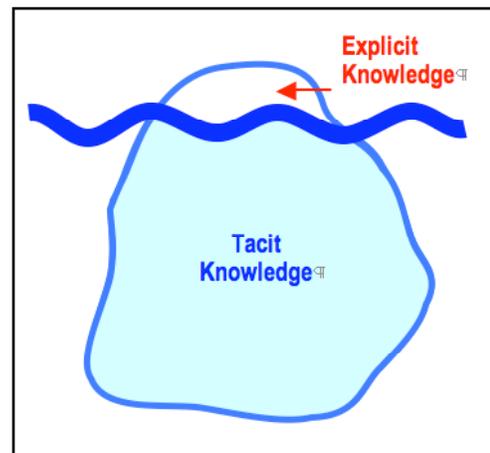
Depending on experience, level of training, professional background, and preferences we have different ways of deploying our cognitive capacities when facing a problem, particularly if the problem is a new one. For example: studies with experienced firefighters have shown that they rely mostly in their portfolio of cases and that what they do first, when arriving to a new fire, is to compare the fire with their portfolio of past cases, looking for a similar one. Once they have the case identified they retrieve what they have learned from fighting that fire, review their main conclusions of the experience and start to use those conclusions for assessing the new fire and for defining how they should approach it. (Klein, 1999.) Physicians also make use of portfolio of cases, with the difference that they can go through a more detailed diagnostic before acting.

What we do when facing a new problem? Indeed, each time we face a new problem, a situation that we are not used with, our brain deploys a whole set of cognitive resources we estimate could be useful for coping with that situation. It can be a combination of six elements:

1. The theories we have learned formally (in classroom or reading books) and we believe are adequate for that kind of problem we are addressing.
2. A set of stories we have listened and a list of similar cases we have known that can be used as reference, as analogy or as starting point for exploring ideas,
3. A set of beliefs and assumptions we have about the problem, the people, the situation and the possible solutions
4. Our feelings about the problem and hunches that can orient us on how to approach it,
5. The methods and analytical tools we can use for deepening our understanding of the problem, and
6. Any information we may have or get, fragmented or organized, we estimate may be useful in our effort for making sense of the situation we have in hand.

We are aware of some of the theories (we have read in books or learned in classroom). These theories, we assume frequently, are the core of our thoughts when we are trying to solve a problem. However, we use all those six elements with different levels of importance and hierarchy. In some times our formally recognized theories are at the core of our thinking, but even in those cases, when we apply formal theories we are not aware of the particular way we are interpreting and applying them, of the set of premises we assume in their application and how we combine them with our beliefs and with other analytical tools and pieces of information we are using.

As we mobilize our set of cognitive resources we are aware of some of them but we are not so aware of most of them. Indeed most of the cognitive elements we mobilize addressing a new problem are below our level of awareness. The challenge is that frequently the results of our effort depend on that set of elements we are not aware of. Ignoring them hinders our capacity of response and makes much more difficult to adapt timely. Most of these diverse elements and most of the knowledge they generate constitute the tacit dimension of our knowledge and of our cognitive processes. The Hungarian chemist and philosopher Michael Polanyi was one of the first authors to call the attention to the importance of these tacit components of our knowledge and cognitive processes, those elements we are not aware of. He created a very known aphorism "We know more than we can say", referring to these tacit elements. (People who may want to go deeper into this matter can take a look at Michael Polanyi's books: "*Personal Knowledge*" and "*The Tacit Dimension*".) Donald Schön (1983) referring to tacit knowledge said:



When we go about the spontaneous, intuitive performance of the actions of everyday life, we show ourselves to be knowledgeable in a special way. Often we cannot say what is that we know. When we try to describe it we find ourselves at a loss, or we produce description that are obviously inappropriate. Knowing is ordinarily tacit, implicit in our patterns of action and in our feel for the stuff with which we are dealing. It seems right to say that our knowing is in our action.

Based on that idea Schön developed the concept of Knowing-in-Action. For him knowing-in-action is the way we deploy our knowledge at the same time we are acting. For example, when we talk with someone else we decipher the sounds we are listening, into meaningful words and interpreting those words as messages, we think on the meaning of those messages and we talk back, using our knowledge of the language syntax and phonetics. Each one of these operations is highly complex and requires practical training and refined knowledge. However we do it in our everyday life without much awareness of what we are doing. Frequently we cannot explain the rules of syntax we are applying in a conversation. We know how to use them in the moment we are using them.

Our tacit knowledge is embedded in our actions; it does not exist as an independent object, it exists only as a cognitive component of our action. Most of the knowledge we have is of that type. Indeed most of the development of our brain, in the last 5 million years, happened before we had a language enough sophisticated for expressing the knowledge we already had imbedded in our practice and, despite of living currently in a knowledge society, we don't know how to express most of our knowledge using words, drawings and symbols.

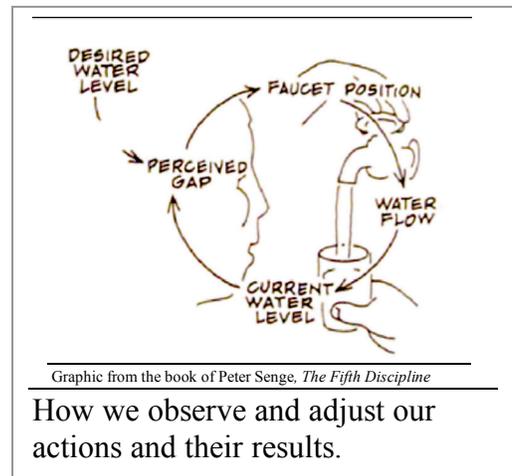
Mental Models

The way we combine all these six elements is by creating a model of the situation in our mind. Some people name that kind of mental artifact a “mental model”. Mental models are abstract representations of reality that people use to think of and to deal with specific phenomena. "In interacting with the environment, with others, and with the artifacts of technology, people form internal, mental models of themselves and the things with which they are interacting. These models provide predictive and explanatory power for understanding the interaction." (Dedre Gentner and Albert Stevens, 1983)

A mental model is a conceptual representation within a person's mind that is used to help the person understand the world and to help the person interact with the world.
(Andrew Kurtz, 2004)

Peter Senge, in his influential book “The Fifth Discipline” has an example that can be a good starting point for understanding our cognitive functioning as we try to solve a problem. Senge has said (1990):

“As we fill the glass, we are watching the water level rise. We monitor the “gap” between the level and our goal, the “desired water level”. As the water approaches the desired level, we adjust the faucet position to slow the flow of water, until it is turned off when the glass is full. In fact, when we fill a glass of water we operate in a “water-regulation” system involving five variables: our desired level of water, the glass’s current water level, the gap between the two, the faucet position, and the water flow. These variables are organized in a circle or loop of cause-effect relationships, which is called a “feedback process”.



As we can see, when we open the faucet we are not starting from zero. At the moment we have grasped the faucet we already have a set of assumptions about the faucet and it can make the water to flow. For example: we assume that if we turn the faucet counterclockwise its flow will increase, and if we turn the faucet clockwise the flow of water will decrease. We also assume that, if we move the faucet by an angle of X_1 degrees the flow of water will be of Y_1 , and if we move the faucet by an angle of X_2 degrees the flow of water will be of Y_2 . In most cases we do not put numbers to those variables in our head, however we have a qualitative expectation of what can happen.

Despite of its simplicity what we have in our mind is a “mental model” about the faucet’s functioning. In that mental model we have only three variables: one cause, the position of the faucet, the first effect, the flow of water, and the second effect, the level of water. Senge’s example of filling a glass of water is valid not only for a mechanical device, like a faucet, but also for more complex activities, like any intervention in the development of an urban area or promoting a social change. In these cases we will have mutually interactive variables generating a complex combination, however the reasoning about the use of mental models would be very similar.

In most cases we don’t construct a formal structure, however we organize our knowledge about a situation in a way we can use it for making sense and foresee what could happen as results of our actions. Senge explains (Senge, 1990):

None of us can carry an organization in our minds—or a family or a community. What we carry in our minds are images, assumptions and stories. ...

In surveying the accomplishment of cognitive science in his book “The Mind’s New Science”, Howard Gardner writes, “*To my mind, the major accomplishment of cognitive science has been the clear demonstration of ... a level of mental representation*” active in diverse aspects of human behavior. Our “mental models” determine not only how we make sense of the world, but how we take action. Harvard’s Chris Argyris, who has worked with mental models and organizational learning for thirty years, puts it this way: “*Although people do not [always] behave congruently with their espoused theories [what they say], they behave congruently with their theories-in-use [their mental models].*”

Why are mental models so powerful in affecting what we do? It is that because they affect what we see. Two people with different mental models can observe the same event and describe it differently, because they’ve looked at different details. When you and I walk into a crowded party, we both take in the same basic sensory data, but we pick out different faces. As psychologists say, we observe selectively. This is not less true for supposedly “objective” observers such as scientists than for people in general. As Albert Einstein once wrote, “*Our theories determine what we measure.*” For years, physicists ran experiments that contradicted classical physics, yet no one “saw” the data that these experiments eventually

Improvement of mental model can be an effective way of learning.

Improved mental models can be more effective receptacles for the knowledge acquired through experience.

provided, leading to revolutionary theories—quantum mechanics and relativity—of twentieth-century physics.

People who are studying the cognitive components of our actions (*Cognitive Task Analysis, CTA*) found mental models very helpful for understanding how we really model reality in naturalistic situations and how our learning processes impact our mental models.

As people gain experience, they are able to build richer, more accurate, more coherent mental models. We see evident that decision makers form mental models in nearly all domains in which CTA was applied. Weather forecasters, for example, form rich mental models involving air masses, fronts, and the like in a four-dimensional imagining. Indeed, meteorologists themselves discovered a need to refer to the notion of mental models, to distinguish how forecasters understand weather from the computer models that provide them guidance in composing forecasts. (Beth Crandall, Gary Klein and Robert Hoffman, 2006)

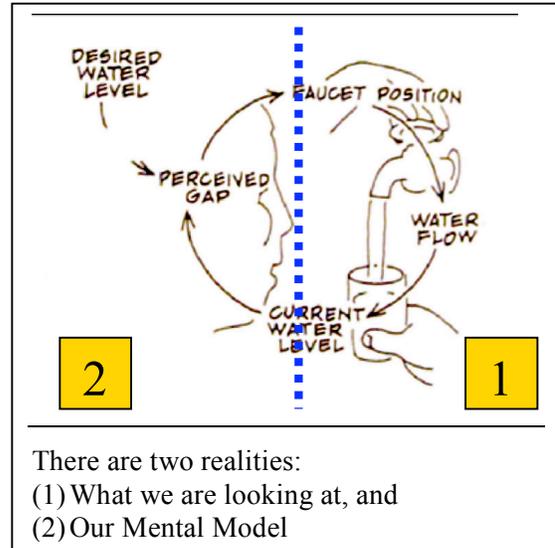
Analyzing the impact of mental model in the way US farmers learn, Eileen Eckert and Alexandra Bell found that, “*farmers use their mental models to guide them in seeking information and deciding what feedback and advice to accept, reject, or adapt, as well as how to act and make decisions.*” They found that farmers act in accordance with mental models based on values, beliefs, and knowledge that were important to them.” And that, “*farmers are more likely to attend to information and ideas that are congruent with their current mental models of farming, as well as with their current knowledge and skills. When educators consider the mental models, especially the guiding principles, of the farmers with whom they work, their feedback is more likely to be accepted and applied.*” This is not true only for farmers but for all kind of professionals.

Some characteristics of mental models are:

- Mental models include what a person assumes is true.
- Mental models are analogies; they try to be similar in structure and features to the object or concept they represent.
- Mental models allow a person to predict the results of his actions.
- Mental models are incomplete, simplified versions of the object or concept they represent. They include only enough information to allow reasoning and prediction.
- Mental models are constantly evolving.

What are we observing at the same time we are acting? Lets come back to the case of the faucet of Senge. We are putting our attention on the faucet position (the direct object of our action), the water flow (the first effect of our action) and the current water level in the glass (the second effect accumulated of our action). We are focused in adjusting the flow of water to the pace of filling of the glass and to the level of water in it. Looking at the faucet, the water and the glass, our mind is dedicated to what is happening in that external world and, frequently, our mental model stays out of our sight, and out of our field of observation and analysis.

We tend to take for granted the functioning of the faucet (the causal relation between our actions and their chain of effects). What if the relation “faucet position—flow of water” surprise us? What if the flow of water is faster or slower than we were expecting? In this case we think again about the faucet and change our mental model respect to the functioning of that particular faucet. At the moment we get to manage the flow of water the way we wish, we stop to think on the faucet. During this process we barely became aware that we had a mental model of that faucet and that a few minutes ago we were forced to adjust that model. The faucet was the object of our thoughts not our mental model. The uncovering of our mental models is a skill, indeed a meta-skill, which we develop through time. It is a kind of second level learning, a more abstract way of learning.



Reflection about our experience is one of the most recognized ways of visualizing our mental models, the rationale behind our actions. But, before to start with reflection, let’s take a look on another key element of professional experience: the design process.

Design

Based on his experience of consultancy and research in MIT, Donald Schön, developed the conception of designing as a conversation with the situation.

Herbert Simon and others have suggested that all occupations engaged in converting actual to preferred situations are concerned with design. Increasingly there has been a tendency to think of policies, institutions, and behavior itself, as object of design.

...

A designer makes things. Sometimes he makes the final product; more often, he makes a representation—a plan, program, or image—of an artifact to be constructed by others. ... Typically, his making process is complex. ... Because of this complexity, the designer’s moves tend, happily or unhappily, to produce consequences other than intended. When this happens, the designer may take account of the unintended changes he has made in the situation by forming new appreciations and understandings and by making new moves. He shapes the situation in accordance with his initial appreciation of it, the situation “talks back”, and he responds to the situation’s back-talk [feedback].

In a good process of design, this conversation with the situation is reflective. In answer to the situation’s back-talk, the designer reflects-in-action on the construction of the problem, the strategies of action, or the model of the phenomena, which has been implicit in his moves.

Schön explains that each move of the designer “*is a local experiment which contributes to the global experiment of reframing the problem*”, that at the same time the designer acts he is reframing the way he understand of the problem. If the new way of framing the problem is effective for developing the solution, the designer goes forward in that route. If it fails he step back and look for other kind of approach.

Schön very well explains the “conversation with the situation”, taking the situation as physical reality, however we need also put attention to the conversation with the social reality, with the diverse stakeholders of the problem. It happens that a problem can be perceived and delimited very differently, depending of whom is considered as part of it. It is very frequent that the professionals who are looking for solutions to a problem are very aware of its technical dimensions and implications, but not necessarily are so aware of how different actors perceive differently the same problem, and how the possible solutions will affect them differently.

For example: in most urban centers of Brazil, the way the transit works is basically adequate for the passengers, particularly for middle class passengers, but the prices are so high that poor people cannot afford to buy the tickets. There are nice and safe busses, with trustable schedules, but poor people cannot use them. One consequence of that is the worsening of social and economic segregation of poor people into slums or marginal areas. In Peru, instead, the transit in urban centers is literally chaotic, annoying for everyone, but particularly for middle class passengers. However the prices of urban transportation in Peru are one third or less of the prices in Brazil, enabling poor people to carry out economic activities that require displacement to other areas of the city, increasing the level of social mobility. So different stakeholders may perceive very differently the same situation.

When working on real world problems we need to be aware of the whole set of stakeholders: who they are, what interests they have, how they perceive the problem and how the problem and the solution may affect each one of them. Having clarity about that we can understand the work of designing as a “reflective conversation with the situation” both at the technical and at the social levels. With this extended approach we can include the diverse perspectives of whole variety of the people related to the problem. This diversity of perspectives is a requirement for being able to solve adequately complex problems. Solving complex problems require the combination of multiple perspectives.

Reflection

Respect to professional development there are two kinds of reflections: reflection-in-action and reflection-on-action. The first kind of reflection is that one people do simultaneously with their actions, at the same time we are performing the action, and the second one is the reflection people do after their action. Most articles and books about reflection refer to this second type.

Reflect-in-action is a cognitive habit of observing how we think in the process of the action and of adapting our thoughts to the requirements of the change we are trying to achieve. It is the management at real time of the approach we are using for analyzing the situation, the assumptions we are taking for granted, the main characteristics of our mental model respect to the problem we are addressing, etc.

Donald Schön refers to reflect-in-action when explaining how the professional does an action (makes a move) and that action (that move) generates an effect in the situation, and this effect is a feedback for the professional to reaffirm, modify or reframe his approach and continue his “conversation with the situation” through a new move. If the professional acts this way, what is happening is indeed a double change: external and internal. At the same time the professional is changing the situation he is changing his ideas. By the end of the process the professional have invented or discovered new ways of thinking about that kind of situation. He has new mental model for the situation and a whole set of new opinions about phenomena that manifested in the course of his action. His cognitive capacities have evolved.

Reflect-on-action, the reflection we can do once the action has finished, is an activity of reconstruction of an experience, based on what we can remember about it. It is an effort of stepping back into the experience, exploring our memory, retrieving what we remember for expressing and organizing those fragmented elements with the purpose of understanding what has happened and draw lessons from the experience.

Gillie Bolton (2005) states that, “*The reflective practice is a process of learning and developing through examining our own practice, and opening this to wider scrutiny by others and studying texts from other spheres.*” The author believes we store knowledge in stories and moments, in those fragments we can retrieve from our memory, and by reviewing them we can discover elements we were not able to see in the course of the action.

Donald Schön named Reflective Practitioners to the professionals who have developed their capacity of reflecting-in-action and reflecting-on-action, of being aware of the conversation they are having with the situations when they are trying to make a change, the capacity of seeing the external (physical and social) reality and his internal cognitive reality.

Reflection-on-action is also a way of getting awareness of our cognitive habits and of acquiring new ones, a way of changing how we are approaching the situations, for being capable of reframing those approaches during the process of the action, increasing both our cognitive flexibility and our effectiveness when addressing complex problems, at real time and in the future. It can also be very useful for understanding how other people are framing the situations and the rationale behind that framing, making us much more effective in creating a common ground for solving conflicts and working together.

Critical Moments Reflection Methodology

There are many methodologies for reflecting and drawing lessons from the experience, but two of the most recognized are: After Action Reflection, AAR, developed by US Army, and Critical Moments Reflection Methodology, CMRM, developed in MIT. Lets put our attention first to the last one.

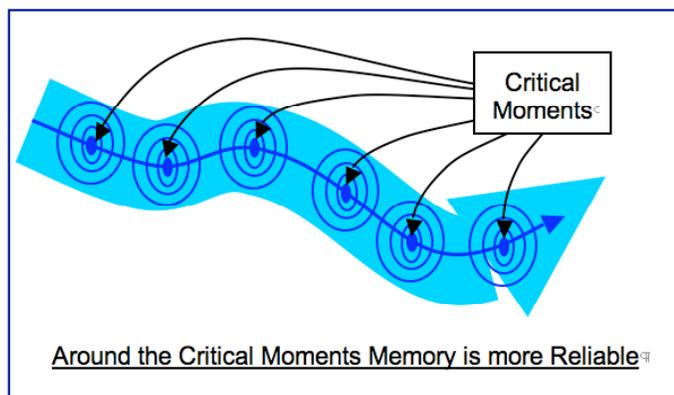
The Critical Moments reflection methodology was developed by Ceasar McDowell and applied to a diversity of cases with high level of effectiveness. The method consists (1) of formulating an Inquiry Question we want to answer with our reflection, (2) of identifying the Critical Moments perceived by the people involved in the experience, (3) of constructing a timeline with those Critical moments, (4a) of analyzing and/or (4b) telling stories about the

timeline and those Critical Moments more relevant for the inquiry question, and (5) making conclusions.

The use of Critical Moments for retrieving an experience has a cognitive base. Human memory organizes their records around those moments that were lived more intensely. Around those moments there is a great quantity of facts and images clearly recorded and accessible, without much effort of remembering. Some times, if life is threatened, the brain records the facts like a movie in slow motion condensing a great quantity of facts in a few seconds of the experience. People who have suffered accidents or have faced extreme situations can describe the evolution of the facts as if they had endured a much larger time than they indeed did.

To retrieve information about the past in the areas around those Critical Moments is highly effective. People are able to remember those Critical Moments and many other events that are related with them. To organize the search of information around the Critical Moments is also effective for avoiding getting lost in the midst of myriads of irrelevant details about the experience.

The retrieving of the Critical Moment illuminates an area of the experience around them, and allows the recovering of many other facts that are connected with them. The retrieval of the Critical Moments is an affective way to reconstruct an experience piece-by-piece.



In general, the Critical Moments are connected with significant changes in the process of the experience and, in general, they are connected with the presence of some special changes. They are meaningful for the individual who identifies them.

Those events can be:

- The happening of surprises (good or bad),
- The emergence of a difficult problem
- The visualization of new futures,
- The disturb of a strong believe,
- The achievement of highly desired objectives.
- The change in a key component of the context, etc.

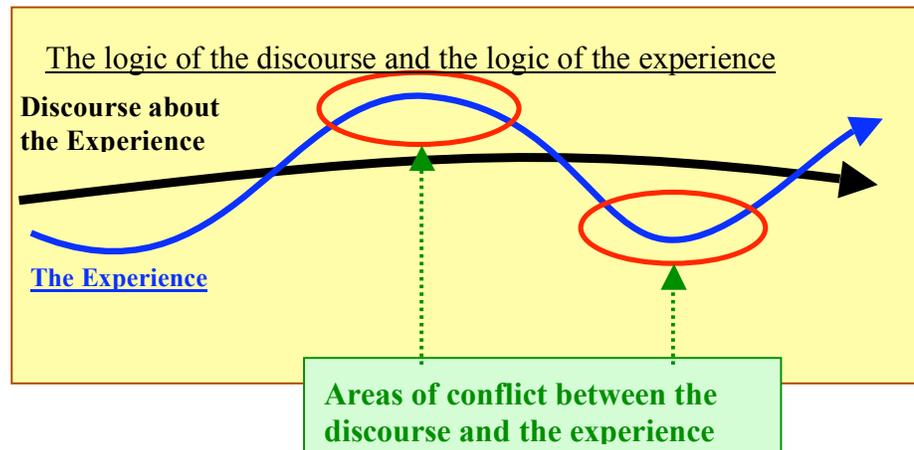
Emotions also play a role in the retrieving of the experience. As people remember their Critical Moments, the emotions that are associated with those Critical Moments also come up in the mind, and those emotions make easier to remember the facts related, in some way, with the Critical Moments.

The discourse and the Experience

The discourse about the experience does not always fit the experience itself. The discourse is a smoothed version of the experience. In most cases the discourse about practice generalizes partial aspects of that practice and loses many elements of its complexity.

Frequently there are many areas of conflict between the discourse and the practical experience. In those cases the discourse may make invisibles those areas, avoiding treat them. The areas of conflict disappear from the discourse. And once they are hidden it is very difficult to treat them publicly.

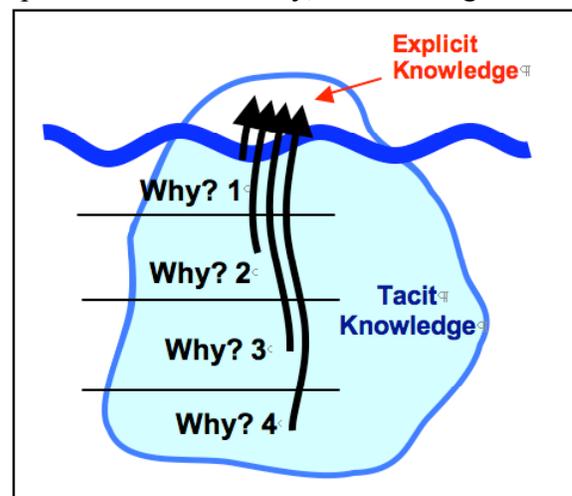
Most of the times the discourses about the experiences are greatly influenced by the requirement of other actors with whom the organization needs to negotiate for surviving. The problem is that, frequently, the official discourse works as a paint that covers the nuances of the experience. A good way for a group to learn is to forget the discourse for a while and to step back through the experience for facing the issues of experience more directly, for focusing their intelligence in deciphering the issues of practice.



The Chain of Whys

For recuperating knowledge that is tacit or not clearly stated it may be used many tools. One of these tools is the chain of whys. The chain of whys is a sequence of questions asking for the reasons people have had to state something. The sequence of questions makes possible to make explicit causes of deeper levels, improving greatly the understanding of the issue under discussion.

The chain of questions is a method for digging into the experience and makes explicit those elements that were yet tacit. Stimulated by the questions the participants go back to the experience looking for elements significant for to answer the question.



The person who is facilitating the reflection makes the first question and listen the answer. If that answer is clearly stated he identifies the main factor of the answer and makes the second question focused in that factor asking for its causes. Once this factor is clear it is object of another question “why”. The sequence may goes on until the facilitator and the storytellers feel

that they have reached the explanation they were looking for, or the level of understanding that they are capable of reaching that moment.

It may happen that the causes are multiple. In those cases the facilitator should manage the level of complexity of the chain for maintaining the level of comprehension of the group. For deepening the analysis without making it too complex the facilitator should focus on the main factors, selecting one or two at each level of causes. The purpose of these questions is to go through a chain of analysis in a flexible way; it is to sustain an analytical conversation. The purpose is to create a dynamic of reflection where the participants achieve to improve their understanding of their experience.

Once these causal issues are better understood they will require, and drive, a new explanation for that experience. The dialogue between the discourse and the logic found in the facts of the experience will make possible to achieve a new understanding of the experience and to renew the discourse. At large this dialogue will make the discourse much more consistent and fine-tuned with the experience.

The application of the Critical Moments Reflection Methodology requires trained facilitators, capable of following the group in their reflection process. The use of Critical Moments showed to be very effective for retrieving experiences that happened some days, some months or some years ago. If well-conducted Critical Moments reflections can go through complex processes of reframing and enable the participants completely change the way they were orienting their practice and formulate a completely new strategy for their intervention.

After Action Reflection Methodology

"The Army's After Action Review (AAR) is arguably one of the most successful organizational learning methods yet devised.

Yet, most every corporate effort to graft this truly innovative practices into their culture has failed because, again and again, people reduce the living practice of AARs to a sterile technique."

Peter Senge

After Action review was introduced in the US Army in the 70s with the purpose of capturing lessons from the simulated battles. However it was after the Gulf War that the AARs became spread widely. David Garvin (2000) explained that:

The technique is relatively straightforward. It bears a striking resemblance to "chalk Talks" in sports, where players and coaches gather around a blackboard shortly after a game to discuss the team's performance. Both chalk talks and AARs are designed to make learning routine, to create, as one commander put it, "a state of mind where everybody is continuously assessing themselves, their units, and their organizations and asking how they can improve." In practice, this means that all participants meet immediately after an important activity or event to review their assignments, identify successes and failures, and look for ways to perform better the next time around.

The process maybe formal or informal, may involve large or small groups, and may last for minutes, hours, or days. But discussion always revolves around the same four questions:

1. What did we set out to do?
2. What actually happened?
3. Why did it happen?
4. What are we going to do next time?

...

According to Army guidelines, roughly 25 percent of the time should be devoted to the first two questions, 25 percent to the third, and 50 percent to the fourth.

The first question has the intension of establishing the main purpose of the action, how the group understood their success, how clear and shared was that purpose. The intension of the second question is to establish the facts, to know what really happened during the action. It may require having more than one source of information for solving possible disagreements between different versions of the facts. These two questions are the base for the other two. Agreement about the objective of the action and the facts is prerequisite for avoiding endless discussions. The third question is interpretative, is an analysis of the actions, the conditions and the behaviors of all actors involved in the action and its stage. It may be simple or highly complex, it may be easy to go through or highly challenging for the participants. The fourth and last question has a strong dependency of the third one. The interpretation of the causal relation among the facts is decisive for designing what should be done next.

Despite of its simplicity it requires immediacy with the action, an environment of trust, horizontality, openness, candor, availability of objective data, and a safe space for accepting mistakes, and also a trained facilitator who are responsible of maintaining the quality of the relation among the participants, and the adequate mood in the group of participants. AAR needs to be institutionalized as a routine in the work for showing its whole potential. AAR is a great tool for learning at tactical level, when the performance of the group depends mostly of themselves. If the strategy of the whole unity or of the organization is wrong, it can be very difficult for the group to go through the questions 3 and 4.

Conclusions

Each time we perform an action we deploy our cognitive resources for controlling the situation we are acting on. These resources are organized around a mental model, an abstraction we construct for dealing with the object of our action. The quality of that mental model is decisive for the effectiveness of our actions. The emerging field of cognitive task analysis is dedicated to understand how we reflect-in-action.

There are two ways of reflecting about ant experience: reflect-in-action and reflect-on-action. Reflect-in-action is the sequence of thoughts we do at the same time we are performing an action. Reflect-on-action is the process of reconstruction of the action, once it has concluded, for drawing lessons form the experience.

For reflecting-on-action there is a diversity of methods. Two of the most effective methods are: critical moments reflection methodology (CMRM), and after action review (AAR). The CMRM is better for experiences that lasted many days, weeks, months or years. Its main premise is that memory is more reliable around critical moments. The AAR is better for short experiences, of hours or a few days. It is a method of analysis of the experience based on fresh memory.

Donald Schön named the habit of reflecting in and on practice as “Reflective Practice” almost 30 years ago, however the interest for this subject is still growing currently. The main reason for that is that it influences the effectiveness and productiveness of professional work when facing complex problems.

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