THE DNA OF PSTs

Systematically Creating Coincidental Product Evolution

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You have, no doubt, heard the following story, or similar versions of it, numerous times. The story begins in 1968 with the inadvertent discovery by 3M research scientist Dr. Spence Silver of a highly unusual new adhesive that did not stick very strongly when coated onto tape backings. In 1973, Art Fry, a fellow 3M employee, applied some of his colleague's low tack adhesive to some scrap paper and began using these as bookmarks for his church choir hymnal. Since then, the Post-it® Note concept has become one of 3M's best selling product lines.

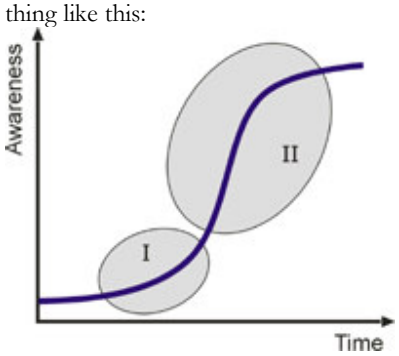
Interesting how such a popular innovation among consumers was, in fact, a product of a failed attempt at something else whose value was only discovered six years later. But is there another moral to this tale? In addition to the understandable drive to find solutions to problems, there may be a benefit in looking at what you have and searching for the problems that it solves.

How do companies find ideas for new products?

Suppose you want to come up with a new product idea. Where do you begin? The challenge in product innovation is to create products that answer unmet needs, especially where a new product addresses a latent need of which even the market was unaware. Unfortunately, most new products tend to be of the former type, and, to make things worse, prone to competition. Why does this happen so often?

Three Sources

Most companies rely on three sources to develop new product ideas: 1) surveying competitors, 2) and market knowledge and research, 3) new technologies. The first one cannot result in a differentiated product. While being an important component in a company's portfolio, the second source – market research – has, surprisingly, been proven to not be conducive to product offerings that distinguish one company from the competition. To understand why, lets look at the following example:
Let's imagine you came up with a really funny joke and told it to a couple of your friends. Each of them would probably tell it to a couple of his or her friends and so on. However, it would take some time before a significant portion of your city's population would hear it, not to mention your country or state. If we tried to describe the connection between the portion of the population that has heard your joke and the time that has passed since you first told it, it would look something like this:



A very similar graph would describe the connection between the awareness to a new need in the market and the portion of the population aware of that need. Observing this graph it is quite clear that any market research, conducted at the section marked I, would have virtually no chance of discovering the new need. It is only in the section marked II that market researches would have a good chance of stumbling upon the new need. Unfortunately, at that point in time it is pretty safe to assume that your competitors' market research would yield very similar results.

Technology can be a source of differentiation, but only provided that your company has access to technologies that are not available to others.

Systematic Inventive Thinking – a fourth source – an alternative approach to innovation

There is, however, a fourth source for developing new ideas – using existing products as a basis for ideas. Based on internal company resources and expertise, it can serve as a strong differentiating factor between companies that know how to utilize it and those who do not.
Systematic Inventive Thinking (SIT), a novel approach to idea creation and innovation, is based on this source. The method has been used by hundreds of companies in more than twenty countries, including several in the paper and tape industry, to help them "listen to the voice of their products." SIT provides a structured process to arrive at innovative ideas for new products.

At the heart of SIT is a crucial idea: inventive solutions share common patterns. It is evident that inventors unknowingly follow patterns when coming up with new product ideas -- patterns defined by observing thousands of products and their evolution. Surprisingly, a majority of new and inventive products can be categorized according to only five patterns.

One of these patterns is called, in SIT parlance, Subtraction. In opposition to the conventional approach to new product development whereby components, attributes or features are added in line with the perceived wants of consumers, with Subtraction, instead of adding components, you remove them - particularly those that seem most essential and indispensable. An example of the Subtraction pattern can be seen in the introduction by Dow Corning of solvent-less silicone PSAs. Solvent had been considered an essential component in delivering silicone pressure sensitive adhesives.

Nevertheless, by removing it, a new form was conceived which had the performance benefits of typical silicone PSA such as the ability to maintain adhesion at extremes of temperature and adhesion to low energy surfaces with the added advantage of being non-toxic and non-allergenic.

A second pattern is Multiplication, which presents a very different approach to the pattern discussed above. Instead of removing components, as we do in Subtraction, you replicate or multiply existing components, but alter the copies according to some parameter. It is critical to not simply add more copies, but to change the copies in some way. An example of Multiplication in PSTs, can be seen in the tape supplied in window insulation kits. Here, one side of the tape is relatively low tack, so that it will stick to window trim, but not peel off paint. The other side's adhesive is more aggressive so that the tape sticks readily to the shrink film that is supplied in the kit. While the adhesive component was multiplied, the parameter "tack" was different in each of the copies in order to produce an innovative product with a clear benefit for a specific application.

Another example of Multiplication is 3M's removable and repositionable tapes that feature a relatively "permanent" adhesive on one side of a film or tissue carrier, and a removable/repositionable adhesive on the other.

The Task Unification pattern is defined as "assigning a new and additional task to an existing resource". It manifests itself when one of a product's components (or some other object in the product's immediate vicinity) is given an additional task without losing its original one. This tool can be used to help companies identify how to expand their business to other markets much like Bemis has done with their Sewfree® Seamless Apparel Construction. Bemis, a company with adhesive technology looking to penetrate a new markets, was able to scan the lucrative garment industry for opportunities. It's adhesive, which normally serves the function of connecting elements one to the other, would be able to steal the task of some other element that does the same – the thread. As the name implies, Sewfree® eliminates the need for sewing allowing a garment to be completely glued together with a specially formulated film.

A fourth pattern is Division, where the components of a product are divided and rearranged either in space or time. A very basic Division can be found in standard tapes that come pre-cut into small pieces. This is not a very exciting innovation, but it performs quite well when analyzed from a business point of view. It would be difficult to imagine that the consumer market was complaining that each time they wanted a piece of tape, they needed to cut it themselves and so companies reacted to this request. It is more reasonable to assume that companies began offering packages of tape cut into small pieces, and the market responded positively to the offering.

The Division pattern can be seen in the recently acclaimed peel-off barcode label found on six-packs of Evian water. The label can be easily peeled off the top of the pack and handed it to the cashier for scanning, saving customers from having to lift the heavy packs onto the counter. The Division in this case was of the label in relation to the packaging. The innovation allowed for the barcode label to be located on the pack when necessary, removed when convenient, and placed in any other location thereafter.

A fifth pattern called Attribute Dependency involves the creation of new relationships between the different variables of a product or its immediate environment. Innovative ideas are often generated by creating new dependencies where they may not currently exist or by modifying or dissolving dependencies where they do. The Attribute Dependency pattern helps accelerate the discovery of products that seem in hindsight to be inevitable.

There exist a plethora of PST products that use "color" as an attribute that changes according to any number of other variables. To name a few:

1. Spear has created a color-changing pressure-sensitive label appearing on the packaging of an Australian lager called Red Ant. Here we see the creation of a relationship between the color of the label and the temperature of the beer inside the bottle. When the bottle is cold, the image of 13 ants (the brand's trademark) is concealed. As soon as the bottle begins to warm up in the hands of the consumer, the ants become visible, creating an exciting revelation.
2. CFC's ArmorVoid security tapes change colors if someone has tampered with the package. Those that receive high security items, currency bags for example, will be able to know whether the item has been tampered with while being transported.
3. The ripeSense™ sensor from the Jenkins Group is affixed inside the front lid of the clear polyester clamshell in which Anjou pears are sold. These types of pears do not change color as they ripen and it is difficult to know when the fruit is ready to eat. Until now, consumers needed to handle the fruit to see if it is soft enough – something that lead to much damage to the pears causing much waste for the retailers. With ripeSense™, the sensor label's color changing chemistry responds to the ripening aromas of the fruit. The indicator color visually indicates the pears' ripeness on an accompanying pressure-sensitive label printed with the scale from crisp (orange) to juicy (yellow).

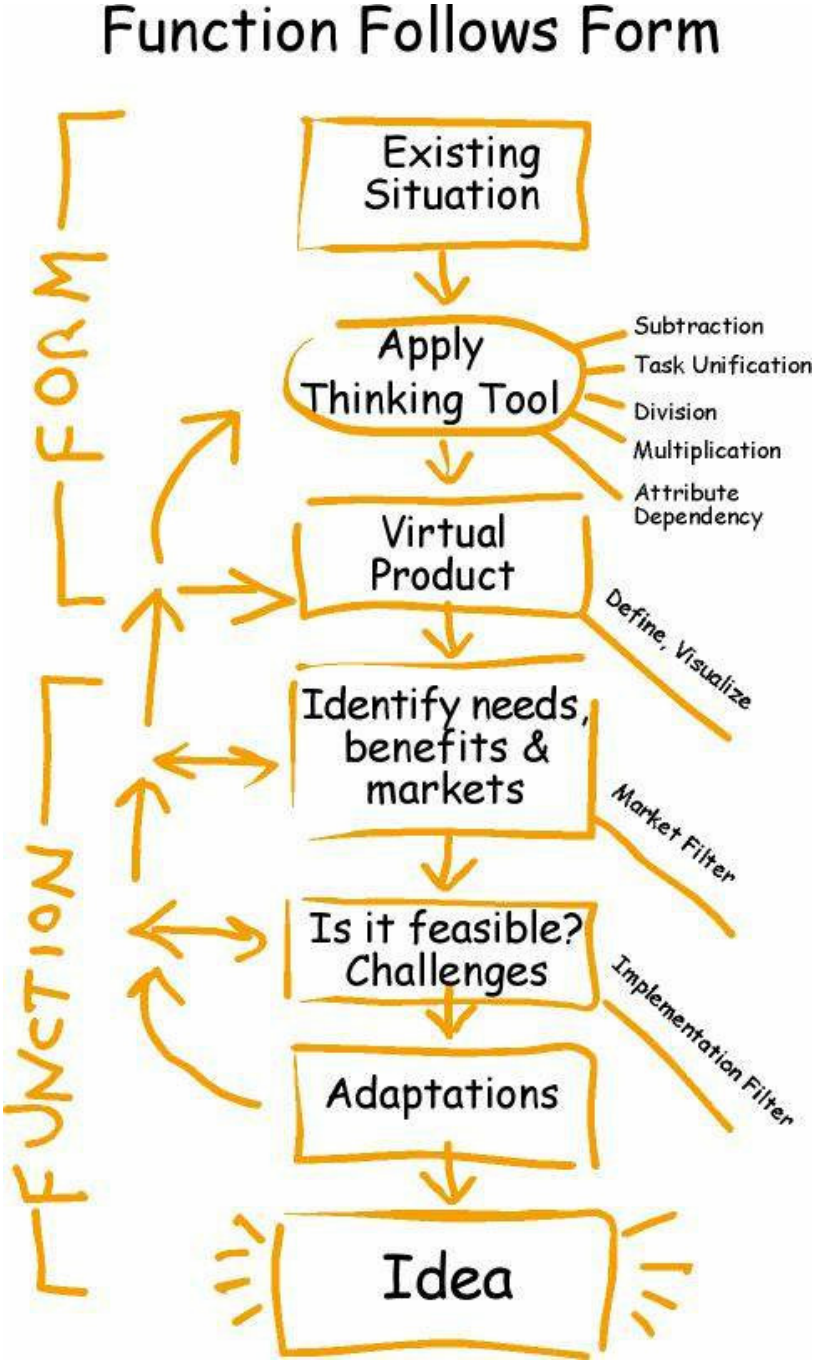
While all these are examples of Attribute Dependency, it seems that the "color" variable is mainly relied upon as an indication tool in this industry. Applying the Attribute Dependency tool would force future innovators to imagine how other variables could be used for the same or different purposes. Would it be possible for the label to decay, change shape, or lose/gain tack, etc. to indicate some desired information?

From Patterns to Tools

Subtraction, Multiplication, Division, Task Unification, and Attribute Dependency are the five patterns that form the core of the SIT method for product innovation. But in order to be able to proactively use the patterns to create future innovations rather than to simply categorize historical ones, a systematic process has been developed to apply them. Thus, the patterns become "thinking tools" which can be used to come up with new ideas; in a sense, they systematically create accidents.

This process is called Function Follows Form (FFF), a term coined by Cognitive Psychologist Ronald Finke. Instead of innovating by identifying a "function" or need and then creating a product accordingly, one first manipulates the existing product and then considers how the new form could of benefit.

Using Function Follows Form, then, one develops products in the reverse order to the market research process. Applying FFF, one begins with an existing concept or product. A list of the product's physical components and its environment is constructed. Then one of the five thinking tools is used to mentally manipulate the product. These new forms, or "virtual products" in SIT-speak, are immediately assessed as to their business value and feasibility. If the virtual product has both market potential and falls within existing company and technological constraints, it undergoes whatever minor adaptations are needed and is considered worthy of following up. As market knowledge is used here as a filter rather than as the starting point, the ideas generated are likely to be different from those that competitors arrive at by searching the market for ideas.



A company that makes Pavement Marking Tapes might begin with a list of the tape's physical components: paper, adhesive, backing paper, etc. as well as those of its immediate environment: automobiles, pedestrians, baby carriages, pavement, etc. It then applies one of the thinking tools – in this case, Task Unification – to ask, "How can each of the environmental resources perform the task of a product component (or vice versa)?" Taking "automobiles", we would ask how they could perform the task of the adhesive, for example. We may soon realize that the pressure exerted by the car or truck on the crosswalk could make it a good candidate to enhancing the adhesion of the tape. Now we would begin to think what the benefits of this idea might be. In this instance, it is quite clear that if we could manufacture pavement marking tapes with less adhesive, the company would save a considerable amount of money on production and time on application of the tape. Additionally, instead of losing tack over time (as tape with little adhesive would), this tape would become more adhered to the concrete as time goes by. Continuing with the FFF process, we check to see if our company has access to the technology that would allow for heavy objects exerting pressure on the tape to affix it further. If the answer were positive, we would consider the adaptations necessary for this idea to work including manufacturing changes and methods of application.

Oftentimes, as the tools become more second nature through practice, one need not stringently adhere to the FFF process to come up with innovative concepts. For example, thinking about using Division for PSTs would lead us to the concept of epoxy-like tapes. Such tapes would be made of a chemistry that allows two pieces to be low tack when separate, but extremely adhesive when put together. This could lead to solutions for instances where the tapes need to be non-adhesive during transfer and storage, but very strong following application.

Let us return to the Post-it® Note example, which can now be clearly identified as a case of function following form. Art Fry was able to take Silver's inadvertent creation and identify its potential benefits -- understanding the value inherent in an accidental discovery. By systematically creating "accidents" through controlled manipulation of the product's components and its environment, the SIT method, too, does not look to solve known problems in the market, but rather concentrates on what could be done to the present form, with the company's present resources, in order to create a new one that makes business sense. Accidents do happen, but rather than wait for the unexpected, it makes sense to exploit a systematic method to create these "accidents" in a structured way.

Citations

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