U-SIT And Think News Letter - 17

Updates and Commentary

Unified **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:

- Mini-Lecture_16 completed a brief discussion of distribution as a problem-solving technique. In this lecture we consideration the fomation of attribute-function-attribute links to discover new solution concepts.

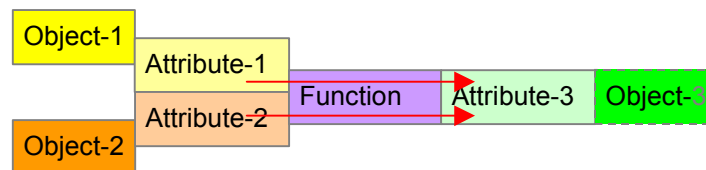| 1. USIT – How to Invent: the USIT textbook.	$44.50

2. USIT – an Overview	FREE

3. Mini USIT Lecture – 17
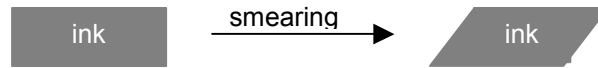
Transduction as a Solution Technique

Continuation of the publisher's problem: "Ink on newsprint is messy. Fix it!"

Transduction and transducer are words derived from transduce, meaning to transform energy from one form to another. Its analog in USIT is the transformation (or coupling) of one attribute to another attribute via a function, A-F-A. Transduction, as used here, is not a literal physical, chemical, or biological annihilation of one attribute and the creation of another. Rather, transduction is a perspective that can cue one's mind for new ideas.

Recall (see textbook) that two attributes, one each from two contacting objects, interact to support a function, which modifies or maintains a third attribute from one of the original objects or a third one. As you can see in the figure, the model of this interaction has two A-F-A links, A1-F-A3 and A2-F-A3.

It just occurred to me that I have never sketched a graphic metaphor for the concept of smearing. It has been captured only in words as viscosity and flow. Let's consider a simple sketch and see if any new perspectives arise. Let a rectangle represent a segment of a cross section of ink and a trapezoid represent the smeared state of the rectangle of ink.
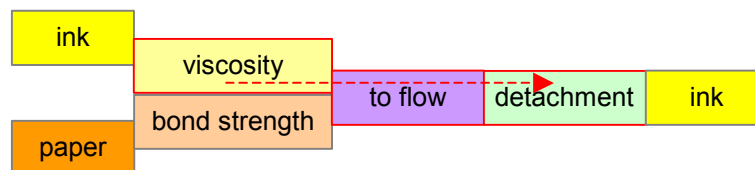
But this sketch does not capture our publisher's problem. The publisher's concern is that readers complain of ink stains on their hands and clothes. Hence, the sketch needs to capture the continuance of smearing to the point of break up and detachment of the sheared ink particles (liquid or solid). Detached ink is shown as squares to represent relaxation of the detaching shear.
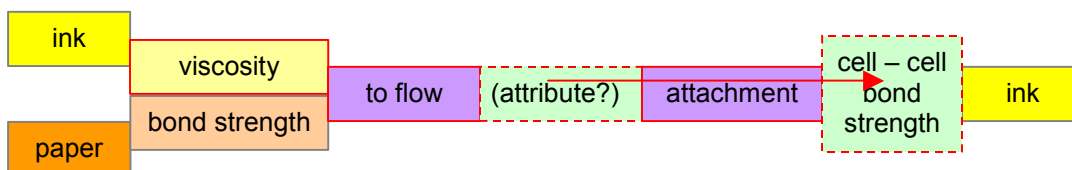

This sketch is more relevant to the problem. It seems evident now that smearing of ink without detachment of ink particles is not the problem. The detached particles are the problem. This observation leads to the idea of holding particles of ink together to prevent their detachment. My image of ink, up to this point, has been that of a continuous liquid phase containing dispersed particles of pigment. The liquid's viscosity gradually increases on drying, but not sufficiently for unwanted smearing to occur.

Now it comes to mind (from "detached particles") to think of small cells of liquid phase ink that slide on one another during shear and separate during detachment. In fact, the cells could contain solid phase ink as long as they were small and lubricous (slippery) to permit their "flowing" onto paper. In this case, the phase within the cells would not have to change if the lubricous nature of their interfaces could be changed into cell-cell bonding. That would prevent their detachment. Our goal, for this concept, is to change the attribute slipperiness to the attribute stickiness.

This is the kind of analysis that leads to transduction. Our current unwanted effect is illustrated below.

Viscosity of ink, needed for its flow, interacts with bonding to paper, that leads to eventual detachment of ink particles when shear is continued. But bond strength to paper is needed to localize ink for creating patterns of ink. Can slipperiness be transduced to a useful attribute, one that prevents detachment?

The needed attribute is some kind of ink-cell – to – ink-cell bond strength, whatever that means. The missing attribute will replace detachment (lack of localization) or inadequate ink-cell – to – ink-cell bond strength. A new A-F-A link is illustrated above.

Cell-to-cell bond strength raises two questions; what is a cell, and what is cell-to-cell bond strength? This is a new perspective of our problem.

If ink is thought of as a continuous solid phase, fracture lines could form cells when shear produces detachment. Thus, cell-to-cell bond strength might be some way of locking fracture cells.

[S40] Compose solid ink to have low fracture strength in shear mode to encourage formation of rough, boundaries of fracture cells. These might allow enough key-and-lock type bonding to discourage detachment of ink.
If cells are thought of as pre-detachment structures, they might be physical cells or some kind of network or lattice structure. Individual pills of ink come to mind here.

[S41] Compose ink as tiny pills of liquid sealed in thin plastic coatings having sticky surfaces. Liquid contents of a plastic coating support flow, while sticky surfaces support cell-to-cell bonding.

[S42] Compose ink as in [S41] but coat pill surfaces so as to have less stickiness initially but to increase in a few moments after exposure to air. This will allow easier flowing of ink followed by curing for stronger bond formation.

[S43] Compose ink as two components that polymerize on mixing. Use only enough polymers to allow linking into a flexible network that holds the ink in cells of the network.

We are nearing the end of this mini-lecture series reviewing USIT. The remaining tool to be described is generification as a solution technique. Do you have ideas for discussion topics or questions on USIT that could be entertained?

5.   Problem-Solving Tricks and Related Miscellany

6.   Feedback

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 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.