

TRIZ and the Art and Science of Thinking

The position of human thought in relation to the external world has been a puzzle for thousands of years. Whether we are talking about Plato's worlds of form and substance or David Deutsch's more recent Fabric of Reality (which has four "strands") the way in which I ("I think therefore I am"?) connect to the outside world, and even act in ways to form it, trips us up when we try to deal with it with logic or metaphor.

It is an area which needs such careful steps, or we slip into believing we are looking from one direction only to find we are looking from another. This paper attempts to see how the structured analytical tools of TRIZ, (The Theory of Inventive Problem Solving) can be put alongside what we are beginning to understand about how our thinking processes work, particularly from some of the neuroscience), to make a little more sense of this relationship.

I do not suggest we have the answer to this longstanding puzzle only that maybe thinking about it gets a little clearer when we use both together.

From hypothesis forming to evidence evaluation

There are many elements to the process of scientific thought, from hypothesis forming, to collecting evidence (data), drawing conclusions with logical/mathematical constructs, evaluating the evidence in a wider context and restating understanding of what we have found.

If we see the process of scientific thought and scientific experiment as a kind of manufacturing process then we can explore it using the same tools of TRIZ that we use to explore more standard engineering design and problem solving.

Key concepts I wish to explore using TRIZ are Hypothesis forming, Data gathering, Data evaluation and drawing conclusions, and finally creating explanations.

In a standard TRIZ approach, for each of these stages we can ask:

What are the resources we are using or can use?

What are the parameters, features, attributes of those resources?

What resources are unnecessary? What can we trim? How can we create a more Ideal hypothesis and experiment?

What Trends are being followed at the moment at this stage of scientific enquiry?

What Contradictions exist in the enquiry process?

How does this analysis inform us as we revisit the initial Hypothesis?

Six Sigma and science and art

Six sigma is a rigorous approach to exploring what we know, exploring what we know we don't know and making step by step improvements from this knowledge.

But this places Six Sigma as only one part of the scientific process. Exploring what we don't know we know, and what we don't know we don't know can also be approached using the structured toolkit of TRIZ thinking and reflection, and this can produce step change improvements.

Although a rigorous approach, TRIZ used with Six Sigma becomes an art based on experience. The more you juggle with the tools the better you get. The complexity that arises in thinking in the world of complexity, the world of what you don't know you don't know, requires skill in being able to move between the world of analysis and the world of creativity.

Forensics and TRIZ

Whether we are working in forensics for the law and order organisations or forensics for the R&D departments in health, engineering, agriculture, or economics, there is the same need to explore both the science of what we know and the approaches to what we don't know. When the police are examining 'evidence' it does not matter that this is a crime scene not an R&D laboratory, the issues are the same as for research in a pharmaceutical company.

How do we check our thinking about what we know?

How do we explore our thinking about what we don't know?

With TRIZ we can approach both through creative and analytical thinking about function, resources, Ideality, contradictions and trends.

For example, we can use evidence of what is not at the crime scene to ask, why is it not there? What would have brought it there and what would have kept it away?

Exformation is a useful concept here. What might we expect to be evidence which is not present? For example, getting up at 8 p.m. and finding busy roads totally empty is a huge amount of exformation.

Combining the concept of exformation with information and these tools of TRIZ and Synectics we can stretch our thinking without getting lost in the process.