Introducing

Macroinnovation[SM]

A Brief Tutorial on Knowledge Management And Business Innovation

Presented By Mark W. McElroy
President, Macroinnovation Associates, LLC
www.macroinnovation.com

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Today's Agenda

- A Brief History of Knowledge Management
- A Brief History of Business Innovation
  – Microinnovation
- The New Science of Chaos and Complexity Theory And Its Influence on Business Innovation
  – Macroinnovation
- Appendix

A Brief History of Knowledge Management

How to become a millionaire!

"First, get a million dollars, then..........."

Comedian, Steve Martin

How to manage knowledge!

"First, find some valuable knowledge, then……(manage it)"

Conventional (1st Generation) KM Dogma

Thus, KM has been largely about *"getting the right information to the right people at the right time."*

<u>Question</u>:

But where does *“valuable organizational knowledge”* come from in the first place?

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Answer:

Individuals, *collaborating in groups*, create it!

Gives Rise to the Distinction Between:

- *Supply*-Side KM
- *Demand*-Side KM

Supply-Side KM

- Focus is on "supplying" the *right information to the right people at the right time*
- Emphasizes *knowledge sharing* from a top-down perspective
- Usually *technology-centric* in its orientation (capture, codify and share Knowledge)

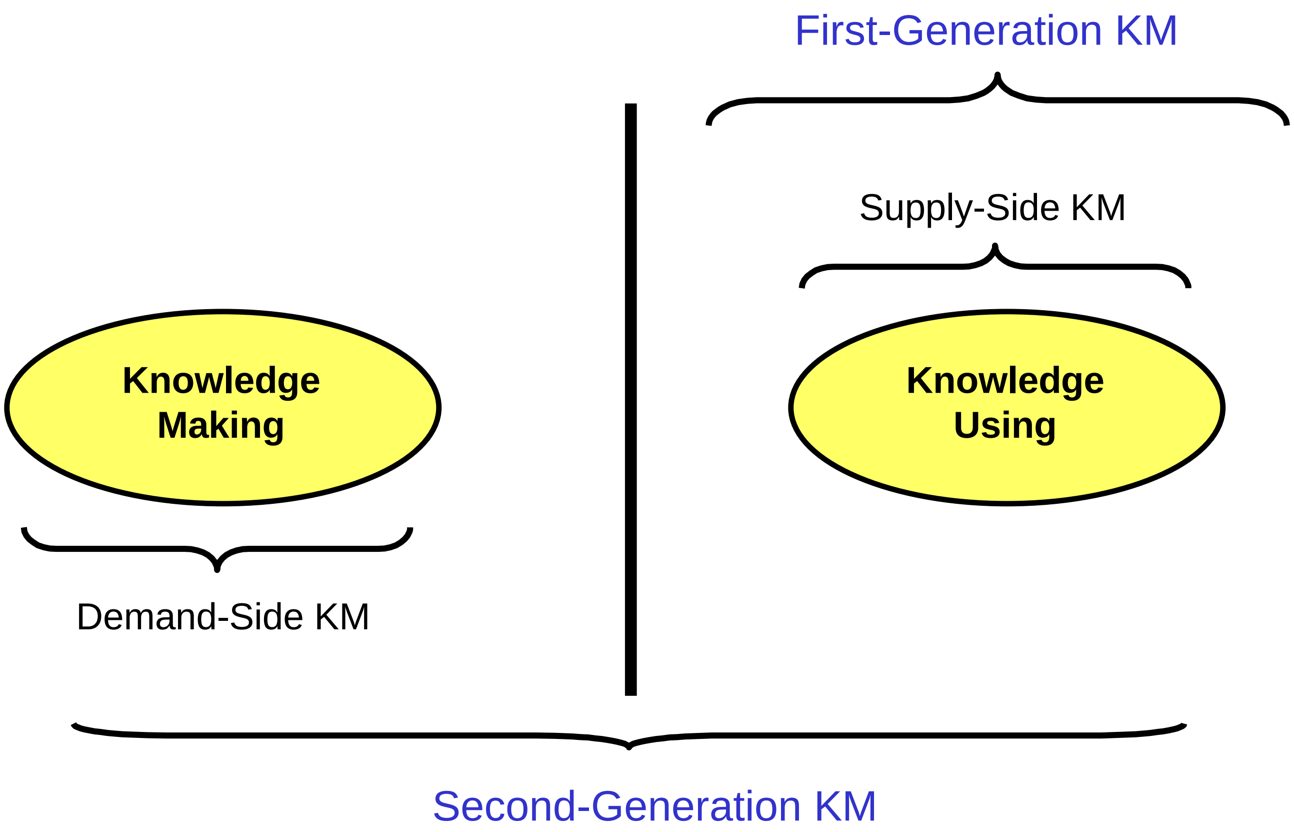
Demand-Side KM

- Focus is on satisfying organizational demand for *the production of new knowledge*
- Emphasizes *knowledge creation* from a bottom-up perspective
- Usually *people and process-centric* in its orientation (collaboration, organiza-tional learning and innovation)

First- vs. Second-Generation KM in a Nutshell

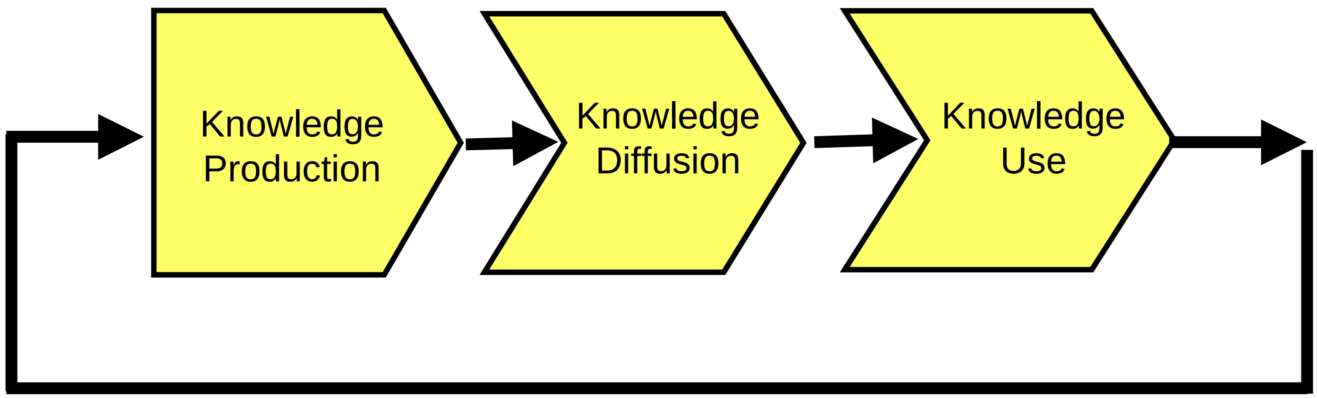
- 1st-Generation KM = *supply-side* only
- 2nd-Generation KM = a more balanced approach; *supply- AND demand-side* perspectives both seen as important

The Two Sides of Knowledge Management



A Life-Cycle View Emerges

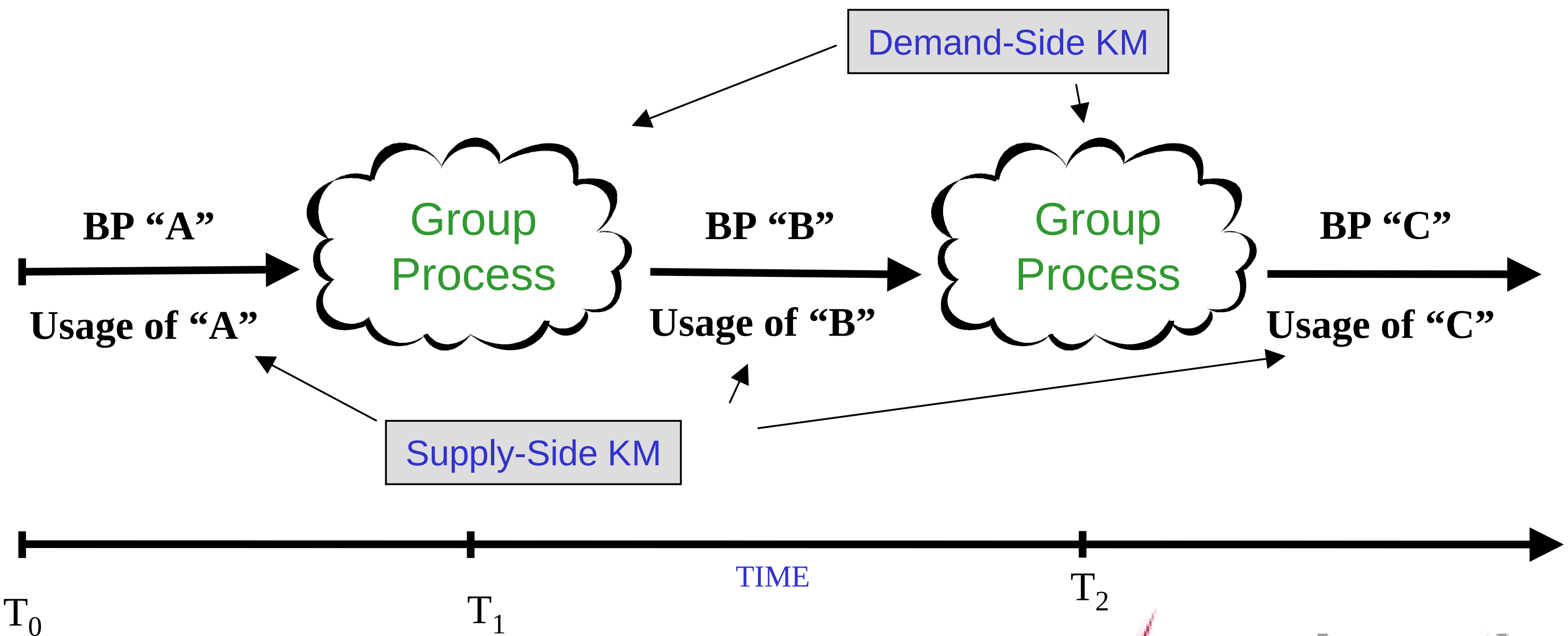
The Knowledge Life Cycle



Experiential Feedback Loop (Organizational Learning)

Example: *Business Processes*

Business processes are nothing more than *codified procedural knowledge* that people collaborating in groups co-create:



Some Other Forms of Organizational Knowledge That People Co-Create

- Business Processes
- Business Strategies
- Organizational Models
- Policies and Procedures
- Products and Services
- Customer Knowledge
- Culture and Values
- Information Systems (and other knowledge artifacts)

All are examples of organizational knowledge domains that are fed by internal knowledge-making processes

Some Important Conclusions:

- Organizations don't just use knowledge, *they create it!*
- Supply-side initiatives important, but why stop there?
- KM strategies should be crafted accordingly

A Brief History of Business Innovation

- Microinnovation

First, Let's Agree On A Definition For *Innovation*

- Dictionary:

  1. the process of making changes; 2. a new method, custom, device, etc."

- Real World:
  - 1. Discontinuous or disruptive change; a sharp break from prevailing practice or a dominant design. Contrast with continuous or incremental improvement
  - 2. The complete life cycle of knowledge encompassing production, diffusion and use; a social process, by definition, since diffusion and use are organizational in scope. Contrast with invention or ideation, which are included in the innovation life cycle but which do not encompass validation, diffusion and use.

- Our Definition:

  A social process by which organizational knowledge is produced, diffused and used within a culture. A social process!

People don't innovate…organizations do!

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The Evolution of R&D

- Four Clearly-Defined "Generations"*
  - 1st-Gen: Laboratories managed by scientists (e.g., Thomas Edison and GE)
  - 2nd-Gen: Labs led by corporate managers; business-focused; project-managed
  - 3rd-Gen: Portfolio and risk management techniques applied (high/low risks balanced)
  - 4th-Gen: "What is now required is a business process focused on innovation rather than a business structure focused on R&D."*

*Source: "Fourth Generation R&D" by W. Miller & L. Morris, 1999

State-of-The-Art R&D in The 21st Century

"..no single department -- including R&D itself -- has the full knowledge needed to carry out the responsibility for innovation, which is now obviously an activity involving the entire organization and extending to include suppliers, customers, and other external partners as well."

W. Miller & L. Morris, "Fourth Generation R&D" (1999)

"Whereas invention occurs apparently and unpredictably at random, innovation is manageable as a business process -- and must be managed."

W. Miller & L. Morris, "Fourth Generation R&D" (1999)

While the *business of business innovation* is, perhaps, becoming less compartmentalized than it used to be, it has certainly become no less reductionist in its approach to the subject.

Other Contemporary Approaches

- Kaizen Technique (Japanese Manufacturing Improvement Technique)
  - Commonly practiced in manufacturing environments
  - Focus is on incremental improvement, not innovation, per se
- "UTIS" (NTELLECK, Inc.)
  - "Unified Structured Inventive Thinking, How to Invent"; E. N. Sickafus, Ford Motor Co.
  - Based on TRIZ method developed by Genrich Altshuller of Russia in '40s
  - A structured approach to innovation based on problem-solving patterns in creative endeavors
  - Widely used in corporate world (e.g., Ford Motor Co., Motorola, Intel)
  - Object-oriented problem solving syntax

(Continued)

Other Approaches (Continued)

- "Inventive Templates" (J. Goldenberg, D. Mazursky and S. Solomon)
  - Also based, in part, on Altshuller's TRIZ method
  - Defines "templates" as "...systematic changes between an early configuration (i.e., previous product version) and the one that follows it (i.e., the next product version)." -- *product-based innovation*
  - Identifies five (5) recurring templates in 70% cases:

Template Name	Incidence in Multiple Studies
Attribute dependency	40%-68%
Component control	10%-30%
Replacement	<1%-19%
Displacement	1%-3%
Division	2%-4%

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Micro-Managing Innovation

- All methods to date have been reductionist in form:
  - treat knowledge production as a *directly manageable* affair
  - the responsibility of *hierarchical management* regimes
  - focused on *tools and techniques for use by specialists*
- A mechanistic process, not a social one

In sum, the *business of business innovation* has historically involved the development and use of hierarchical management methods for knowledge production, the practice of which can be thought of as micro-managed innovation or, microinnovation

The New Science of Chaos and Complexity Theory And Its Influence on Business Innovation

- Macroinnovation

A Crash Course in Complexity Theory

- The science of complexity is: "The quantitative study of unstable, aperiodic behavior in nonlinear, dynamical systems." *(Stephen H. Kellert, 1993)*
- Complexity, then, is the study of behavior… *organizational behavior*

- And the organizations of interest to us, i.e., those which exhibit complex behaviors, are referred to as "Complex Adaptive Systems"
- Complexity, then, is the study of behavior in complex adaptive systems (CAS)

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A Convergence of Ideas: Complex Adaptive Systems and *Learning Organizations*

- Human organizations, businesses in particular, are complex adaptive systems -- They survive by adapting and they adapt by learning

- *The Learning Organization*: An idea thrust into the mainstream by Peter Senge, author of *The Fifth Discipline*

Complex adaptive systems -- human and otherwise -- are "learning organizations." They learn continuously and they do so in the aggregate without any central planning or control.

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…..without any central planning or control!

- First, what is “learning” if not *knowledge production*?
  - – Learning, knowledge production, and innovation are three ways of saying the same thing
- The question becomes:

How do complex adaptive systems innovate?

CASes - The most successful learning organizations in the history of the planet! Perpetual innovators! How do they do it?

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What Can We Learn From Them?

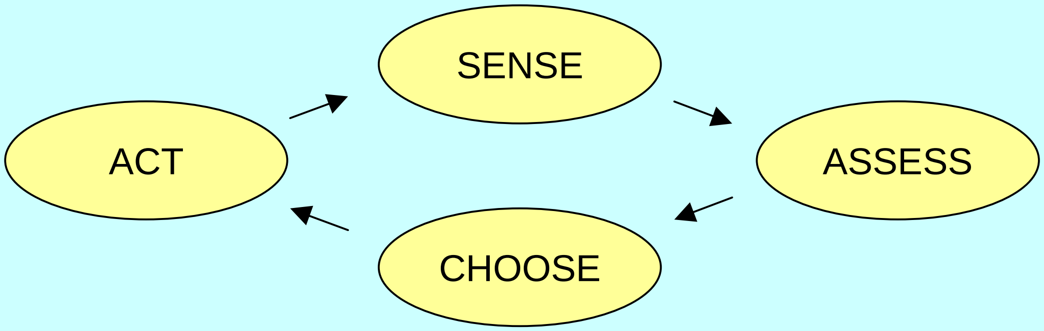
- First, they tend to self-organize into communities
- Second, their members are self-managed, free to act and learn independently and collectively
- Third, their collective behavior is “complex”; not managed from the top down, but emergent from the bottom up, mutually-created

Insight
1 of 3

World-class innovators are self-organized communities of interest whose members tend to learn independently and collectively and whose collective behaviors are emergent

What Else Can We Learn From Them?

- Learning tends to follow a pattern:



- Knowledge produced by individual members is freely shared with every other member

Insight
2 of 3

World-class innovators learn systematically and share what they know across the entire organization.

And What Else?

- Creativity and innovation increases proportionately with the diversity of their members
- Levels of learning and adaptiveness increase with the density of communication within the system

Insight 3 of 3

World-class innovators leverage the diversity of their members as a rich source of creativity and inventiveness. They, in turn, share the diversity of their knowledge across tightly-woven networks of connectivity to which all of their members are tied.

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Innovation Is a Function of Routines!

- World-class innovators:
  - Evoke new knowledge through self-directed individual learning and self-organized community formation
  - Systematically learn and share what they know on an organization-wide basis
  - Are diverse in composition and rich in connectivity

World-class innovators create new knowledge by leveraging the power of the whole system -- people don't innovate…organizations do!

Introducing Macroinnovation℠

- A *whole-system* approach to business innovation in which the business of business innovation is carried out by entire organizations, not just designated individuals or centralized groups
- A *policy-based* model in which the production of new knowledge is determined by the extent to which an organization's routines are oriented towards *collective innovation*

Macroinnovation’s Prescriptive Model

- An organization’s rate of innovation is a function of how well its knowledge-making policies are aligned with endemic routines
- Improving an organization’s rate or quality of innovation can be achieved by systematically transforming non-compliant policies and principles to the prescriptive model
- Think of it as shaping an organization’s knowledge operating system (KOS)

Macroinnovation's *KOS* Model

Aspects of KOS Culture

- Embryology (Of Knowledge)
  - Individual Learning
  - Community Formation
- Politics (Of Knowledge)
  - Knowledge Production
  - Knowledge Diffusion
  - Knowledge Use
  - Knowledge Entitlement

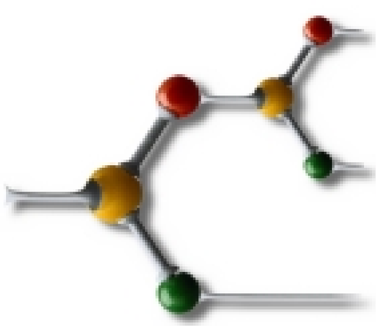
Target States

- Self-managed individual learning programs prevail and are supported by management; prescribed training programs are balanced with self-determined learning agendas
- Communities of interest self-organize without mgmt. direction or constraint
- Knowledge-making is carried out by self-organized communities of interest
- Policies and practices concerning knowledge production, diffusion and use ensure independence from authority structures, yet are tightly coupled to decision-making regimes
- Co-creators of new knowledge share equitably in its value

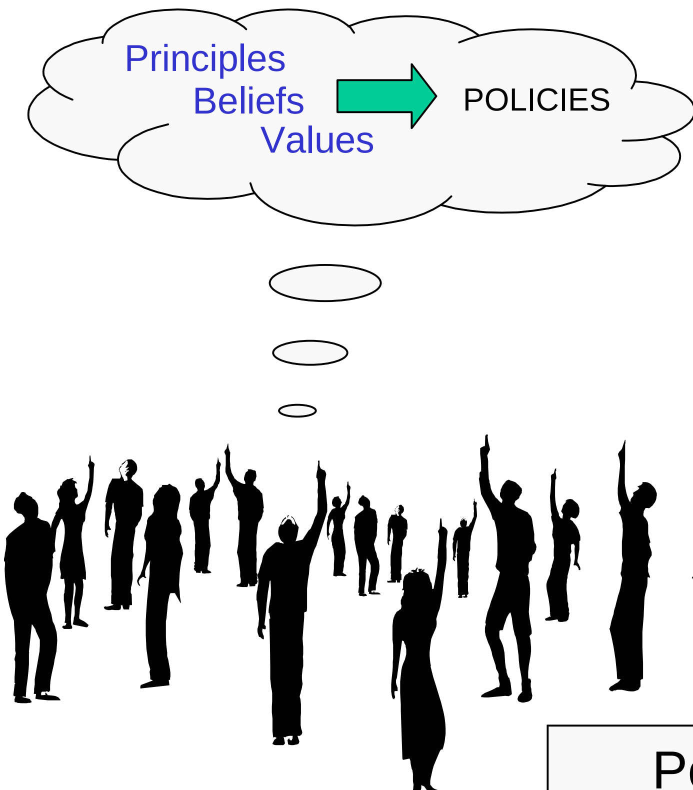
(Continued)

Macroinnovation's *KOS* Model (cont.)

Aspects of KOS Culture	Target States
• Diversity (Of Worldviews)	• Organization tends toward high degree of dispositional diversity in make-up, and also strives to stay that way
• Connectivity (Communications)	• Internal communications networks are dense with high volumes of information flow and feedback prevalent throughout



Culture Drives Policy & Behavior



Organizational Behavior

$$(P + EC) \times P = OB$$

People in the midst of environmental conditions, modified by their policies, produce organizational behavior

Policies are the best source of leverage because they reflect culture and drive practice!

Some Brief Examples

Macroinnovation Model	What Most Firms Do
Self-directed learning	Prescribed training
Self-organized communities	Functional compartments
Democratic organization-wide knowledge making	Centralized knowledge making by power regimes
Knowledge sharing (entitlements)	Knowledge hoarding and confiscation (IP agreements)
Diversity (well-rounded organizations)	Homogeneous, well-rounded individuals
Connectivity (dense com-munications networks)	Getting better at this

Macroinnovation In A Nutshell

- Macroinnovation is a management method for improving business innovation

- It differs from other so-called innovation management schemes in that its practice consists of direct interventions in social policy in areas related to how firms produce, diffuse and use their knowledge

- Of specific interest are four areas of organizational policy which combine to determine how well an organization creates an applies new knowledge: 1) Embryology, 2) Politics, Diversity and 3) Connectivity (i.e., an organization's "*knowledge operating system"*)

Macroinnovation: A Prescription For Sustainable Innovation!

"The only sustainable advantage in business is the ability to learn faster than your competitors."

Arie de Geus, Former Head of Planing, Royal Dutch Shell

"The only sustainable advantage in business is the ability to *learn sustainably* -- *w*ho cares how *fast* it is if it's not sustainable?"

Mark W. McElroy, Macroinnovation Associates, LLC

Remember, people don’t innovate…organizations do!

Appendix

The Macroinnovation℠ Method: *A 10-Step Process*

1. Discover and document make-up of current KOS in practice in four areas of interest (practices)
2. Discover and document principles held behind current KOS in 4 areas of interest (policies)
3. Baseline current and historical rate and quality of organizational innovation
4. Identify conflicts between current KOS and prescriptive model
5. Assess impact and level of effort required to resolve conflicts
6. Bootstrap prototypical "political system" using prescriptive Macroinnovation model
7. Customize bootstrapped political system by subjecting itself to its own knowledge production system
8. Subject embryological prescriptive policies to the customized political system
9. Subject remaining prescriptive policies to the customized political system
10. Develop and execute comprehensive implementation plan; periodically revisit rate and quality measurements; refine interventions as needed

- Identify principles
- Define policies
- Plan resources

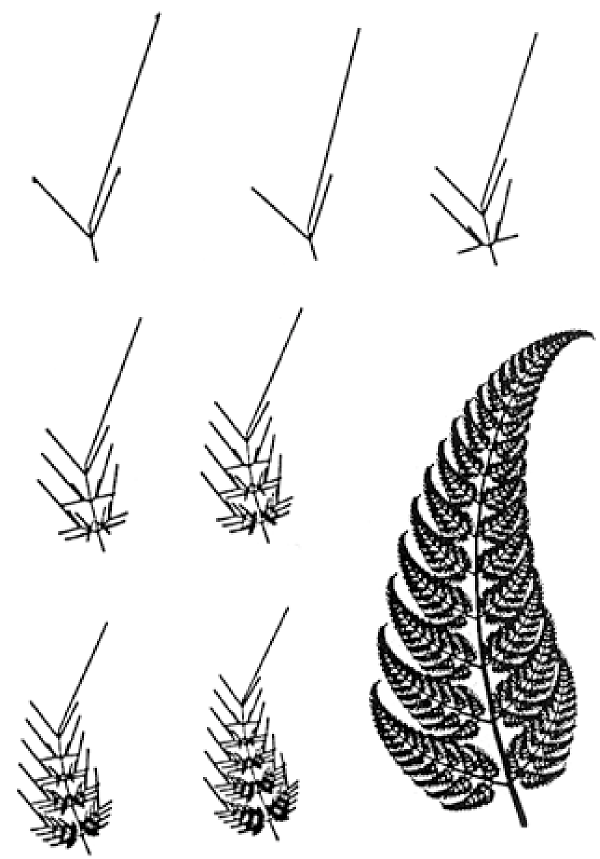
What's Up With The Ferns?

Some observers of the graphics used in this presentation will be wondering about my penchant for the use of ferns. If so, they will be pleased to learn, I hope, that there is indeed a method to my madness. One of the central themes behind the Macroinnovation concept is that knowledge-making is an organizational, not an individual, affair. Optimum organizational behavior is a function of what entire populations of individuals can create, not just the privileged few who might have formal authority to do so. Moreover, one cannot infer from the parts what the potential of the whole system will be. Only the whole system, left to its own devices, can produce its creative works.

A visual representation of this idea is beautifully provided in the form of fractals. To capitalize on this theme, I chose a fern fractal developed by Linda Garcia in her 1991 book, The Fractal Explorer (Dynamic Press, Santa Cruz), to serve as the basis of Macroinnovation's logo. Accordingly, the "root" stick, or twig, shown to the right in the upper-left is reflected in the company's logo design -- albeit, rotated ninety degrees to the right. By systematically building upon itself, this root twig evolves into a fully elaborated fern, the final shape and character of which cannot be inferred or deduced from an inspection of the root twig itself.

Garcia's fractal follows a few short rules. First, the root is free to repeat itself at any level of scale. Next, its repetitions must all "point" in the same direction. And finally, each iteration must physically connect with what has already been done. The result is truly an emergent group effort, something that none of the individual root twigs could have pulled off alone.

Mark W. McElroy



Source: L. Garcia, The Fractal Explorer (1991)