

## **How does Creativity Complement Today's Currency of Innovation?**

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*In this article the authors discuss the definition of innovation, its associated process, and related measurement tools. The definition of innovation is a process of creativity leading to something highly useful and novel. The purpose of this article is to define the difference between creativity and innovation, outline the process of innovation, and discuss measures of innovation. Our research suggests that creativity is a subcomponent of the innovation process, and is focused on divergent ideas. Whereas the purpose of innovation is to use divergent ideas towards a convergent solution that is both highly novel and useful.*

### **INTRODUCTION**

In the past few years' innovation has been a popular topic in various fields of economics and academia. Academics and professionals have written about this topic in great detail. Authors such as Steven Johnson (2010), Clayton Christensen (2003), Michael Michalko (1991), Edward De Bono (1999), Robert Sternberg (2010), Jonathan Littman (2005), Scott Berkun (2010), Peter F. Drucker (2007), and many others have suggested, in not so many words, that innovation is modern day's currency.

In an effort to further understand this currency: innovation, this paper presents and discusses the misalignment and use of creativity testing for purposes of measuring innovation. Numerous definitions of creativity exist, which have spawned the development of various creativity tests. These tests have been based on accepted definitions of creativity – such as “a behavior that is imaginative and inventive” (Guilford, pp. 444, 1950).

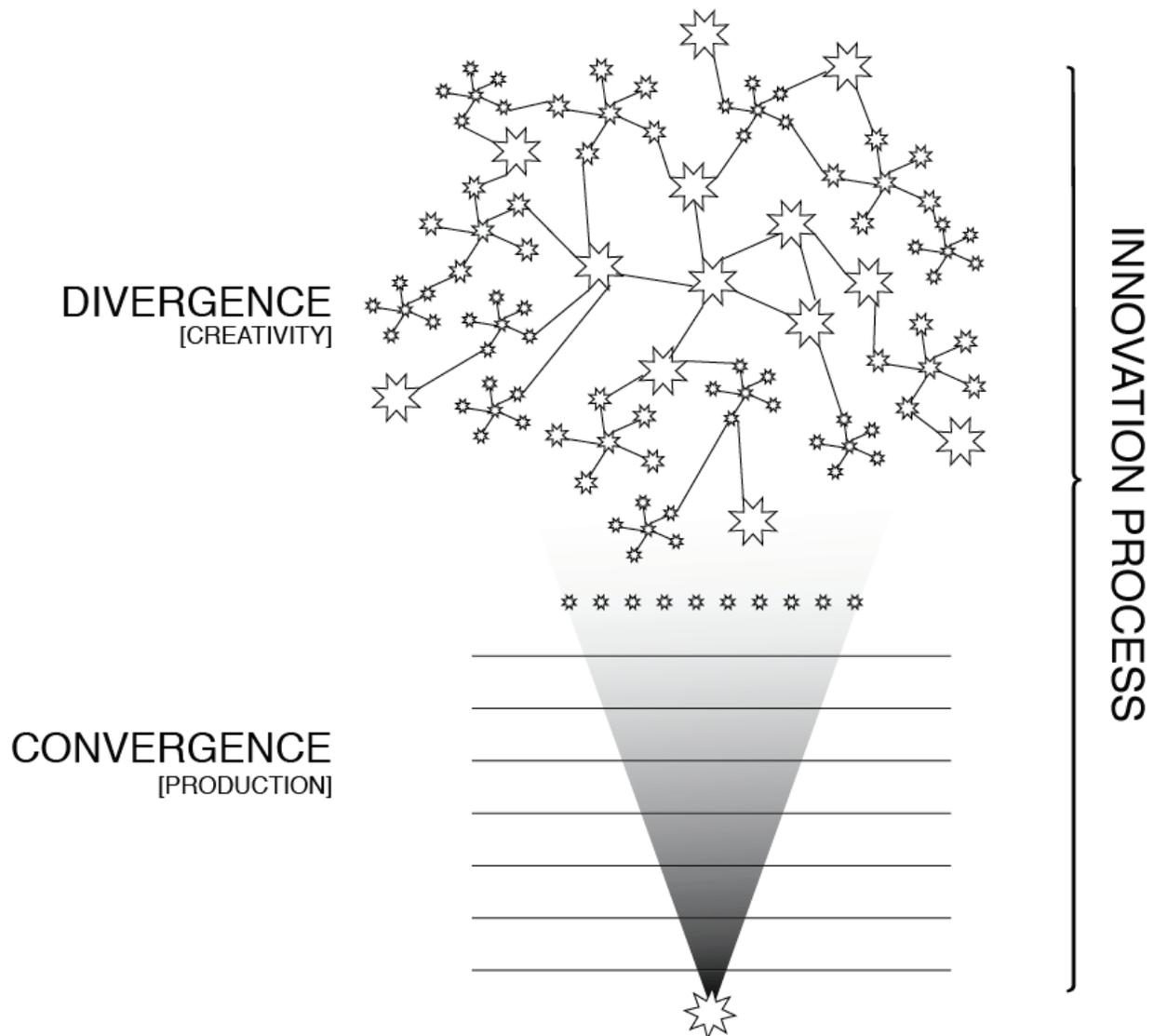
Innovation, in contrast, is not the same as creativity. Innovation is structured creativity focused on producing an innovative product, service, or system. In essence it is a “practical creativity.” Although related, creativity and innovation are distinct and different. Consequently they should use distinct and different assessments. Paradoxically, most efforts to measure innovation are based on creativity definitions and tests, or only focus on production. This paper compares and contrasts the definitions, assessments, and instructional practices of creativity and innovation, in an effort to further clarify how and what should be taught regarding innovation, and how it might be more effectively measured.

## INNOVATION DEFINED

Many researchers have made the argument that innovation is not the same as creativity (Amabile, Conti, Coon, Lazenby, & Herron, 1996a; Carr & Johansson, 1995; Van de Ven, Polley, Garud, & Venkataraman, 1999). According to these researchers and others, innovation can be defined as structured creativity, focused on producing an innovative product, service, or system (Amabile, Conti, Coon, Lazenby, & Herron, 1996a; Carr & Johansson, 1995; Van De Ven, Angle, & Poole, 1989). Although related, creativity and innovation are distinct and different (Amabile, Conti, Coon, Lazenby, & Herron, 1996a; Carr & Johansson, 1995).

Innovation has often been inappropriately used to define a person or thing that is simply *creative*. To be creative, does not mean, to be innovative. Creativity is a subcomponent of innovation. Innovation is a process that involves moving from divergent ideas to a convergent solution. In this definition creativity is a measure that can be applied to divergence. Creativity can be thought of as the starting point for innovation. Consequently, creativity and innovation should be assessed differently. Image 1 further clarifies the divergence to convergence relationship.

**IMAGE 1**  
**INNOVATION PROCESS – MOVING FROM DIVERGENCE TO CONVERGENCE**

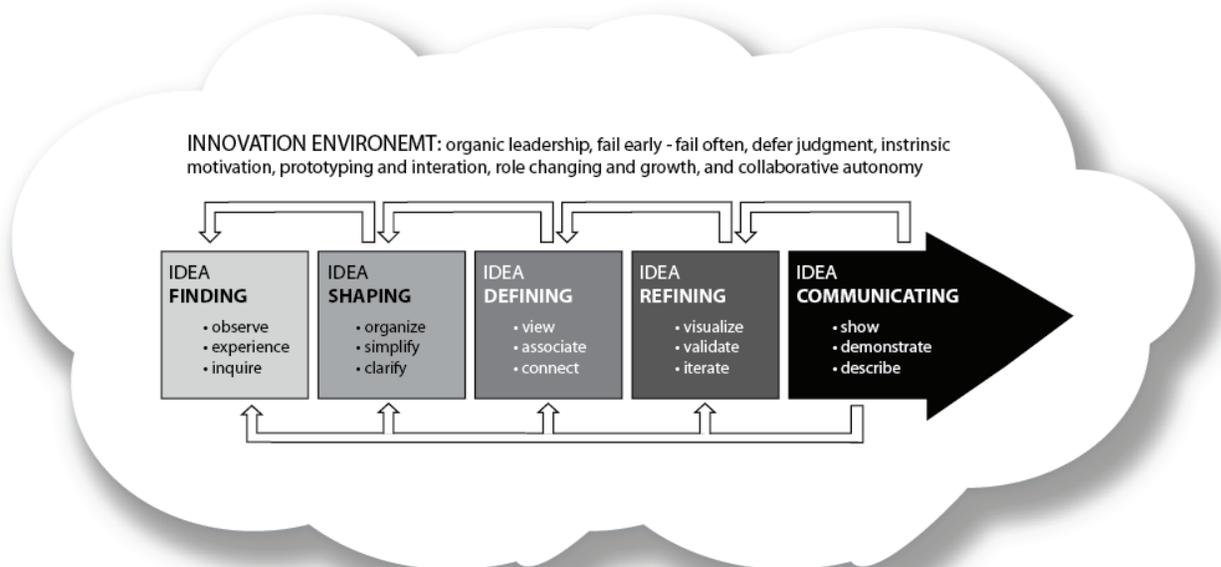


According to the definitions of creativity and innovation, creativity assessments only test a segment of the innovation process. The issue with this is that creativity assessments are being used to assess innovation, and in so doing, are only actually assessing the preliminary part of innovation: creativity. This is similar to trying to test a student's understanding of math by only administering a multiplication test. While the assessment is valuable to understand the student's grasp of multiplication, it does not provide data on the student's ability to do math, which involves more knowledge (e.g. subtraction, division, and addition). Creativity assessments are useful but only measure one part of the innovation process; an innovation assessment would need to measure the elements or characteristics of the entire innovation process.

Innovation is a process that is both linear and cyclical. Linear because ultimately the goal of innovation is to create a new product, system, or service, and is best serviced by moving from divergent ideas to a convergent solution. Innovation is cyclical in that the linear movement towards a solution will not happen unless the various principles of the innovation process are continuously revisited. Image 2 diagrams the flow. It presents the idea that the movement towards a new product, system, or service is made up of five components: idea finding, idea shaping, idea defining, idea refining, and idea communicating. Each part is then broken down into three tools. Idea finding incorporates observing, experiencing (e.g., situations or events), and inquiring (e.g., asking questions). These tools guide a person to find ideas by being aware of his or her surroundings through being conscious of what he or she is experiencing and questioning situations or events. Idea shaping incorporates organizing (e.g., categorizing ideas by similarities), simplifying (e.g., finding the central part of the idea), and clarifying (e.g., explaining the idea clearly). This takes the ideas from the previous step and shapes them by organizing the ideas in written form. Writing the ideas down helps to clearly define the idea and simplify it. Once the ideas are written down, idea defining then incorporates viewing (e.g., look at the problem differently), associating (e.g., associate ideas with other situations, topics, or objects) and connecting the ideas.

**IMAGE 2**  
**INNOVATION PROCESS**

**PROCESS of INNOVATION** | a semi-linear process of movement, embedded in a non-linear innovative environment.



Viewing the ideas organized in one way helps a person start associating and connecting the ideas in new ways. Idea refining involves visualizing the ideas to validate them and provide iterations. The last part in the process is idea communicating, which involves showing, demonstrating and describing the idea in various methods (e.g. prototypes, drawings, or role-play).

Image 2 also shows two additional concepts important to understanding innovation. First, that the innovation process involves iterations between the parts. For example, idea shaping through clarification often leads back to idea finding. Also, idea communicating provides feedback for all steps of the innovation process and may start it all over again. Second, it shows that the innovation process takes place in an innovation environment. This environment may provide leadership that encourages innovation, a fail early-fail often mentality, judgment deferral, intrinsic motivation, prototyping, and collaborative freedom. With this environment, the professors believe that the innovation process will better succeed.

## CREATIVITY AND INNOVATION MEASURES

A thorough literature review revealed that both creativity and innovation assessments do exist (Cropley, 2000; Hocevar & Bachelor, 1989; Kaltsounis & Honeywell, 1980; Torrance & Goff, 1989), however, we did not discover any assessments that tested for both creativity and innovation. In analyzing the types of questions in the innovation tests, we discovered that most of the questions were asking questions about creativity – not innovation. In our literature review we did not find any tests that assessed both creativity and innovation. However, as we analyzed the purpose, scope and type of questions asked in the assessments we discovered the assessments focused on two primary – yet distinctly different – domains. The creativity assessments focused on divergence, while the innovation assessments focused on quantity of products. For example, the Torrance Test of Creative thinking (TTCT) asks questions focused on measuring divergent ideas. In the TTCT, participants are asked to sketch and explain different objects in response to visual stimuli presented in the test (e.g., circles, lines, abstract drawings) within restricted time limits. Developed from Torrance's research on creativity and previous theoretical work by Guilford (1967), the TTCT measures the following components of creativity: (1) fluency, the ability to generate large numbers of meaningful ideas, (2) originality, the ability to produce ideas that are statistically infrequent in the normative population (used less than 5 percent of the time), (3) elaboration, the ability to add details to one's ideas, (4) resistance to premature closure, the ability to maintain an open and flexible mindset, and (5) abstractness of titles, the ability to think abstractly about concepts. The TTCT also assesses other minor aspects of creativity, such as unusual visualization, storytelling articulateness, and fantastical imagery. These minor aspects are called *creative strengths*. A human scorer scores the five components of creativity and creative strengths in a participant's test according to detailed instructions and after receiving proper training. Other creativity tests such as Guilford's Alternative Uses Task equally ask questions focused on the area of divergence by asking questions like "Name all the uses for a brick." Focusing on the area of divergence is helpful, but it is only one part of the 2-part definition of innovation, and therefore any claims that the TTCT or other creativity tests are valid measures of innovation are inaccurate.

Cropley's (2000) more recent study examined a smaller number of creativity tests than the previously mentioned researchers. These tests were limited to paper-and-pencil tests - since those "are the most widely used in education and research" (p. 2). He also limited the number of tests discussed to those developed during the modern creativity era introduced by Guilford (1950). Cropley's study organized creativity tests into four categories. These categories focused on products, processes, motivation, and personality/abilities (pp. 17-19). In analyzing the tests Cropley categorized, we discovered that the tests he grouped into the products and processes categories seemed to be slightly more innovation centric, asking questions related to product development. These tests might measure a product's usefulness and novelty but do not assess the innovation process as a whole. This finding proves interesting because what Cropley was actually testing was innovation, not creativity. One such test is the Creative Product Semantic Scale (CPSS) developed by Besemer and O'Quin (1987). The CPSS is based on three

dimensions: novelty, resolution, and elaboration and synthesis. Another test is called the Consensual Assessment Technique (CAT). This assessment asks participants to create a product, which is then rated by two or more experts in the field. The criterion for the CAT is appropriateness as evaluated by a community. Product creativity tests, as exemplified by the CPSS and CAT, focus on the end result. In contrast, the tests he grouped in the motivation and personality categories had more to do with creative thinking, which asked questions that had to do with divergence, and which typically used questions much like those identified on the TTCT. For example several of the creativity centric tests required participants to draw as many ideas in a specified amount of time. This type of task tests fluency – which is a measure of divergence.

The literature review showed that although both creativity and innovation assessments exist, the innovation assessments are typically found within business contexts, centered on *the end product*. For example, Europe uses the Community Innovation Survey (CIS) to assess national innovation performance. This survey measures innovation in terms of input and output (Godin, 2002). Salazar and Holbrook (2004) critique the CIS and suggest that innovation needs to be studied as an activity and not as an end result (pp. 263). An instance in the CIS where this is evident is in the quantification questions regarding the number of how many new products have been developed, and in how much time, and how many new products will be developed, again in a measured amount of time. In addition the CIS also asks other questions regarding end results: Did your enterprise introduce new or significantly improved goods? Were any of your goods and service innovations new to your market? Did your enterprise introduce new or significantly improved methods of manufacturing or producing goods or services? Did your enterprise engage in the following innovation activities (research and development, acquisition of machinery or software, etc.)? Table 1 compares the more common creativity measures previously mentioned and the innovation measures from the CIS.

**TABLE 1**  
**INNOVATION TO CREATIVITY COMPARISON**

		Creativity Assessments	Innovation Assessments (CIS)
Personality/Ability	Active Imagination	X	
	Flexibility	X	
	Curiosity	X	
	Independence	X	
	Acceptance of Own Differentness	X	
	Tolerance for Ambiguity	X	
	Trust in Own Senses	X	
	Openness to Sub-conscious Material	X	
	Ability to Work on Several Ideas Simultaneously	X	
	Ability to Restructure Problems	X	
Ability to Abstract from the Concrete	X		
Process	Uncensored Perception and Encoding of Information	X	
	Fluency of Ideas	X	
	Problem Recognition and Construction	X	
	Unusual Combinations of Ideas	X	
	Construction of Broad Categories	X	
	Recognizing Solutions	X	X
	Transformation and Restructuring of Ideas	X	X
	Seeing Implications	X	
	Elaborating and Expanding Ideas	X	X
Self-directed Evaluation of Ideas	X		
Product	Originality	X	X
	Relevance	X	
	Germinality	X	
	Complexity	X	
	Usefulness	X	
	Pleasingness	X	
	Elegance/Well-Craftedness	X	
	Understandability	X	
	Goal-Directedness	X	
Motivation	Fascination for a Task or Area	X	
	Resistance to Premature Closure	X	
	Risk-Taking	X	
	Preference for Asymmetry	X	
	Preference for Complexity	X	
	Willingness to Ask Many (unusual) Questions	X	
	Willingness to Display Results	X	
	Willingness to Consult Other People	X	X
	Desire to Go Beyond the Conventional	X	
Innovation	Research & Development		X
	Acquisition of machinery, equipment, and software		X
	Acquisition of Knowledge		X
	Training		X
	Patent Application, Trademark, Copyright		X
	Marketing		X
	Education		X
Funding		X	

## CONCLUSION

The breadth and scope of this paper was to define the difference between creativity and innovation, outline the process of innovation, and discuss measures of innovation. Our research suggests that creativity is a subcomponent of the innovation process, and is focused on divergent ideas. In contrast the purpose of innovation is to use divergent ideas towards a convergent solution that is both highly novel and useful. Usefulness can be defined as the number of people that will benefit from the product, system, or service. Novelty is defined as being a highly unique, fresh, original and new product, system or service.

In the second part of the paper, innovation is defined as a practical creativity - where creativity is the preliminary part of the innovation process (divergence). The discussion in the second part of the paper then outlines the problems with only using creativity assessments to measure innovation, when creativity is only one part of the innovation process. Although the authors recognize and accept the importance of assessing the creativity component of innovation, there remains a need to create an assessment that assesses the innovation process as a whole. Future research should include developing an assessment that combines issues of convergence and divergence; therefore ensuring both creativity and innovation is being assessed.

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