Abstraction and Analogy Thinking for Innovative Solutions

BY **ADITYA BHALLA**

Abstraction and Analogy Thinking

Abstraction is the ability to describe the essence of a situation using simple words devoid of technical terms and jargons and is one of the core skills of strong innovators.

Abstraction thinking helps in overcoming terminological inertia which acts as a psychological roadblock towards generating strong innovative solutions. Terminological inertia constrains the mind to think in the narrow groove of possible solutions as known to the profession. One way of checking whether the description of the core problem has been made in simple form is to ask the question: "Will a teenager be able to understand all the terms used to describe the situation?" Another way could be to ask the question: "Will understanding this description require the reader to be fully inducted into our organization?"

Analogy thinking is the ability to review the abstract situation and be able to relate to similar situations in completely unrelated domains.

Analogy thinking helps the mind explore solutions in completely unrelated domains that on the surface may not be applicable to the problem situation but can yield innovative solution directions that the profession may not have thought of earlier.

Both the skills once mastered are powerful assets but require a lot of practice especially by professionals, who over time become mentally conditioned to consider their profession as unique.

For serious students of TRIZ (Russian Acronym for *Theory of Inventive Problem Solving*) there are ample opportunities to develop these skills as part of the structured learning process including mastery of the Algorithm of Inventive Problem Solving (ARIZ).

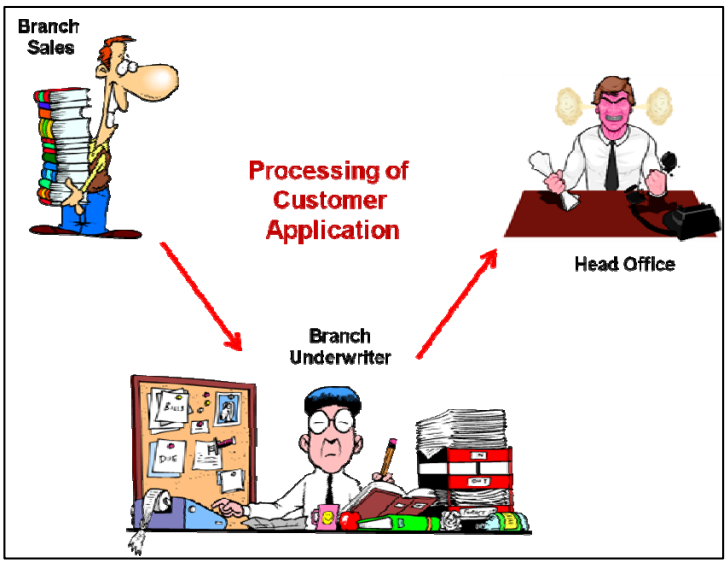
However, even those who are not pursuing TRIZ learning can through practice hone their skills.

Let us consider the application of Abstraction and Analogy thinking to a real world scenario.

Case Study: New Customer Applications with Incomplete Documentation

A financial services company was facing a problem that its branch sales team was frequently sending new customer application forms to head office with incomplete supporting documents.

The company had outsourced the work of reviewing new application forms for discrepancies to an external agency. The agency had a team of financial underwriters at each branch to perform the preliminary underwriting operations. Still there were instances of forms dispatched to head office with incomplete supporting documents (refer image).



The internal process improvement team investigating the root cause found that sales was in the habit of submitting the customer application forms at the last moment to meet the monthly cutoff date for logging sales. The underwriting staff of the external agency were contracted to work on defined turnaround time targets for processing of applications. While the staff was able to catch some discrepancies at the branch level the sheer volume of workload many times resulted in the shipping of customer application form to head office with missing supporting documents.

The process improvement team did brainstorming exercise and thought of the following ideas but rejected them for reasons listed alongside.

1. Increase the size of the financial underwriter team at branch level
    a. Reason for rejection: Management was pushing for reduction in the overall headcount of underwriters across the country to reduce cost.
2. Ask the agency to only have a bigger team present at the last week to meet the increased workload. That way the overall cost would not go up.
    a. Reason for rejection: Customer applications could come in anytime before the month end. Not having an underwriter team at all times could result in processing delays which would make the organization non-competitive
3. Remove the contractual commitment to meet turnaround time for volume exceeding specified threshold
    a. Reason for rejection: There was no assurance that the external agency won't deliberately resort to dilatory tactics. Additionally, there were implications of delays in processing genuine customer orders leading to potential customer dissatisfaction.
4. Advance the cutoff date for logging sales to allow the underwriters more time to review the applications.
    a. Reason for rejection: Sales would not agree to this. As it is they were under pressure to make sales happen.
5. Request sales head to force his team to submit applications in a continuous flow and not towards the end of the month
    a. Reason for rejection: There was no assurance that this would necessarily work out as the sales head was also under similar pressures to make sales happen.

The team at this moment was dejected as they had run out of brainstormed ideas to improve the situation.

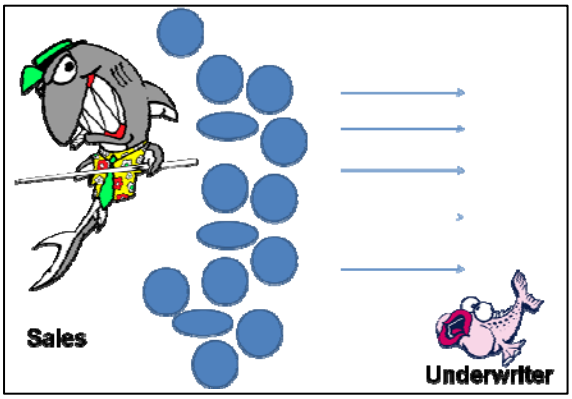
Abstraction and Analogy Thinking for the Situation

Let us try to apply Abstraction thinking to first represent the situation in a simplified form without use of complex terms and jargons.

The context of the problem has made it very clear that expecting sales team to cooperate would be futile. We are clearly seeing a situation where sales would continue its practices to meet its numbers by the cutoff date. It is for the operations team to design a robust process under the given constraint.

If we think in abstract form then entity 1 is dumping a large volume of objects towards entity 2 and hiding some defective objectives in this large volume. Entity 2 is unable to spot all the defective objects in this large volume (refer image).

As shown in the image a large volume of circular objects are being pushed with some oval shaped hidden amongst those objects. The underwriter (Entity 2) is unable to spot all the defectives or the oval shaped objects.



Let us now perform Analogy thinking to see if we can generate new ideas by borrowing practices from totally unrelated domains. The table below summarizes the ideas generated using analogy thinking.

Analogous Situation	Idea from Analogous Situation	How to implement in Current Situation?
Police scanning luggage at airport	Machines are designed in such a way that they only highlight the suspicious objects. Additionally, they use color as a resource to identify different types	This gave the team multiple ideas 1. Redesign the form using color as a resource that does not allow critical documents to be missed out 2. Use font size and color as a resource to highlight parts of the form and

Analogous Situation	Idea from Analogous Situation	How to implement in Current Situation?
	of objects – metal, liquid etc	supporting document to be checked The above solution concept was to be done in such a way that it cut down the review time per application to not more than 2-3 minutes from the earlier 10-15 minutes.
Immigration officers scanning passport	Check in database for people with a history	The team got an idea to introduce bar code system for application forms and also link entry of form to sales employee id. The software would generate summary of discrepancies by sales person. This would be shared with head of sales. Additionally it would be brought up in review meetings as cost of poor quality resulting in higher cost of operations impacting the profitability.
Customs clearance	Green Channels for those with nothing to declare Red Channels for those with something to declare VIP Channel for diplomats etc	The team got another idea. The past record of the sales team in submitting complete and accurate documents would be used to classify sales team as per different bands. Those who fell into a better band would have their applications processed earlier giving them an edge over other sales team members in providing faster service to their customers. Customer satisfaction rating with the sales experience was included as one of the performance metrics for sales team.

The above is a sample to illustrate how even with this simple concept of Abstraction and Analogy thinking teams can generate many more ideas than they would normally be able to do through regular brainstorming sessions. The team has to further develop the solution concepts to successfully deploy them including the resolution of secondary problems.

Conclusion

Abstraction (the ability to express the core problem in simple term) and Analogy (the ability to find commonalities in seemingly unrelated situations possibly between unrelated domains) are two core skills that strong innovators have mastered well.

These two skills can by themselves help many problem solvers generate strong innovative ideas to resolve the current problem situation.

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Author Details

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His articles on innovation, lean, and Six Sigma have been published in magazines such as Altshuller Institute, ASQ Quality Progress, Quality Digest, ASQ Six Sigma Forum, TRIZ Journal, IDG Outsourcing World and OUTSOURCING. He is on the book review panel of Pearson Vue (owners of Addison Wesley, Penguin brands).

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