



U-SIT And Think News Letter - 21

Updates and Commentary

- 1 USIT – How to Invent
- 2 USIT – an Overview
- 3 Mini Lecture
- 4 Classroom Commentary
- 5 Problem-Solving Tricks and Related Miscellany
- 6 Feedback
- 7 Q&A
- 8 Other Interests

Unified Structured Inventive Thinking is a problem-solving methodology for creating unconventional perspectives of a problem, and discovering innovative solution concepts, when conventional methodology has waned.

Dear Readers:

- Mini-Lecture 20 introduced material prepared for a NATO sponsored summer school in Sicily and is continued here. The barhopping problem is completed. And a strategy for invention is introduced.

1. USIT – How to Invent: the USIT textbook.	\$44.50
---	---------

2. USIT – an Overview	FREE
-----------------------	------

3. Mini USIT Lecture – 21

Continuation of ...

“USIT – an Alternative Method for Solving Engineering-Design Problems”

Solution by simplification

The barhopping problem was analyzed in Mini-Lecture_20 using the *simplification* . We noted that the problem can be reduced to a repeated pattern (of numbers), solved for one instance, and extrapolated to N instances. In this lecture, I introduce the *contrarian* and apply it to the barhopping problem.

Be a contrarian

A contrarian views the world in opposite ways, ways that are opposite to conventional or expected ways. As usual, there are multiple verbalizations of this heuristic. One is to *work problems backwards*.

In the barhopping problem we are given the final state where the bar hopper has no money remaining in his pocket. And we are asked to find the initial state, how much money did he start with. This is an ideal situation for applying the contrarian heuristic by working the problem from the final state to its initial state. Try it, if you haven't yet solved this problem.

Solutions for the bar hopping problem: By now you have probably found the number of dollars needed to enter a first bar and barhop for N bars is $3(2^N - 1)$, which follows from the pattern, 3, 9, 21, 45, 93, etc., for N bars where N = 1, 2, 3, 4, 5, and so on.

How to invent

I want to shift discussion now to the topic of inventing – “How to Invent”. This is a topic on which much has been written (including my first book). Consequently, there are many “how-to” views and ideas that have been expressed. I chose this topic for the abbreviated USIT training module because it provides an overview of USIT while immediately putting it into practice. First I’ll outline the strategy for invention using USIT and then spend some time demonstrating it.

A strategy for invention

As a well-defined problem must conform to the methodology to be used in solving it, a strategy for invention must conform similarly. In this case it must conform to USIT’s definitions and tools. This requirement is readily translated into the formulation of an exercise to invent as an exercise to solve a well-defined USIT problem. And this condition begins with a single unwanted effect. However, in the case of invention, the unwanted effect may not be as obvious as it is when presented a problem to solve. This is the situation to be addressed.

Invention definition

I have discussed in earlier mini-lectures how important is *problem definition based on a single unwanted effect*. And you have seen it used to solve a problem having an extant prototype solution that’s in need of improvement. This requirement for a problem definition provides a convenient and effective strategy for inventing.

The initial issue with intentional invention is deciding where and how to start. The intention to invent implies recognition of a need and this implies a problem situation has been recognized. But, recognizing a problem situation and knowing where and how to start solving it are different things.

A manufacturer of any product wishing to invent the next generation of the product has a natural starting point. It is the product itself visualized (worded) as having a single unwanted effect. I’ll assume that we are a manufacturer in search of an invention for product improvement that will leapfrog the competition. Our team has been assigned this problem and we recognize that we must first construct an unwanted effect. We will select a particular product momentarily. First, we need a strategy.

Ideas spark ideas

Perhaps the most powerful tool for the three phases of problem solving, definition, analysis, and solution, as well as for invention, is *ideas spark ideas*.

I like to support that statement with three axioms of problem solving relevant to a team of technologists:

Axiom 1. Put a problem on the table and every person present will try to solve it.

Axiom 2. Offer a solution concept and every person present will try to shoot it down.

Axiom 3. If unable to shoot it down, every person present will try to improve upon it.

I surmise from these axioms that *ideas spark ideas*.

This suggestive statement is rather terse and lacking of consequence. A more useful form is *ideas spark ideas so generate ideas*. A very straightforward method for generating ideas is to *analyze*. Synthesis builds whereas analyze takes apart. Analyze suggests to ...

- separate into constituent parts,
- determine elements essential features,
- examine critically,
- give the essence of, and
- identify causes, key factors, and possible results.

The simple process of systematic analysis creates ideas and sparks new ones. This will be demonstrated momentarily.

The strategy for invention

- Select an artifact (any product of human endeavor).
- Analyze it:
 - Determine its visual characteristics,
 - Determine other physical characteristics,
 - Postulate functions for every characteristic,
I maintain that, “*Every artifact has a function*”,
 - Determine attributes that support the functions,
 - Rank the functions according to their relevance to the perceived value of the artifact,
 - List functions of similar artifacts produced by our competition.

The purpose of our invention is to improve its value as perceived by a buyer.

- List newly recognized functions for our product that could improve its perceived value. Novelty functions are acceptable.
- Select from ideas generated by this analysis a single function to be incorporated into the chosen artifact.

***** To Be Continued in the next USIT Newsletter *****

We will pick an artifact from the objects visible in the lecture room. What would you pick?

5. Problem-Solving Tricks and Related Miscellany

6. Feedback Questions you would like to have discussed are welcome.

7. Q&A

8. Other Interests

- Regarding inquiries about ordering the book, “Unified Structured Inventive Thinking – How to Invent”, details may be found at the Ntelleck website: www.u-sit.net. The cost of the book is US\$44.50 plus shipping and handling. See the website for S/H charges. Send a check made out to **Ntelleck, LLC** for the proper amount, drawn on a US bank, to

Ntelleck, LLC, P.O. Box 193, Grosse Ile, MI 48138 USA

Please send your feedback and suggestions to Ntelleck@u-sit.net

To be creative, U-SIT and think.