

COURSE MATERIALS FOR  
PUBLIC ADMINISTRATION 729

ISSUES IN PUBLIC MANAGEMENT

GEORGE MASON UNIVERSITY

FALL, 1991

# SYLLABUS, PUAD 729, FALL, 1991

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## PUAD 729, FALL, 1991. ISSUES IN PUBLIC MANAGEMENT (3:3:0).

Prerequisite PUAD 621 or permission of department.

**CATALOG DESCRIPTION OF COURSE:** Current issues in management of public organizations in contemporary American government. Practical applications of theories and analysis to managerial problems. Competence in improving management in selected government settings.

### OBJECTIVES OF THE COURSE:

- 1) To clarify the impact of complexity on government, and especially on the quality of bureaucratic response to complexity
- 2) To examine specific cases (e.g., from the Department of Defense, the Bureau of Fisheries, the American Indian community, and private sector interactions with government) to see how complexity is handled
- 3) To examine the potential benefits of the Learning Organization in government agencies
- 4) To examine critically the concept of "expert" in working with complex issues
- 5) To show the benefits and methodology of system design as the only documented means for insightful management of complexity

### REQUIRED TEXTS:

1. Peter Senge, THE FIFTH DISCIPLINE: The Art and Practice of the Learning Organization, New York: Doubleday, 1990.
2. John N. Warfield, A SCIENCE OF GENERIC DESIGN: Managing Complexity Through Systems Design (two vols.), Salinas, CA: Intersystems Publications, 1990.

### ISSUES TO BE EMPHASIZED:

1. Complexity of government, and bureaucratic responses to complexity (examples from the Department of Defense)
2. The quality of government-industry interactions--regulations versus principles--(examples from the Department of Defense and the banking industry)
3. Micromanagement (Defense acquisition versus the Persian Gulf War) (Government and American Indian interaction)
4. Structural incompetence and individual contributions in government
5. The absence of validated design practices in government

## COURSE REQUIREMENTS:

Oral assignment: This course will be taught in a seminar format; that is, all students are encouraged and required to participate in class discussions. Class discussions are based on the assumption that the reading assignment for the week has been carefully read, and annotated by the student for purposes of class discussion. The failure to participate actively in class discussions will adversely affect one's grade. Moreover, each student will make an oral presentation of his or her papers to the class.

### Written assignments:

1. An up-to-date *vita* or resume, due in class September 11.
2. *First paper:* A critique of the Senge book, showing all of the major points made in the book (omit all the anecdotal material), and assessing their merit or lack thereof. Look especially for any inconsistencies of the type where one chapter might recommend a certain course of action and a different chapter might make a case against that course.

This paper is due October 30.

3. *Second paper:* an organizational case study involving these concepts (a) the organization as a Learning Organization--is it or isn't it--how does it relate to the Senge five disciplines--(b) the organization as a designed organization--was it or wasn't it-- can it be described in the field mode?--is there an options profile description, and can you show it?-- (c) the organization as a designing organization--is it or could it be--can you design a change scenario whereby it could become a designing organization--(d) is there structural incompetence in this organization, and how could it be corrected?

This paper is due on December 18.

## EVALUATION:

Oral assignments will be evaluated on the basis of the adequacy of preparation, the relevance of remarks to the course, and the degree to which contributions are informed and insightful. Written assignments will be evaluated on how well they are clearly focused on the objectives of the course, are organized and coherent presentations of the subject with sufficient subheadings, are written in clear English using well-structured sentences and paragraphs, reflect an appropriate mix of academic sources and government documents in analyzing the paper topic (with appropriate referencing in one of the standard styles).

### Grading:

An **A** represents excellent work that is well-organized, well-expressed, thorough, insightful, and demonstrates true mastery of the subject. It requires some originality and creativity.

A **B** represents good work that is well-organized and expressed, thorough, and demonstrates a good level of mastery of the subject. This grade is for above average achievement.

A **C** represents work that is adequate for undergraduate work, but is not acceptable at the graduate level.



Attendance: Attendance in class is expected, and tardiness that interrupts class activity is not looked on with favor.

Deadlines: Only in exceptional circumstances will deviation from deadlines be allowed.

Weights. The approximate weight of factors in determining course grades:

Attendance and promptness:	20%
Class participation	20%
First paper:	25%
Second paper:	35%

**OFFICE HOURS:** I am normally in my office from 8:00 AM to 12:00 Noon, and normally out of the office in the afternoon. But I will be teaching classes off-campus in the fall, so I will be away from the University quite a bit of the time. If you leave a message on my recorder which is connected to the phone number 993-2995, I will try to return your call--please speak clearly when giving name and telephone number and, if appropriate, the best time to call.

#### **SCHEDULE:**

0. **September 4.** Distribution of Syllabus, Study Questions, note on "Twelve Laws", and copy of paper on "Complexity and Cognitive Equilibrium. Roll Check. Brief Discussion.
1. **September 11.** Senge, Chapter 1 and Handout on the Laws of Generic Design. Vita due. \*
2. **September 18.** Senge, Chapter 2. DoD Cases.
3. **September 25.** Senge, Chapter 5. Handout on Climax Agriculture.
4. **October 2.** Senge, Chapter 6. Handout on Problematiques.
5. **October 9.** Senge, Chapter 9. Discussion of Bennis and Salk ideas [Warfield text (see index)]
6. **October 16.** Senge, Chapter 11. Winnebago Case.
7. **October 23.** Senge, Chaps. 15 and 18. Fisheries Case.
8. **October 30.** First Paper Due. Class Presentations of Papers.
9. **November 6.** Warfield, Chap. 1.
10. **November 13.** Warfield, Chaps. 5 and 6
11. **November 20.** Warfield, Chaps. 6 (continued) and 7
12. **November 27.** Warfield, Chap. 7 (concluded)
13. **December 4.** Warfield, Chap. 8
14. **December 11.** Warfield, Appendices 2, 5, and 8.
15. **December 18.** Second Paper Due. Class Presentations of Papers.

\* If you can spare a small photograph, please print your last name on the back of it and attach it to your vita. This will help me learn your names rapidly, and help me keep track of your classroom contributions (which will be part of your evaluation, as explained above).



# **STUDY QUESTIONS FOR PETER SENGE'S BOOK: THE FIFTH DISCIPLINE**

These questions were prepared by J. N. Warfield, and they are stored in a computer file called SENGEQUE.WP

## **STUDY QUESTIONS FOR PART I (CHAPS 1-3): HOW OUR ACTIONS CREATE OUR REALITY...AND HOW WE CAN CHANGE IT**

### **CHAPTER 1. "GIVE ME A LEVER LONG ENOUGH...AND SINGLE-HANDED I CAN MOVE THE WORLD"**

1. What did physicist David Bohm say about the feasibility of trying to see the big picture by listing and organizing all the pieces? Is this a believable statement? What does it imply about the way Senge's book should be presented?
2. What does Fortune magazine say about the most successful corporation of the 1990's?
3. What will distinguish learning organizations from traditional authoritarian "controlling organizations"?
4. What is the difference between an invention and an innovation?
5. What were the five critical technologies which, when brought together and integrated, made possible the DC-3 airplane?
6. What factor was missing from the Boeing 247 that made this airplane unsuccessful?
- A. What two Laws of Generic Design are illustrated by the DC-3/Boeing 247 example?
7. What is wrong with the statement "you can only understand the system of a rainstorm by contemplating the whole, not any individual part of the pattern"?
8. How does the author define "systems thinking"? Can you find another definition by Peter Checkland and compare the two?
9. What are the "five disciplines" of Senge?
10. What is the definition of "personal mastery"?
11. What is the definition of "mental model"?
12. What was the nature of Royal Dutch/Shell's work with mental models, and what was the result?

13. How are planning and learning related? How are corporate planning and institutional learning related?

14. What is the definition of "shared vision"?

15. What do leaders learn when they master the discipline of shared vision?

16. What paradox is confronted in the process of team learning?

17. How does team learning start, according to Senge?

18. What is meant by "dialog"?

19. How does the description of "innovations in human behavior" as "disciplines" relate to Bohm's statement?

20. What does it mean to "practice a discipline"?

21. What occurred as a consequence of the success of the DC-3?

22. What is the "fifth discipline"?

23. What does the fifth discipline do?

24. Why is lofty vision alone insufficient for organizational success?

25. How do the five disciplines work together to realize their mutual potential?

26. What is at the heart of the learning organization?

**B.** How does this chapter relate to Argyris' concept of "framebreaking and remodeling"?

27. What is meant by "metanoia"?

28. Why does the author take this word apart and then put it back together again? What do "meta" and "noia" mean?

29. How are adaptive (survival) learning and generative learning distinguished?

30. Is it true, as Senge says, that "business is the locus of innovation in an open society"?

31. Why was systems thinking not enough by itself in an organization, according to Senge? What else was needed?

32. Give some examples of the "new management practitioners" according to Senge.

## **CHAPTER 2. DOES YOUR ORGANIZATION HAVE A LEARNING DISABILITY?**

1. How long do large corporations typically "live"?
2. What is a consequence of having people in organizations focus only on their own position?
3. In an authoritarian organization, who is the "enemy"?
4. What is the meaning of "true proactiveness"?
5. What are the two competing forms of threats to our survival?
6. What ability is useless if we only focus on short-term events?
7. What lesson is taught by the Senge parable of the frog?
8. How can the frog be compared to the American auto industry in the 1960's?
9. What is wrong with the idea that we "learn from experience"?

**A.** According to the American philosopher C. S. Peirce, how can we find the meaning of a concept?

10. What is the "core learning dilemma" of most organizations?
11. What is meant by the "learning horizon" of an individual?
12. What is meant by the statement on page 23 that "cycles are particularly hard to see, and thus learn from"?

**B.** What can we learn from the Zamerowski paper on the Sahel?

13. What are "stovepipes" in organizations?
14. How do teams often behave in business organizations?
15. Why doesn't Senge mention Janis?
16. According to Argyris, why do management teams go to pot when confronted with complex issues?
17. What do managers find collective inquiry threatening?
18. What is meant by "skilled incompetence"?



**C.** What is meant by "structural incompetence"?

**D.** If you have skilled incompetence at the manager level and structural incompetence at the staff level, how effective can the organization be?

19. In summary, what are the learning disabilities of orgns.?

### **CHAPTER 3. PRISONERS OF THE SYSTEM. OR PRISONERS OF OUR OWN THINKING?**

1. What type of organization does the "beer game" represent?

2. What are the three major lessons that the beer game teaches?

3. What is the meaning of "structure" in complex living systems, according to Senge?

4. What hides the power of leverage?

5. What is Senge's "first principle of systems thinking"?

6. How does Tolstoy's quotation on page 44 relate to Bohm's quotation on page 3? What does the fact that Senge is using both quotations to buttress his arguments tell us about Senge's own system thinking?

7. Discuss the confusion in Senge's mind in terms of what he says in the paragraph on page 44 starting with "The term 'structure', as used here, does not mean..."

8. What must the players do to improve performance in the beer game?

9. How does the Law of Success and Failure apply to the beer game?

10. What six learning disabilities are operative in the beer game?

11. Is the concept of "levels of explanation" viable?

**A.** Why might structural explanations "be rare", as Senge indicates?

12. Why are structural explanations important?

**B.** What assurance is there that even structural explanations will be sufficient to resolve complex issues?

13. What is meant by saying that structural explanations are "inherently generative"?

## **STUDY QUESTIONS FOR PART II (CHAPS. 4-8): THE FIFTH DISCIPLINE: THE CORNERSTONE OF THE LEARNING ORGANIZATION**

### **CHAPTER 4. THE LAWS OF THE FIFTH DISCIPLINE**

1. How many "laws of the fifth discipline" are there?
- A. How do these laws compare with the "Laws of Generic Design Science"?
2. What is the meaning of each of the eleven laws, using Peirce's concept of meaning, applied to your own personal behavior? That is, e.g., if you accept the first law, what does it say about what your own behavior should be like?
3. Concerning the quotation of Lewis Thomas on page 62, what is the value of this statement?
4. Is it correct to describe law #9 as one that might say "work with the relevant sets"?
5. What definition does Senge give of "system boundary"?

### **CHAPTER 5. A SHIFT OF MIND**

1. According to Senge, systems thinking is the following:
  - a) a discipline for seeing wholes
  - b) a framework for seeing interrelationships (patterns)
  - c) a set of general principles
  - d) a set of specific tools and techniques

The general principles are "distilled over the course of the twentieth century" and come from diverse fields such as "the physical and social sciences, engineering, and management".

At the same time he says that the "specific tools and techniques" originate in two threads: "'feedback' concepts of cybernetics and 'servo-mechanism' engineering theory dating back to the nineteenth century."

He also indicates that "these tools have been applied to understand a wide range of corporate, urban, regional, economic, political, ecological, and even physiological systems".

Note especially that the location of the footnote 1 reference would suggest that the reference deals with all this understanding that has been developed. But when you look at the reference it seems that it is more a discussion of the tools and techniques.

How does the foregoing hang together, and to what extent is it historically accurate? See for example, such diverse sources as A HISTORY OF FORMAL LOGIC by Father Bochenski and the Forbes article about DOCTOR DOOM.

2. Compare the arms race example on pages 69 and 70 with an example in *Societal Systems*, page 398.
3. What are the "two types of complexity"?
4. What evidence is there that these two types of complexity form what is called a mutually exclusive and exhaustive set?
5. What evidence is there that, as Senge indicates, "the real leverage in most management situations lies in understanding dynamic complexity, not detail complexity"? Suppose this statement were wrong--what might be some of the consequences of training top managers to believe this?
6. Is a linear cause-effect chain an interrelationship?
7. How does Senge suggest we should proceed so that we can go about "seeing processes of change rather than snapshots"?
8. On page 79, we see the statement "imagine our difficulties using everyday English to describe the multiple feedback processes in an organization". Senge says that "a new language for describing systems is needed". He says that we are used to using a "linear language". What is a linear language?
9. What are the two types of feedback processes?
10. Where is evidence given for the statement on page 80 that "all ideas in the language of systems thinking are built up from these elements..."?
11. Describe the process for "reading" a reinforcing circle diagram.
12. What is homeostasis? Given that Ross Ashby introduced this term into modern systems thinking, why do you suppose Ashby is not mentioned in this book?
13. What clues suggest the presence of reinforcing processes? the presence of balancing processes?
14. What is a high leverage point for improving system performance?
15. What is the most powerful new source of competitive disadvantage?
16. What are the three building blocks for "systems archetypes"?
17. What are "systems archetypes"?



## **CHAPTER 6. NATURE'S TEMPLATES: IDENTIFYING THE PATTERNS THAT CONTROL EVENTS**

1. What is the definition of a "system archetype" or "generic structure"?
  2. What is the "key to learning" that these archetypes embody?
  3. What is the greatest promise of the systems perspective?
  4. What is meant by "create our reality"?
  5. What are the components of systems archetypes?
  6. Describe A1--the Limits to Growth.
  7. Where is the leverage point(s) for A1?
  8. What may limit the growth of quality circles?
  9. What may limit the growth of Just In Time manufacturing?
  10. Construct a "limits to growth" story from your own experience, draw the diagram and explain it.
  11. Describe A2--Shifting the Burden.
  12. Where is the leverage point(s) for A2?
- A.** How does the "Problematique" structure relate to A2?
13. Construct a "shifting the burden" story from your own experience, draw the diagram and explain it.
  14. On page 112, right below the drawing, we see the statement "start by identifying the 'problem symptom'". What does this say about the arithmetic of "shifting the burden"?
- B.** In the light of experience with problematques, as illustrated in A Science of Generic Design and in the DoD Workshops, how naive is the continuing assumption of just two loops in Senge's archetypal drawings? Are we seeing Forrester's modeling errors all over again in Senge's theoretical presentations? Or does the third from last paragraph on page 113 indicate clearly the state of affairs?

## **CHAPTER 7. THE PRINCIPLE OF LEVERAGE.**

1. What is the Principle of Leverage?

2. Senge says that it is hard to apply the Principle of Leverage, because actors "don't see the 'structures' underlying their actions". What has Senge done so far in this book to suggest how actors can actually see these structures? Do the quotation marks around the word "structures" suggest that Senge is referring to invisible entities in nature which cannot be portrayed on paper?

3. Senge says that WonderTech illustrates another systems archetype called "growth and underinvestment". Explain how this archetype may be at work in a service industry or in a government agency.

## **CHAPTER 8. THE ART OF SEEING THE FOREST AND THE TREES.**

1. On Page 127 we see the following: "How many CEOs today can stand and give a fifteen-minute speech that lays out a compelling explanation of the systemic causes of an important issue, and the high- and low-leverage strategies for dealing with that issue?"

What key assumption(s) are incorporated in this statement? Has any proof been provided to support the assumptions?

2. On Page 128 we see the following: "Systems thinking does not mean ignoring complexity. Rather, it means organizing complexity into a coherent story that illuminates the causes of problems and how they can be remedied in enduring ways."

What key assumption(s) are incorporated in this statement? Has any proof been provided to support the assumptions?

3. On page 130 we see the following statement: "By using the systems archetypes we can learn how to "structure" the details into a coherent picture of the forces at play.

Once again we see quotation marks around the word "structure" suggesting that the author is not literally referring to a real structure.

What key assumption(s) are incorporated into the foregoing? Has any proof or solid evidence been provided to support the assumptions?

4. To what extent does the anecdotal discussion of Peoples Express fill the role of studies of enough cases to get some statistical significance into the conclusions?

## **STUDY QUESTIONS FOR PART III (CHAPS. 9-12): THE CORE DISCIPLINES: BUILDING THE LEARNING ORGANIZATION**

### **CHAPTER 9. PERSONAL MASTERY.**

1. Which of the following statements is true?
  - a. A necessary condition that organizational learning occurs is that individual learning occurs.
  - b. A sufficient condition that organizational learning occurs is that individual learning occurs.
  - c. A necessary and sufficient condition that organizational learning occurs is that individual learning occurs.
2. Discuss the differences in organizational leadership stemming from the following two images of managerial responsibility:
  - a. "planning, organizing, and controlling"
  - b. "providing the enabling conditions for people to lead the most enriching lives they can"
3. What is the source of the "spirit of the learning organization"?
4. What are the two underlying movements involved when personal mastery becomes a discipline to the individual?
5. What is the author's definition of "current reality"?
6. What is the author's definition of "creative tension"?
7. The author has said that individual disciplines by themselves are not enough for organizational learning. Suppose everyone in the organization had achieved personal mastery, but that none of the other disciplines were at work. What might happen in the organization?
8. How does the organization's well-being find its way into the idea of personal mastery, or does it?
9. To focus on "ultimate, intrinsic desires" seems to require the same kind of capability that was mentioned earlier in the book, in connection with the discussion of "Shifting the Burden". Is the author saying here that people shift the burden in their own lives and their own behavior?
10. Which of these statements is true?
  - a. A vision is a necessary condition for personal mastery.
  - b. A vision is a sufficient condition for personal mastery.
  - c. A vision is a necessary and sufficient condition for personal mastery
  - d. Purpose is a necessary condition for personal mastery.
  - e. Purpose is a sufficient condition for personal mastery.
  - f. Purpose is a necessary and sufficient condition for personal mastery.



7. Explain "merit, openness, and localness".

A. How does Rorty's comment about the role of philosophers relate to material in this chapter?

8. What might explain the fact that mental models in Western culture are "chronically nonsystemic"?

9. What are the four "basic skills" that Hanover seeks to develop in regard to mental models?

10. What has been suggested as the "critical question in planning"?

11. What are the two broad classes of learning skills of action science practitioners?

12. Describe these four concepts:

a. Leaps of abstraction

b. Left-hand column

c. Balancing inquiry and advocacy

d. Espoused theory versus theory-in-use

13. What benefit is seen for a "library of generic structures"?

14. What major change will occur in mental models in moving from most of today's organizations to the learning organizations of the future?

## CHAPTER 11. SHARED VISION

1. What is the most common origin of vision in today's organization?

2. What is an "extrinsic" shared vision?

3. How does courage relate to vision?

4. Can there be a learning organization without shared vision?

5. What does shared vision foster?

6. How has the author arrived at his statement "While it is true that there are no formulas for 'how to find your vision'..."?

7. From what does shared vision emerge, according to Senge?

8. Could personal vision emerge from shared vision?

6. What is the central message of systems thinking, according to Senge?
9. "Personal mastery is the bedrock for developing shared visions." This statement provides a relationship between two of the disciplines. Collect all of the statements from this book that clearly provide relationships among the five disciplines, and build a structure that shows all of them. Is this structure consistent?
10. On page 212 we see this statement: "The most direct is for leaders who have a sense of vision to communicate that in such a way that others are encouraged to share their visions." How does this statement differ from a similar statement at the bottom of page 206?
11. Discuss the arguments made about shared vision with the historical image of shared vision in the IBM Corporation.
12. What is meant by "enrollment"?
13. What distinguishes "commitment" from "enrollment"?
14. Why do many managers prefer compliance to enrollment and/or commitment?
15. What can be done to get another person to enroll or commit?
16. What three governing ideas anchor vision?
17. What did Forrester say was the hallmark of a great organization?
18. What are ways in which vision can die?
19. What does systems thinking add to shared vision that may enable shared vision to survive?
20. What followup is given in this book to the statement that "This situation is unlikely to improve until teams share a new language for describing complexity"? (page 267)

## **CHAPTER 12. TEAM LEARNING.**

1. What is meant by "alignment"?
2. What is the fundamental characteristic of a relatively unaligned team?
3. What is meant by "team learning"?
4. What is the key learning element in an organization?
- A. What does the Pentagon report on smart weapons reveal about the need for team learning?
5. How are dialog and discussion distinguished?

6. What is the central message of systems thinking, according to Senge?
7. On page 238, we see this: "Despite its importance, team learning remains poorly understood". What proof or evidence is provided of this statement?
8. On page 241, we see that Bohm has identified the purpose of dialog as "to reveal the incoherence in our thought". Would it not be appropriate both to reveal the incoherence and to structure the coherence?
9. What are Bohm's three basic conditions which are necessary for dialog?
10. How does the statement in problem 7 above relate to the assurances provided about the role of facilitator on page 247?

**B.** How do the statements about conflict in teams compare with the evidence provided in Appendix 5 of A SCIENCE OF GENERIC DESIGN?

11. What defensive strategy is often followed by strong leaders?
12. What are two attributes that defensive routines must have to remain effective?
13. Why is it necessary that team learning be a "team skill"?
14. What is a "virtual world"?
15. Different views of dialog are given on page 243 and 259/260. Are the different views significantly different?
16. What followup is given in this book to the statement that "This situation is unlikely to improve until teams share a new language for describing complexity"? (page 267)
17. Senge recommends the use of the systems archetypes as a way of bolstering the new language needed. Is the use of the systems archetypes likely to be more valuable in analyzing situations or in synthesizing new possibilities?
18. Is it likely that a new language will offer only one benefit (see the statement "This, of course, is precisely the benefit of a language for complexity--it makes it easier to discuss complex issues objectively and dispassionately.")?

8. What is the "Tragedy of the Commons" archetype?

9. Who must identify the commons and determine how they should be managed?

10. How does a manager prepare to be a researcher and designer?



## STUDY QUESTIONS FOR PART IV (CHAPS 13-18): PROTOTYPES

### CHAPTER 13. OPENNESS.

1. What are the two antidotes to internal politics and game playing in organizations?
2. According to popular belief, what are the primary motivating factors for people?
3. Why is it necessary to have both participative and reflective openness, in order to produce "real openness"?

#### **A.** How does Interactive Management deal with openness?

4. What is meant by "The Wall"?
5. What is the supposed greatest benefit of The Wall?
6. How are convergent and divergent problems said to differ?
7. If a problem is divergent, what might substitute for a desire to "solve the problem"?

### CHAPTER 14. LOCALNESS

1. What undermines the incentive to learn?
2. Why will learning organizations become localized organizations?
3. When is localness especially vital?
4. What capabilities will allow more learning organizations to be more locally controlled and more well coordinated than their hierarchical predecessors?
5. What is the greatest single issue in moving from authoritarian to local controls?
6. How does distributed control differ from concentrated control?
7. How does the management of mental models relate to control?
8. What is the "Tragedy of the Commons" archetype?
9. Who must identify the commons and determine how they should be managed?
10. How does a manager prepare to be a researcher and designer?

11. What must accompany encouragement of risk taking?

## **CHAPTER 15. A MANAGER'S TIME**

1. What are the Japanese and American assumptions about what a person is doing when sitting quietly?

2. What is thought to be the source of the American drive for instant action?

3. What is the "chain gang model of management"?

4. What issues should reach a senior manager's attention, according to O'Brien?

5. How many decisions per day and per year should a manager make?

6. How does this chapter relate to micromanagement in government?

## **CHAPTER 16. ENDING THE WAR BETWEEN WORK AND FAMILY.**

1. What is often cited as the number-one priority by people who attend Senge's course in Leadership and Mastery?

2. What do traditional organizations do to create problems between work and family?

3. What is the "Success to the Successful" archetype?

4. Which type of feedback dominates in the S to the S archetype?

5. What can an organization do to help with the war between work and family?

## **CHAPTER 17. MICROWORLDS: THE TECHNOLOGY OF THE LEARNING ORGANIZATION**

1. What are the purposes of using computer-based microworlds?

2. What three microworlds are discussed in this chapter?

3. What necessary role does the personal computer play in each of the three microworlds?

4. What is the stopping rule for a group to use when constructing a shifting the burden diagram, as on page 330?

## CHAPTER 18. THE LEADER'S NEW WORK GENERIC DESIGN

1. If people widely prefer learning organizations, why are so few of them created?
2. How is the argument made for "leader as designer"?
3. On page 342 we see the statement: "Design is, by its nature, an integrative science because design requires making something work in practice". Discuss the logic of this statement.
4. What must the new leader do, according to Stata?
5. If it is true, as indicated on page 345, that the "leaders' task is designing the learning processes" for the organization, how does today's business school and public administration education prepare them for this task?
6. If the leader is to be a teacher, what should the leader teach?
7. How many charismatic leaders manage at the event level, according to Senge?
8. Who are the natural leaders of learning organizations?



## TWELVE LAWS OF GENERIC DESIGN

The book *A Science of Generic Design: Managing Complexity Through Systems Design* presents twelve laws of generic design. Three of these laws are based on experimental research carried out at George Mason University. (Each of them has an asterisk after its name in the list below.) The supporting data appear in Appendix 5 of the book mentioned. Additional discussion of these three laws appears in a paper with this citation: John N. Warfield, "Complexity and Cognitive Equilibrium: Experimental Results and Their Implications", which will be distributed to the class.

The following are the titles of the twelve laws (in alphabetical order):

- o Gradation
- o Inherent Conflict\*
- o Limits
- o Requisite Parsimony
- o Requisite Saliency
- o Structural Underconceptualization\*
- o Success and Failure
- o Triadic Compatibility
- o Uncorrelated Extremes\*
- o Universal Priors
- o Validation

One of the key factors that is often overlooked or inadequately dealt with in working with such issues is the challenge to get people to agree on potential resolutions and then act on them. This statement reflects executive inattention to methodology for group activity, and the metaphysical nature of those approaches that are heavily promoted.

Another key factor that is seldom well-managed is the problem of connecting the work of staff and middle-managers to executives who retain the power to implement reforms.

### Objective of this Paper

This paper is intended to shed significant light on the especially to present and interpret empirical data drawn from several years of conduct and

This page prepared by J. N. Warfield, August 1, 1991.

**COMPLEXITY AND COGNITIVE EQUILIBRIUM:  
EXPERIMENTAL RESULTS AND THEIR IMPLICATIONS**

**John N. Warfield**

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In working with complex issues, cognitive equilibrium (Zeleny, 1989 a,b,c and 1991 a,b) is prerequisite to emotional equilibrium; and both are prerequisite to a state of serenity and harmony within which human beings can enjoy coexistence, mutual respect, and constructive interdependence.

The importance of the foregoing proposition lies in the fact that in these times, society faces many complex, high-stakes issues (Perrow, 1984; Salk, 1985; Warfield, 1990). Typically these are dealt with by people educated in relatively narrow disciplines whose content is far lower than that required to cope with such issues. Two of the primary attributes of these problems are (a) their scale (as measured by the number of people who are or may be significantly affected by them) and (b) the need to have people work together diligently in order to (i) describe these issues in sufficient depth and breadth, (ii) discover one or more superior approaches to their resolution or amelioration, and (iii) implement one of these approaches across institutional or even international boundaries. Such issues are so well-publicized today that details concerning them can be ignored in deference to discussions of how to cope with them.

One of the key factors that is often overlooked or inadequately dealt with in working with such issues is the challenge to get people to agree on potential resolutions and then act on them. This statement reflects executive inattention to methodology for group activity, and the metaphysical nature of those approaches that are heavily promoted.

Another key factor that is seldom well-managed is the problem of connecting the work of staff and middle-managers to executives who retain the power to implement reforms.

**Objective of this Paper**

This paper is intended to shed significant light on the conditions surrounding group work, and especially to present and interpret empirical data drawn from several years of conduct and

observation of group activity in working with complex, high-stakes issues. This activity has ranged over a wide variety of groups. All of the cases involved have shared these factors: (a) a complex, high-stakes issue as the focal point of the work, (b) a group of people (typically a mix of staff and middle-management) who are knowledgeable about and motivated to resolve the issue, (c) two key methodologies (to be described later) that were used in all the group work, and (d) documentation of the conduct and products of the group work.

### Prior Studies

Prior studies relevant to group activity can be categorized as lying in four areas. The areas are:

- a) Individual behavioral features that are transferable to a group setting
- b) Groups engaged in tasks
- c) Organizational problem-solving behavior
- d) Conflict studies

Individual Behavior. Relevant data is generally limited to the first of these, and relates to individual capacity to manage information (G. Miller, 1956; H. Simon, 1974).

Group Behavior. Data coming from research on groups engaged in tasks is often inadequate because of the situation that the experimental design is forced to accommodate, such as students working for pay on non-complex, non-high stakes issues; or military people on leave similarly situated. What seems most valuable from research on groups is the categories that have arisen for describing and interpreting behavior. For example, Bales (1951) introduced the categories of emotional behavior and task-oriented behavior to describe individual behavior in groups. Tuckman (1965) introduced his famous sequence of forming, storming, norming, and performing to describe unregulated group behavior. Janis (1982) elaborated on the "groupthink" phenomenon to show dysfunctional performance of individuals in groups.

Organizational Behavior. Simon enriched the language by introducing the term "satisficing" to represent the lazy approach of organizations to solution-seeking. Argyris (1982) aggressively described the inability of groups working in organizations to break through the entrenched behavioral patterns that involve trying to deal with all issues in the same way, regardless of their underlying differences.

Conflict Situations. The modern industry of "conflict resolution" is characterized by an almost total lack of empirical research, and even the philosophizing that is done or overdone is unashamedly



metaphysical, such as Burton's (1987) unwavering restriction of analysis to an insistence that it is "deeply-held, non-negotiable values" that prevent the resolution of conflicts. One must note that if this view is accurate it seems to preclude any resolution of any conflict.

Summary. The lack of data relevant to work with complex, high-stakes issues leaves open issues of validation of any theories or beliefs concerning such issues. Shrewd observations or generalizations have been made based on much experience, but it still remains to validate these by high-quality experimental evidence. For these reasons, it is believed that the empirical results to be presented here are uniquely valuable in the history of research on groups. If they will be taken seriously by investigators who propose categories and hypotheses, and integrated into their frameworks, not only can new perspectives be gained on how to deal with groups involving complex issues; but new opportunities for additional data-gathering can be created that will help reinforce or amend the conclusions to be offered in this paper.

#### Objectives of Group Work

In this context, the objectives of group work are viewed as twofold, in the light of past experience. The first is that the **working group** (typically comprised of staff and middle managers) should reach a **state of serenity** in regard to (a) their understanding of the issue, and (b) their consensus on how to deal with the issue. Such a state could arise out of a newly-found confidence that, at last, the issue and its resolution can be understood, and that the proposed resolution can confidently be defended in forums against any alternative proposals coming from other sources. The second is that the **executive**, with implementation authority, **will have previously made a commitment** to understand the products of the group work and to take one of two actions in a timely way. Either the executive will choose to embed the issue in a larger one, and feed the products into a new group that will incorporate the results in consideration of the larger issue; or the executive will proceed immediately to implement the results of the group work. (An appropriate combination of these two possibilities may sometimes be indicated.)

#### Components of Serenity

A state of serenity involves both individual and group **equilibrium**. As in the physical science situation involving equilibrium, the state of the object or objects involved has become impervious to small perturbations arising from the environment, and the state will persist indefinitely unless some major incursion arises that involves forces well beyond the norms of the existing situation.

Individual equilibrium reflects the fact that an individual has reached a state of serenity relative to the particular issue. Group equilibrium reflects the fact that every member of the group has attained virtually the identical state of serenity. Consensus is the hallmark of this serenity. It can only be reached by extended, high-quality, thoughtful communication, accompanied by agreement on the key patterns relevant to the issue.

Serenity in the individual and the group involves two major components. These two components correspond to the conditions involved in the two hemispheres of the brain.

Cognitive Equilibrium. One of these components is **cognitive equilibrium** (Zeleny, 1989 a,b,c and 1991 a,b). This component refers to the patterns of knowledge of the issue that have been constructed by and accepted by group interaction. The building elements of these patterns reflect the separate and constructive contributions of the individual members; likewise they reflect, by their absence, those earlier individual contributions of individual members that have been discussed, clarified, and found wanting in the light of the patterns discovered by the group. Members of the group are both teachers and students. Cognitive equilibrium arises from a period of sharing of information and thought, including a period of development and sharing of patterns that define the issue and its proposed resolution.

Emotional Equilibrium. The other component of the state of serenity is **emotional equilibrium**. This condition grows from the elimination of doubt and the satisfaction of having finally reached a viable perspective on a complex issue. Emotional equilibrium means that the proposed resolution of the issue is compatible with both individual value systems of members of the group and with the intersection of these values systems which reflects group sharing of values. Such sharing is a consequence rather than a predecessor of the group activity.

Behaviorally, cognitive and emotional equilibrium compare with Bales' (1951) categories of "task-oriented behavior" and "emotional behavior".

#### Necessary Conditions for Serenity

If serenity is a goal, what are the necessary conditions to attain it? **A state of serenity cannot be reached through emotional equilibrium alone.** In high-stakes issues involving many people it will not be possible to reach serenity in an environment of relative ignorance. Such an environment cannot provide any closure on the likelihood of resolution of the issue and cannot, therefore, bring about a state of emotional equilibrium. It must be appreciated that time scale is significant here. Research on groups shows that apparent consensus is reached when groupthink is



involved. But this apparent consensus will disintegrate rapidly under the impact of bad outcomes, as Allison's study of the Bay of Pigs incident makes clear.

Cognitive equilibrium is a necessary condition for emotional equilibrium (though not a sufficient condition, as will be indicated). Even if everyone in the group attains a feeling of confidence in the group understanding of the issue and its prospective resolution, thereby attaining cognitive equilibrium, there is no assurance that the resolution will not require executive action on the part of individuals who may not wish to hear, study, accept, and implement the work of the group. That is why prior commitment by the executive, as discussed previously, is important to attaining emotional equilibrium. But once again the time scale rears its head, and rapid disintegration of consensus is not compatible with equilibrium, as defined.

Issues, as originally defined, have a tendency to escalate beyond the initial bounds (Warfield, 1982b). Products of groups may deal with limited versions of issues that have to be integrated with larger issues. Therefore a state of serenity is finally attainable only when closure is reached. Empirical evidence to be discussed can only highlight the aspects of the group work that produce cognitive equilibrium. Emotional equilibrium cannot be highlighted by empirical results to date.

#### Data Origins in Methodology

To appreciate the data obtained, it is necessary first to understand the two principal methodologies that were involved in gathering the data. It should also be appreciated that no member of any of the groups involved in producing the data was advised that data were being taken on the group activity for purposes related to scientific ends. A principal reason for this is that the data gathered are only those that are required by the methodologies as an integral part of the approach to defining and resolving the issue. In other words, the data are mainstream requirements of issue resolving, not determined by needs for empirical evidence. To have told the group members that the data were being collected for scientific reasons would not only have been misleading, but might even have affected adversely the members' decisions to participate.

The Nominal Group Technique. The Nominal Group Technique (NGT) has been widely used since its introduction as a means of enhancing group work (Delbecq, et al, 1974). The particular cases where this methodology was used, and from which data are drawn, were all conducted by the Center for Interactive Management under the leadership of Dr. Alexander N. Christakis, with support from Dr. David Keever and others. [Reports on the cases are archived in Fenwick Library, George Mason University, Fairfax, Virginia.]



In applying NGT, members of the group work from a context statement about the issue to generate ideas about the issue silently. Then there is a round-robin recording of the ideas. Next there is a formal period of clarification of the ideas, aimed at assuring that everyone in the group has the opportunity to understand every idea. As used by the Center for Interactive Management, the last step in applying NGT is to ask each individual member of the group to vote anonymously on what that individual believes are the five "most important" ideas in the set of ideas that remains after clarification. This voting record becomes part of the permanent data set on how members of the group share or do not share beliefs about relative importance of constituent factors in the complex issue under consideration. It allows a ranking pattern to be produced reflecting a group product at a certain point in time in considering the issue. This ranking pattern will be referred to as **Pattern One** in the subsequent discussions.

Interpretive Structural Modeling. The second methodology always used in the cases being discussed is called Interpretive Structural Modeling (ISM) (Warfield, 1976, 1982a). It is a methodology for group construction of patterns that relate to the issue. It is also a powerful learning method, because it involves disciplined, detailed, examination of relationships among factors involved in the complex issue; accompanied by discussion and further clarification.

The patterns produced by the use of this methodology can take any of a variety of forms. However a very common form of pattern that is produced is called a "problematique". This particular pattern shows how a set of problems all involved in the issue are interrelated to each other in an influence pattern. Specifically, such a pattern shows how a given problem may cause some other problems in the set to become worse. Problematiques typically contain "cycles"; i.e., subsets of problems such that each problem in a subset makes every other problem in the subset worse. Cycles represent (model) escalating situations that may only be susceptible to corrective action by working with all members of the cycle as a group, rather than working individually and independently with problems uninformed by their interaction.

Another type of pattern that can be produced using ISM is called a "priority structure". Such a structure shows the sequence in which component problems of an issue should be addressed. These structures also typically contain cycles, meaning that some problems need to be addressed simultaneously.

The priority structure should be informed by the problematique. Otherwise, problems will be treated in a way that is uninformed by their mutual interaction. Such a piecemeal approach is responsible for many of the complex issues that persist through time, and for the failure of many ameliorative actions that are taken with good intentions.

Individual equilibrium reflects the fact that an individual has reached a state of serenity relative to the particular issue. Group equilibrium reflects the fact that every member of the group has attained virtually the identical state of serenity. Consensus is the hallmark of this serenity. It can only be reached by extended, high-quality, thoughtful communication, accompanied by agreement on the key patterns relevant to the issue.

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receiving votes is almost seven times that number. The average number, as well as the individual case data, shows that there are always major differences among the group members concerning the relative importance of individual factors in the issue.

The Law of Inherent Conflict then reads as follows:

**"No matter what the complex issue, and no matter what the group involved in its study, there will be significant inherent conflict within the group stemming from different perceptions of the relative significance of the factors involved in the complex issue."**

If one chose to assume that there is some correct answer to the question: "what are the five most important factors in this issue?" the data indicate that at most one member of the group has the "right answer" and the rest are wrong. A much more likely conclusion is that they are all wrong in some sense.

The question may arise as to whether the conflicts can be separated into cognitive and emotional differences. If they can, it is clear from the data that the differences are individualized rather than associated with blocs or groups. The common treatment of conflict, which assumes two parties to the conflict, is not at all consistent with the data. The data do not show blocs or groups. They show individuals expressing different beliefs. It is reasonable to assume that the majority of the differences stems from cognitive factors. Before such an assumption is allowed to take much credibility, it is important to look at what the other two Laws have to say.

The Law of Structural Underconceptualization. The Law of Structural Underconceptualization is based in data arising from 31 cases of application of ISM. These data show the following:

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| o Average number of ideas structured:  | 22    |
| o Average length of the longest cycle appearing in the structural pattern:     | 7.1   |
| o Average length of condensed hierarchy:                                       | 6.3   |
| o Average length of walk along the longest cycle plus the condensed hierarchy: | 13.4  |
| o Percent of structures with at least one cycle:                               | 96.8% |

[The complete data appear elsewhere (Warfield, 1990, Appendix 5). What is presented here consists of excerpts from the total array of data.]

Structural underconceptualization means that the organization of the information about a given issue is insufficient to enable the important patterns to be inspected. Because the structuring of the information with the help of ISM produces structures with cycles in



almost 97% of the cases, and because cycles are almost never mentioned, much less identified, in the ordinary way of looking at complex issues, we can say as a first aspect of underconceptualization that ordinary processes omit recognition and interpretation of the cycles that are at work in a given issue. The second aspect of underconceptualization stems from the normal absence of any sense of length of logic, which in the above data is conservatively at least 13 units long (including that part of the logic walk that traverses the longest cycle). The third aspect of underconceptualization arises by ignoring in ordinary approaches to issues the human limitations on working mentally with information, which are well-known from the work of G. Miller, Simon, and others; but which seem systematically to be ignored in systems analysis and design activity.

The formal statement of the Law of Structural Underconceptualization is as follows:

No matter what the complex issue, and no matter what the group involved in its study, the outcomes of ordinary group process (i.e., process in which computer support for developing the formal logical structure of the issue is lacking) will be structurally underconceptualized (as evidenced, for example, by the lack of delineation of the cycles and of any structural connections among them).

The Law of Uncorrelated Extremes. The Law of Uncorrelated Extremes is a consequence of analysis and comparison of data arising from NGT and ISM sessions dealing with a common issue. It arises from a statistical comparison of Pattern One (seen as one extreme in the evolution of an adequate perception of a complex issue and its resolution, i.e., the initial synthesized group view); and Pattern Two (seen as the other extreme in the evolution, i.e., the view synthesized by the group during the ISM sessions).

If one presumed that the group had a satisfactory initial interpretation of the complex issue, and that only modest change in this view would appear as a consequence of the use of ISM, the result would be that there would be a strong correlation between Pattern One and Pattern Two. In fact, what was discovered (Kapelouzos, 1989) is that there is **no correlation** between Pattern One and Pattern Two! This startling result shows that there is major learning going on during the ISM exercise which results in patterns for interpreting the issue that were entirely absent in the initial thinking of the group.

It is probably impossible to overstate the implications of this finding for group work on complex issues. This finding alone explains to a large extent why so many complex issues continue unresolved year after year and, in some instances, decade after decade. This finding is, however, indicative of a necessary condition and far from conclusive in terms of a sufficient

condition for resolving complex issues. The reason does not lie in the data or in the process. Instead it lies in the absence of adequate usage and adequate followup study. Why is there inadequate usage and followup? It is largely because of the lack of understanding on the part of authority figures, i.e., executives with implementation authority to understand, appreciate, and be guided by the findings given herein. Without this attention, it is not possible to tap the resources required to do what is needed, in spite of the fact that the financial and human burdens that arise from ignoring or neglecting this condition far exceed the costs of the resources required to take advantage of it.

The formal statement of the Law of Uncorrelated Extremes is as follows:

No matter what the complex issue, and no matter what the group involved in its study, the initial aggregate group opinion concerning the logical pattern of the factors involved in the issue and the final aggregate group opinion concerning the logical pattern of the factors involved in the issue (i.e., the views at the two extremes of the application of the Generic Design Science, before and after) will be uncorrelated; showing that significant learning takes place through the application of the generic design processes.

#### Compatibility With Prior Study.

The research results described above have been compared with earlier research of such authors as Bales, Tuckman, G. Miller, H. Simon, C. Argyris, and I. Janis mentioned earlier in this paper. There do not appear to be any conflicts between these results and those reported by these authors in their referenced work. On the other hand, there is a major discrepancy between these results and the work on conflict resolution reported (Burton, 1987). As mentioned earlier, Burton insists that conflicts involve deeply-rooted values that are non-negotiable, and this is why so many conflicts are so difficult to work with. Burton also ignores virtually all of the work of the authors mentioned above, and seems impervious to any ideas having to do with the cognitive component of group activity; placing all of the emphasis on the emotional.

This posture applied to conflict resolution precludes any findings of a comprehensive nature, for it is equivalent to an assumption that knowledge plays no role in conflict resolution. In contrast, the research results reported above, while not conclusive with regard to their significance in conflict resolution, stress the fact that emotional equilibrium, in the absence of cognitive equilibrium is not likely to be found.

Moreover the discrepancies involved here serve to prevent the introduction of processes into conflict resolution group work that



help provide interpretive means to cognitive equilibrium; thereby precluding any study of the potentially beneficial impact of cognitive equilibrium in promoting emotional equilibrium.

### Conclusions

New research results suggest strongly that effective group work on complex issues should begin with a facilitated approach to cognitive equilibrium, followed by efforts to achieve emotional equilibrium. The combination of these two components would produce a state of serenity based in human satisfaction at having discovered how to interpret and to resolve complex issues.

In spite of the potential benefits of applying these research results to all group work involving complexity, it will still be necessary to make significant inroads into the executive community before the true benefits of high-quality group work can be translated into human society.

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