a model of **innovation**

Innovation is a holy grail of contemporary society, and especially business. A flood of books and magazines promote it. Design firms promise it. Customers demand it. Survival, we're told, depends on it.

But what is it? And how do we get it?

We used to ask the same questions about quality. Then Walter Shewhart and Edward Deming answered. Today, statistical process control, total quality management (TQM), kaizen, and six-sigma management are fundamental tools in business.

Organizations have become much better at managing quality. Quality has become a commodity, or at least "table stakes," necessary but not sufficient. Now, innovation matters more—because you can't compete on quality alone, whether as a business, a community, or a society. The next arena of global competition is innovation, but the practice of innovation remains stuck some 40 years behind the practice of quality.

Quality is largely about improving efficiency, whereas innovation is largely about improving effectiveness. Improving quality is decreasing defects. It's about measuring. It's making processes more efficient. It works within an existing paradigm.

Business Week design editor Bruce Nussbaum has suggested you can't measure your way to innovation—measurement being the hallmark of quality processes. And though some six-sigma advocates disagree, Nussbaum is pointing out a fundamental difference between managing quality and managing innovation. Innovation is creating a new paradigm. It's not getting better at playing the same game; it's changing the rules and changing the game. Innovation is not working harder; it's working smarter.

This poster proposes a model for innovation. It takes the form of a concept map, a series of terms and links forming propositions.

The model is built on the idea that innovation is about changing paradigms. The model situates innovation between two conventions. Innovation transforms old into new. It is a process—a process in which insight inspires change and creates value.

The process begins when external pressure or internal decay disturbs the relation between a community and its context, a relation maintained by a convention.

The existing convention no longer "fits." Perhaps the context changed. Or the community. Or even the convention. Someone notices the misfit. It causes stress. It creates enough friction, enough pain, to jump into people's consciousness. Perception of misfit almost simultaneously gives rise to proposals for change, for reframing. These proposals compete for attention. Most fail to inspire, are ignored, and fade away.

The changes that survive are by definition those a community finds effective. They spread because they increase fit (gain) and lower pain or cost (delivering value).

We rarely recognize innovation while it's happening. Instead, innovation is often a label applied after the fact, when its value is clear and a new convention has become established.

Ethnography and other research techniques may help identify opportunities for innovation. Design methods may increase the speed of generating and testing new ideas. But new ideas are still subject to natural selection (or natural destruction) in the political process or the marketplace.

Innovation remains messy. Even dangerous. Luck and chance, being at the right place at the right time, still play a role. But heightened sensitivity and persistent alertness may increase luck.

This model is not a recipe. At best it suggests ways to increase the probability of innovation. Our goal is for it to spur discussion. Our hope is that increased understanding will spur innovation and increase the greater good.

community$_1$

A community is a system of people who interact within an agreed set of rules—conventions.

Typically, members of a community share a common location or common interests. They may be related by birth or may come together for social or business reasons. Communities rely on individuals to provide the variety necessary for survival—to share perspective, insight, ideas, and inspiration.

Over time, new members join and existing members depart. These changes can affect the conventions the community keeps.

agrees on & is shaped by

may fail to recognize

pressure (external)
decay (internal)

Entropy always increases.
Resisting entropy requires energy and variety.
Inevitably, both are limited.

pose long-term threats to any

inevitably lead to

convention$_1$

Every convention exists within a community.

A convention establishes a relation between a community and its context. It defines a way the community expects its members to behave in a given situation. It prescribes the tools they can use, even what they can think.

Every innovation has a precedent in a previous convention.

maintains relationship to

each faces

change (disturbance)

Pressure from outside or decay inside changes the relationship between a community and its context. That relationship—formalized as a convention—is no longer comfortable, no longer a fit.

A disturbance upsets an existing convention.
This is a root cause of innovation.

A disturbance has variety of its own.
Unless a community has corresponding variety to cancel it, the variety in a disturbance will overwhelm the community.
Variety cancels variety.

is imbalance in relations among

disturbs relations creating

creative destruction
(unplanned consequences)

Conventions exist in a web of culture. Innovation in one place affects related conventions and may reduce their "fit." Fostering further innovation. As the cycle continues, second- or third-order or indirect effects are not knowable in advance. Results can be surprising and consequences unintended.

Joseph Schumpeter describes creative destruction as "the process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one."

if strong, raise calls for efficiency, dangerously reducing

context$_1$
(environment)

Every community exists within a context.

Context is the environment in which a community lives. To survive, a community must have a stable relationship with its environment. Maintaining that stable relationship is the purpose of conventions.

can be superseded by

misfit (pain)

A misfit arises when a convention no longer maintains a desired relation between a community and its context.

Misfit manifests itself as pain. It exacts a cost—physical, mental, social, or financial—on members of the community.

that is large enough gains

increases the likelihood of

variety
(experiences)

W. Ross Ashby describes variety as a measure of information. Variety describes a system's potential to respond to disturbances—the options it has available. Applied to communities, variety describes the experiences—the richness of language and range of cultural tools—they can bring to bear on problems.

In a stable environment, increasing efficiency makes sense. Do what you've been doing, but do it better and at a lower cost. That means narrowing language—decreasing variety.

In an unstable environment, pursuing efficiency may actually be dangerous. You may get better at doing the wrong thing—at doing something that no longer matters.

The key is to make sure what you produce is valuable, before you worry about making it more efficiently. Increasing effectiveness calls for increasing variety—changing perspective, bringing new people, new experience, and new language into the conversation and expanding the field of action.

possess

recognition (definition)

Recognition of misfit comes from observation and experience.
Research methods—such as ethnography—help.

But identifying a problem requires definition.
Definitions are constructed—agreed to.
They have constituencies.
Thus, definition is a political act, an exercise of power.

frames possibilities for

learning process
(refining goals)

Testing a prototype may raise questions about the framing of a problem or definition of goals. Reframing or refining opens the possibility to trying other approaches.

innovation requires

Each innovation is a link between two conventions:
the one it replaces and the one it becomes.
An innovation is a pivot; it transforms one period into the next.

preparation aids
(immersion)

Some organizations have processes by which their members build (or buy) new ideas at a small scale. The organizations vet (or select or destroy) ideas, moving a few to the next stage. They "incubate" new ideas in "hothouses" long enough to launch them into the world. Examples include (perhaps most notably) Royal Dutch Shell, some religions (such as Catholicism), venture capital firms, and technology companies such as Google.

Some communities (some ecologies) seem to have the variety and structures needed to raise the probability of innovation (within certain domains). For example, Silicon Valley, Route 128 around Boston, Austin, Research Triangle, and Seattle all currently enjoy this advantage.

as it diffuses becomes

(a bit of luck)

insight (seeing opportunity)

Insight begins a process of restoring fit. Insight remains the most mysterious part of the innovation process. It may be irreducible, but it can be aided. Immersion within the context is almost always essential. Experience with other domains helps (by increasing variety). For example, applying patterns from other domains can help solve new problems. This is the promise of Genrich Altshuller's system known as TRIZ.

Insight is a type of hypothesis, a form of abduction.
Insight may come from juxtaposition and pattern matching.

György Polya suggests asking:
What is the unknown?
What are the data?
What is the condition? (What are the constraints?)
What is the connection between data and unknown?
What is a related problem?
How could you restate the problem?
What could you draw to represent the problem?

design process
(artificial evolution)

Natural destruction (i. e., discarding poorly performing variations) is the second mechanism of evolution—and design.

comes from

individuals drive

Individuals who are prepared to innovate possess:

Optimism
Belief they can improve the world
Openness to change
Confidence to make it so
Tenacity, persistence to see it through
Passion, desire, even obsession

Variety
Experience, skill, and talent
Domain expertise
Knowledge of other domains
Understanding of the process
Methods and techniques
Management, rhetorical, and political skills
Practice (Doing it a few times helps.)

They also know what is not known but necessary for progress; they understand how to find it; and they recognize who can provide that knowledge.

must be shared through

articulation (prototyping)

For insight to matter, it must be articulated—given form.

It might be a
Hypothesis
Model or diagram
Outline
Script or story
Sketch
Mock-up
Prototype
Pilot

simple iteration
(trial & error)

Creating variation is the first mechanism of evolution—and design.

helps improve

that fails may lead to new

may prompt a new

may create a multiplier effect leading to more

motivates

benefit from (increase efficiency by) sharing skills within a

commu

must be proved through

demonstration (testing)

No innovation arises fully formed.

Articulation provides a means of sharing an insight.
Demonstration proves (or disproves) the insight's value.
Demonstration provides a basis for adoption;
it is a key to creating change.

Demonstration enables evaluation.
Testing discloses errors, increases understanding, and provides a basis for improvement.

Iteration is always necessary.

community$_2$

Of course, the convention resulting from a successful innovation differs from the convention that preceded it. Likewise, the community that exists after an innovation is likely to have changed from the community that preceded it. The context, too, is likely to have changed beyond the change which created the misfit leading to an innovation.

agrees on & is shaped by

evaluates

preserves status quo by resisting

convention$_2$

creates new

maintains relationship to

is balance in relations among

reduces risk, encouraging

adoption (counter-change)

The scale of change varies.
Many people have proposed models, for example:

Michael Geoghegan:
- Recognizing a new domain of invention
- Creating new opportunities for discovery within the domain
- Improving the efficiency with which the discoveries are applied

Horst Rittel:
- Simple problems, where the goal is defined
- Complex problems, where the goal remains unclear
- Wicked problems, where constituents cannot agree on the goal

Parrish Hanna:
- Tactical or incremental
- Strategic or punctuated
- Cultural or process-oriented

leads to new

beliefs

may lead to

actions

may lead to

artifacts

all deliver

is a measure of propensity for

reforms relations creating

fit (gain)

is reflected as increased

value

Dubberly Design Office prepared this concept map as a project of the Institute for the Creative Process at the Alberta College of Art and Design. The Institute exists to focus and organize activities, enterprises, and initiatives of ACAD with regard to the cultivation of dialogue, research, and special projects that directly address the nature of the creative process and design thinking. ACAD is a leading centre for education and research, and a catalyst for creative inquiry and cultural development.

Please send comments about this model to icp@acad.ca

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