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Systematic Learning from Significant Surprising Events

Drawing the right lessons for improving the future

A BOK paper for TOCICO

by Eli Schragenheim

Abstract

It is easy to suggest to others to constantly check their assumptions. However, it is very difficult for us to even express many of our hidden assumptions and paradigms. Yet, it looks valid to assume that at any given time our achievements are limited by several flawed assumptions.

How should we effectively identify flawed assumptions and be able to update them?

The objective of this paper is instituting a systematic process of learning to reveal **the root flawed assumptions behind unexpected events, both good and bad, and draw the effective conclusions** for superior achievements in the future. In other words, the flawed assumptions reveal themselves by causing us to be surprised by an outcome we haven't expected due to a flawed assumption.

Just to illustrate the need, consider the blockage at the Suez Canal that began on March 28, 2021. The relevant question for the future is: **What was learned from that event?**

This paper defines the area where the regular Thinking Processes (TP) have to be used in a somewhat different way in order to explain surprising events that should be viewed both as emerging threats and also as the opportunity to overcome flawed paradigms.

Among other insights, the paper suggests using a team to inquire into a surprising event as a vehicle for gaining new understanding.

The proposed methodology for organizations to learn from such surprises consists of eight steps:

Step 1: Choose the right event to learn from.

Step 2: Create a team for the chosen case.

Step 3: Verbalize clearly the gap between prior expectations and the actual outcome.

Step 4: Raise a list of all possible explanations/hypotheses one can think of.

Step 5: Create detailed explanations and invalidate those that clearly didn't cause the gap.

Step 6: Identify the flawed paradigm/assumption.

Step 7: Develop the necessary changes in the policies and norms.

Step 8: Share the new understanding.

The first two steps are preliminary to any learning. The key to the process of identifying the flawed assumptions is described in steps 3 to 6. Step 7 is focused on drawing the value from the new understanding and step 8 is spreading the knowledge.

This proposed methodology could be viewed as part of the 'The Learning Organization' – an interesting and challenging objective. Some of the insights of this paper could push the current knowledge to more effectively achieving the higher objective.

Introduction

Are there clear signals whenever we make mistakes due to flawed basic assumptions?

It is logical to assume that there are. TOC succeeded to discover several common flawed paradigms in managing organizations causing severe negative impacts. This was shown through logic, simulations, and case studies, suggesting every organization is still trapped by flawed paradigms to some extent.

TOC suggests we start with the question: what most limits us from achieving more? It pushes management to build the cause-and-effect behind the current state, identify the limiting factors, and then ask what needs to be changed to get more. The TOC Thinking Processes (TP) is focused on the ongoing undesirable effects (UDEs) that are known to most members of the organization.

What the TOC Thinking Processes don't effectively cover is the area of being surprised by events, which could point to flawed assumptions that might cause huge damage in the future. The trigger for the unexpected outcome, which caused a surprise, could have been a recent change that wasn't fully noticed or understood. When that surprise doesn't initiate proper cause-and-effect analysis, then it could easily cause a serious threat that is too late to deal with successfully.

In almost every area of life, unexpected or unexplained events occur. The first reaction is to quickly handle the immediate situation, which is often referred to as fire-fighting. But this doesn't help much in preventing similar occurrences in the future.

This paper is focused on learning the **right lessons from surprising events**, in order to draw all the value from revealing a flawed hidden assumption, and realize new opportunities based on the updated assumptions. The surprise should be viewed as an opportunity to identify and update hidden invalid assumptions.

The most vicious obstacle to effective learning is the tendency to blame others. This paper claims that although negligence and bad intentions might be part of the explanation, it is not the common case. Most organizations operate under a flawed paradigm that every undesired outcome is because of a "mistake" made by a person who should be blamed for it and pay the price. Without understanding the flaw and how to correct it, the result of blaming is forcing people to hide information and refrain from any move that is somewhat risky. There is no positive value to blaming.

I'm aware that Kepner and Tregoe (1976) have dealt with the topic of using rational thinking for decision making. As this paper is focused on the TOC BOK, it doesn't go into comparing the two approaches.

The TOC current knowledge regarding learning

Dr. Goldratt pointed out the need to look for **inconsistencies** as signals to what we don't know. He used the term 'mysteries' as a trigger for learning since it is obvious that any mystery means that we are operating under at least one flawed paradigm.

The main 'bread-and-butter' of TOC regarding analysis of reality has been expressed in the TP tools.

The TP starting point is a list of several UDEs. The term 'undesirable effect' identifies a consistent **effect that is known and widely recognized as 'undesired.'** It raises the question about why the organization has not yet solved the UDE. The answer is that solving the UDE would create another problem. In other words, the UDE is the result of a conflict. Thus, the Current Reality Tree (CRT) starts with several UDEs and converges on a root cause. The root cause expresses a policy, measurement or behavior that causes damage. Presenting the root cause as a conflict (cloud) triggers efforts to reveal a flawed hidden assumption, thus leading to the development of superior policies, measurements, and behaviors.

However, **this kind of analysis does not deal with a new unexpected UDE.** A new and unexpected UDE cannot be translated into a conflict, because the causes behind it are not recognized. Thus, the damage associated with preventing the UDE is not known. We also don't know, at this initial stage, how the new UDE and its causes are connected to the current reality state of the organization. Additionally, we are unable to predict the full impact of the new UDE and its cause(s) in the future.

The norm of the TOC TP methodology is to verbalize the cause-and-effect logic in the present tense. This makes sense under three key assumptions:

1. People within the relevant environment are aware of the UDEs and recognize the conflicts causing them.
2. Whenever we claim that "If (A), then (B)" we actually claim that in the majority of the cases an incident of (A) causes (B). However, it could sometimes happen that (A) doesn't cause (B) due to an insufficiency that has not been included due to its relative rarity.¹
3. The time of impact between the cause and its effect is relatively short.

Mapping the cause-and-effect logic of a specific past event has to be expressed in the past tense. We shouldn't assume the people involved were aware of the full relevant logic. We also have to consider the remote possibility of a mere statistical fluke.

¹ For example, "If a known politician is accused of committing a crime", then "The reputation of the politician with his potential voters is dropping." Sometimes, voters believe so much in their leader that they will deny the accusations.

The proposed methodology was developed in the mid-90s by Eli Schragenheim and Dr. Avner Passal, a behavioral consultant in Israel (Schragenheim and Passal, 2005). The process was implemented in several security-oriented units in Israel.

The fear of learning

Human beings fear to admit, or even realize, that while operating under a flawed assumption they have made mistakes in the past. Generally speaking, we need to deal with two different causes of fears preventing learning:

- a. The blow to our ego.
- b. Being blamed by others for making a major mistake.

The first is a conflict between correcting a flawed assumption for doing better in the future and protecting our self-confidence that we know what we're doing.

The fear of being blamed is tricky to handle because it is caused by the organizational culture encouraging internal competition. That paradigm means someone has to be punished for incompetence for any damage that occurs.

Goldratt's insight of *"Tell me how you measure me and I'll tell you how I'll behave"* points to the negative impact of blaming. Acting against the measurements causes blaming and punishment. "Mistakes" are interpreted according to the results that follow the actions. When people are negatively measured due to their "mistake", it is obvious that whenever an undesired result happens, people try to conceal their involvement, and by that destroy any possibility of inquiring about the cause.

A process targeted at identifying and fixing paradigms and assumptions without blaming, unless clear negligence and bad intentions were revealed, should be formally launched by top management. To do so, the process has to be based on sound logic, applied by a team, and aimed at revealing common assumptions that require updating. This is a necessary condition for reducing the fear of learning and promoting a culture of striving for excellence.

The systematic process of learning from a surprising event

Two leading examples for the process:

- 1. *The company has just lost its largest client, who announced moving to the company's main competitor. The chief sales officer says that no formal complaints were ever received.***
- 2. *A company producing food has launched a new soup expecting enough sales just to cover the development costs. Those expectations were based on mediocre results of the tasting team that checks all new products. The soup became the top fast mover of the company products.***

Step 1: Choose the right event to learn from.

The first step is to identify a worthy event to learn from. Focusing on the few variables that truly impact the performance is a key TOC insight. Thus, effective learning has to define when NOT to invest effort.

The first condition for dedicating the effort to learn from an event is being **significantly surprised**. Only then is the event worthy of being investigated.

Any surprise is caused by a significant gap between **the prior expectations and the actual outcome**.

Considering the first example: if the loss of the client didn't surprise anyone, then there is a bigger problem, and that event is just part of it. The right TP technique to deal with that case is the Current-Reality-Tree (CRT).

However, if the act of the client caused a real surprise, then there is a flaw in one or more assumptions concerning the relationships between the organization and its client. It is possible that the flawed assumptions might impact the relationships with other clients as well. Once this assumption is identified, new answers to the three key TOC questions are required.²

The second example poses a situation where the surprise is "good" – meaning the result is welcomed. However, the fact that the success of the new soup was a surprise signals that something important was not clearly seen a priori. Why were the expectations were so low when the market had eventually reacted enthusiastically? If better understanding of the critical elements for outstanding success is achieved, then it will lead to more successes and probably less mediocre ones.

There are two different categories of surprising events:

The first category consists of events where the clear a priori expectations didn't materialize.

The second category consists of surprises without any a priori well-defined expectation. One example is when an embezzlement is discovered by coincidence.

The main parameters for deciding to invest efforts to learn from a specific case are:

- a. The gap between prior expectations and outcomes is significant.
- b. The ramifications preventing the surprise to repeat in the future are relevant to the goal of the organization. For example, being greatly disappointed by the food at a supposedly good restaurant might have little future ramifications for the management of a paper manufacturing company.

Step 2: Create a team for the chosen case.

The fear of learning, certainly within an organization, is a tough obstacle. How can a person realize an old basic assumption is flawed without self-defense mechanisms coming to the rescue? Relatively few people have the ability to change their basic paradigms even when they face hard evidence that they are flawed.

A team has a better chance to deal with updating common assumptions, especially when it includes people with different life experiences and relationships that are not too close. It is critical to include

² What to change? What to change to? How to cause the change?

within the team **people who were involved in the specific event** and other people who were **external to the event**. This combination provides the full team with the closest current intuition on the cause-and-effect logic concerning the event, together with the ability to challenge well-rooted assumptions coming from the external people.

The inclusion of people who were directly involved sends a clear message that the objective is not to blame anyone, but to find better ways.

A team of 3 to 5 members seems right.

Step 3: Verbalize clearly the gap between prior expectations and the actual outcome

The **focus of the learning** is to understand the cause(s) of being surprised: the gap between prior expectations and outcome.

Thus, clear verbalization of the gap should ignite the cause-and-effect analysis that leads to a focused search for the flawed assumption(s) causing the gap.

When the prior expectations were clearly verbalized, like in detailed planning, then the gap is easy to verbalize. Some caution is required as **the planning objectives usually represent the optimistic assessment**, while the real expectations might have been lower.

Many cases of big surprises, good or bad, happen without any record of prior expectations. The feeling of surprise means the expectations weren't met. So, the first need is to verbalize the gap and get full consensus on it.

When analyzing the first example, the team should realize the gap is not losing the client, but not knowing ahead of time that the client is considering moving his business elsewhere! The gap should be described like this:

Prior Expectations: ***We have a good idea how the client views his business with us.***

Actual event: ***The client stopped his business with us without us getting an early signal.***

The second example leads us to the following gap:

Prior Expectations: ***We have a good idea of the prospect of success of every new product based on the testing of the taste team.***

Actual event: ***A specific soup had huge success that was not predicted by the test.***

My own experience in leading inquiry teams shows that verbalizing the gap is a significant step which takes considerable time to get consensus of all the team members. The following steps went much more smoothly due to the agreement on the focus of the learning.

Step 4: Raise a list of all possible explanations/hypotheses one can think of

The Categories of Legitimate Reservations (CLR), a key part of the TP, include the “Another cause” reservation. Even when we have a cause and a valid logical cause-and-effect branch starting with Cause ‘A’ leading all the way to Effect ‘Z’, it is still possible that ‘Z’ is being caused (as well) by another cause ‘B’.

The TP deals with chronic cause-and-effect where frequent actions are causing the same effects. It is still possible that Effect Z is caused by several causes, some more frequently than others.

Here we have a somewhat different situation. We have an UDE that happened, so far, just once. It seems obvious that there might be several different possible causes, so it is easy to get stuck by one possible explanation and ignore all others. In order to reach the right conclusions, the team has to evaluate the validity of **every potential explanation** that looks somewhat possible.

There is a need to raise many possible explanations, hopefully covering the whole scope of possible explanations, to gain confidence that the analysis would point to the true cause(s).

Coming up with a possible explanation is NOT the equivalent to a detailed cause-and-effect branch. It is just the first step aiming at expressing the gross possibilities. The next step is where a cause-and-effect branch would be constructed and tested!

For instance, when we view the second example, such a high-level potential explanation could be: “There was a mistake in the recording of the data of the tasters.”

This is an initial statement of a direction for a full explanation. At this stage, such a statement of a possible explanation is enough, provided all the team members understand it might explain the gap.

Generally speaking, we can distinguish between two types of explanations:

1. Claiming the expectations were not realistic to start with.
2. While the prior expectations were justified, something else went wrong.

The focus in this step is **to cover all the possibilities of explanations** before determining which one is right.

Step 5: Create detailed explanations and invalidate those that clearly didn’t cause the gap

The objective of the fifth step is to identify and validate the **operational cause**. Two missions are interwoven in achieving this objective:

1. The first is to turn every explanation/hypothesis into a full cause-and-effect branch. We need to ensure that every explanation/hypothesis looks complete.
2. The second mission is to answer the following question:

Did it really happen like this in reality?

As the explanation could involve several causes, the question is whether it is possible to validate that all the assumed causes truly happened leading to the gap between the prior expectations and the actual outcome.

There are four broad ways to validate or invalidate whether an assumed cause has occurred.

a. *Direct validation that the effect did or didn't exist at the time.*

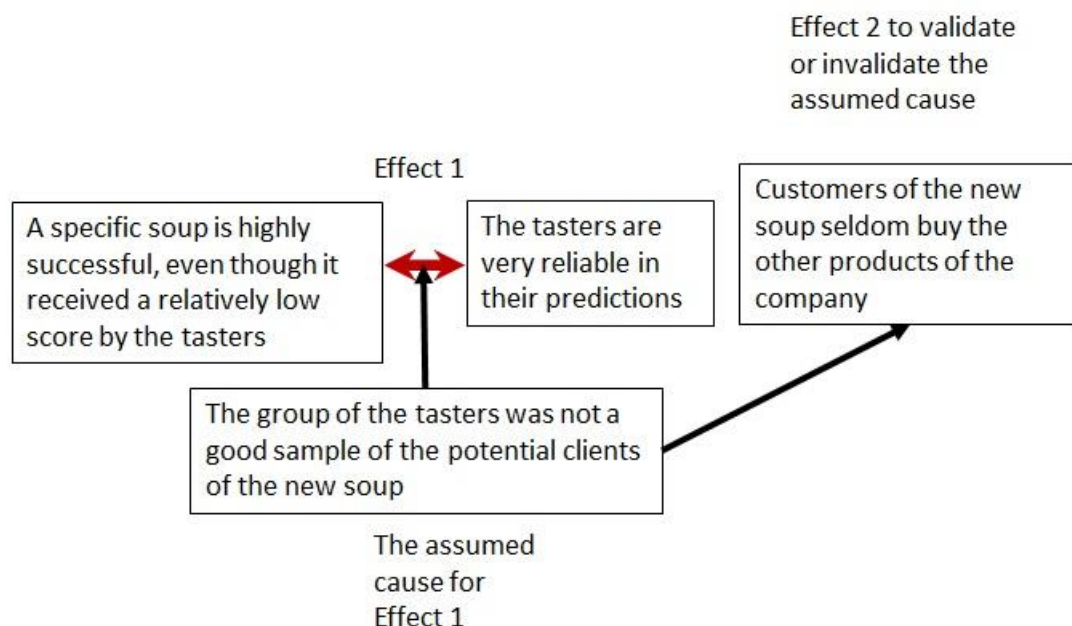
For instance, the effect of “There was a mistake in the recording of the data of the tasters” could be easily validated or invalidated by checking the recorded answers on the original forms filled in by the tasters.

However, it is not always possible to directly validate a proposed cause. One example is the following hypothesis: “The group of tasters was not a good sample of the potential clients of the new soup”.

b. Using the effect-cause-effect basic structure.

The term effect-cause-effect was used by Goldratt to validate proposed causes. The idea is to show logically that if that cause existed at the time, then it had to cause another effect, which we might be able to use to prove its existence.

For instance, if the assumed cause “The group of the tasters was not a good sample of the potential clients of the new soup” truly existed, then if we inquire about the sales data from the supermarkets and see that customers who bought the new soup did not usually buy other products of the company, we can conclude that the assumed cause seems to be valid. Note that even though effect-cause-effect is widely used in science to validate hypotheses, it can never fully prove any hypothesis; however, it could prove the hypothesis is invalid.



The effect-cause-effect method is especially strong for invalidating certain hypotheses as validation is probable rather than proven. In the above example, if the correlation is high, there is still a chance that the assumed cause is still valid.

c. Identifying a cause for an effect.

Suppose that in inquiring into the crash of an airplane one of the explanations is that “the pilot made a human error”. It is difficult to validate whether this was true. What might be used to validate this hypothesis is to identify a cause for such an error. If we find that the pilot did not sleep well or had a very pressing personal situation, then the hypothesis has some support.

A partial, but practical, validation:

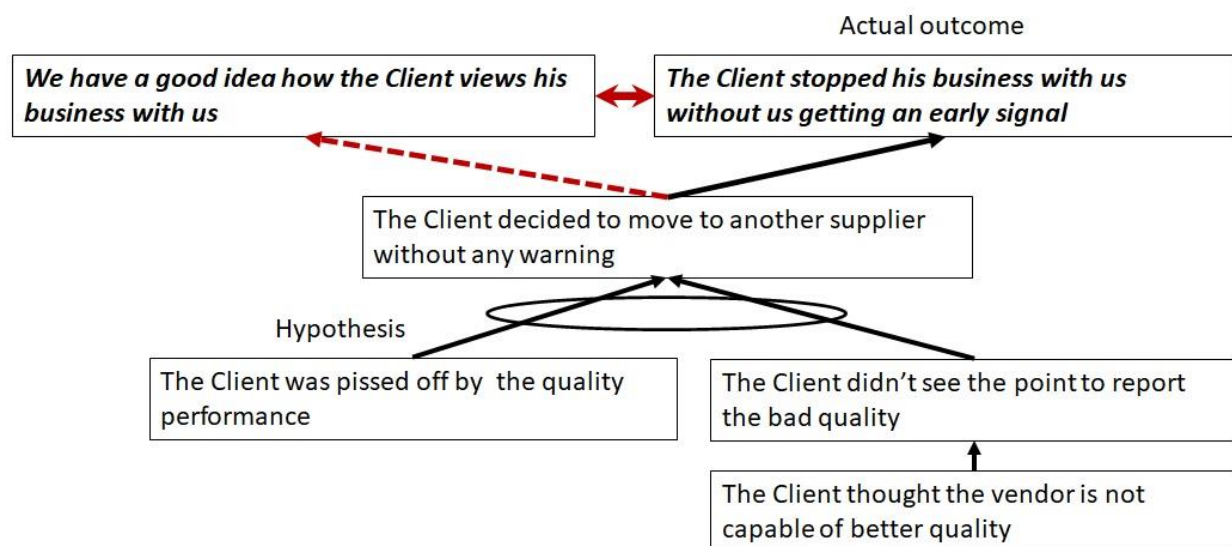
d. All other possible explanations have been invalidated. This is “proof by elimination”.

Step 6: Identify the flawed paradigm/assumption

This step is clearly divided into three sub-steps. First, the team needs to fully verbalize the logical connections for each hypothesis explaining how it **might** explain the gap. Then sub-step 2 requires the team members to actively look for the ‘**core operational cause**’, which the group of sufficient facts that have caused the gap. The third sub-step would force the team members to dive down from the operational cause to identify the flawed assumption or paradigm that caused the operational cause.

Sub-step 1

Each hypothesis is checked for its logical connection leading to the gap. In the first example, let’s begin by checking one possible explanation for the client moving to another supplier, which assumes the client was pissed off because of bad quality. The simple initial logical claim is:



This is a logical possible explanation of the gap. The specific hypothesis explains the surprise of not having the signal: the Client thought the vendor is not capable of better quality.

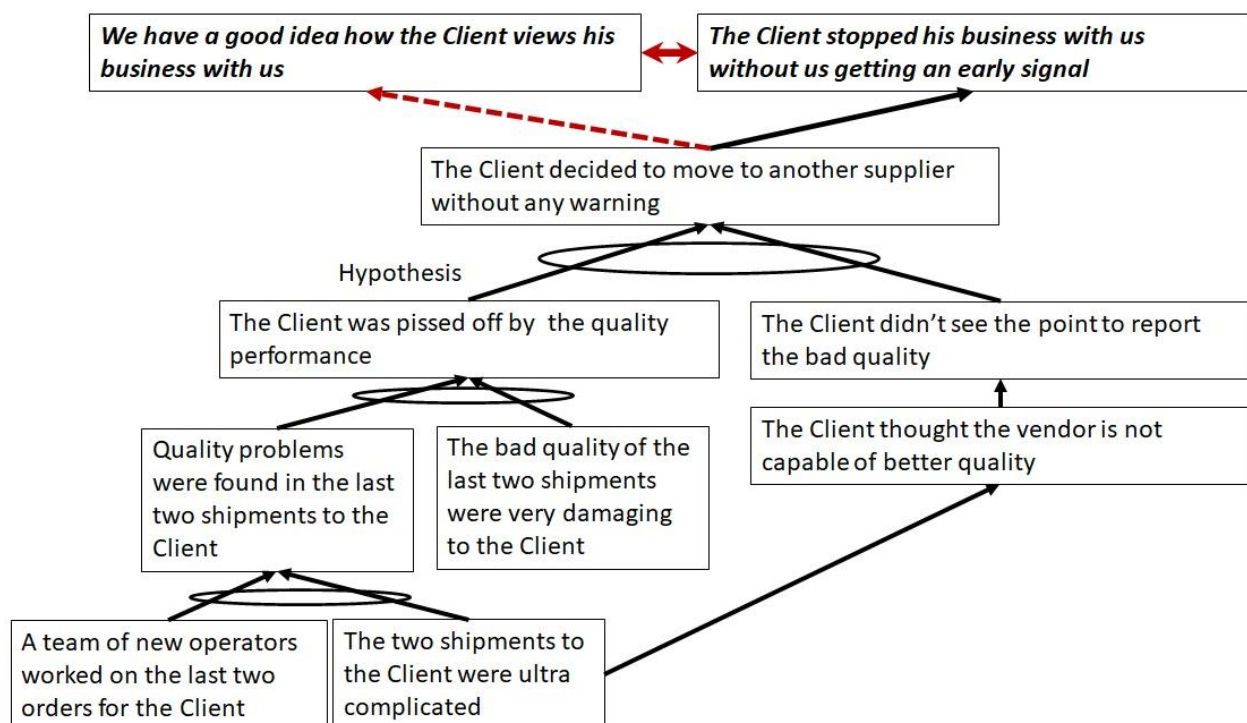
Note, this is still a hypothesis, not necessarily what truly happened. All the entities at the bottom need to be validated in reality!

All the hypotheses should be built to this level before going to sub-step 2.

Sub-step 2

The main body of this sub-step is to check facts that would either **invalidate or validate** the hypotheses. The emphasis on invalidation is to rule out the definitely wrong hypotheses. Note that it could well be that more than one hypothesis is validated – so, the event was the result of a combination of effects. It is less likely that there will be more than one flawed paradigm without one causing the other. In such a case, it is important to assess which one has the stronger and wider effects.

The objective is to **uncover the core operational cause**. The resulting new cause-and-effect structure is:



The effect of “A team of new operators worked on the last two orders for the Client” appears to be the core cause that led to the gap. We should now proceed to the third sub-step.

Sub-step 3

The mission now is to ask the question: Why did **the core operational cause happen?** The regular TP would call for constructing a cloud. However, in such a case which never happened before, **there is no obvious conflict.**

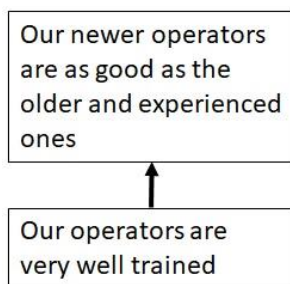
So, why did the company let a team of new operators, supposedly well trained (this has to be checked in reality), deal with complicated orders without special quality checks and attention of a more experienced supervisor? Diving down the logic has to confirm that special supervision did not take place. Let's suppose that this has been validated.

The existing paradigm, which worked fine so far, has to be carefully verbalized. In this particular case, we could verbalize it as:

Our operators have been properly trained and thus are equal to the more experienced ones.

When people discover a flaw in a basic assumption then the automatic response might be to reverse the assumption. This is a very erratic behavior. One has to realize that the paradigm had been a good match to reality in many previous cases. Thus, the team needs to record the cases where the paradigm worked well **and identify the difference between this case and the previous ones** that made the paradigm to be wrong.

Every paradigm is actually a small branch of cause and effect. Let's verbalize the original paradigm:



When we notice that in this particular case the operator's job was not routine then we could update the original with the following paradigm:



The team should be challenged to generalize the new assumption to a wider area. Possibly the original assumption is thought to be valid **not just for operators**, but for other roles within the organization! For instance, could be that the original assumption would fit also salespersons.

The team should do their best to verbalize the most generic new assumption, actually an updated paradigm, to fit the reality of the organization and its environment.

For instance, the more generic updated paradigm could be:

Our employees and managers are well prepared for their routine jobs; however, when an ultra-complicated mission appears, expert support should be given.

Step 7: Develop the necessary changes in the policies and norms

We have reached the stage to develop the Future Reality Tree (FRT), deriving all the changes that are required due to the update of the flawed paradigm. In most ways, this is quite a regular FRT.

What makes this process a little different is that the desirable effects (DEs) are usually prevention of threats in the future.

As the whole learning was initiated based on one UDE – a gap between prior expectation and an actual event, **the ramifications of the FRT could and should look much wider than the original objective.** This sort of FRT requires more care and attention from the team because the ramifications of a flawed basic assumption could touch upon issues that were not mentioned at all in the previous analysis.

In the first example, we could assume that examining again the quality of work from new employees might lead to different policies in Operations and Sales, in addition to probably analyzing the performance of newly promoted managers.

Let's assume that the analysis of the second example has revealed the following paradigm:

The average score of the taste team predicts well the expected sales.

However, there is a clear difference when half of the group loves the new soup, while the other half hates it. Those who love the soup would probably buy the soup regularly, while the others won't buy at all. From the sales perspective, a 50% market share is GREAT. The full analysis should check the new assumption by running the statistics on the old tasting tests and validate whether the correlation with the actual sales is higher. If that hypothesis is validated, then changes to the general strategy for new products should be introduced.

TOC has not dealt, so far, with **the identification and prevention of threats to the organization**, with the exception of the concept of negative branch reservations (NBRs), which is focused on the threat of implementing new ideas that cause problems. The whole process described in this paper is designed to look for flawed paradigms, which mostly mean potential threats, but also learning to look for potential opportunities that are hidden below "good surprises", which this process also handles.

This paper does not detail the process of building an FRT, including raising the negative branches and the trimming of those, as these are all covered in the TOC regular knowledge. The implementation procedures are also skipped, with the exception of spreading the new learning within the organization, which is the last step in the proposed process.

Step 8: Share the new understanding

Implementing the new policies that stem from the updated paradigm is not the same as **sharing the experience** of identifying a common flawed assumption and updating the paradigm.

Making **a story** of the discovery has the potential of delivering the idea of the search for new understanding through keen interest of those who have not been involved. The bare facts of the event that initiated the learning are key in generating interest of other people. Presenting a very concise version of the final cause-and-effect tree as a story is a powerful way to communicate the logic, including the policies that have been changed, and the negative branches and their trimming ideas.

The shorter we can express the logic and its impact, the higher the chance that people who were not involved in the event would learn the lesson.

Addressing the fear of learning

For the whole process to be implemented in an organization, overcoming the obstacle of fear is a must. Implementing such a process requires a clear effort of top management to change the culture. Instead of the norm “do not make mistakes” as an appreciated value, management should lead based on the very different norm of “**making mistakes the first time is inevitable, repeating them is bad!**”

A key paradigm in programming software is: **it is not possible to prevent bugs in software**. The mission is to be able to identify the bugs and fix them as fast as possible. This is the common culture in developing software. If we can somehow implement this kind of culture in the organization in a generic way, then the proposed process would be easier to implement.

The TOC culture certainty backs up the need for learning from mistakes through its “challenge your own hidden assumptions” insight. This process makes this insight clearer and stronger and should be, in the author’s view, an integral part of any TOC implementation.

Experiencing the process

The main ingredients of this process were developed by the author and Dr. Avner Passal. It was implemented in several security-oriented organizations in Israel. The implementations were not TOC-oriented and the TP was not utilized. Instead, the need for logical verbal explanation was emphasized, including the need to check sufficiency, which seems to be the most common mistake people make when raising logical arguments.

The author has led several teams to inquire about events that were identified not just as surprising, but also as painful to the organization. While details of the specific inquiries cannot be revealed, two effects seemed to be common to all:

1. Verbalizing the gap took a relatively long time, but then the rest of the inquiry was fast.
2. The teams were amazed by the scope of general ramifications from fixing the flawed paradigm.

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