



## *Guaranteed Project Success*

### **The Central Role of Creativity in Problem Solving**

By Michael Reames and Gabriel Kemeny

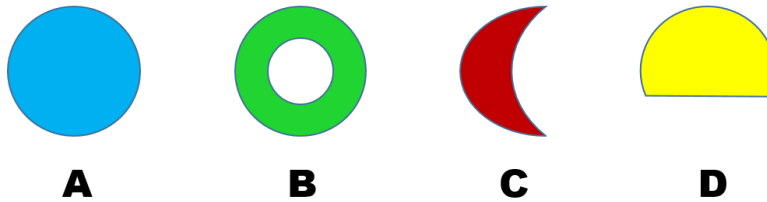
In problem solving, creativity and innovation are “levers” in eliminating validated root causes. A variety of tools and techniques can stimulate collective thought to produce a large number of improvement ideas. Improvement objectives are often stated in terms of elimination or reduction of the root causes of process variation.

Innovation is necessary for business survival: Throughout history, there has been constant change and innovation, from the first settled communities about 12,000 years ago (Neolithic Period); to the Industrial Revolution some 250 years ago; to the Information Age which started less than 50 years ago. Not only has change been constant, but the pace of change has been accelerating. Just consider that only twenty [short] years ago very few people used the Internet to communicate. Wireless communication only became practical and popular in 1997 with the release of the IEEE 802.11 WLAN protocol; Facebook and Twitter have been around for less than ten years (2003 and 2004); the iPhone ushered in the era of smartphones with its 2007 debut. Taking some examples in aerospace, consider that in little more than 100 years, we progressed from the first powered human flight (Orville & Wilbur Wright, 1903) to breaking the sound barrier in a jet-powered aircraft (Charles Yeager, 1947) to the first moon landing (Neil Armstrong, 1969) and to robotic rovers on Mars today.

As a result of the fast-paced information age, civilization and organizations are faced with rapid and constant change. Organizations that learn and thrive from this chaotic environment create order by redesigning processes, by enhancing services, and by creating products that are new, different, and responsive to customer requirements. These companies see change as an opportunity, where innovation is a part of the culture; where they are willing to respond radically to changes in the marketplace; where information flows freely; and where the organization’s vision is created by all and is clearly known and felt.

We live in a culture in which our education system teaches us that there is a “right” answer to any question. Teachers develop tests with a mind to a “book answer:” as if there is one, and only one, correct answer. This makes it easy for the teacher to grade; however, innovation often requires thinking in ways that reveal more than one answer. For instance, perhaps you’ve seen the following from “What Color is your Parachute?” (continuously in print since 1970 and with a 2014 update):

### Odd One Out... Which Shape Doesn't Belong?



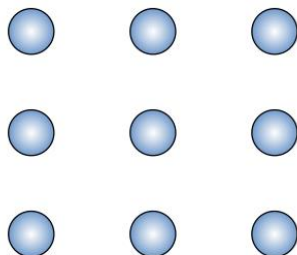
Ask a group of individuals to pick the appropriate shape, and you'll get a variety of answers and an even greater variety of rationales. Here are some examples:

- "A" is the only shape that is completely symmetric
- "B" is the only shape that is not a solid
- "C" is the only shape which is solid and not completely convex
- "D" is the only shape with a straight edge

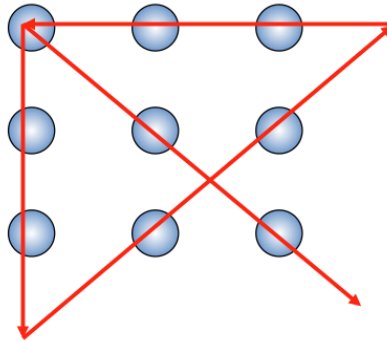
ProcessGPS has used this simple exercise in facilitated training for many years and we have heard even more creative answers. Two examples: the green figure is the only shape not a primary color; and "B" is the only one that is not a "moon" (think about the moon's phases in the sky). Nevertheless, what's the object of this thought exercise? Despite our cultural bias for a "book answer," often there is more than one right answer. In the case of these shapes, one can create a reason for any of these shapes not belonging to the set of others.

This suggests a larger learning point, and one that applies to problem solving: If asked to find a needle in a haystack, does the team stop searching the haystack when a single needle is found [the term for this type of person is "satisficer"]; or does the team search the entire haystack to find more potential needles ["optimizer"]? Resist the temptation to be a satisficer . . . the vast majority of situations may have multiple solutions. There is almost always more than one right answer; and by exploring several possibilities, one is much more likely to find an optimal solution.

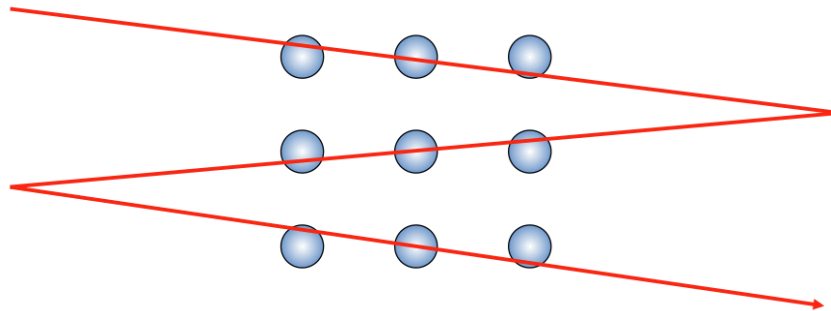
In fact, this is the origin of the problem of the nine dots:



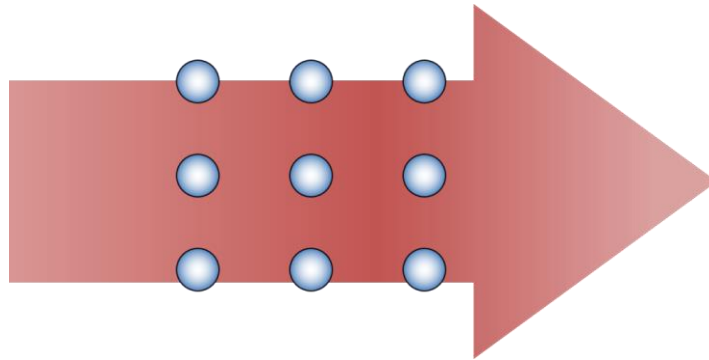
A creative person who figures out how to solve this problem with four straight lines may rightly feel very accomplished, primarily because he or she has seen beyond a paradigm: to solve it, lines must extend well beyond the confines of the imaginary boundary around the nine dots. Starting at the top left dot:



But we should then ask: Are there other ways to connect all nine dots, perhaps with even fewer lines? After all, the statement was “Connect all nine dots with no more than four lines.” For instance:



The paradigm that inhibits this creative solution fails to recognize that the dots have relatively large diameters. And with this breakthrough, why not imagine that the dots are so close together that a large-diameter pencil can connect all nine dots with a single line:



Thus, a learning point: Question everything!

Now, a bit more about paradigms, which can be usefully defined as “a group of ideas about how something should be done, made, or thought about” (Merriam-Webster Learner’s Dictionary). More broadly, a paradigm is a pattern of thinking (even a habit or custom); something that, once learned, becomes second nature. For example, while driving, “rules of the road” are our paradigms. We know to stop at a red light, to yield the right of way when we see a yield sign, and to signal our intention to turn. As long as everybody follows these rules, we can safely transport ourselves to our destination. Defensive driving tries to modify that set of paradigms because we can’t always expect all drivers to follow the same rules.

Thus, paradigms are useful because they (1) establish boundaries, (2) provide rules for success, (3) act as filters to new data, and (4) help us to focus our attention on key problems. In short, paradigms allow us to multi-task.

However, we saw in the nine-dots exercise that we need the ability to break through our paradigms to see possibilities that may not be obvious. In fact, paradigms can blind us to creative approaches that might readily occur to one not vested in the paradigms. They lead to an inability to act since we cannot accept new information.

Changing paradigms takes conscious effort and is difficult for improvement teams. This is because new ideas cause change, and change is uncomfortable for many. Most people view the future as a gradual extension of the past; thus, they resist innovation, which may be more radical change. It is for these reasons that people who create new paradigms are usually outsiders; i.e., those without expertise in the subject matter at hand. For this reason, during problem-solving efforts it’s a good practice to invite people unfamiliar with the problem to contribute – it’s much easier for them to think in innovative ways, since they’re not boxed in by the paradigms of the current methods.

Creativity requires originality, expressiveness, and imagination. When we think creatively, we generate ideas and alternatives that did not previously exist. Innovation takes creative ideas to the next step by transforming them into useful applications.

Organizationally, this may mean more efficient operations, solutions to thorny problems, or increased customer satisfaction.

Thus, creative problem solving invokes divergent and convergent thinking styles to develop innovative solutions to chronic problems.

Sounds straightforward, doesn't it? Nevertheless, those who have contributed to process improvement know that there are barriers to creativity. Individuals and (sometimes) entire teams are reluctant to express themselves creatively to generate innovative solutions. This may be related to team dynamics, the organizational environment, or time pressures. Of all the potential barriers, the most common one is individual fear: the fear of being wrong, of being laughed at, of being scorned. Interestingly, all humans possess the ability to be creative. To demonstrate creativity (see the traits listed below), ability must be coupled with the skill to sort and screen information, and the motivation to do so.

Individuals may increase their creative capacity in the following ways:

- **BUILD PERSONAL COMMITMENT:** commit to change and create a vision for thinking creatively
- **CHALLENGE ASSUMPTIONS:** Understand perception patterns, create new paradigms, and practice the characteristics of creative people
- **USE POSITIVE VISUALIZATION:** stretch your thinking in new ways; change one's self-image
- **BE PROACTIVE:** recognize the difference between one's circle of influence and circle of concern. Release worries over things outside of your control; instead, concern yourself with those things on which you can be proactive.
- **CREATE AND MAINTAIN A SENSE OF ADVENTURE:** Be passionate about something; use humor; and learn from mistakes, seeing them as opportunities for learning and growth.

## Creative People Tend to Be:

- Optimistic about the future
- Open to alternatives
- Daydreamers
- Highly curious and observant
- Independent thinkers
- Able to recognize and break bad habits
- Good at turning alternatives and unusual ideas into practical solutions
- Adventurous with multiple interests
- Constantly exposing themselves to new ideas and information
- Willing to take risks; unwilling to let fears hold them back
- Open to new experiences
- People who take action and make things happen
- Full of commitment to what they are doing
- Nonconformists

Source: *Techno Trends*, Daniel Burrus.

Emphasizing and developing your innate creative abilities allows problem solvers to generate many innovative solutions. Among the advantages are:

- a. Some solutions may be better than others depending on circumstances (timing, cost, effect on customer satisfaction, employee morale, etc.). Having several solutions allows for consideration of the appropriate circumstance.
- b. Having multiple solutions increases the ability to accumulate significant causes until the gap between current and desired performance is overcome.
- c. Multiple solutions allow for optimization of the selected solutions by “importing” good features from the “loser” (not selected) solutions.
- d. Generating lots of solutions helps to promote participation among team members.

Commit yourself to increasing your creative capacity, and break through paradigms to innovate as you contribute to problem solving and process improvement!



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