BEST PRACTICES WHITE PAPER

Solving the Mystery of Innovation in Technical Organizations

Bob Webber, Senior Fellow, Construx Software

Version 1.1, August 2012

Today's companies are seeking ways to increase innovation but find it difficult to identify and implement effective practices. "Secrets of Innovation" can be found on numerous web-sites and in books, yet organizations still struggle to find the practices that actually work for their organizations. Bits and pieces of what seems to work for others are adopted, yet nothing changes. Construx research has found that innovation initiatives generally fail because they don't account for internal consequence systems that can either foster or inhibit innovation. This white paper takes a unique view of the innovation process by recognizing that innovation is a product of a series of human behaviors. Innovative organizations apply practices that provide timely positive reinforcement for these critical behaviors, often without a complete understanding of the key role they play. Targeted practices based on well-established principles of basic human behavior can significantly increase organizational innovation. Construx also provides a practical benchmarking on-line technical innovation assessment to determine the likelihood of ongoing organizational innovation and identification of practice gaps and solutions.

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Introduction

In a 2011 Development Dimensions International (DDI) Global Leadership Forecast, nearly 12,500 leaders from around the world cited fostering creativity and innovation as one of the top three business priorities for the future.[1] Organizations are searching for ways to increase innovation, either to seize new opportunities or to prevent market loss from more innovative competitors. Books and consultants focus on the topic, however creating a culture where innovation flourishes remains elusive for most organizations.

What seems to be the secret for one organization often has little or no effect for another - for example, allocation of "20% innovation time." Often observed to be Google's key to innovation, this white paper will show that the timely positive reinforcement of behaviors that produce innovation is actually the critical factor. Simply announcing 15% or 20% innovation time without timely positive consequences for behaviors that lead to innovation will have little impact.

Construx has developed a new model of innovation based on well-established principles of natural human behavior that provides insight into the "missing ingredient" of organizational innovation. The model includes an on-line assessment that predicts the likelihood of ongoing innovation within an organization. People who have completed the assessment report a strong correlation with the level of innovation observed within their organizations.

Innovation Definition

Any discussion on innovation should include a definition. Here are some examples:

> "The act of introducing something new" (the American Heritage Dictionary)
>
> "A new idea, method or device" (Webster online)
>
> "Change that creates a new dimension of performance" (Peter Drucker)
>
> "Innovation is a new element introduced in the network which changes, even if momentarily, the costs of transactions between at least two actors, elements or nodes, in the network" (Regis Cabral)

Construx developed a practical definition that identifies when innovation has occurred and also considers the series of behaviors that typically precede innovation.

> "Innovation is a *non-obvious improvement* in a product, process or solution that results in a *measurable increase in stakeholder value*"
>
> "To innovate (verb) – To accomplish a *series of behaviors* that produces innovation"

[1] Innovation–Driven Leadership, Training and Development, March 2012

The verb definition is based on the fact that all organizational results are the product of behavior. For example, an innovation could result from an individual performing the following series of behaviors:

1. Researching a problem or opportunity
2. Learning about new technologies that could provide unforeseen solutions
3. Researching what stakeholders highly value
4. Communicating an idea to the development team
5. Creating a proposal
6. Building a prototype to show application

Observe that these behaviors generally occur over long periods of time and depend on discretionary effort by an individual. Furthermore, these behaviors will decrease over time if not supported by reinforcement systems within the organization. If not supported, innovation is left to the rare individual who can push through to innovation while obtaining little or no recognition (or even scorn!) along the way. However, companies want everyone to contribute to innovation to their maximum ability, and they are not just looking for new product innovation. They want innovation everywhere – concept, requirements, architecture, design, construction and sustaining, and in process improvements related to these activities.

Innovation Behavior Model

Here's another view of the cycle of behaviors that leads to innovation:

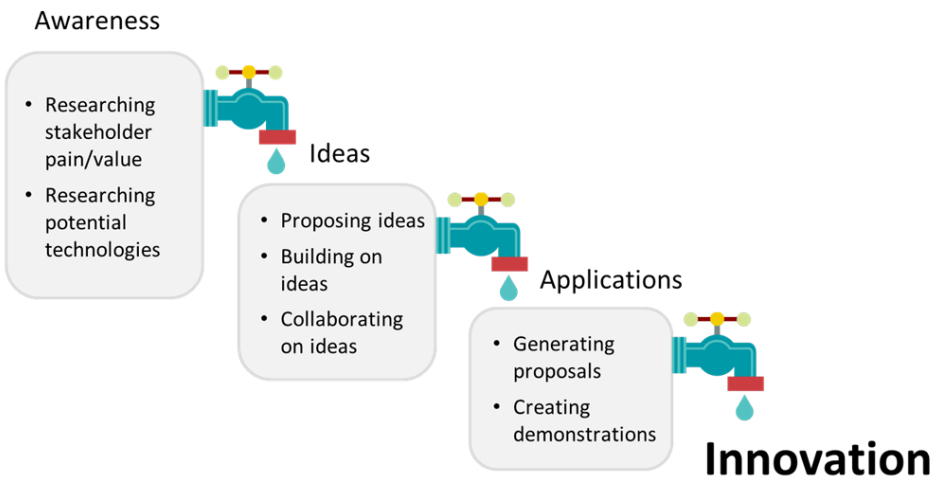

Figure 1 *Innovation is a long term result of intermediate behaviors*

The flow stops if any behaviors along the way are not reinforced. Recognition for actual innovation is long-term, infrequent and unpredictable, hence it is not a motivator for most people. That is why many product development leaders claim that, "only the top 10% of my staff contribute to innovation." Sadly, it's true. But it doesn't have to be that way.

There are "three legs to the stool" when it comes to increasing innovation, as depicted in the figure below.

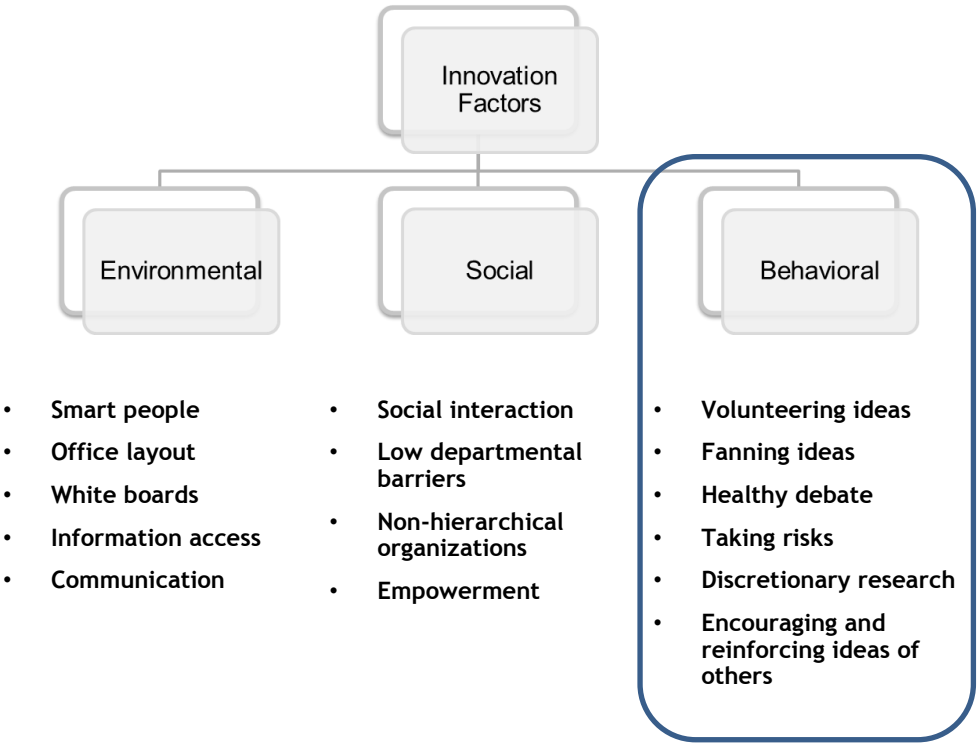

Figure 2 *The Innovation Triad*

Current advice and practices intended to increase innovation generally focus on environmental and social factors. Certainly, these can help. However, many companies improve these factors, and even designate "innovation time," yet nothing happens. In these cases, the frequent positive reinforcement for the cycle of behaviors that produces innovation is missing. It's like putting kindling and wood together and expecting a fire to break out. Innovation will emerge in organizations that understand the behaviors that lead to technical innovation and establish practices that positively reinforce them.

Reinforcing Innovation Behaviors

The scientific basis for increasing organization behavior through reinforcement is well-established.[2] This author has personally experienced dramatic results through application of software engineering practices using these concepts (see bio below).

In short, there are two ways to increase behavior:

- Positive Reinforcement (R+) – People get what they want following the behavior.
- Negative Reinforcement (R-) – People "don't get what they don't want," meaning that they increase behavior to avoid punishing consequences.

For example, someone working towards a goal in anticipation of team recognition is motivated by R+. An individual working towards a goal under fear of being yelled at is motivated by R-. The following principles of Performance Management are relevant to innovation:

1. Although both R+ and R- increase behavior, discretionary effort occurs only through R+. People motivated by R- will perform just to the level required to avoid the anticipated punishment.
2. Reinforcement must occur during or soon after the behavior to have any significant effect.

Innovation behaviors require discretionary effort and therefore need to be positively reinforced soon after the behaviors occur. How often does innovation result from an "innovation or else" approach? A system for providing timely positive consequences must exist within the organization to reinforce the intermediate behaviors that lead to the longer term result of meaningful innovation.

Many companies have attempted innovation improvement initiatives with little success. They are often driven by the latest book or article on the "Secrets of Innovation," or even resort to outside consultants. Initial improvements may occur, but soon peter out. An innovation initiative without the supporting reinforcement practices in-place will end up being perceived as "just another fad."

What about the other strong consequences in place in a development organization? Behavior will certainly be prioritized by an individual in view of the relative strengths, perceived certainties, and frequencies of consequences. That's why some companies choose to dedicate blocks of time, like "Hackathons" that can last weeks, or Scrum "Innovation Sprints." These approaches temporarily remove perceived immediate negative consequences (like being called out for missing development schedules) that

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[2] *Performance Management: Changing Behavior That Drives Organizational Effectiveness*, Aubrey C. Daniels and James E. Daniels, 1992, Updated 2006

normally override any positive consequences for innovation behaviors. And, developers anticipate timely positive reinforcement when they are able to show what they have created, so innovation behaviors do increase. These are effective practices for the reasons stated, but truly innovative organizations are able to create a steady flow of innovation, not just within assigned time periods and from specific groups.

Below are examples of practices from companies that are noted for innovation.

Apple's Design Process, Bloomberg BusinessWeek, March 8, 2008 – Paired Design Meetings:

> "This was really interesting. Every week, the teams have two meetings. One in which to brainstorm, to forget about constraints and think freely. As Lopp put it: to "go crazy." Then they also hold a production meeting, an entirely separate but equally regular meeting which is the other's antithesis."

In the first meeting, the stage is set for encouraging, reinforcing and building on ideas. Participants experience immediate R+ without concern for criticism or thinking too far outside the box. The second is a practical meeting to distill the ideas that merit follow-up.

Sir Jonathan Ive, Senior Vice-President of Industrial Design at Apple, London Standard, March 12, 2012:

> "Q: How does a new product come about at Apple?
>
> A: What I love about the creative process, and this may sound naive, but it is this idea that one day there is no idea, and no solution, but then the next day there is an idea. I find that incredibly exciting and conceptually actually remarkable.
>
> The nature of having ideas and creativity is incredibly inspiring. There is an idea which is solitary, fragile and tentative and doesn't have form.
>
> What we've found here is that it then becomes a conversation, although remains very fragile."

It was not about Steve Jobs yelling at people. He was smart enough to support continuous positive reinforcement practices for innovation behaviors within Apple. Did Steve Jobs' personality have an impact on Apple? Sure, it did. He had vision that inspired and made people reach for a higher bar. If you have attained rock-star status within your industry and organization through a proven record of disruptive technological and marketing innovation, you may also get away with yelling at people. But, it's the reinforcement practices throughout your organization that will determine the degree to which innovation actually occurs.

Interview with Google Product Manager on Google Student Blog:

> "Google encourages innovation first and foremost through its people. We spend a lot of time in rooms just brainstorming, and by having a bunch of smart and adventurous people together, we get a lot of great ideas.

> Another way in which Google encourages innovation is through lowering the barrier to trying out new ideas through prototyping."

The first paragraph emphasizes the importance of making idea sessions positively reinforcing for attendees to encourage attendance and free thinking. However, innovation can also be inhibited by people who shut down ideas with comments like "we tried that before," or who immediately criticize fresh ideas. These people either need to be left out of idea meetings, or their behavior needs to be corrected. This is part of creating a culture that supports innovation. There certainly is a need for critical assessment of new ideas, but not at that "fragile" stage referred to by Jonathan Ive.

The second paragraph relates to what is arguably the single most effective R+ for engineers – the chance to show what they built. There should be frequent opportunities for engineers to receive timely R+ for demonstrations.

> *The way to get good ideas is to get lots of ideas, and throw the bad ones away.*
>
> *- Linus Pauling, Nobel Prize Winner*

Innovation Practice Example

Construx's Product Leadership and Innovation seminar includes practices that reinforce innovation behaviors as well as a framework for business and technical collaboration. For example, beyond just coming up with ideas, frequent positive reinforcement is required to move ideas through the cycle of innovation behaviors. One example is an "Innovation Kanban." The word "Kanban" (literally "signboard") comes from a technique originated in Japan to organize flow of work. It is often used by Scrum teams to organize tasks.

Why not use a Kanban to follow and frequently reinforce innovation behaviors targeted on the highest stakeholder values? Below is an example for one stakeholder value.

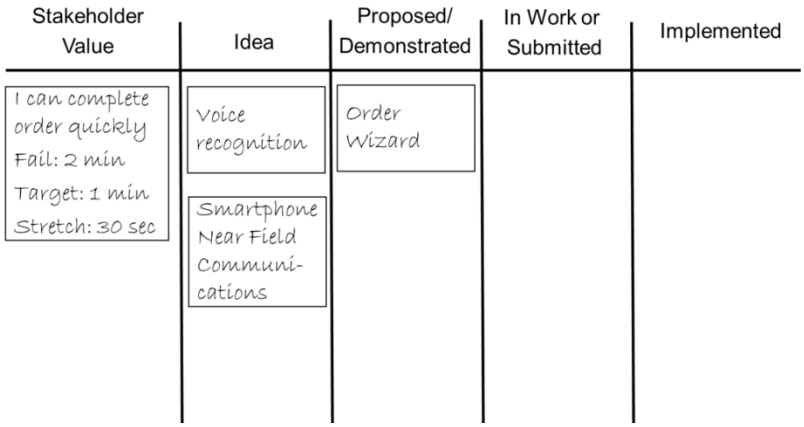

Figure 3 *Innovation Kanban*

The board provides the opportunity for timely positive reinforcement from within the development team and from their management. Note the column for stakeholder value. Innovation should be focused with a deep understanding of what stakeholders value the most. Construx provides practices to identify and quantify stakeholder value as part of the Product Leadership and Innovation seminar.

One overlooked aspect of innovation is that it also requires frequent positive reinforcement for the technical and product leaders and managers who reinforce others for innovation behaviors. Reinforcing innovation is a behavior itself. If you are a second-level manager or higher, how often are you reinforcing innovation in your meetings and interactions? Is it all about budget, schedule and project problems? If so, why would you expect innovation to flourish in your organization?

Benchmarking Innovation

Construx has developed practices to increase innovation behaviors, and surprisingly, they require little capital investment. Construx has developed a benchmark based on this innovation model to identify the extent to which innovation behaviors are currently being reinforced in your organization. The on-line assessment can pinpoint areas for improvement where reinforcement practices can be targeted. The on-line assessment can be found here if you would like to benchmark your organization.

The innovation benchmark has been used in our Product Leadership and Innovation seminar. Attendees express a high degree of correlation between the scores and the level of innovation happening, or not happening, in their organizations. Attendees from companies with reputations for innovation score well.

Here is an example of a question that is directly related to whether or not innovation behaviors are positively and frequently reinforced in your organization:

> "I make time to innovate" (scored 0 – 4)

Note that it is not stated as, "I am given time to innovate." Even with the proverbial "20% for innovation time", the score will be low unless sustained positive and timely reinforcement exists. Scores can even be higher in organizations that don't allocate a percentage of time yet have effective innovation reinforcement practices in place. Effective positive reinforcement will increase discretionary effort applied to innovation.

Summary

Technical innovation and why it does or doesn't occur is not a mystery. It can be understood through the behavioral approach in the Construx innovation model. The extent to which the necessary behaviors are currently being reinforced in your organization can be assessed through our on-line technical innovation assessment. The presence or absence of these behaviors determines the likelihood that your organization will produce ongoing innovation. While this white paper provides one example of increasing innovation based on the model, a good innovation initiative will involve benchmarking and identifying gaps to focus practices that will work for your organization, as well as ongoing measurement of continual improvement.

Author

Bob Webber, Senior Fellow, Product Leadership and Innovation

robert.webber@construx.com
+1(425) 636-0113

Mr. Webber is a Senior Fellow at Construx with over 30 years of software experience delivering innovative products in telecommunications, entertainment, and life sciences. Bob's roles have ranged from software developer to executive R&D positions at GTE and AT&T, followed by engineering and product management leadership at three successful start-up companies. Bob's record of innovation is supported by five US patents and an Academy of Motion Picture Arts and Sciences Technical Achievement Award in 1999. As CEO, Bob led TranSenda to win Microsoft's Life Sciences Innovation Award in Clinical Development in 2009, and successful acquisition in 2010.

Bob was also a member of the senior R&D leadership team at AG Communication Systems, a GTE/AT&T joint venture. The division obtained national recognition for applying the human behavior model to software engineering practices. Results from Bob's department appear in the 2006 edition of *Performance Management: Changing Behavior That Drives Organizational Effectiveness* by Aubrey C. Daniels and James E. Daniels. Several articles also appeared in Ed Yourdon's American Programmer magazine highlighting the unique approach and significant results.

About Construx

Construx Software is the market leader in software development best practices training and consulting. Construx was founded in 1996 by Steve McConnell, respected author and thought leader on software development best practices. Steve's books *Code Complete*, *Rapid Development*, and other titles are some of the most accessible books on software development, with more than a million copies in print in 20 languages. Steve's passion for advancing the art and science of software engineering is shared by Construx's team of seasoned consultants. Their depth of knowledge and expertise has helped hundreds of companies solve their software challenges by identifying and adopting practices that have been proven to produce high quality software—faster, and with greater predictability. For more information about Construx's support for software development best practices, contact us at consulting@construx.com, or call us at +1(866) 296-6300.

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Construx Software Builders, Inc.
10900 NE 8th Street, Suite 1350
Bellevue, WA 98004
U.S.A.