# U-SIT And Think News Letter - 69

**Subject Keys**

PD = Problem definition

**H = Heuristics**

T = Theory

**M = Metaphors**

A = Analysis

**U**nified **S**tructured **I**nventive **T**hinking is a problem-solving methodology for creating unconventional perspectives of a problem, and discovering innovative solution concepts, when conventional methodology has waned.

**Dear Readers**:

. Finally, the new web site is completed – please visit http://www.u-sit.net/

. This means that the new book, "**Heuristic Innovation"**, is also completed and is described in the new web site along with its table of contents.

. At the site a vote is being taken to measure potential interest in a second newsletter having mini-lectures devoted to heuristic innovation.

. While they last, the two textbooks are being offered for the price of one.

**Mini USIT Lecture – 69**
**Heuristic Innovation**
This lecture is devoted to introducing the What? and Why? of the new textbook

## Heuristic Innovation and its Development

Heuristic innovation was developed from unified structured inventive thinking. The motivation for its development resulted from a bit of self-referential reasoning that went like this:

. USIT is a structured problem-solving methodology that claims to evoke innovative thinking by establishing new and unusual views of a problem.

. If this is true, then USIT could be used to find a new and unusual view of itself.

This seems like a reasonable approach to developing an advanced form of structured problem solving. But where does one start?

Innovative thinking from the new and unusual
Obviously, according to USIT, we must start with a well-defined problem, which must arise from an unwanted effect. The goal mentioned above of establishing *a new and unusual view* of USIT, doesn't exactly identify an unwanted effect. This is a common situation when starting a problem. It usually requires a bit of talking through the situation to begin to see unwanted-effect opportunities. I began by reviewing the status of USIT from an overview perspective. This entailed identifying its salient features and their purpose.

Simplify in order to find what lurks under superfluous detail
Perhaps the strongest feature of USIT is its use of the heuristic "simplify" to build a logical method of innovative thinking applied to problem solving. The early work of Dr. Horowitz and colleagues in developing ASIT had this goal as they worked to simplify TRIZ.

In essence, the first stage of simplification is to reduce a problem to three essential elements; objects, their attributes, and the functions they support (where functions are wanted or unwanted effects). Following that

  

simplification, all further developments, in the unified approach, are based on these elements.

As this discussion progresses, note the heavy use of logic in the organization and application of USIT. It is considered to be an appealing aspect of USIT – but, logic is more appealing to technologists than to artists, dreamers and others with active imaginations. This realization had some influence on the final unwanted effect that was adopted.

Logic, the bane of the dreamer

In some sense, the need of logic produces a contradiction of expectations when trying to evoke innovative thinking and adopting new perspectives. The technologist tends to evaluate the logic of a potential thought path before venturing down the path. The poet, by comparison, sees the newness of a path and leaps ahead to find what it offers without concern for its logic. The technologist hopes to avoid wasting time and facing potential embarrassment, while the poet hopes to at least find a nub of an idea that can be burnished into something provocative. Neither one can use a final concept devoid of the other's influence.

This line of reasoning confronted me with the obvious — USIT is too logical. Is this the unwanted effect I am looking for? Here, I decided to examine the degree of logic wrapped around USIT to protect it from misguided and unguarded thinking.

Tools and rules

At the heart of problem solving is problem definition – a very creative exercise. A well-defined problem becomes one that is defined so as to be amenable to the solution techniques to be applied. (Sounds like circular logic – it's well defined if it fits your methodology!) Once defined, the problem can be analyzed using USIT's plausible root-causes tool. Here the analyst engages in questioning his or her personal understanding of the technical logic tying together cause and effect. The underlying bond between a cause and its effect is one or more active attributes. Down this path one stretches personal logic and experience to its limits.

At the heart of a problem's solution is a concept, as opposed to an engineered, working prototype. USIT teaches technologists how to find the concept. It assumes that we need no further training in bringing it into existence. Our need is to be weaned from technically stilted practice to examine new ways of thinking.

Six problem-solving heuristics were chosen for USIT and given names that relate to their logical line of thinking: uniqueness, dimensionality, pluralization, distribution, transduction, and generification. Uniqueness focuses on the spatial and temporal characteristics of effects. Dimensionality focuses on the activation and deactivation of attributes. Pluralization examines multiplication and division of objects. Distribution rearranges objects (and functions). Transduction looks at the connectivity of the elemental components of a problem's definition. And generification uses known solution concepts as thought starters for finding new concepts. Together, these form a knit of basic elements capable of covering the scope of creative thinking. (But does it?)

Keep the best

Finally, the whole of USIT is brought together in a logical organization that provides a flow chart of actions to be taken on the way from problem definition to discovery of its solution concepts. Students and practitioners of USIT have expressed their satisfaction with this logical unification of structured problem solving. Surely it is worth fostering and preserving. It is. So how could there be too much logic at hand?

That is, this logic is worth fostering and preserving for the following reasons. The practice of problem simplification *a la* USIT, and its procedures of finding new insights, can be counter intuitive and not obvious. It may even be threatening to one's cherished ways of thinking. Thus, learning the methodology would be nearly hopeless without its interwoven logic. The same goes for teaching USIT, or any other technical subject, logic is the gateway to one's mental acceptance of new ideas. We learn, teach, and communicate technology using logic. The structure of USIT is logical.

Understanding and practice of USIT methodology has an interesting learning-curve that begins in an up-hill climb as terminology is learned and applied to real-world problems. Progress is slow. With memorization of terminology and experience in applying the methodology, progress improves and the hill begins to flatten. As

with learning of any technical subject, its familiarity begins to obviate need of flow charts and procedural details, the method becomes a subconscious way of thinking. Logic makes this possible. So logic has a fundamental role in learning and teaching. The procedural tools of USIT have done their pedagogic job once the method is ingrained in the subconscious. Now what?

As USIT takes root

Pondering the 'now what' question took an interesting turn when I began to read about results of studies in cognitive psychology regarding the brain's ability to solve problems. We each have two engines of cognition, our two brain hemispheres, which both engage in solving the same problem simultaneously. However, they bring different biases in their preferred protocols for dealing with a problem. One engine favors logic while the other favors intuition. Both produce solution concepts. At this point the light came on! USIT has pushed one hemisphere to new capabilities without offering equal opportunity to the other hemisphere.

Opportunities for the wording of unwanted effects began to surface; opportunities such as

- USIT is too logical
- USIT is too complex
- USIT is has too steep of a learning curve
- USIT does not foster intuitive thinking
- and others.

Before discussing these, I'll comment on why I was led to wonder if one could find a new and unusual view of USIT.

Within my first half year of practicing structured problem solving I began to notice that I was using a variety of short cuts rather than draw all of the diagrams the method teaches. Once noticed, it caused me to wonder if I was shortchanging the method and missing potential solution paths to investigate. Of course, there is no way to know what may or may not have been missed in one's thinking if one hasn't even had the thoughts. But, the matter of shortchanging the method can be examined. It was, and I concluded that this was an indication of subconscious adoption of a new way of thinking. In the ensuing years I began to wonder if USIT could be extended into an advanced stage and how?

Shortchanging intuition

The first three of the above mentioned unwanted effects are rather generic and a bit trite. They could be claimed of many methodologies; but the fostering of *intuitive* thinking as an extension of USIT struck me as a valuable and unique opportunity. So the unwanted effect selected was, "USIT emphasizes logic at the expense of intuitive thinking".

Plausible root causes became evident as lack of ways to stir intuitive thinking, on command, and means of recognizing response. The latter, recognizing response, has been handled in USIT and other methodologies by the admonition to restrain from criticizing ideas as they arise. The former, stirring intuitive thinking, was not emphasized, but was allowed. The power of metaphors was recognized and these were intentionally created through words for objects, attributes, and functions plus sketches of problem situations. But their functioning was not elaborated nor developed into effective tools. Most emphasis was placed on the power of language and images in communicating with the brain and stirring creative thinking.

Metaphors as seeds for subconscious thinking

Reading about studies in cognitive psychology made clear how one brain hemisphere tends to excel in language and thereby controls conscious, logical thinking. The other understands language but has different interests as it considers a problem. An important point, for me, was learning that both hemispheres understand metaphors. From this arose the idea that both hemispheres can be seeded simultaneously to sprout new ideas from the subconscious by using metaphors. They allow each hemisphere freedom to use them as they wish, with or without literal logic.

That raised the question of what are the ingredients of a seed? Dictionaries tend to give definitions of metaphors as centered on words. I generalized the idea to intentionally omit the vehicle for provoking thought (words), and emphasize instead its intent – to produce concepts that do not literally denote anything. That led to the idea that all sensory inputs to our two cognitive engines (denoting nothing in particular) are capable of making subconscious associations to our past experiences and from those to bring to the conscious new ideas (useful or not). The smell of a new car led to an after-market product of canned new-car odor.

We must have experience

For example, I recall an elementary school experience of listening to classical music and then drawing a picture of something that came to mind in the process. I still easily remember the sound of the bassoon and my image of a waddling duck. From further back, I easily remember the taste of grandma's corn bread with the image of the wood-burning stove warming the kitchen and the faint smell of hot bacon and the sound of crackling embers and the texture of the fresh bread. I've learned that any one of those sensory inputs can bring back that memory.

Solution concepts usually come to mind not as finished products but as simple associations from past experience that then spark conscious effort to make them relevant. But, we must have experience.

Heuristics

A strategy began to develop that would capture USIT's methodology for rapidly reducing a problem to its essence and discovering plausible cause and effect for its understanding. Once this becomes second nature in one's thinking, the strategy turns from consciously forcing logical structure to creating metaphorical seeds for sparking both hemispheres into action. These need not be logical. A crackling ember probably doesn't make you think of warm bread. But I would bet that it recalls some experience.

To put these ideas together, metaphors became the goal, and to be useful to both cognitive hemispheres they were seen as expressible in heuristics. For a new way of looking at heuristics, a graphic technique was used to define a problem. From this graphic metaphor, thinking paths to solution concepts were identified. These ideas are presented in heuristic innovation. Starting with graphics may quickly spark intuition while logic pauses to select associated words to ponder.

Yet, I wondered if logic was still giving intuition short shrift? This again brought up the issue of not only stirring intuitive thinking but also recognizing its response.

Natural thinking, problem definition, and heuristic innovation

At first glance, this appears to be a wrong path. After all, the success of science and engineering is obviously its grounding in logic. Furthermore, it assiduously bolsters that logic with mathematics. The reason for this is that we early learn in science that our intuition can be wrong. Our use of mathematics aids in discovering and correcting such errors.

On second glance, it comes to mind that many inventions, creative ideas, and amazing insights had no obvious links to mathematics and or even to logic. Logic may have been needed to make a concept intelligible for further development and for communication. It comes to mind also that thinking itself is not logical, orderly, or predictable. We start our thought process and it quickly finds other matters to explore, some relevant and some not, as it constantly jumps about. It takes conscious effort to push an initial problem through the morass of thoughts in search of relevant ideas. But it works. This is natural thinking. Why not capitalize on it by marrying its success with the best features of USIT?

Now that we have adopted the structured methodology into our subconscious it acts to keep subconscious thinking not always on a direct path, but at least on circuitous routes that bring it back to the issue at hand. This reliability gives us an opening to explore the benefits of natural thinking; that is, thinking unencumbered by conscious rules. First, note two points: the beginning of problem solving is problem

definition, and in USIT the path of simplification takes us through many metaphors as we strive to improve a problem's definition. This is where the most innovative action is. Thus, in heuristic innovation there is one directive, define a problem iteratively. In each iteration, change words and sketches to invoke new and unusual metaphors, thus giving both hemispheres provocative seeds. The most effective metaphors are not known *a priori* to problem solution. Therefore, iteration plows the ground for multiple seeding.

Once concepts are found they now are available for polishing, restructuring, incorporating, or culling. Unified structured inventive thinking and heuristic innovation have done their jobs.

Ed Sickafus, March 2007

## Papers and essays

The following materials can be accessed by clicking on their titles. Links are also available on the USIT website (www.u-sit.net/Publications)

1. "Injecting Creative Thinking Into Product Flow"
2. "Problem Statement"
3. "Metaphorical Observations"

## Other Interests

1. Have a look at the USIT textbook, "Unified Structured Inventive Thinking – How to Invent", details may be found at the Ntelleck website: www.u-sit.net (*Note*; not at www.ic.net)
2. USIT Resources Visit www.u-sit.net and click on Registration.

| Publications | Language | Translators | Available at … |
|---|---|---|---|
| 1. Textbook: Unified Structured Inventive Thinking – How to Invent | English | Ed Sickafus (author) | www.u-sit.net |
| 2. eBook: Unified Structured Inventive Thinking – an Overview | English | Ed Sickafus (author) | www.u-sit.net |
| | Japanese | Keishi Kawamo, Shigeomi Koshimizu and Toru Nakagawa | www.osaka-gu.ac.jp/php/nakagawa/TRIZ/ |
| | Korean | Yong-Taek Park | www.ktriza.com/www/usit/register_form.htm |
| "Pensamiento Inventivo Estructurado Unificado – Una Apreciación Global" | Spanish | Juan Carlos Nishiyama y Carlos Eduardo Requena | www.u-sit.net |
| 3. eBook "Heuristics for Solving Technical Problems – Theory, Derivation, Application" -- HSTP | English | Ed Sickafus (author) | www.u-sit.net |
| "Heurísticas para Resolver Problemas técnicos – Teoría Deducción Aplicación" | Spanish | Juan Carlos Nishiyama y Carlos Eduardo Requena | www.u-sit.net |
| 4. U-SIT and Think Newsletter | English | Ed Sickafus (Editor) | www.u-sit.net |
| | Japanese | Toru Nakagawa and Hideaki Kosha | www.osaka-gu.ac.jp/php/nakagawa/TRIZ/ |
| | Korean | Yong-Taek Park | www.ktriza.com. |
| Mini-lectures from NL_01 through NL_64 | Spanish | Juan Carlos Nishiyama y Carlos Eduardo Requena | www.u-sit.net click on Registration |

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

**To be creative, U-SIT and think.**