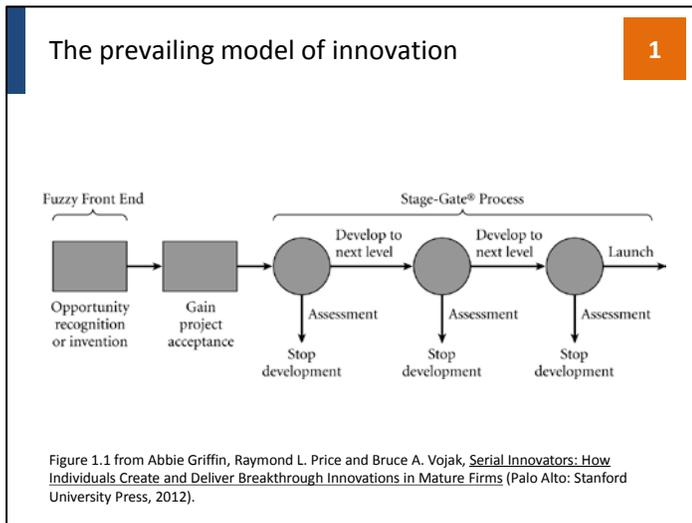


The front and back ends of innovation

The prevailing model of innovation

The “Fuzzy Front End” and the “Stage-Gate® Process” are perspectives that dominate how we think about innovation



To set the stage for a broader discussion of innovation processes, metaphors and paradigms in subsequent essays, it seems appropriate to begin by briefly reflecting on the prevailing model of innovation. A common view of contemporary innovation accepts that two, very different, complementary processes exist in series as illustrated in Figure 1, a creative, divergent “front end” followed by an implementation, convergent “back end”.

The front end of innovation carries with it the unarticulated assumption that we cannot fully grasp how innovation really occurs; the **“Fuzzy Front End” (FFE)** is an example of such a perspective.ⁱ Along with other important benefits (summarized in Figure 2), such a “fuzzy” view of innovation appropriately opens up possibilities for the volatility, uncertainty, complexity and ambiguityⁱⁱ that characterize breakthrough innovation.

The back end of innovation carries with it the unarticulated assumption that we can systematically evaluate and develop promising innovative concepts, that is, that we can reasonably grasp how to proceed with innovation; the **“Stage-Gate® Process” (SGP)** is an example of such a perspective.ⁱⁱⁱ Along with other important benefits (summarized in Figure 3), such a “process” view of innovation appropriately systematizes innovation activities in ways that characterize how most other, non-innovation processes in the firm work.

Thus, the FFE and SGP collectively span the breadth of what is required for breakthrough innovation.

Having said this, and not surprisingly, each of these two process views carries with it limitations, also summarized in Figures 2 and 3. First and foremost, both often fail. Failure

in the FFE often is characterized by a heroically technical success that finds no place in the market. Failure in the SGP often is characterized by incremental, rather than a breakthrough success. Perhaps most importantly, the combination has the appearance of an inefficient production line – generating large amounts of product (generating potentially breakthrough ideas in the FFE) followed by filtering out the defects (filtering of ideas in the SGP). In the ridiculous extreme, with this perspective we close our eyes, grit our teeth and throw ourselves in a direction (FFE), after which we are told whether or not it’s the right direction (SGP) – an endeavor that is exhausting and infrequently fully satisfying.

At the risk of oversimplification, the Fuzzy Front End represents an attitude of epistemological “skepticism” while the Stage-Gate® Process, in contrast, represents an attitude of limited epistemological “certainty”. So what do we mean by these statements? And what are the implications of such insight?

Some initial epistemological implications of this model

As I suggested earlier in this essay, both the front and back ends of innovation reflect unarticulated assumptions. Returning now to expand on this, these are the underlying, and most likely unexamined, philosophical assumptions about what knowledge is and how you get it – the stuff of epistemology. So, let’s dig just a bit deeper with the idea that we will return to some of these concepts again in future essays. Consider this merely the first of several iterations.

At the risk of oversimplification, the FFE represents an attitude of epistemological “skepticism” while the SGP, in contrast, represents an attitude of limited epistemological “certainty”. So what do we mean by these statements? And what are the implications of such insight?

Skepticism is a position where we hold back from making specific claims about what we know. Representing the front end of innovation as a “black box” is an example of this. When practitioners, popular authors and academics illustrate it in this way, their unarticulated assumption is that we just do not grasp much about what occurs in the FFE.

Limited certainty is a position where we assert that we can make some claims about what we know. Representing the back end of innovation as a series of stages and gates is ➤

A “fuzzy” view of innovation

2

- Benefits
 - Acknowledges the intuitive, creative aspects of innovation
 - Does not attempt to over-control innovation
 - Increases the potential for radical, disruptive innovations, rather than category enhancements
 - Provides an alternative to incremental thinking
- Limitations
 - In spite of the benefits, still often fails
 - Tends to yield technology-driven inventions, rather than market-accepted innovations
 - Does not provide a means to evaluate the innovative abilities of those practicing this approach

A “process” view of innovation

3

- Benefits
 - Ensures that critical information and thinking is not missing or ignored
 - Brings the customer’s “voice” to innovation
 - Trains less experienced people in the innovation process
 - Processes are disciplined, not chaotic
 - Makes innovation more uniform, more predictable – minimizes variation in the innovation process
 - Reduces risk of failure due to innovation process mistakes
- Limitations
 - In spite of the benefits, still often fails
 - Has the appearance of inspecting out defects, rather than designing quality into the innovation in the first place
 - Typically results in incremental category enhancements, not new businesses

an example of this. When practitioners, popular authors and academics illustrate it in this way, their unarticulated assumption is that we can, with this systematic, linear method of the SGP, come to know with general confidence whether a concept will or won’t succeed^{iv} as a breakthrough innovation in the marketplace.

What carries the FFE and SGP perspectives is that they provide some very good insights within which to explore and practice innovation. For example, they accurately portray that innovators begin knowing relatively little about how to proceed (skepticism) and end with a pretty good idea as to what to do (limited certainty). Thus, two important features of innovation are part of this model and appear in the ultimately correct order. Unfortunately, the FFE and SGP are cobbled together in a way that is awkward at best, not a compelling whole. This only becomes a problem when the model is accepted as *the* paradigm for innovation and, thus, corporate innovation practices are implemented based on this *model* which is now taken as the *reality* of innovation. To the extent that this model is epistemologically flawed or incomplete, then, it will yield suboptimal results for the firm.

As I will explore in subsequent essays, what we find in practice is that this combination of FFE and SGP perspectives – and, thus, this combination of epistemological perspectives – is insufficient to describe how breakthrough innovation actually occurs. Only fresh epistemological perspectives will enable us to improve breakthrough innovation practice. ■

Bruce A. Vojak is Associate Dean for Administration and an Adjunct Professor in the College of Engineering at the University of Illinois at Urbana-Champaign. Prior to joining the university in 1999 he was Director of Advanced Technology for Motorola’s non-semiconductor components business; earlier he held business development and research positions at Amoco and a research position at MIT Lincoln Laboratory. In addition to his administrative responsibilities, he teaches and conducts research on the topics of innovation and strategic technology management. With Abbie Griffin and Ray Price he is co-author of Serial Innovators: How Individuals Create and Deliver Breakthrough Innovations in Mature Firms (Palo Alto: Stanford University Press, 2012). Further, he currently serves on the Board of Directors of Midtronics, Inc. and periodically consults for Procter & Gamble. Bruce holds B.S., M.S. and Ph.D. degrees in Electrical Engineering from the University of Illinois at Urbana-Champaign and an MBA, with concentrations in finance and marketing, from the University of Chicago’s Booth School of Business.

ⁱ P.A. Koen, G.M. Ajamian, S. Boyce, A. Clamen, E. Fisher, S. Fountoulakis, A. Johnson, P. Puri & R. Seibert, “Fuzzy Front End: Effective Methods, Tools, and Techniques,” in The PDMA ToolBook 1 for New Product Development, P. Belliveau, A. Griffin and S. Somermeyer, editors (New York: Wiley, 2002) pp. 5-36.

ⁱⁱ See, for example, http://en.wikipedia.org/wiki/Volatility,_uncertainty,_complexity_and_ambiguity

ⁱⁱⁱ R.G. Cooper, “Stage-Gate System: A New Tool for Managing New Products,” Business Horizons, 33: 44-54, (1990).

^{iv} The SGP represents a form of *limited* certainty in that it seeks primarily to reject bad ideas, not necessarily create good ones.

“On the Epistemology of Innovation: How Breakthrough Innovators Connect the Dots” is a series of brief, occasional essays addressed to executives, managers, and technologists responsible for innovation in industry. Its purpose is to challenge readers to reflect broadly and deeply on the practice of innovation – in particular on how innovators come to know what to do today – in order to succeed commercially in the future. Essays are available without charge at the University of Illinois’ digital archive at <https://www.ideals.illinois.edu/handle/2142/27667>. The discussion group at <http://epistemology-of-innovation.com> is a place to provide feedback and dialog with the author and others regarding these essays, as well as to register to receive notice of new essays as they are issued.