Creativity in product innovation

Jacob Goldenberg

and

David Mazursky

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Introduction: Characterization and Illustration of Creativity Templates

Creativity Templates depict discernable, measurable and learnable regularities or patterns in innovations and novelties emergence. They enable us to understand general mechanisms of past product alterations, as well as to foresee the next alteration in the series.

The *Creativity Templates* approach is a counter-intuitive view for product emergence and a novel method for ideation, yet it does not contradict any current marketing theory. It does, however, add an important perspective to the process of product innovation by drawing on the primacy of the idea itself as a driving force toward new product success. Creativity templates are derived by inferring patterns in the evolution of products, such as those that can be inferred from the following illustrations.

Gates, computers and extraterrestrial intelligence

Thomas Alva Edison – *Life* Magazine's "Number One Man of the Millennium" – was one of the outstanding geniuses in the history of technology. Listed under his name are 1,093 US patents (including the incandescent light bulb, the phonograph and the motion picture projector). Many tales are told of this colorful personality.

One legend about Edison tells that Edison's guests were always complaining that the gate to his house opened with great difficulty, and they were required to exert great force in order to open it. Jokes were rampant about the obstinate gate and the clever inventor who could not find a way to fix it. At the end of his days, Edison was finally willing to explain: the gate was connected to a water pump, and anyone who opened the gate unknowingly pumped up water to fill Edison's private swimming pool.

Can anything be learned about creativity and innovation from this amusing story? Would information about the form of Edison's brain, his modes of thinking or his lifestyle aid us to be more creative?

We have no information about the form of Edison's brain, but this, in any case, would not help us much. For instance, scientists have recently debated whether one part of Einstein's brain (the inferior parietal region) was indeed physically extraordinary – but how can such information be useful to us in search for ideation methods?

Studying Edison's modes of thinking would not be of much use either. The following are some of his own words about the creative process: "A genius is a talented person who does his homework." "Good fortune is what happens when opportunity meets with preparation." "All you need to be an inventor is a good imagination and a pile of junk." "I didn't fail ten thousand times. I successfully eliminated, ten thousand times, materials and combinations which wouldn't work." "The three things that are essential to achievement are: hard work, stick-to-it- evenness, and common sense." And finally: "Genius is one percent inspiration and ninety-nine percent perspiration." You may have been thinking of flashes of genius, thunder and lightning – this is obviously not the case here.

Edison's lifestyle may also not be a worthy source of explanation. He had only a few months of formal education. He went to work on a train at the age of twelve, and set fire to that train. He was fired from his work as a telegrapher for almost causing a collision of two trains. As an employer, he was jealous of the most talented of his employees, and took credit for other men's work. He did not pay his bills, treated his wives badly, neglected his children, and "did not ever sleep the requisite eight hours a night."

It seems, therefore, that it is not from Edison's biography that we may learn about creativity. Is there another source of information concealed in his story? Before we answer this question, let us present another example drawn from a remote context.

Compaq Computer Corporation is a Fortune Global 100 company, the second largest computer company in the world and largest global supplier of personal computers. In mid-1999, the Compaq Corporation announced a new innovation: a Notebook® computer whose battery is recharged by typing on the keyboard. The ingenuity of this invention lies in the fact that the very activity that discharges the battery serves also to recharge it. The target population for this computer is businessmen on the move. Its benefits are obvious: its weight is reduced by eliminating the need to carry a spare battery and by reducing the size of the main battery.

Can you see any difference in the basic structure of the above two illustrations (Edison's gate and the new configuration of the Compaq computer)? In both cases, the innovators harnessed an energy source from the immediate

environment (Edison's guests or Compaq end-users) in order to fulfill a necessary function (water pumping or battery recharging). This similarity may point to certain regularities or patterns (or, as we call them, Creativity Templates) which are the subject of this book.

The Creativity Templates approach precludes the need to enter the brains and the thought processes of innovators such as Edison and the Compaq engineers. It discovers and traces the regularities underlying creative ideas or products. These regularities can be conceived as codes embedded in the product itself and are revealed by observing the pattern in product evolution.

Can such patterns (or *Creativity Templates*) be applied to problems other than those involving energy sources? Let us illustrate further a brilliant innovation in the category of extended cellular phone speakers installed in cars. The research and development (R&D) team of Wirefree Ltd, a company that specializes in such speakers, have noticed an interesting contradiction: The barrier to the quality of the sound is the miniature loudspeaker, which is one of the most expensive parts in this product. Normally, we expect that improvement in the quality of a product would entail higher costs and consequently a more expensive product. Relying on the pattern in idea emergence that was identified above (Edison's gate and Compaq computer) we may expect an idea that will break this vicious circle.

But first, let us generalize further the template structure underlying this type of idea: An internal component that performs a certain function (Edison himself, a battery) is drawn from the system's configuration. In order to fulfill its function an external resource (energy from the guests in the case of the gate and energy from the user in the case of the computer) is used to replace the internal component that was drawn out. This replacement is designed in such a way that the new resource bears the same function as that of the removed component. Let us examine the speaker in view of this rule: It is quite obvious that in order to eliminate the size problem the cellular phone loudspeaker has to be removed. The remaining question is whether there is a resource in the vicinity of the system (car) that can carry the function of the removed loudspeaker. A perfect candidate would probably be the loudspeaker of the stereo system in the car itself.

The invention introduced in 1999 by Wirefree was to assign the function of the loudspeaker to the stereo system, enabling major cost savings and, at the same time, a substantial improvement of the sound (see Figure I.1).

It is interesting to note that the firm re-used this template in implementing the connection between the speaker and the radio system: Instead of producing a connector for each radio system, the appliance transmits the signals (in FM) to the radio. It turns off the radio while the telephone is activated.

Figure I.1 The Wirefree cellular phone speaker for cars.

One abstract template surfaces from all of the above ideas, based on a code underlying them – harnessing resources from the immediate environment to replace a component that fulfills a needed function of the product. We can therefore generalize:

Replacement Template: The utilization of resources available in the immediate environment to replace a component that fulfills a needed function of the product.

This is but one code of innovation emergence that characterizes product evolution. It signifies a certain rule in evolutionary processes. Clearly, it is not the only one. Another template may be extracted from the following illustrations.

What is the shared structure of a multicolored car and pizza delivery?

Multicolored car

In 1995, Volkswagen Motor Co. launched a new model of the Polo car, named "Polo Harlequin®." The Polo, marketed until then as a solid, dependable car,

Figure I.2 The Polo Harlequin®.

acquired a new attribute: each part of the car was painted a different color (see Figure I.2). This configuration gave the car an original, mischievous look that appealed to a sizable market share. A short time after its launching, the Harlequin could be found all over Europe. The only detail that was changed in the production process was the order of assembly: instead of feeding the robot assembling the car with parts of the same color, it was fed with multicolored parts.

The curious detail about this story is that this model was originally intended as an April Fools' Day joke. Although this joke was coordinated with the PR Department of the firm who distributed multicolored posters to go with the launching (including details of two models produced in this configuration), the company did not intend to implement this concept and launch such an odd product.

To Volkswagen's great surprise, the idea captivated many customers, and a great uproar arose the next day. Orders for this (nonexistent) car started piling up in the sales department, and interest kept growing. The next step was obvious: the model was to be offered on the suddenly awakened market.

In a conventional car there is no connection between the type of outer body component of the car (e.g., doors, engine cover, top) and its color – all of the components are of the same color. The Harlequin has the characteristic of a new connection between the type of component and its color: different components have different colors. This may be illustrated in graphical form as shown in Figure I.3.

Is this procedure unique to the development of the Polo Harlequin®, or is there a recurrent pattern here that we may use in other, different and seemingly remote cases? From the realm of automobile-industry products, we shall move to an illustration from the realm of food-industry services.

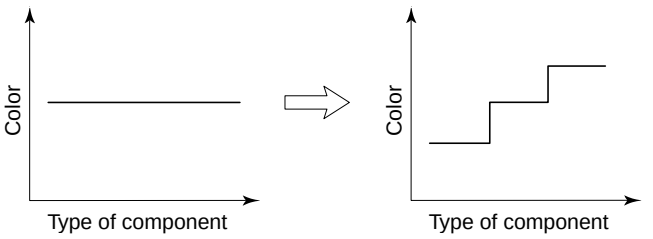

Figure I.3 Introducing a new connection in the Polo Harlequin®.

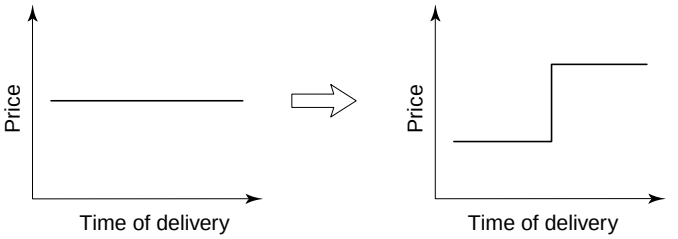

Figure I.4 Introducing a new connection in the pizza delivery.

Basically there is no difference between products and services, let us examine the same template manifestation in a famous service – pizza deliveries.

Pizza delivery

Domino's Pizza is a world leader in pizza delivery. Its success was partially due to the introduction of a novel idea: a promise to reduce the price of the pizza whenever delivery takes longer than 30 minutes. This new and original promise has caused a boom in Domino's business. In addition to the firm's obligation to fast service, there is an interesting gamble in ordering a pizza: the customer may hope that the delivery will be late and the price reduced.

Free deliveries, even a promise of fast delivery, and tasty pizzas existed before Domino's appeared on the scene. Once again an innovation can be formulated (graphically) in the same transition from a constant (straight line) to a step-function (see Figure I.4).

In this illustration, a new dependency was created by a step-function between two previously independent variables: price and time. A similar dependency could be created between two other independent variables, e.g., price and temperature. A promise would be given to deliver the pizza to the customer while hot; otherwise the price would be reduced.

Surprisingly enough, Figure I.4 presents exactly the same pattern of change

as that for the Polo Harlequin®. What does this mean? Is there a common superstructure behind these ideas that may be extracted and generalized? Before drawing a conclusion, let us look at one more illustration.

The wonderful Lighthouse of Alexandria

The Lighthouse of Alexandria, built in 286–246 BC, is considered one of the Seven Wonders of the World. Many years of planning and a great engineering project led to the erection of this 134-meter tall lighthouse. It was built in order to light the seamen's way to port on stormy nights, but also to extol the name of Alexandria and its rulers. A brilliant architect directed the project. King Ptolemy II who sponsored the project wished to put a stamp of ownership on this immense asset.

The Greek architect was a genius, and put great store by the credit he would receive for his achievement. The money and vision of Ptolemy were valuable, but the architect wanted to assure recognition of his own genius and accomplishments by future generations. Such problems are solved today with the aid of a battery of lawyers dealing with intellectual or physical property, and by negotiations leading to a compromise. But those were the days of Ptolemy, when kings had no use for legal decisions in such petty matters. The architect realized that even raising the idea of credit would shorten his life considerably.

In many cases, a creative idea is expressed in the solution to a dilemma (a state in which there are two simultaneous conflicting demands). In our case the architect's dilemma was clear: the two conflicting ideas were the wish to achieve fame through the project, and the wish to continue living. The greater the fame, the shorter his life; the longer his life, the less the fame. This brilliant man needed a creative idea by which both of these requirements could be fulfilled. A compromise would be the obvious first step to take, therefore could not be termed creative even if it would solve the problem. The architect could, for example, inscribe his name in such small letters that the chance of the king seeing it would be minimized. In this case both demands would be only partially fulfilled – the credit would be small, but the risk of shortening his life would still exist (although minimized). He could also have requested in his will that his heirs should engrave his name on the lighthouse wall, but this would entail a measure of risk for them.

The architect was creative enough to find another solution. He engraved his name on the stone of the lighthouse, including a blessing for those who read his lines. He then covered the stones (and the engraving) with plaster, inscribing

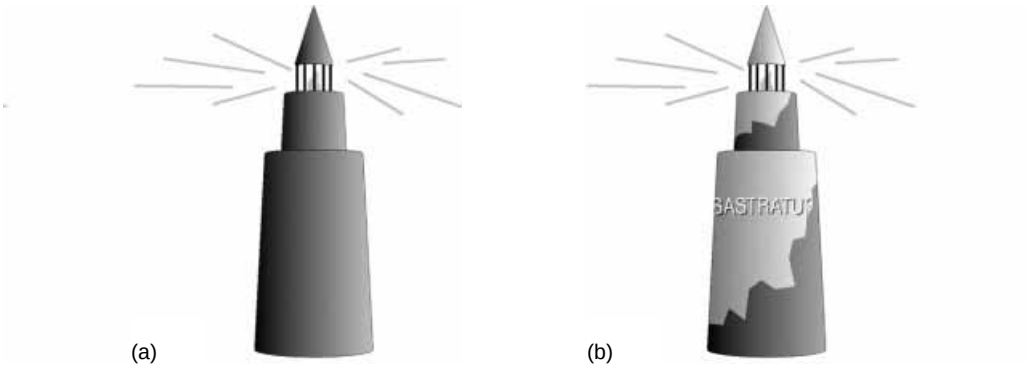

Figure I.5 The Lighthouse of Alexandria. (a) At time of construction. (b) With the passage of time.

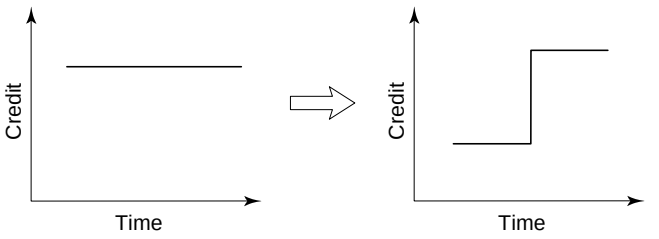

Figure I.6 Introducing a new dependency in the Lighthouse of Alexandria.

in it with great pomp the name of Ptolemy II, with praises for his deeds. Both king and architect eventually joined their forefathers, but the forces of nature worked incessantly. Erosion by sun, wind and salt air caused the peeling off and removal of the layers of plaster. The name of Ptolemy slowly disappeared, and the name of the architect – Sastratus of Cnidus – appeared in its place (See figure I.5). Thus he succeeded in bringing about his own renown as the constructor of the lighthouse (which has since collapsed as a result of an earthquake) for as long as 2,000 years after his time, without risking his life.

Legend has it that the heirs of Ptolemy enjoyed the idea so much that they did not efface the architect's name or re-plaster the area upon which he had stealthily "inherited" their ancestor's glory.

The architect of the Lighthouse of Alexandria established dependency between two formerly unrelated variables: *Credit*, nonexistent at first, was achieved only with the passing of *time* (Figure I.6). We term this pattern **Attribute Dependency Template**. The illustrations of the Polo Harlequin® (*color* and *components*) and Domino's Pizza (*price* and *time* or *price* and *temperature*) also fall in this category.

Attribute Dependency Template: Finding two independent variables and establishing dependency between them.

Another pattern used by the architect is the **Replacement Template,** which was demonstrated in the cases of Compaq portable computer and the cellular phone speaker. He utilized resources available in the immediate environment of the lighthouse (*humidity, water* and *salt*) in order to fulfill the function of *immortalizing* his name. It is consistent with the pattern obtained in the illustrations of Edison's gate (*guests' work energy* and *water pumping*), Compaq's Notebook® (*typing energy* and *recharging of battery*) and Wirefree's speakers.

The above illustrations of the Replacement Template and the systematic change between the previous and the current mode indicate that the Templates may also be used for problem-solving. In such case the goal of the problem is known a priori, and we seek ways to achieve it.

From antiquity to modernity

Templates of creative thinking taken from the past may be used for accelerating thinking about new ideas in the present.

Practically, we don't have to search for Creativity Templates in ancient Egypt or Greece. Our argument is that some templates have survived over history, and have preserved their structure even though the context has been changed. As in every evolutionary process, "the fittest survives." Adaptable historical templates – those more successful and effective – have survived well, and the information embedded in them may be used in the framework of creative thinking. Therefore, it suffices to locate templates embedded in creative ideas that have survived in the twentieth century, in which acceleration of innovative processes is witnessed and documented. The realm of new products has undergone a genuine revolution in the past 50 years, characterized by an avalanche of innovative ideas and providing evidence for the existence of Templates and possibilities for using the information embedded in them.

This introductory chapter has pointed the way to Creativity Templates and offered some clues about their meaning and operation. In Part I, the various

sources used traditionally in generating new product ideas are compared with the source which underlies the Creativity Template approach. The templates approach is the one which relies on a relatively unexplored source – the information inherent in the product itself and the evolution of products over time. Part II illustrates and discusses more fully each of the major Creativity Templates. Among these templates, found to account for almost 70% of new product emergence, four templates, namely Attribute Dependency Replacement, Displacement, and Component Control, are detailed providing prescribed procedures for their implementation. Part III examines the generalizability of the notion of templates, illustrating the ways templates are derived and formulated in the context of advertising. Following identification of templates as a generalizable phenomenon, a more detailed analysis of the templates as a well-defined framework is provided. Part IV provides the empirical basis of the Creativity Templates approach – its validation in the realm of new products.