Thinking More Effectively about Deliberate Innovation

Christopher M. Barlow, PhD
The Co-Creativity Institute and DePaul University

Can innovation leaders benefit from thinking in new ways about innovation?

Successful innovation often requires the application of many different areas of expertise by a variety of organizations and other players. Some innovation proceeds as a variety of ideas and possibilities bouncing through society and the marketplace until someone finds the last piece and an innovation is born. Other innovations are put in place by entrepreneurial heroes working like Ford or Edison. While most people think of them as successful solo inventors they actually did quite a bit to adjust the other parts of the system. Thomas Edison realized that he could not just manage the invention of the light bulb, he had to get generation and transmission equipment designed, had to develop accurate measurement instruments to enable billing, and had to convince investors to capitalize his establishment of electric companies to get it started. Henry Ford is known not only for his design of the Model T, but his efforts to improve metallurgy and adapt mass production methods, and his innovation in paying his workers enough to let them buy his product, driving other employers to do the same, further increasing his market. Each of them spent a lot of time interacting with many different people to fix each of the elements of their innovation.

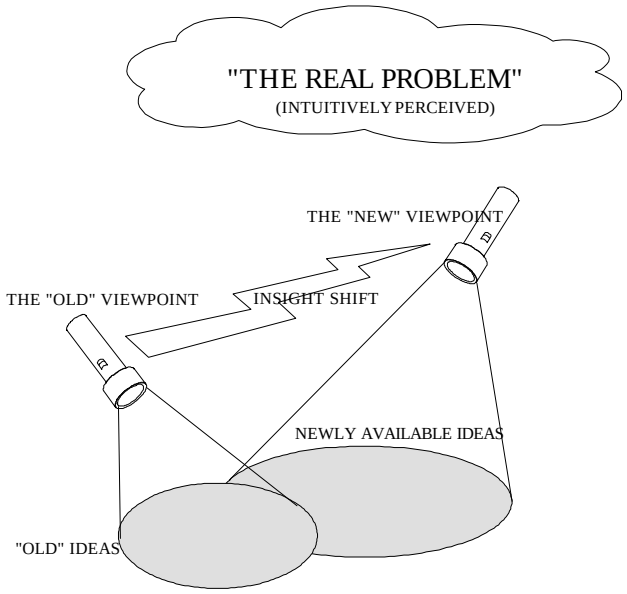
Of course, many of today's systems are so extensive and complex that opportunities are available beyond the capacity of individuals and organizations working alone. Obviously, there is a great deal of potential in the idea of assembling people who understand all the various aspects of a situation to invent and innovate together, but this is far easier said than done. Differences in knowledge, perspective, thinking styles, cultures, goals, and values all interfere in effective communication and collaboration. Those who want to drive deliberate innovation need to understand ways to lead this interaction and synergy.

The Benefits of a Different View

Those seeking to deliberately accelerate the innovation process push "out of the box" thinking, seeking opportunities hidden by the assumptions and perspectives of knowledgeable people. Whether through selecting project participants, building special environments, or leading alternate methods of interacting such as brainstorming these innovation leaders lead individuals, teams, and organizations to look outside their knowledge for possibilities. In both process and content they push people to explore the less familiar. They consider ways that their knowledge might be limited and try new thinking and interaction processes in a search for hidden possibilities.

I would like to suggest that these innovation leaders may also need to do some "out of the box" thinking about the tools and approaches they use, especially as the target problems become more complex.

To get us started with the impact of our language on our effectiveness in this area, lets start with the analogy of Roman numerals. If I ask you to multiply XXVI times XIX it is going to be a long time before you come up with CDXCIV. However, if you convert it to Arabic notation, 26 times 19, some readers can do it in their head, most can do it with paper, and all can do it with a calculator. In the same way, as a college professor teaching leadership, it has been very helpful to change the language. I teach that no one "has" leadership, although we all "have" followership, processes that cause us to give someone our trust. When the characteristics or behaviors of one individual trigger the followership of another, we call the process leadership.



However, in today's multicultural and cross-functional world, people are so different in their followership triggers that no one person can be said to "have" leadership. This change of language allows teaching of "deliberate leadership", a process of investigation and experimentation with various human and organizational factors until the desired followership triggering relationship emerges.

I am convinced that in the area of deliberate creativity and innovation many of our most popular concepts can be like trying to multiply Roman numerals, especially as one shifts attention from individual creativity to teams to organizations and to trans-organizational collaborations. Trying to produce new, "out of the box" ideas from teams of highly creative people who develop a complete understanding of the problem, then spend many hours of "less creative" time judging, documenting, and selling the ideas and overcoming resistance might lead us to less than optimum strategies for important innovations. Let us discuss some useful differences in understanding creativity at different innovation levels, starting with a suggestion to stop focusing on ideas.

Creativity: Not out of the box thinking, better box thinking!

Creativity facilitators have talked for years about the idea generating power of redefining or "reframing" problems, but I find it very useful to **define** creativity as the **insight**, not the idea. This grew out of analyzing the "AHA!" or "Eureka!" experience, that tremendous feeling we get when a new idea emerges in our minds. Looking scientifically for what changed when creativity happened, in order to research the phenomenon, forced me to a new perspective: creativity is not a change in the problem, it is a change in us, a change in our thinking that makes the already possible solutions obvious. In a very real way, each AHA moves us into another reality, another way of seeing the world. Figure 1 is an attempt to describe this process. Take, for example, the classic creative quote: "Don't raise the bridge, lower the water."

Imagine a "floor" which contains all the things we might do. Each flashlight represents a viewpoint, problem statement, or "framing" which illuminates a certain set of alternatives. We start with the left flashlight, representing our initial problem statements, such as "raise the bridge", illuminating on the "floor" all the various ways to raise bridges. The lightning bolt of insight leads us to a second perspective such as "get the boats past the bridge" which we instinctively and intuitively know is closer to the real problem, represented by the cloud above. When some of the alternatives "illuminated" or made obvious by the new viewpoint are better than the best of the old ideas, we call it creativity.

Of course, to a person with the old viewpoint, these ideas make no sense. They are "out of the box". If I ask you to design a lift bridge, and you begin describing the building of a dam and lock to lower the water level, I have to wonder about your sanity or intelligence. An important aspect of this model is that what is important is not just that the ideas are out of the original "box", but that they are in a "better box", the focus on getting the boats past.

Another interesting result of labeling the insight as being the creativity is that when we share our learning with a decision maker who then makes the same shift, we can argue that they have been creative with an "appreciative AHA". Certainly their shift of perspective also requires creativity that can be as difficult and just as important as the one getting the idea. Since the full creative event involves not only the generative shift of the "inventor" but also the appreciative shift of the decision makers, those decision makers are your co-creators. Managing that co-creative process as a whole can greatly increase the ROI of innovation efforts.

On the academic research side, defining creativity as the change in your perspective on the problem or the solution materials allows us to more effectively link creativity and innovation, one of the toughest tasks in researching this area. Many ideas disappear in the chain of events that lead to effective innovation, because the insight that produced the original idea triggers even better ideas as the innovation proceeds. The idea disappears, but the insight continues through the innovation.

The other important aspect of this definition of creativity as finding a "better box" is that expertise and relevant knowledge comes back into the model. If the creativity lies in shifting to a flashlight or viewpoint that better fits our knowledge (the fuzzy cloud), then our sense of creativity, or the "betterness" of the box, is totally dependent on our understanding, knowledge, and values. The accuracy of that understanding strongly impacts the usefulness of the insights and ideas.

We have all had the experience of sharing a problem with someone whose enthusiastic creative suggestions demonstrate that there are large areas of the problem that they do not understand. They are certainly having creative "AHA" experiences based on their "cloud" of understanding, many of which have little or no value. However, when one of their insights triggers an AHA shift in you to a "better box", your AHA is more relevant. I have seen a high-tech cross-functional multi-level creative effort in which a production worker with extensive hobby reading came up with an idea he could not even spell correctly which triggered the PhD Chemical Engineer head of R&D into the creative realization that he could make this work as a future generation of their product. His "appreciative AHA" certainly was a creative event, critical in the innovation impact of the effort. Efforts to deliberately improve creativity must not only increase generation of new ideas and insights, but also must increase the openness of bright people to "appreciative AHA's". Deliberate innovation should be focused on assembling and leading processes that are more likely to produce "relevant AHA's" not only in the "creators" but also in the organization and decision makers who are expected to innovate with the new insights. This is a reason to include decision makers in the process, so they are there to be shifted with everyone else, in ways that reflect their knowledge and understanding. For those who do not participate, it is necessary to identify the creative insights that make the ideas worth considering and triggering those insights before trying to explain the ideas.

Cross-Functional Creativity: Learning Until it Becomes Obvious

There are opportunities for innovation and creativity that require integration of knowledge that transcends the capacity of most single brains. Sometimes we get lucky with a brain that can process more knowledge or with a brain that contains an unusual combination of knowledge. For example, although the Wright Brothers were derided as "bicycle makers" they were able to solve key problems like steering because that derided knowledge gave them critical insights unavailable to those with backgrounds in areas like automobiles (e.g. both bicycles and airplanes lean into turns). It is a lot of work to generate creative ideas and insights within specific domains of knowledge like physics or mechanical engineering or accounting, but it becomes even more difficult when innovations require multiple areas of knowledge.

These problems are well represented by the classic poem, The Blind Men and the Elephant. (Figure 2)

The Blind Men and the Elephant

It was six men of Indostan,
To learning much inclined,
Who went to see the Elephant
(Though all of them were blind),
That each by observation
Might satisfy his mind.

The first approached the Elephant,
And happening to fall
Against his broad and sturdy side,
At once began to bawl:
"God bless me! but the Elephant
is very like a WALL!"

The second, feeling of the tusk,
Cried, "Ho! what have we here
So very round and smooth and sharp?
To me' tis mighty clear
This wonder of an Elephant
Is very like a SPEAR."

The third approached the animal,
And happening to take
The squirming trunk within his hands,
Thus boldly up and spake:
"I see," quoth he, the Elephant
Is very like a SNAKE.

The fourth reached out an eager hand,
And felt about the knee
"What most this wonderous beast is like
Is mighty plain," quoth He:
"Tis clear enough the Elephant
Is very like a TREE!"

The fifth, who chanced to touch the ear,
Said: "E'en the blindest man
Can tell what this resembles most;
Deny the fact who can,
This marvel of an Elephant
Is very like a FAN!"

The sixth no sooner had begun
About the beast to grope,
Than seizing on the swinging tail
That fell within his scope,
"I see," quoth he, "the Elephant
Is very like a ROPE!"

And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the right,
and all were in the wrong!
John Godfrey Saxe

Each expert, engineer, scientist, lawyer, accountant, etc., is like a blind man only seeing one part of the elephant. The solution is not for them to stop being blind so they can see the elephant. The real solution is for them to share their insights and knowledge openly and creatively until, as a group, they can understand the elephant, even though not any one actually understands the whole thing in all details. This is the essence of a successful cross-functional or multi-disciplinary team. In fact, I prefer to define a cross-functional team as one in which the team members **cannot** check the detailed work of other team members. Accountants cannot check the calculations of the mechanical engineers, engineers cannot check the allocations of the accountants. This takes away our preferred way to assess the competence of those we depend on. If we put together a basketball game, it does not take long to assess the competence of the other players. In cross-functional teams, we lack that frame of reference, so all that is left is to assess the character of the team members, for social processes to allow us to assign a degree of trust to our coworkers. Notice that this is the same process described above for deliberate leadership. In a very real sense, the relationship among members of a cross-functional team is one of co-leadership.

The real challenge is in leading the experts to create together. There are a broad array of thinking and leadership tools available, but here again, there is an aspect of multiplying with Roman Numerals. There are many similar plans for deliberate creativity by groups, but many of them are like project management or manufacturing processes. Take the order (get assigned the problem), assemble the needed parts (team members and information), manufacture (brainstorm lists of ideas), inspect for quality (selection processes), pack and ship (document and present proposals). It sounds good, but the research I have done suggests that the best ideas emerge during the proposal writing phase and are more likely when more time is spent in judging the ideas and documenting them to propose to the organization or client.[1]

This is totally out of the expected sequence, but it reveals another way to think about creativity and design efforts, to think about it as learning. Every task and interaction makes the team more and more knowledgeable and better connected about the problem and its possibilities. Every task also has an impact upon individual and group creativity. The later it gets in the process, the more prepared the team is to have relevant and transformative AHA's. This has led me to insert extra creative efforts as "breaks" in the documentation phase, generating some of the teams' best results. I now also view each step in the process as a way to increase the knowledge, creativity, and cohesiveness of the group. As a group works together creatively, each becomes aware of the issues of the other areas, at least at a strategic level. Marketers get more aware of production's issues, manufacturing becomes more aware of the needs of salespeople, etc. As each gets a broader understanding, the group is more capable of a "group AHA" when ideas emerge that synergistically benefit multiple areas. This perspective seems to allow us to create collaborations far better prepared to deliver "relevant AHA's" responding to a fuller spectrum of the real world issues and opportunities. This is an interesting contrast to the usual innovation management plan that sees changes as easier in the early phases of design and most difficult and expensive at the end, and therefore ignores later creative efforts whose ideas might be too expensive. A learning perspective suggests that a design team should be challenged late in the process because that is when they are prepared to be most effectively creative.

The Hypertext Team

Even the definition of the team can limit our thinking. Nonaka[2] makes an interesting point that a team includes not only the people in the room, but also all the people and knowledge they are connected to. He compares teams to a hypertext web page that not only includes the pictures and words on the page, but all the content and programs and processes that the page links to. A team member makes a direct contribution of inputs, but also has the ability to return to his or her organization and use various available resources. This can give interesting guidance when picking team members. A senior expert in a field might not be as useful as a junior who has better contacts or access to critical resources.

A co-creative impact arises from this insight. As team members work on sub-problems with colleagues in their areas of the organization, that interaction is likely to trigger in those colleagues the shifts in perspective needed to see the true value of the eventual recommendations. This process can greatly improve the accuracy of assessment and speed of adoption.

Words may be too simple

Again, our thinking habits can reduce our effectiveness as problems become more complex. For example, commonly used word oriented methods such as brainstorming and discussion are capable of generating long lists of short ideas, but complex problems tend to need short lists of long ideas. Moving beyond words can greatly increase creative effectiveness.

Geir Kaufmann[3] investigated the usefulness of visual images in the solution of concrete problems. In a 3 by 3 research design he took problems and puzzles that had already been

assessed for their difficulty and presented then in different ways. He took easy, moderately difficult, and difficult problems and presented them to different people as: word problems requiring word answers; picture problems requiring sketched answers; or actually putting the subjects in the physical situation described in the problem.

The toughest problems were only solved by people working in the real situation. The easy problems were solved quite effectively when given as word problems, and presenting them as pictures or real world situations just slowed down the solution.

Problems of moderate difficulty were difficult to solve as word problems, but generally well solved as picture problems, while there was little advantage to putting the subjects in the real world.

This seems to indicate that sitting around chatting (or even brainstorming) is only going to work for the easiest of problems. With more difficult problems, there is an advantage to drawing pictures to understand and solve the problem. And for the most difficult problems, it seems that you need to just jump into the situation and muddle around until you get it solved.

Three-dimensional prototypes or scale models may also fit this "reality" category. Designers of buildings and products have known for a long time that some people can make sense of blueprints but others really need a physical model to begin reacting to ideas or contributing to a design. Therefore, external models may permit people who think more complexly to present and manipulate their structural ideas while permitting those who operate at lower levels to check its implications against their knowledge.

The Wicked Nature of Trans-Organizational Innovations

When handling complex situations and problems it is helpful to recognize that they are a blend of complicatedness and wickedness. Systems researchers have long measured the complicatedness of a system by the number of different states the system can be in, the number of different "moves" for each of the sub-components. Checkers has more options than tic-tac-toe, chess has more options than checkers. As the numbers of elements in a product or service or process to produce and distribute them grows, the complicatedness becomes more challenging. This is the kind of difficulty addressed in Kaufmann's research, an issue which greatly benefits from imagery and models. But there is more to complexity.

Wicked is a word that emerged in the discussion of levels of problem solving. There are some problems that we know the answer to, others that can be solved with a known structured process. Others are considered ill-structured because the problem itself is not fully or correctly understood. While ill-structured problems generally have agreement among the players on the values there are problems whose stakeholders have truly conflicting goals. These have been given the label "wicked".

Many creative problem solving methods assume that once all the aspects are clearly understood, a commonly beneficial solution is available. Even though finance, manufacturing, engineering, marketing, etc. all have to make compromises, all are attempting to contribute to a profitable company. But some of the most significant innovations go beyond the boundaries of any one organization.

One of the most frustrating things about many large scale innovations is that from the time they seem to be obvious, it can be a long time before they actually occur. Bhaskar Chakravorti notes in *The Slow Pace of Fast Change: Bringing Innovations to Market in a Connected World*[4] that, in the language of game theory, many innovations require multiple simultaneous changes by a number of different players, most of whom do not benefit if they act alone. The innovation causes others losses for which they must be compensated before giving needed consent and cooperation.

For example, if a complete electronic medical records technology system was in place, the benefits and savings would be substantial for most participants in the medical system. Yet, if any one person or organization acts alone, they achieve limited benefit, often at substantial cost. Chakravorti argues that real life innovation takes far longer than expected because it takes years for all the players to move together in ways that make the innovation complete. A real challenge to innovation leadership, whether heroic or collaborative, is to accelerate these adjustments.

The "Wicked" Nature of Organizational Politics

It is useful to note that similar clashes of goals and values occur within organizations. While customer satisfaction and organizational profits/performance are important, most players have other goals which conflict with each other and cannot be easily resolved by "ultimate" goals like "optimum shareholder value". Engineering might be attempting a standardization program to better control quality while marketing is pushing for mass customization. Shifts in course requirements for a degree in a university can shift enrollments, increasing or decreasing the number of faculty positions in the affected departments. If these strategic level questions can become part of problem solving and design efforts solutions can often be found that better satisfy these conflicting goals, or at least prepare the innovators to deal with the resulting organizational resistance.

Solving the Wickedness of Complex Problems

The wickedness of problems is the disjunction and conflict among the goals of the owners and stakeholders in the situation. This is normally the realm of negotiations, politics, and power although creative effort can reduce the apparent conflict and enlarge the pool of available alternatives.

Creative effort in this area requires a characteristic that psychologists call “cognitive complexity”, the ability to accept conflicting realities and values. This is actually necessary from the earliest phases of organizational creativity, as manufacturing wants large long-term orders, accounting wants payment in advance, and marketing needs small short-term orders with payment after delivery.

Such issues can be managed and resolved by focusing on impacts on profits or other ultimate organizational goals, while wicked problems are defined by the conflicts in these ultimate goals. As difficult as these goal and value conflicts seem, we solve problems like this everyday. Sports leagues set rules that the teams comply with while attempting to defeat each other. Professional associations set ethics rules that maintain the existence and trustworthiness of the profession, while allowing members to compete strongly. Industries attempt to set standards that support all players while the players are trying to put each other out of business.

Complex innovation requires understanding and acceptance of the needs, desires, and goals of the various players so that a pattern of activities can be developed which will synergize into a solution in which all are doing well while producing a valuable new innovation. For some innovations, a single entrepreneurial organization can design and negotiate all the pieces, but it seems that if a set of partners can create a collaboration process that create together and allow the firms to creatively explore their own options, a better innovation can result. Of course, this is far easier said than done.

Accelerating the Creativity of Trans-Organizational Collaborations

There is nothing new to suggesting joint ventures and collaborations to attempt large-scale complex innovation. There is a vast array of tools and techniques used in this area. What this article attempts to suggest is that in the planning of these efforts, in the selection and application of the tools of deliberate innovation, the language and concepts described above might provide better returns on the invested resources.

Some of the elements mentioned above are:

- Focusing beyond ideas to insights
- Moving from "out of the box" thinking to "better box" thinking
- Making sure the collaborators include knowledge of the whole "elephant" of knowledge, perspectives, and values so they produce "relevant" AHA's
- Managing the creativity/innovation process as a learning process in which the collaborators learn more and more about the whole "elephant" until the solution is obvious.
- Seeing those who resist our ideas with objections as our co-creators, for whom we must eliminate objections by improving our ideas or giving those resisting the insight necessary to understand the true value of the idea.
- Including stakeholders or designing links to stakeholders not only to include their perspective in ideas but also to trigger shifts in their perspectives that will prepare them to understand and accurately judge the new ideas.
- Having the leadership tools and skills to enable the resulting complex and diverse teams and meetings to effectively appreciate each other and work with each other effectively

"Co-creating relevant and mutually advantageous AHA's" is a great focus phrase. The social aspects of the collaboration process need to be structured to build the kind of trust and cohesiveness among the collaborators that allows them to not only challenge each other and seek new perspectives together, but also to accept and work with profound differences in goals and values. The technical aspects of the collaboration not only apply thoroughly the expertise and resources of the team members, but test insights and create useful shifts in perspectives among decision makers and stakeholders.

Collaborations need appropriate informatics, flexibly managing not only the words and spreadsheets, but also the images and models reflecting the complex realities of the project.

Collaboration leaders who understand and are able to apply these strategies seem likely to produce successful innovations far more efficiently.

Are you one of them?

References

[1] Barlow, Christopher M. "Deliberate insight in team creativity" *Journal of Creative Behavior* 2nd qtr 2000

[2] Nonaka, Ikujiro. and Takeuchi, Hirotaka *The Knowledge Creating Company*,. New York: Oxford University Press, 1995.

[3] Kaufmann, Geir. *Imagery, Language, and Cognition.* New York: Columbia University Press, 1980.

[4] Chakravorti, Bhaskar. *The Slow Pace of Fast Change: Bringing Innovations to Market in a Connected World*, Harvard Business School Press, 2003.