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Norwegian Research School in Innovation
NTNU – Trondheim
Norwegian University of Science and Technology

PIMS
Program in Innovation Management and Innovation Strategy
NTNU – Trondheim
Norwegian University of Science and Technology

Research on Innovation Processes
Class 1
Mapping the Innovation Journey

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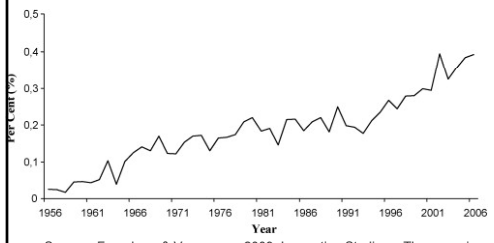
Overview of PhD Course on Research on Innovation Processes

Class	Topic	Readings & Assignments
1. Sept. 10 am	Mapping Innovation journey	IJ Chpts 1-2 & 8 or 10 Complete case form
2. Sept. 10 pm	Models of innovation process	Van de Ven & Poole, 1995 & examples
3. Sept. 11 am	Planning your innovation study	ES chpts 1 & 9 Complete worksheet
4. Sept. 11 pm	Central problems: executive session	Central Problems Breakdowns, ES C3
5. Sept. 12 am	Innovation question & theory	ES Chpt. 4Garud et al, AMJ 2002
6. Sept. 12 pm	Innovation research design	ES Chpts 6 & 7 Complete research design
7. Sept. 13 am	Communicating research findings	ES Chpts 8 & 9 Huff & Pratt papers

Class 1 Innovation Journey Agenda

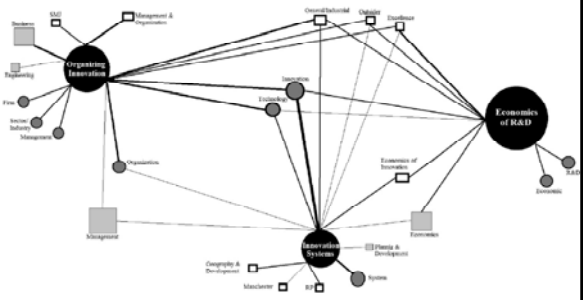
- Overview of Innovation research
- Definitions of Innovation
- Process question: How are innovations developed from concept to implementation or termination?
  i.e. What is the order & sequence of events?
  - At the individual project level
  - At organization level
  - At industry/infrastructure level

Social Science Articles with 'Innovation' In the title 1956-2006 (in percent of all social science articles)



Source: Fagerberg & Verspagen, 2009. Innovation Studies – The emerging Structure of a new scientific field. Research Polidy, 38, 2.

Innovation Literature Clusters



Source: Fagerberg, Fosaas, & Spprasert, 2012. Innovation: Exploring the knowledge base, Research Policy, 41:1142.

Innovation Clusters Over Time

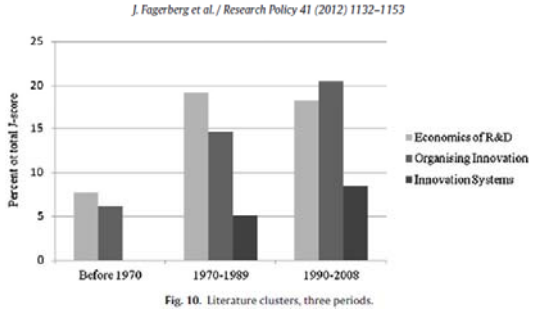
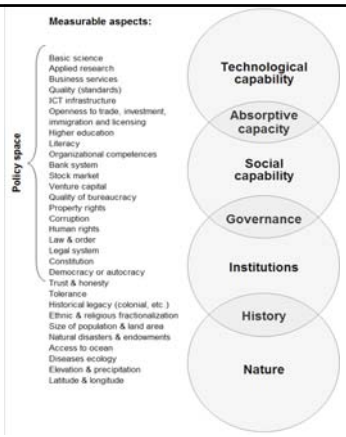
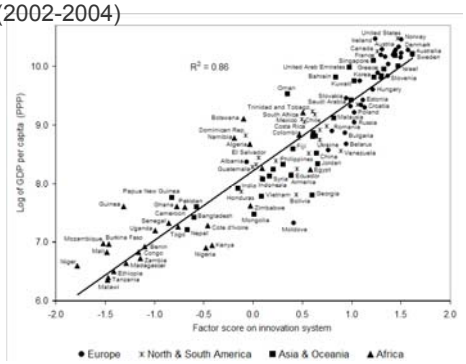


Fig. 10. Literature clusters, three periods.

National Innovation System Factors



GDP per capita and National Innovation System (2002-2004)

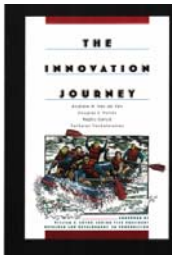


Fagerberg & Srholec, 2007. National innovation systems, capabilities and economic development, Centre for Technology, Innovation & Culture, Univ. of Oslo.

Some Definitions on Organizing Innovation

- Change – an observed difference over time in an entity
- Invention – when the change represents a new idea
- Innovation – The invention and implementation of a new idea.
- In each definition, the change (observed difference) may vary in:
  1. Time (duration, pace, momentum of key events)
  2. Newness (to an observer and the people involved)
  3. Magnitude (from small/incremental to large/radical)
  4. Complimentarity (relatedness to interdependent changes)
  5. Unit of analysis (a project, series or platform of projects)
  6. Level of analysis (individual, organization, industry, etc.)
  7. Assessments (good, bad, advocate, resist)
  8. Process (how above unfold over time)

Minnesota Innovation Research Program



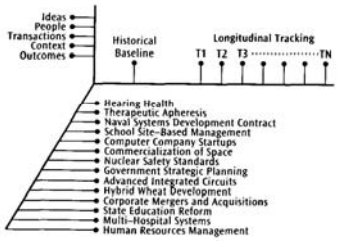
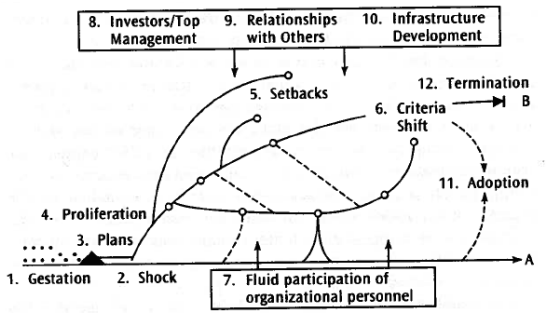


Figure 1.1 Minnesota Innovation Research Program

'Fireworks' Model of the Innovation Journey



Source: A. Van de Ven, D. Polley, R. Garud, and S. Venkataraman, The Innovation Journey, Oxford Univ. Press, 2008

Common Characteristics of the Innovation Journey

Initiation Period

1. Gestating chance events
2. Shocks trigger innovation efforts
3. Innovation team formed & funded based on plan

Developmental Period

4. Activities proliferate
5. Setbacks and mistakes occur
6. Innovation goals and criteria change
7. Innovation personnel part time and turnover
8. Leadership involved and shift roles
9. Lock-in to developmental paths & relationships
10. Building innovation infrastructure

Implementation/Termination Period

11. Linking "new" with "old" and reinvention
12. Innovations stop when implemented or money runs out

Source: Van de Ven et al. The Innovation Journey. NY: Oxford Univ. Press, 1999, pp. 23-24.

How did the following occur in your innovation case?

Initiation Period	
1. Gestating chance events	
2. Shocks trigger innovation efforts	
3. Innovation team formed & funded based on plan	
Developmental Period	
4. Activities proliferate	
5. Setbacks and mistakes occur	
6. Innovation goals and criteria change	
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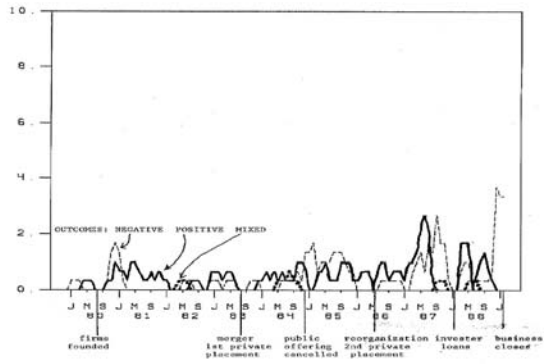
Group Discussions of Innovation Journeys

- Briefly introduce yourself and your innovation case
- Which of 12 characteristics did your NOT experience?
- What OTHER characteristic did you experience?

Obstacles During Development Period

- People often temporary, inexperienced, & turnover
  - Creates freshness, but loss of memory
- Setbacks often occur; do not trigger learning
  - Activities proliferate, goals change
  - Mixed & uncertain performance information
- Lock-in to developmental paths & relationships
  - Resistance to renegotiating contracts
- Over-optimism & Impression Management
  - Administrative reviews poor substitute for market test
- Learning opportunities avoided; Future trials denied

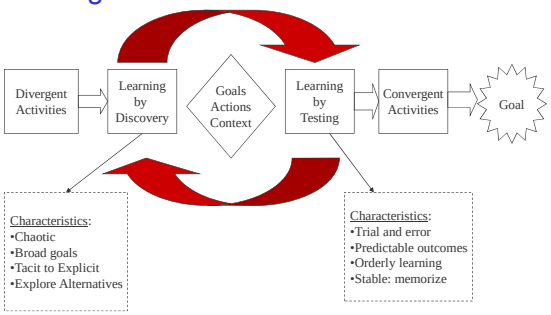
Mixed Outcomes during Innovation Journey



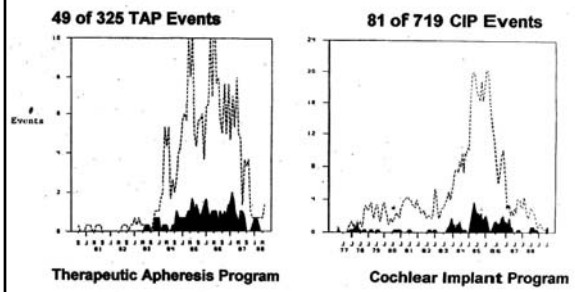
Learning the Innovation Journey

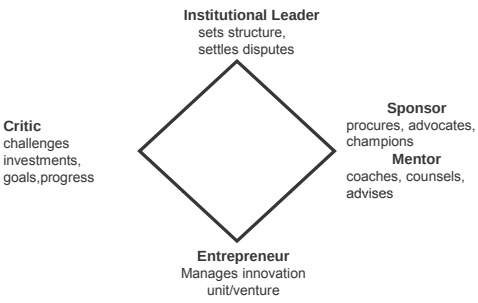
Actions = net monthly # events in which innovation unit continued with minus change its course of
Outcomes = net monthly events of positive minus negative otcomes from events
Plots are three-month moving averages

Model of Learning by Discovery & Testing



Number of Events Involving Top Managers During Development of TAP an CIP Innovations

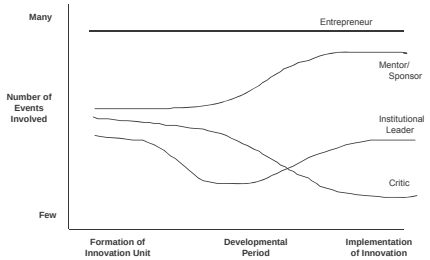




Leadership Roles in Innovation Development

Proposition on Balance & Timing of Innovation Leadership Roles

Organizational learning & adaptability increase when leader roles are exercised as follows during the innovation development journey

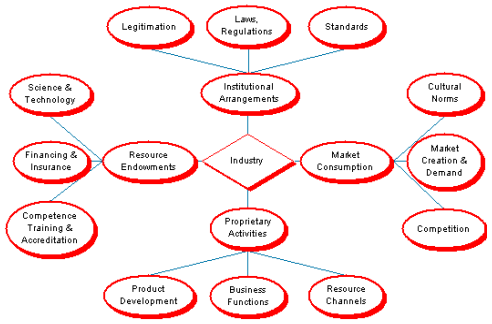


A Leadership Model for Innovation Journey

- View leadership as a role, not as a person
- Balance different roles & shift between them: sponsor, mentor, critic, institutional roles
- Key leader skills: negotiation, conflict resolution & partisan mutual adjustment

Innovation success increases when the dimensionality of leadership matches the dimensionality of the tasks undertaken.

Industry Infrastructure for Innovation



Adapted from A. H. Van de Ven and R. Garud, "A Framework for Understanding the Emergence of New Industries," Research on Technological Innovation Management and Policy, 4: 295-325..

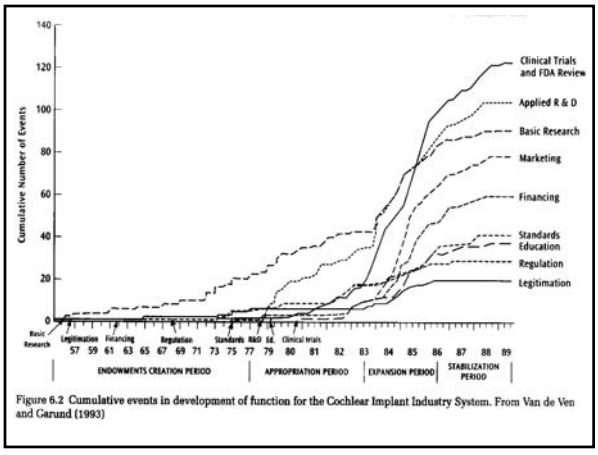


Figure 6.2 Cumulative events in development of function for the Cochlear Implant Industry System. From Van de Ven and Garund (1993)

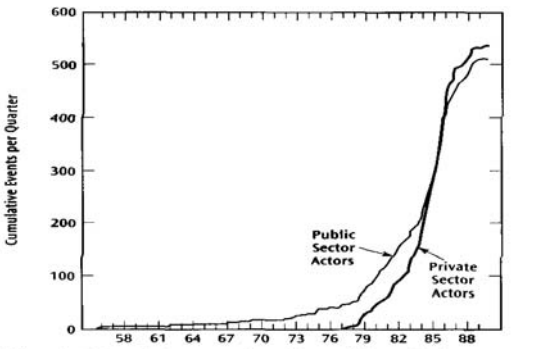


Figure 6.3 Cumulative events involving public- and private-sector actors. From Van de Ven and Garund (1993)

Participants are Distributed, Partisan & Embedded

- Distributed: Different actors play key roles
  - No single actor controls any developmental path
- Partisan: Actors participate from own frames
  - Interests of producers, regulators, investors, etc. are not the same
  - Solutions through partisan mutual adjustment and social movements
- Embedded: Actors become dependent on paths they create.
  - Many opportunities for learning & escalation

Those who "run in packs" will be more successful than those who go it alone

Innovation is a collective achievement.

- No single actor can do it alone.
- Knowledge distributed in different people & places
- Innovation costs exceed proprietary benefits.


The Peloton

The crash

- Stuff happens!
- Falling out of line
- Being ostracized

The breakaway

When "run in a pack?"

When "go it alone?"

First-mover advantages/disadvantages

- *The technical design of the first-mover seldom becomes the dominant design that yields the greatest profits.*

Strategic Questions for Innovators

1. **What components of the infrastructure help and hinder innovation progress?**
2. **What actors are involved in each component?**
3. **In what components should a firm play a role?**

These decisions have strategic implications:

"The world is run by those who show up." …and it usually favors the ones who are involved and politically savvy.

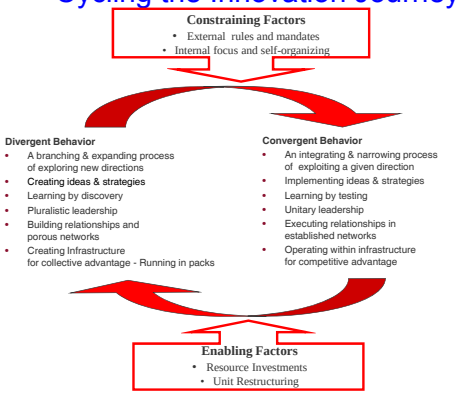
Overall Dynamic of Innovation Journey

Finding: The innovation journey is not sequential and orderly, nor random; instead, it is a nonlinear dynamic cycle of divergent & convergent activities that repeat over time and across levels if enabling & constraining conditions are present.

Implications:

- Go with the flow -- You cannot control it, but you can learn to maneuver the journey.
- Enabling & constraining factors set innovation scope.
- Develop ambidextrous management skills.
- Multi-dimensional leadership - balance opposites

Cycling the Innovation Journey



Source: Van de Ven et al., *The Innovation Journey.* New York: Oxford Univ. Press. 2008, p. 185.

Your thoughts, please

Thank You!

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The Victor

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Class 2. Research on Innovation Processes: Innovation Models

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Class 2 Innovation Models Agenda

- Why did your innovation process unfold as it did?
  - Theoretical explanations of innovation process
- Models of organization innovation and change
  - Teleology (planned change)
  - Life Cycle (regulated change)
  - Conflict (dialectical change)
  - Competition (evolutionary change
  - Interactions among models
- Models as research guides

What explains this innovation journey?

Initiation Period

1. Gestating chance events
2. Shocks trigger innovation efforts
3. Innovation team formed & funded based on plan

Developmental Period

4. Activities proliferate
5. Setbacks and mistakes occur
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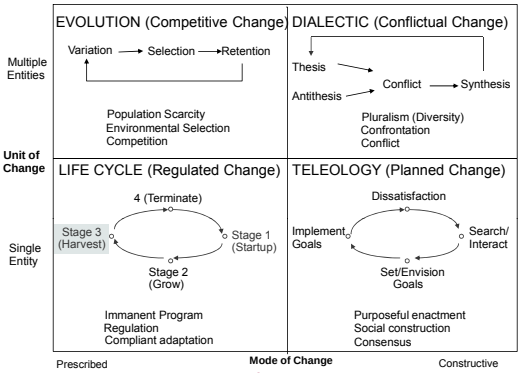
Implementation/Termination Period

11. Linking "new" with "old" and reinvention
12. Innovations stop when implemented or money runs out

Source: Van de Ven et al. The Innovation Journey. NY: Oxford Univ. Press, 1999, pp. 23-24.

Key Questions for Team Discussions

1. Explain WHY your case unfolded as it did.
2. What triggered the process?
3. What guided the development process?
4. Why did it end the way it did?



Process Models of Organization Change

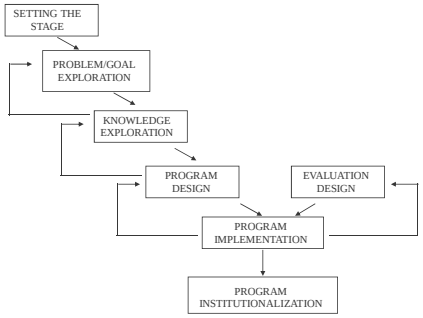
Note: Arrows on lines represent likely sequences among events, not causation between events.
Source: Van de Ven & Poole, *Explaining Development and Change in Organizations*, AMR, 1995.

Example of Planned Change: Kotter Model

1. Establish a sense or urgency
2. Form a powerful guiding coalition to work as a team
3. Create a goal or vision to direct the change effort
4. Communicate the new vision to people
5. Empower others to act on the vision & get rid of obstacles
6. Plan/create short-term wins or performance improvements
7. Consolidate & continue improvements by hiring, promoting & developing employees who implement the vision
8. Institutionalize the change by showing the connections between new behaviors and corporate success.

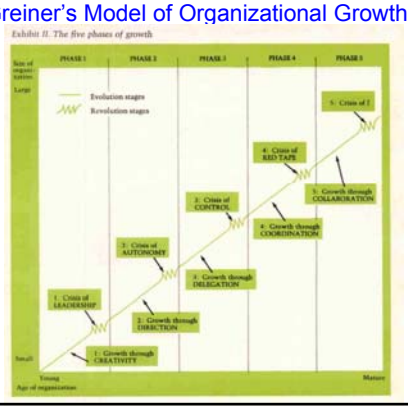
Source: John P. Kotter, Leading Change: Why Transformation Efforts Fail, *Harvard Business Review*, 1995, pp. 59-67.

Example of Planned Change: The PPM



Source: A. Delbecq, A. Van de Ven, and D. Gustafson, *Group Techniques for Program Planning: A Guide to Nominal Group and Delphi Processes*, Glenview, IL: Scott, Foresman and Company, 1975.

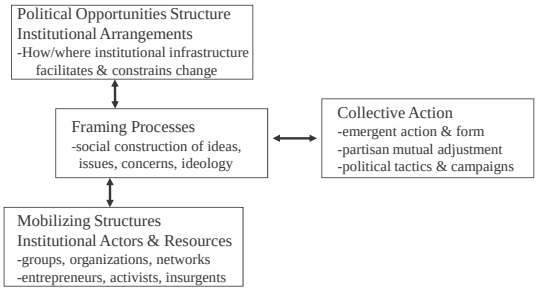
Example of Life Cycle & Dialectical Change: Greiner's Model of Organizational Growth



Example of Evolutionary Change: Miner's Model of Evolutionary Change

Variation	*Selection*	*Retention*
1. Institutionalized experimentation a. Research and development b. Champion and entrepreneurial roles c. Some total quality experiments d. Parallel projects	1. Goals	1. Active controls a. Budgets b. Information systems c. Audits
2. Direct and indirect incentives a. Innovation norms b. Professional individual incentives c. Material individual incentives value d. Equity interests	2. Values	2. Formalization a. Rules b. Job descriptions c. Procedures d. Research protocols
3. Playfulness a. Informality b. Skunkworks c. Slack resources	3. Project criteria	3. Social values
	4. Project checkpoints	
	5. Competition a. Shoot-outs b. Managerial competition for resources	

Collective Action Model of Social Movements



Doug McAdam, John McCarthy, and Mayer Zald (eds.), *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures and Cultural Framings*, NY: Cambridge Univ. Press, 1996

Innovation as Social Movements

- If innovation is a social movement, pay attention to:
  - Political structure, mobilizing actors & framing processes
  - Collective action: conflict, power & political strategies
  - Dialectics of thesis, antithesis & synthesis
- Politically-savvy innovators may outperform technically-savvy innovators.
  - Technical savvy is necessary but not sufficient; also need political savvy
- Innovators who "run in packs" will be more successful than those that go it alone.
  - the liability of unconnectedness (Baum & Oliver, 1992)

Usher's Model of Partial Cumulative Synthesis

For an Individual

Stage 1: perception of incomplete pattern

Stage 2: Setting the stage

Stage 3: Act of insight

Stage 4: Critical revision & mastery of new pattern

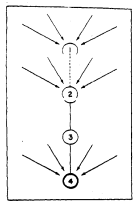


Fig. 7. The emergence of novelty in the act of insight: synthesis of familiar items: 1, perception of an incomplete pattern; 2, the setting of the stage; 3, the act of insight; 4, critical revision and full mastery of the new pattern.

For all individuals

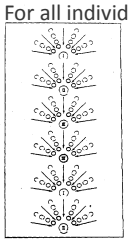


Fig. 8. The process of cumulative synthesis. A full cycle of strategic invention, and part of a second cycle. Large figures I–IV represents steps in the development of a strategic invention. Small figures represent individual elements of novelty. Arrows represent familiar elements included in the new synthesis.

Source: A. P. Usher, A History of Mechanical Inventions, Harvard Univ. Press, 1929, 1954

Models of Organizational Change

	Teleology Planned Change	Life Cycle Regulated Change	Dialectic Conflictual Change	Evolution Competitive Change
Example	Program Planning Model	Greiner's model of organizational growth	Political action models of change & protest	Miner's managerial model of evolution
Process cycle	Dissatisfaction, search, goal setting, & implementation	prescribed sequence of stages of development	Confrontation, conflict & synthesis between opposing interests	Variation, selection & retention among competing units
Triggering force	Social construction of desired end state	Prefigured program regulated by nature, logic or rules	Conflict between opposing forces	Competition for scarce resources
Key metaphor	Purposeful cooperation	Organic growth	Opposition, conflict	Competitive survival
Process failures	Decision Biases, Lack of consensus Group think	Resistance to change noncompliance Monitoring & control	Destructive conflict Irresolvable differences	Requisite variety Lack of scarcity
Process remedies	Critical thinking Rational decisions Consensus building	Obtaining 'buy in' Internalizing mandates	Negotiation skills Partisan mutual adjustment	Strategies for competitive advantage

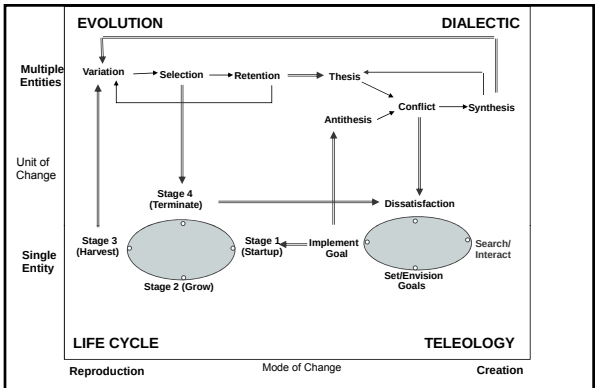


Figure 2. Interplays of Process Theories of Organizational Development and Change

Note: Arrows on lines represent likely sequences among events, not causation between events.

Your thoughts, please

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Research on Innovation Processes
Class 3
Engaged Research Methods

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Class 3 Innovation Research Methods Agenda

- Engaged Scholarship Model for conducting research
- Key questions in your research study worksheet:
  - What is your research problem and question?
  - What is your proposed answer (or theory)?
  - How will you empirically study your proposal?
  - How will you communicate and use study findings?
- Small group discussions and presentations

The Gap Between Science & Practice

- A dual challenge
  - Academics: put your theories into practice!
  - Managers: put your practice into theory!
- Addressed three ways
  - A knowledge transfer problem
  - Science & practice different kinds of knowledge
  - A knowledge production problem
- How do we make research useful for theory and practice?
  - Relevant and rigorous for whom?

Viewing the gap as… a knowledge production problem

If the duty of the intellectual in society is to make a difference, the [academic] research community has a long way to go to realize its potential.

The action steps to resolve the old dichotomy of theory and practice were often portrayed with the minimalist request for researchers to engage with practitioners through more accessible dissemination.

But dissemination is too late if the wrong questions have been asked. A wider and deeper form of engagement between researchers and practitioners is needed to co-produce knowledge.

Andrew Pettigrew,

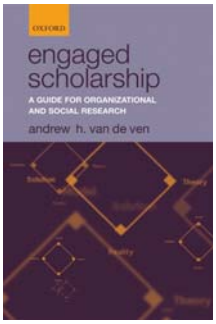
"Management Research After Modernism," *British Journal of Management*, 2001, vol. 12, iss. SPI/1, pp. S61-S70

Engaged Scholarship

- A **participative form of inquiry** where researchers involve others and leverage their different perspectives to learn about a problem domain.
- An **identity** of how scholars define their relationships with their communities and their subject matter.
  - > Other academics, practitioners, students
- A **relationship** involving negotiation, mutual respect, and collaboration to produce a learning community.
- Studying complex problems ***with*** and/or ***for*** practitioners and other stakeholders
  - > Many ways to practice engaged scholarship

Engaged Scholarship: A Guide for Organizational and Social Research

Andrew H. Van de Ven, (Oxford Univ. Press, 2007)



Book Chapters

1. Engaged Scholarship in a Professional School
2. Philosophy of Science
3. Problem Formulation
4. Theory Building
5. Process and Variance Models
6. Designing Variance Studies
7. Designing Process Studies
8. Communicating & Using Research Knowledge
9. Practicing Engaged Scholarship

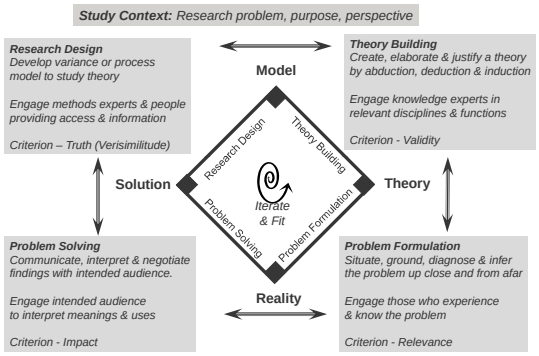
See Web page at http://umn.edu/~avandeve
Click Teaching - MGMT 8101: book chapters in weekly reading assignments

Key Proposal for Engaged Scholarship

Claim: We can increase the likelihood of advancing knowledge for science and profession by interacting with stakeholders in four steps of any study

1. Formulate a big problem/question grounded in reality.
2. Develop alternative theories to address the question.
3. Collect evidence to examine the theories.
4. Apply findings to address the problem/question.

Engaged Scholarship Diamond Model



Alternative Forms of Engaged Scholarship

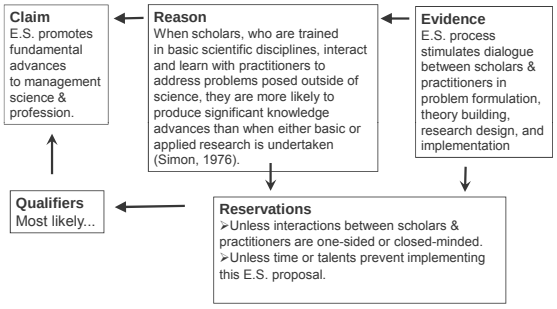
Research Question/Purpose

Research Perspective	To Describe/Explain	To Design/Intervene
Detached Outside	Basic Science With Stakeholder Advice (1)	Policy/Design Science Evaluation Research For Professional Practice (3)
Attached Inside	Co-Produce Knowledge With Collaborators (2)	Action/Intervention Research For a Client (4)

Challenges in Practicing Engaged Scholarship

1. A fast track to contributions & promotion
2. It's about the problem and question
3. Mode of inquiry
4. Triangulation strategy
5. Research *with* and/or *for* whom?
6. Being reflexive
7. Spending time in the field
8. Limits of engagement
9. Study size and scope

Summary of Argument for Engaged Scholarship (ES)



Five Key Research Questions

1. **What is your research problem and question?**
   - Address who? what? where? when? why? & how? the problem exists up close & from afar
2. **What is your proposed answer to the research question?**
   - Is your answer any better than the status quo or a competing plausible alternative answer?
3. **How will you design research to study your answer?**
   - Outline of variance or process research design.
4. **How will you communicate and use study findings?**
   - How communicate, interpret & use findings with intended audience?
5. **What/Who's perspective will you take?**
   - For whom and with whom are you conducting the study?
   - Who's point of view will you take to conduct the study?
   - Who are the users and audience of your study?
   - Who will you engage to answer these questions?
     - **Don't go it alone!!**

Common Problems in Research Papers

- Phenomena lack grounding in reality; Pseudo-problems beget pseudo-theories.
  - A first step in science is 'establishing the phenomenon'
  - Applies to *both* problem-driven & theory-driven research
  - Ground the problem in reality up close & from afar
- Theories do not advance knowledge beyond the what is already known (the status quo).
  - Make an inference that goes beyond the information given and beyond the status quo
  - Ground & compare your theory/hypotheses with the status quo (not the null hypothesis).

Grounding Problem/Theory in Reality

- W*ho*, *what where, when, why* & *how* the issue exists
  - in particular (up close) with example, anecdote or experience
  - in general (from afar) with data on prevalence & context of problem
- Techniques
  - Talk to people who experience & know the problem/issue
  - Conduct interviews, NGT meetings, Cognitive mapping techniques
  - Review literature to understand & situate the problem

Exercise in Mapping a Problem

Q1. Write label for problem
Q2. What is a satisfactory alternative to problem?
Q3. Why does this matter you? (consequences)
Q4. Why does this problem happen (causes)?

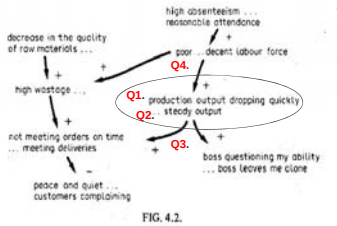


FIG. 4.2.

Source: Eden, C., Jones, S., & Sims, D. (1983) *Messing about in problems: An informal structured approach to their identification and management.* Oxford: Pergamon Press. Fig 4.2, p. 42

Exercise in Problem Formulation

1. What research problem and question are you studying?
- Address who? what? where? when? why? & how? the problem exists:

a. up close

b. from afar

2. What is your conjecture or hunch for answering this research question?
> Is your answer any better than the status quo or a competing plausible alternative answer?

Your thoughts please!

1. What is your research problem & question.
   -- Give example.
2. What is your answer?
   -- Better than status quo?
3. How design study?
4. How communicate and implement your findings?
5. Knowledge for whom? For what?

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Research on Innovation Processes
Class 4
Problems in Managing Innovation

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Class 4 Problems in Managing Innovation Executive Session

1. Human problem – managing attention
2. Process problem – pushing ideas into good currency
3. Structural problem – part-whole relationships
4. Strategic problem – leadership
5. Conceptual problem - myopia

Paying Attention to Innovative Ideas

- ***Research Finding:*** Innovations are not initiated on the spur of the moment, by a single dramatic incident, or by a single entrepreneur. An extended gestation period often lasting several years, of seemingly random events occur before innovations are initiated. Many events are not intended to start an innovation. Some trigger recognition of need for change; others awareness of technical possibilities. Some of these events "shock" entrepreneurs to mobilize efforts to mobilize plans and resources for developing an innovation.
- ***Question:*** What can organizations do to increase the chance of innovation?

Creating a Culture of Innovation at 3M

1. ***Vision.*** Declare the importance of innovation; make it part of the company's self-image.
2. ***Foresight.*** Find out where technologies & markets are going. Identify articulated & unarticulated needs of customers.
3. ***Stretch goals*** to make quantum improvements. (e.g., 30% of sales from products introduced in past 4 years).
4. ***Empowerment.*** Hire good people and trust them; delegate responsibilities, provide slack resources, & get out of the way.
5. ***Communications.*** Open, extensive exchanges according to ground rules in forums for sharing ideas, and where networking is each person's responsibility.
6. ***Rewards and recognition.*** Innovation is an intensely human activity. Emphasize recognition more than monetary rewards.

Source: William Coyne, "Building a Tradition of Innovation," UK Innovation Lecture, 1996.

Pushing Ideas into Good Currency: Schon's Political Model of Public Policy

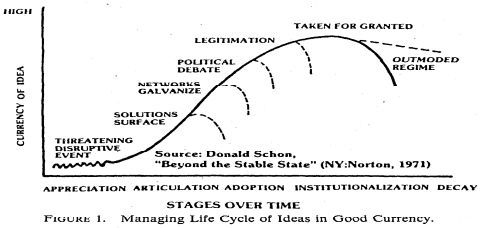


FIGURE 1. Managing Life Cycle of Ideas in Good Currency.

Innovation Adoption & Implementation

Research Finding:

- Innovations are implemented by integrating the "new" with "old" and by reinventing them to fit the local situation.

Question:

- What factors influence the implementation, adoption, and diffusion of innovations?

Factors Influencing Innovation Adoption

Innovation Characteristics:
- Relative advantage based on evidence,
- Compatible with existing practices,
- Easy to understand - not complex,
- Observe how it works
- Try it out to fit local needs.

Organization Characteristics:
- Organizational culture

Individual Characteristics:
- Resistance to change
- Compliance with requests

Individual Factors Influencing Adoption

People would rather implement their own innovation than someone else's.

People Resist Change when the Change:
- is not understood => provide trial demonstrations
- costs outweigh benefits => make evidence-based case
- is imposed or threatening => encourage local reinvention
- incompatible with arrangements => align structures & incentives
- bogs down => need process facilitators & leadership support
- process wanders => structure events, forums, deadlines to maintain attention

Adoption processes vary when:
- Decision unit is an individual or complex organization,
- Change is implemented in depth or in breadth
- Change is externally mandated or locally chosen to fit situations,

People are more likely to comply when:

1. A reason is provided for the request
2. Reciprocity exists: provide an initial gift before making request
3. Small initial commitment is made, then rely on consistency
4. Social proof exists that many similar others are complying
5. Request comes from individual they know and like
6. Request comes from legitimate authority
7. The opportunity is scarce, limited, or difficult to attain

Modern life creates cognitive overload because of technical advances, burgeoning information, expanding choices and opportunities, and exploding knowledge. People use decision shortcuts by relying on simple triggers for compliance. The most reliable triggers are commitments, opportunities for reciprocation, the compliant behavior of similar others, feelings of liking or friendship, authority directives, and scarcity information.

Robert B. Cialdini, *Influence: Science and Practice*, Third Ed. New York: HarperCollins, 1993.

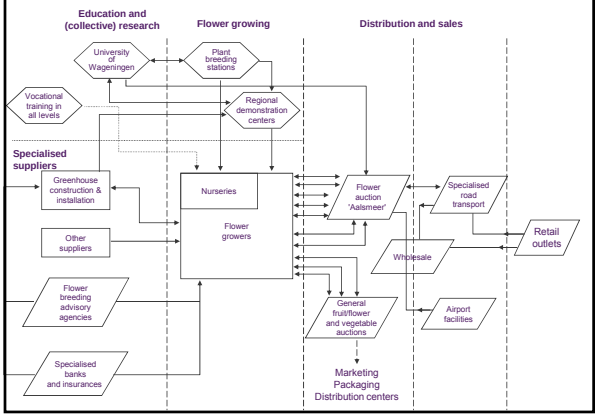
Institutional Leadership Problem

INSTITUTIONAL PROCESSES	IDEA	TECHNICAL PROCESSES
CREATION, ELABORATION OF IDEOLOGY	FOUNDING IDEALS	STATEMENT OF ORGANIZATIONAL GOALS
USE OF PERSONAL NETWORKS; SELECTION BASED ON VALUES AND IDEALS	RECRUITMENT	BROAD SEARCH: USE OF UNIVERSALISTIC CRITERIA
FACE-TO-FACE CONTACT WITH FOUNDERS: SHARING RITUALS, SYMBOLS	SOCIALIZATION	RULES AND PROCEDURES LEARNED THROUGH COLLEAGUES
CHARISMATIC, MYTHIC IMAGES (TRANSFORMING)	LEADERSHIP	PROBLEM SOLVING AND CONSENSUS MAKING (TRANSACTIONAL)
IDEALS PARAMOUNT: STRUCTURE TENTATIVE	FORMALIZATION	EARLY ROUTINIZATION; UNCERTAINTY REDUCTION

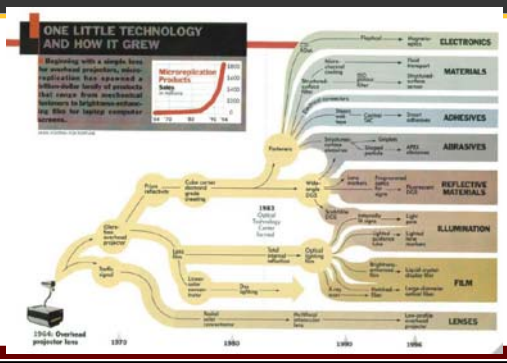
FIGURE 3. Institutional and Technical Processes. Source: T. Lodahl and S. Mitchell (1980).

Structural Problem: Part-Whole Relations
How get this tulip bouquet on your table?

Cut flower cluster based in the Netherlands



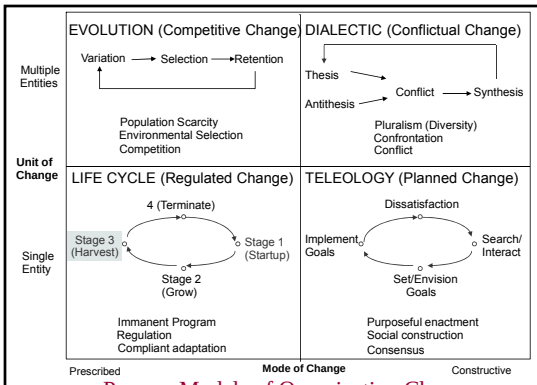
A 3M Technology Platform for Innovation



Conceptual problem: How Think of Change? The Kotter Model of Planned Change

1. Establish a sense or urgency
2. Form a powerful guiding coalition to work as a team
3. Create a goal or vision to direct the change effort
4. Communicate the new vision to people
5. Empower others to act on the vision & get rid of obstacles
6. Plan/create short-term wins or performance improvements
7. Consolidate & continue improvements by hiring, promoting & developing employees who implement the vision
8. Institutionalize the change by showing the connections between new behaviors and corporate success.

Source: John P. Kotter, Leading Change: Why Transformation Efforts Fail, *Harvard Business Review*, 1995, pp. 59-67.



Process Models of Organization Change

Note: Arrows on lines represent likely sequences among events, not causation between events.
Source: Van de Ven & Poole, *Explaining Development and Change in Organizations*, AMR, 1995.

Models of Organizational Change

	Teleology Planned Change	Life Cycle Regulated Change	Dialectic Conflictual Change	Evolution Competitive Change
Process	Dissatisfaction, search, goal setting, & implementation	prescribed sequence of steps or stages of development	Confrontation, conflict & synthesis between opposing interests	Variation, selection & retention among competing units
Triggeri	Goal, opportunity or threat	Prefigured program regulated by nature, logic or rules	Conflict between opposing forces	Competition for scarce resources
Key metaphor	Purposeful cooperation	Organic growth	Opposition, conflict	Competitive survival
Process failures	Decision Biases, Lack of consensus Group think	Resistance to change noncompliance Monitoring & control	Destructive conflict Irresolvable differences	Requisite variety Lack of scarcity
Process remedies	Critical thinking Rational decisions Consensus building	Obtaining 'buy in' Internalizing mandates	Negotiation skills Partisan mutual adjustment	Strategies for competitive advantage

Key Points on Models of Change

- What change model do you have in your head?
  1. Planned change (teleology)
  2. Regulated change (life cycle)
  3. Conflictive change (dialectics)
  4. Competitive change (evolution)
     - Each model needs to fit the specific situation.
- When change does not unfold as your expect:
  1. Do you change the organization to fit your model? or
  2. Do you change your model to fit the organization?

Your thoughts, please

Thank You!

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Research on Innovation Processes
Class 5
Innovative Theory Building

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Class 5 Innovation Theory Building Agenda

- Methods of reasoning:
  - Idea creation by abduction
  - Theory development by deduction
  - Theory justification by argument and induction
- Basic principles of theory building
  —
- Exercises in theory building

Grounded Theory (GT) Building

- … Not a specific method, but a style of doing qualitative analysis that includes some distinct features, such as theoretical sampling, use of constant comparisons, and coding schemes undertaken to explain complex phenomena (Strauss, 1987).
- Basic question: How capture & explain the complexity of reality (phenomena) we study?
  - > Observe reality to appreciate its complexity
  - > Guide data collection & analysis by successive evolving interpretations.
  - > Develop a conceptually rich theory that avoids simplistic & thin renderings of phenomena in the literature.

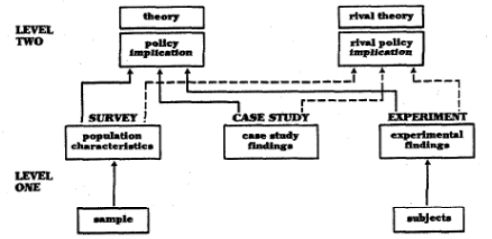
Sources: Glaser, B. & Strauss, A. 1967. The Discovery of Grounded Theory. Chicago: Aldine.
Strauss, A. L., 1987. Qualitative Analysis for Social Scientists. New York: Cambridge Univ. Press.

Eisenhardt: Building Theory from Case Study

Step	Activity
Getting Started	Situate problem/phenomenon: perspective, focus, level, scope Define research question; start with journalist's questions
Selecting Cases	Use theoretical/analytical, not statistical population sampling
Instruments	Triangulate; use multiple data collection methods
Entering field	Overlap data collection and analysis to sharpen concepts -- If foggy at first, they will defog with field work
Analyzing data	Within-case for up-close particulars; Cross-case for patterns
Enfolding literature	Compare similar and conflicting literature
Shaping hypotheses	Iterate above three steps; search for "why?" and "how?" Use abductive logic to develop alternative conjectures
Reaching Closure	Theoretical saturation on research question Go beyond the information given (Bruner)

Adapted from Kathleen Eisenhardt, *Building Theories from Case Study Research*, AMR, 14, 4 (1989), p. 533.
Eisenhardt & Graebner, *Theory Building from Cases: Opportunities and Challenges*, AMJ, 50 (2007): 25-32

Case Study as a Research Strategy



Statistical Generalization – Making inferences to population based on sample data as done in sampling units in survey research (level 1)
Analytical Generalization – Making inferences to a theory or rival theory (level 2) Like experiments, case studies should be used to generalize to plausible alternative theories.

Yin, R. K. (2009). *Case study research: Design and methods*, 4th ed. Thousand Oaks: Sage., p.39.

Styles of Thinking & Reasoning

- All scientific theories must be conceived, then elaborated & then checked out.
- Strauss calls this induction, deduction & verification
  - "Few make the mistake of believing these stood in a simple sequential relationship… Many mistakenly refer to grounded theory as "inductive theory" … All three aspects of inquiry are absolutely essential (Strauss, 1987: 11-12).
- I call this abduction, deduction & induction
  - Abduction is inferring a theory/hypothesis to explain observed anomaly that goes beyond the specific case (Peirce, 1955).

Abductive Process of Inference

1. Surprised by an anomaly, breakdown or puzzle
2. Analyze/verify the anomaly
3. My anomaly is gone if . . . . . 
   - > a creative germ
   - > a hunch, conjecture,
   - > a half-baked idea
4. Refine the conjecture and build the theory
   - > Go beyond the information given

Take Many Trials in Abductive Thinnking

Describe an anomaly

- > A good research question poses an interesting anomaly about the problem domain.

Brainstorm conjectures that might resolve the anomaly

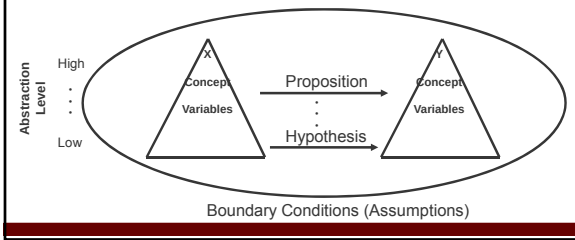
- > Conjectures are half-baked yet plausible hunches
- > Strategies for developing independent thought trials:
  1. Deal with it as done today – the status quo baseline answer
  2. Shift between micro-macro levels
  3. Alternate time periods
  4. Introduce new concept

Key Elements of Theory Construction

1. Theory
2. Terms: theoretical concepts & operational variables
3. Definitions: semantic & constitutive
4. Propositions
5. Arguments
6. Logical Validity
7. Empirical Truth
8. The Rhetorical Triangle

A Theory

- An explanation of an expected relationship between two or more concepts within a set of boundary conditions.
- The explanation includes an argument.



Semantic & Constitutive Definitions

- Semantic: a term is defined by other terms at same level of abstraction
  - Affirmative or positive: A is similar to B, C & D
    - Metaphors & analogies can provide useful semantic definitions
  - Negation: A is different from (or not) E, F, or G
    - *Terms that are defined by negation are determinate; those defined without negation are indeterminate* (Osigweh, 1989)
- Constitutive: a term is defined by its component parts at higher/lower levels of abstraction
  - Lower: A consists of a1, a2, and a3 components.
  - Higher: a is a component part of A
  - Convention: terms defined by levels of abstraction are named:
    - Concepts/constructs - abstract term semantically defined by non-observable terms
    - Variables - an operational term that specifies how it is measured

Propositions

A Statement of relationships among terms. Four kinds:

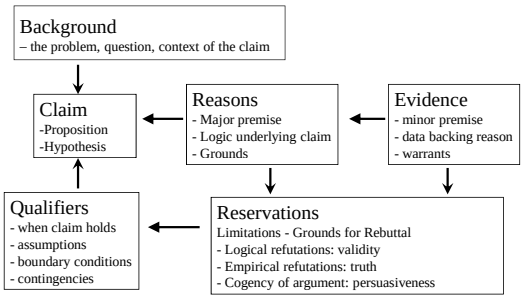
- Categorical - assign things to classes or categories
  - e.g., Aristotle: All men are mortal
- Disjunctive - differentiate classes of things
  - e.g., A is either very bright, or studies a lot
- Conjunctive - integrative; connect or bridge terms
  - e.g., A read this and found it interesting
- Conditional - "if - then" propositions
  - e.g., If today is Tuesday, then tomorrow is Wednesday
  - the antecedent "if" implies the consequent "then"
  - A deductive conditional proposition is a constitutive definition where the consequent (then) follows from the definition of the antecedent (if).
  - A causal conditional proposition is a testable hypothesis stating that the antecedent causes the consequent

Empirical Truth

Whereas logicians assess the validity of their arguments, scientists evaluate the logical validity and empirical truth of their theories

- We use inductive conditional propositions to test hypothesis:
  - > all observed members of p are q. Therefore, all p are q.
  - > The greater the number & variety of p, the stronger the hypothesis.
- We reject hypothesis by denying the consequent
  - If p then q — If hypothesis is true, then the predicted fact is true
  - Not q — The predicted fact is not true.
  - Therefore, no p — Therefore, the hypothesis is false. -- Valid
- We cannot prove hypothesis; that would be the fallacy of affirming the consequent
  - If p then q — If hypothesis is true, then the predicted fact is true.
  - q — The predicted fact is true
  - Therefore, p — Therefore the hypothesis is true. -- Not valid
  - > Existing facts may have more than one explanation.
  - > Search and rule out plausible alternative hypothesis.

Toulmin Structure of Argument



Stephen Toulmin, The Uses of Argument, Updated Edition. Cambridge: Cambridge Univ. Press, 2003

Exercise: Form Your Theory as Argument

- > Background
- > Claim:
- > Reasons:
- > Evidence:
- > Reservations:
- > Qualifications:

Mapping Your Argument: Step 1 Unscramble

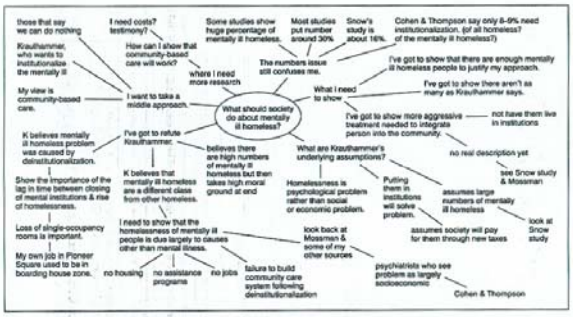


Figure 3–1 Steve's initial idea-map on issue of "What should society do about the mentally ill homeless?"

Source: John Ramage & John Bean, *Writing Arguments*, Third Edition, Boston, MA: Allyn-Bacon, 1995:67.

2. Shape your argument with tree diagram

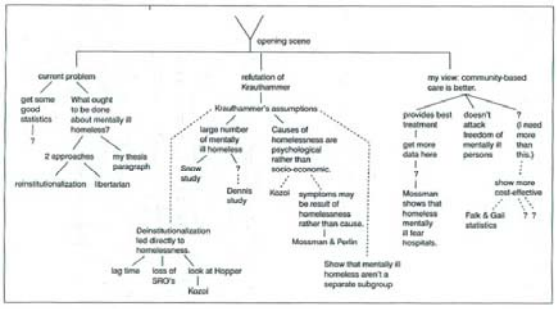


Figure 3–3 Steve's initial tree diagram with later additions and notations (solid lines = original tree diagram; broken lines = later additions)

Source: John Ramage & John Bean, *Writing Arguments*, Third Edition, Boston, MA: Allyn-Bacon, 1995:73.

3. Refine the story & argument in your tree diagram

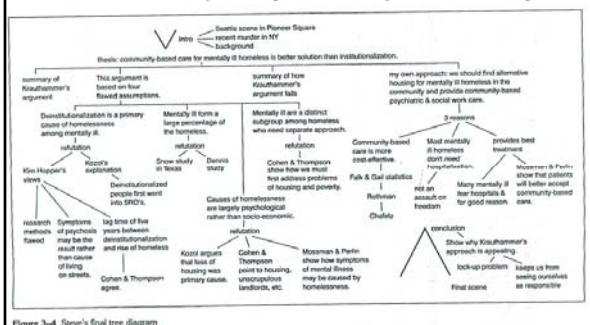


Figure 3–4 Steve's final tree diagram

Source: John Ramage & John Bean, *Writing Arguments*, Third Edition, Boston, MA: Allyn-Bacon, 1995:74

Exercise: Draw Tree Diagram of your theory

Your thoughts please!

1. What is your research problem & question.
   -- Give example.
2. What is your answer?
   -- Better than status quo?
3. How design study?
4. How communicate and implement your findings?
5. Knowledge for whom? For what?

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Research on Innovation Processes
Class 6
Innovation Research Design

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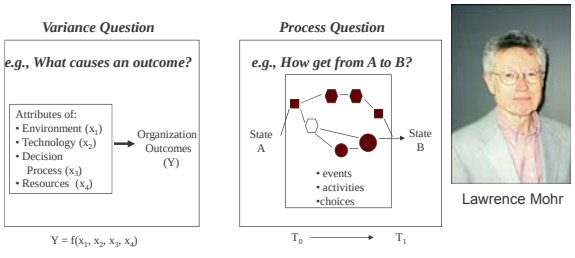
Class 6 Innovation Research Design Agenda

- Two modes of knowing: variance and process models
- Designing variance studies
- Designing process studies
- Discussion of research design worksheets

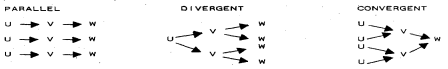
Variance and Process Questions



Lawrence Mohr

Alternative Progressions of Events

- **simple unitary progression**
  - A sequence of the form U → V → W
- **multiple progressions**
  - Development can follow several paths
  - Forms: parallel, divergent, and convergent



- **cumulative progressions**
  - More than one stage may belong to a unit at a time.
  - Forms: by addition, substitution, or modification

- **conjunctive progressions**
  - Events in one path are related or influence events in another path of a multiple progression
  - Relations may be *probabilistic, inclusive, or mediated*
- **Recurrent progressions**
  - Repeating strings of events over time

Source: L. van den Daele, "Qualitative Models in Developmental Analysis," Developmental Psychology, 1969.

Worksheet for Designing a Variance Research Study

Issues	Your Variance Research Study
1. State your variance research question Whose viewpoint is featured?	
2. What is the unit of analysis? What is the unit of observation?	
3. State the key proposition that answers\ Your research question.. How will you probe causation?	
4. What is your experimental design? How will you control for extraneous factors?	
5. How sample units, constructs, measures & settings? What is your sample size?	
6. How manipulate or measure variables? What is the frame of reference of measures?	
7. How code and analyze the data?	
8. What are the threats to study validity? - Internal validity - Statistical validity - External validity - Construct validity	

Worksheet for Designing a Process Research Study

Issues	Your Process Research Study
Process Study Design	
1. State your process research question. Viewpoint?	
2. How define process as variable or event? Unit of analysis?	
3. State your key process proposition. Process theories examamined?	
4. What is your process research design? Concepts/units examined? Real-time or historical?	
5. How measure process concepts? Define incident/event. How measure & verify? How tabulate process data?	
6. How sample cases, events? # events vs. cases	
7. How analyze data to develop/test your process proposition?	
8. What are the threats to: Study validity? Replicable methods? Reliable measurements? Story verisimilitude?	

ASSUMPTIONS AND OBSERVATIONS ABOUT CORE INNOVATION CONCEPTS

	Literature implicitly assumes:		But we see this:
Ideas:	One invention, operationalized.	→	Reinvention, proliferation, reimplementation, discarding, and termination.
People:	An entrepreneur with fixed set of full-time people over time.	→	Many entrepreneurs, distracted fluidly engaging & disengaging over time in a variety of roles.
Transactions:	Fixed network of people/firms working out details of an idea.	→	Expanding, contracting network of partisan stakeholders who converge & diverge on ideas.
Context:	Environment provides opportunities and contraints on innovation process.	→	Innovation process creates and constrained by multiple enacted environments.
Outcomes:	Final result orientation; A stable new order comes into being.	→	Final result indeterminate; Many in-process assessments and spinoffs; Integration of new orders with old.
Process:	Simple, cumulative sequence of stages or phases.	→	From simple to many divergent, parallel & convergent paths; some related, others not.

A Sample Event Data Entry Form

Date:_____ Event #: _____

Event: (description of actor, action, outcome in context)

_____

_____

Observation: _____

_____

Source: _____

Keywords: _____

Existing Event Data File

Days	Event	Observation	Source	Keywords
01/01/77	House & Doyle in Los Angeles conduct the 1st cochlear implant in the U.S. by implanting a limited # of patients using single electrode dev.	The event was published in W.F. House and K.Berliner's, "Cochelar Implants: Progress & Perspectives," Annals of Otology & Rhinol. 1982, p. 1-124.	ASHA, May 1985	House, Academicians, transaction outcome-positive
	More Events ↓			

Added Columns

i	pe	tr	c	ac	aΔ	op	on
0	0	0	1	0	1	1	0

Edmondson's Research Triangle

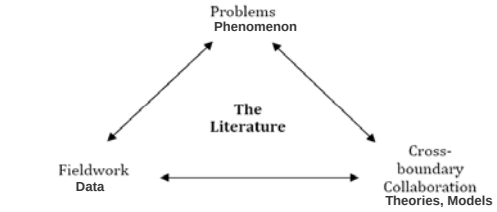


Figure 1. Relationships Between Problems, Fieldwork, and Collaboration

Edmondson, A.C. 2009. "Crossing Boundaries to Investigate Problems in the Field: An Approach to Useful Research," In E. Lawler & S. Mohrman (eds). *Doing Research that is Useful for Theory and Practice – 25 Years Later*, Berrett-Kohler

Triangulation:
Multiple sources aimed at corroborating the same fact or phenomenon

Multi-method:
Multiple sources each aimed at a different fact or phenomenon.

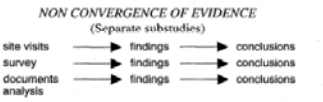


Figure 4.2 Convergence and Nonconvergence of Multiple Sources of Evidence
SOURCE: COSMOS Corporation.

Yin, R. K. (2009). *Case study research: Design and methods*, 4th ed. Thousand Oaks: Sage, p. 117

Qualitative Methods for Analyzing Process Data

- Narrative Strategy
- Template Matching
- Grounded Theorizing
- Visual Mapping
- Temporal Bracketing
- Synthetic Strategy
- Quantitative Strategy

Ann Langley
HEC, Montreal

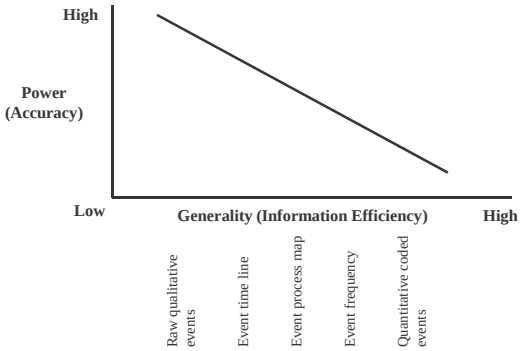
Also Examine Quantitative Methods for Analyzing Process Data

Kevin Dooley
Arizona State University

- Analyzing Event Sequence Data
- Structures of Event Time Series
- Models for examining different structures of time series
  - Orderly data
  - Chaotic data
  - Random data

Listen to Dooley's Tutorial at
http://www.processresearchmethods.org/tutorials.htm

Power-Generality Tradeoffs of Methods



NORSI
Norwegian Research School in Innovation
NTNU – Trondheim
Norwegian University of Science and Technology

PIMS
Program in Innovation Management and Innovation Strategy
NTNU – Trondheim
Norwegian University of Science and Technology

Research on Innovation Processes
Class 7
Using Research Findings

Andrew H. van de Ven
University of Minnesota
PIMS Visiting Faculty
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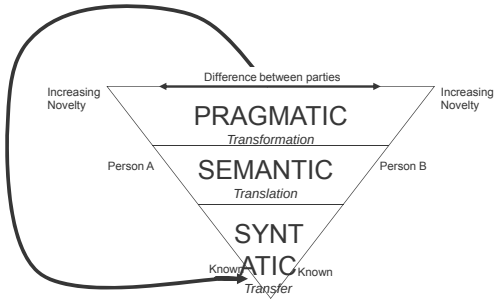
How will you Communicate Findings to Encourage Use by Intended Audience?

- Typical answer? Write a report, publish it, and present at conferences & host sites
- Problem: Sound research is often not used as intended
- We need deeper understanding of communicating knowledge across boundaries and more engaged relationship with intended audience.
- Proposition: The more novel and different the knowledge, the greater the difficulty of communicating it across boundaries between speakers and listeners.
  - When syntax is clear the problem is knowledge transfer from speaker to listener
    - fidelity of message
  - When semantics unclear the problem is knowledge translation
    - conversations about meanings
  - When interests conflict the problem is knowledge transformation
    - negotiate goals and uses of knowledge

Source: Paul R. Carlile, 2004. Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries, *Organization Science*, 15, 5: 555-568.

Carlile's Framework of Managing Knowledge Across Boundaries



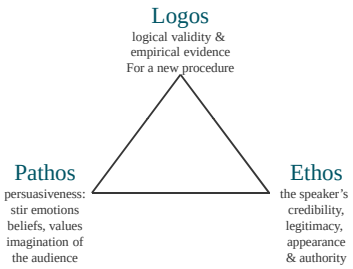
Adapted from Carlile (2004), Integrative Framework for Managing Knowledge Across Boundaries. *Organization Science* 15(5), pp. 555-568.

Knowledge transfer more likely when:

1. Message (research findings) has a relative advantage, is compatible, simple, explicit, observable & can be tried out.
2. Message anticipates assumptions & needs of audience.
3. Message engages & reflects views of lead adopters.
4. Pathos, logos & ethos justifications are presented.
5. Present pathos first to grab listener, then logos to explain rationale & evidence, and then ethos to appeal to morally 'right thing to do.'

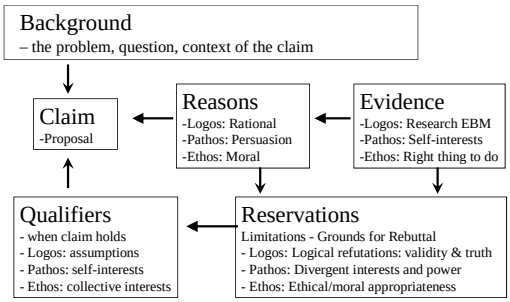
Pathos initiates change, logos implements it, & ethos sustains it.

The Rhetorical Triangle

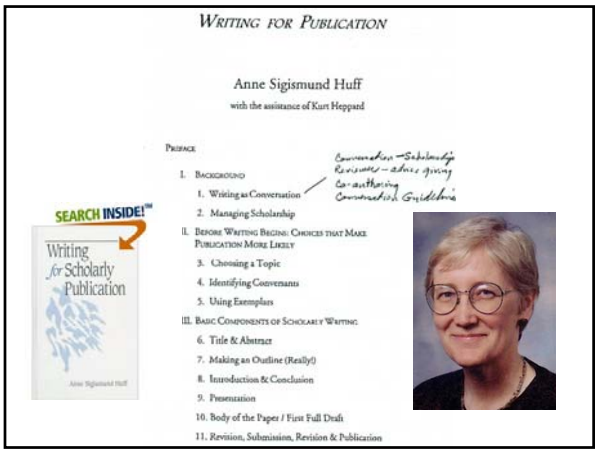


Van de Ven and Schomaker, The Rhetoric of Evidence-Based Medicine, Healthcare Management Review, 2002

Argument Reflecting Logos, Pathos, Ethos



Stephen Toulmin, *The Uses of Argument*, Updated Edition. Cambridge: Cambridge Univ. Press, 2003
Green, A Rhetorical Theory of Diffusion, *Academy of Management Review*, 2004.



Huff: Writing as Conversation

- *Scholarly work is rooted in the lively exchange of ideas — conversation at its best,*
- *Written work is the most enduring and often the most influential contribution a scholar makes to academic conversation.*
- *Writing is also important to scholarship because it clarifies thought and thus the generation of new knowledge.*
- *Even procrastinators often begin writing before establishing critical parameters of communication, thus diluting these benefits,*
- *Seeking advice from others, from the beginning, can save time and firmly put writing into a conversational mode.*

Source: Anne Sigismund Huff, *Writing for Publication*, Thousand Oaks, CA: Sage, 2002

Huff's Guidelines for Good Conversation

1. Listen before you speak.
2. Connect with points already made.
3. Be interesting.
4. Be polite.

Andy's Guidelines for Good Living

1. Be appreciative - give credit where credit is due
   - Acknowledge & thank all contributions
2. Share the wealth - ideas, resources, opportunities
   - Pass it on
3. "Keep on the sunny side of life"

Engaged Scholarship Diamond Model

Study Context: *Research problem, purpose, perspective*

Research Design
Develop variance or process model to study theory

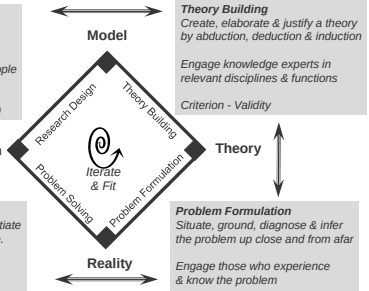
Engage methods experts & people providing access & information

Criterion – Truth (Verisimilitude)

Theory Building
Create, elaborate & justify a theory by abduction, deduction & induction

Engage knowledge experts in relevant disciplines & functions

Criterion - Validity



Problem Solving
Communicate, interpret & negotiate findings with intended audience.

Engage intended audience to interpret meanings & uses

Criterion - Impact

Problem Formulation
Situate, ground, diagnose & infer the problem up close and from afar

Engage those who experience & know the problem

Criterion - Relevance

Alternative Forms of Engaged Scholarship

Research Question/Purpose

Research Perspective	To Describe/Explain	To Design/Control
Extension Detached Outside	Basic Science With Stakeholder Advice 1	Policy/Design Science Evaluation Research For Professional Practice 3
Intension Attached Inside	2 Co-Produce Knowledge With Collaborators	4 Action/Intervention Research For a Client

Challenges in Practicing Engaged Scholarship

1. The research problem and question
2. Mode of inquiry
3. Triangulation strategy
4. Negotiating the research relationship
5. Research *with* and/or *for* whom?
6. Being reflexive
7. Spending time in the field
8. Limits of engagement
9. Study size and scope

Sharing and Learning

- Volunteer student presentations of research proposals & questions (as time permits)
  - > 10-15 minutes each – volunteer time keeper?
- Conclusions:
  - This course is a beginning. Implement your research proposals!
  - Be an engaged scholar.
  - Thank you for your participation!
  - Best wishes!