# THE DEMING LIBRARY

# Profound Knowledge

## DISCUSSION GUIDE

VOLUME 13:
AMERICA IN THE GLOBAL MARKET

VOLUME 14:
UNDERSTANDING PROFOUND KNOWLEDGE

VOLUME 15:
COMPETITION, COOPERATION, AND THE INDIVIDUAL

VOLUME 16:
THE QUALITY LEADER



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# TABLE OF CONTENTS

## VOLUMES 13-16

Introduction .....3
Overview .....4
The 14 Points .....5

## VOLUME 13: AMERICA IN THE GLOBAL MARKET

Introduction .....5
Discussion Questions .....6

## VOLUME 14: UNDERSTANDING PROFOUND KNOWLEDGE

Introduction .....7
Discussion Questions .....7
Graphics for Volume 14 .....11

## VOLUME 15: COMPETITION, COOPERATION, AND THE INDIVIDUAL

Introduction .....14
Discussion Questions .....14
Graphic for Volume 15 .....16

## VOLUME 16: THE QUALITY LEADER

Introduction .....17
Discussion Questions .....18
Graphics for Volume 16 .....20

## APPENDIX A: A SYSTEM OF PROFOUND KNOWLEDGE

Overview .....22
Introduction .....23
A. A System .....24
B. Some Knowledge of Statistical Theory .....26
C. Theory of Knowledge .....27
D. Knowledge of Psychology .....28

## APPENDIX B

Overview .....29
Some Remarks About the Boundary of a System .....29

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**VOLUMES 13-16**

## INTRODUCTION

When different people view a videocassette, each sees, hears, and learns something different. If all those people discuss their different insights, they will learn more than they would have if they only viewed the tape. Talking about the cassette helps people to understand and absorb the information.

There is no need to view The Deming Library in strict numerical order, and most of you will find your own best sequence.

For instance, one viewer tells us that his people are more receptive to The 14 Points (Volume 2) after they see the Red Bead Experiment (Volumes 7 and 8). He says the Red Bead Experiment convinces people that the Deming Method will help "because the focus is not on the faults of employees, but on the improvement of systems." That sounds reasonable to us.

However, as a suggestion, we think students should first view Volume 1 to understand the philosophical background and Volume 13 to understand the historical one. These two tapes help to explain why the Deming Method is important in today's global economic competition. To understand how much has to change and how deep the commitment to change must be, particularly among top management, we suggest the Ford Motor Company story (Volumes 3-6).

Sooner or later you will run into resistance to change. Continuous improvement is not an easy concept, and there is some frustration in trying to understand and apply it. At that point, we think the Vernay Laboratories story (Volumes 10-12) can encourage people by showing them that their feelings are not unique, and if they'll just stick with the Deming Method, it does pay off. You will also find encouragement in the Ford story.

Volumes 14-16 explain Dr. Deming's philosophy in several different ways. The philosophy often runs counter to traditional management thinking and, as Lloyd Dobyns says, cannot be fully understood the first time it is presented. We suggest you consider studying Volumes 11, 9, 14, 15, and 16 more than once. If you do, we predict that you'll discover something new every time you view them. While students who have viewed Volumes 1-9 can skip ahead to a specific subject, we recommend that you view the whole series in whatever order seems best for you. Managers who are trying to create a better

work environment might want to go directly to The Quality Leader (Volume 16). But if they do not learn about profound knowledge (Volumes 14 and 15), they can never understand Dr. Deming's strategy for change.

We encourage you to show The Deming Library in the order that best meets your needs. Should you find a sequence you believe works particularly well, we'd appreciate hearing about it so that we can tell other viewers. This is, as we've said before, like studying a language. You don't have to learn the parts of speech in any particular order, but you do have to learn them all eventually.

The Deming Method does not have to be learned in order, but it has to be learned.

This guide is designed to help you start a general discussion. The idea is to raise questions that participants will try to answer. However, the discussion leader is not limited to these few questions. Indeed, the leader is encouraged to help participants raise their own questions about points made on the cassette.

One caution: Be sure the people in the group understand that this is a discussion-it is not a quiz.

## OVERVIEW

In Volumes 14, 15, and 16 of The Deming Library, Dr. Deming presents a detailed explanation of profound knowledge – an understanding of the entire system – that managers must apply to the 14 Points in order to achieve quality and improved productivity. He explains how effective leaders use profound knowledge to boost intrinsic motivation, promote cooperation, and support innovation – the basis for competitive success.

The aim of profound knowledge, Dr. Deming says, is "optimization" – the greatest good for the greatest number – for the workers, managers, customers, owners, and society. In Volume 13, Mr. Dobyns provides an historical account of America's changing economic position in the global marketplace.

This Discussion Guide is designed to help you get the best possible benefit from these cassettes. The more people think about what they have seen and heard, the more this will sharpen their thoughts. They will also begin to work together – a step toward teamwork. The leader should encourage participants to help each other during the discussions. The emphasis should be on group cooperation.

It is essential that the discussion of each tape comes at the end of that cassette, while the information is fresh in the minds of the participants.

## THE 14 POINTS

Following are Dr. Deming's 14 Points. Familiarity with them will help in your discussions.

1. Create Constancy of Purpose.

2. Adopt the New Philosophy.

3. Cease Dependence on Mass Inspection to Achieve Quality

4. End the Practice of Awarding Business on Price Tag Alone. Instead, Minimize Total Cost, Which Is Often Accomplished by Working with a Single Supplier.

5. Improve Constantly the System of Production and Service.

6. Institute Training on the job.

7. Institute Leadership.

8. Drive Out Fear.

9. Break Down Barriers Between Departments.

10. Eliminate Slogans, Exhortations, and Numerical Targets.

11. Eliminate Work Standards (Quotas) and Management by Objective.

12. Remove Barriers That Rob Workers, Engineers, and Managers of Their Right to Pride of Workmanship.

13. Institute a Vigorous Program of Education and Self-Improvement.

14. Put Everyone in the Company to Work to Accomplish the Transformation.

# VOLUME 13: AMERICA IN THE GLOBAL MARKET

## INTRODUCTION

In Volume 13 of *The Deming Library*, Lloyd Dobyns, writer and narrator of the 1980 award-winning NBC White Paper *If Japan Can… Why Can't We?*, gives an historical account of why management techniques that made America the world's leading industrial power no longer work. He explains how American businesses can use the Deming

Method, as the Japanese did, to transform the economy and restore its competitive strength in the global marketplace.

**QUESTIONS 1-5**

1. What does Mr. Dobyns mean when he says, "We have been unable or unwilling to recognize that we have caused most of our own problems"?

2. Do you agree with Mr. Dobyns that the prevailing attitude in official Washington and for much of America is "we're still doing what we did when we had half the world market, so if we don't still have half the world market, it can't be our fault – all those other people must be cheating"?

3. Why is the following quote by Oscar Wilde relevant to Mr. Dobyns' speech: "There are only two tragedies in the world. One is not getting what one wants. The other is getting it"?

4. After the first machine-made, interchangeable parts were demonstrated in 1851 by an American gunsmith, European industrialists referred to the idea as "the American system of manufactures." Why was this idea revolutionary in industrial history?

5. Why was Henry Ford's invention of the assembly line revolutionary?

**QUESTIONS 6-10**

6. Frederick W Taylor, the first time-and-motion-study expert, achieved "mechanical efficiency" on the assembly line by having each person do just one small piece of the job. Why was this work arrangement appropriate for the American labor force in the early 20th century?

7. In 1945 the American domestic market was eight times larger than the next largest market. How did this account for American economic success? What has changed?

8. Why, according to Mr. Dobyns, did post-World War II America have superior technology to other countries and a more highly skilled labor force?

9. Mr. Dobyns says that America now has the highest rate of functional illiteracy in the industrial world. Why is this a crucial time in American economic history, when "a demonstrably better educated work force is needed"?

10. What influence do you think American managers had on postwar American economic success? Were they superior to European and Asian managers?

## QUESTIONS 11-16

11. Why does Mr. Dobyns say that after the Depression and World II, "The problem for American industry was not quality; it was quantity. They could sell anything that they could make"?

12. What does Mr. Dobyns mean when he says, "The solution to any problem will inevitably lead to another problem unless that solution is continually improved"?

13. When asked, "Can America continue to be the number-one economic power in the world?" why do you think Mr. Dobyns says, "No, I believe that may be very good for us and even better for the world"?

14. Do you agree with Mr. Dobyns when he says, "We may be in a position where we are linked together [with other countries], sort of tied for first place, and that could be very good for us all. It is very difficult to bomb a country if two of the plants making bomb parts for your bombs are located there"?

15. What does Mr. Dobyns mean when he says, "When Dr. Deming talks about win-win, when he talks about doing away with rankings, when he talks about cooperation, no one ever said he was talking about one plant, or one company, or one country"?

16. What do you think Mr. Dobyns means when he says, "Wouldn't it be the most wonderful improvement if, having won World War II by the quantity of what we could produce, we could avoid World War III by the quality of it"?

# VOLUME 14: UNDERSTANDING PROFOUND KNOWLEDGE

## INTRODUCTION

In Volume 14 of *The Deming Library*, Dr. Deming presents a detailed explanation of the first three parts of profound knowledge. He explains why management must understand systems, statistical theory, and the theory of knowledge in order to make critical predictions, and to produce quality at a cost that will entice the customer.

## QUESTIONS 1-5

1. What does Dr. Deming mean when he says, "Given the choice, people buy something else, not American. Our problem is quality"?

2. What, according to Dr. Deming, did the Japanese lack in the early 1950s?

3. What does Dr. Deming mean when he says that the purpose of consumer research is to determine how to "get ahead of the customer and entice him to buy"?

4. The flow diagram that Dr. Deming showed the Japanese in 1950 depicts manufacturing as a system. Draw a flow diagram that depicts several functions of your organization as a system. *See Graphic 1*.

5. Explain what Dr. Deming means when he says, "The design and redesign of product and seance will affect the materials that you buy, will affect processes, and will affect the product"?

**QUESTIONS 6-10**

6. Why does Dr. Deming say, "You have to see things as a system"?

7. Does your organization have methods for improving processes? What are they?

8. What does Dr. Deming mean when he says, "Quality is made by the C.E.O. and executives. It can be no better than the intent"?

9. Dr. Deming says, "If we were to hold a national referendum, 'Are you in favor of quality, yes or no?' it would be overwhelmingly a vote in favor of quality" Why does Dr. Deming say "We are being ruined by people putting forth their best efforts"?

10. Why does Dr. Deming say that automation and machinery will not ensure quality?

**QUESTIONS 11-15**

11. According to Dr. Deming, what are some of the common management practices that fail to produce quality? Why don't they work?

12. What does Dr. Deming mean when he says, "Everybody has the answer, [but the answers are] all wrong in the sense that they won't do it; altogether they will not do it"? *See Graphics 2 and 3*.

13. What does Mr. Dobyns mean when he says, "The fact that they don't work does not mean that each of them is wrong"?

14. Why does Dr. Deming say that work standards or quotas actually double the cost of production?

15. What does Dr. Deming mean when he says that work standards "rob people of pride of workmanship, the emphasis being on numbers, not on quality"?

**QUESTIONS 16-20**

16. Why, according to Dr. Deming, are quotas and time standards a barrier to improvement?

17. What does Mr. Dobyns mean when he says, "Quality can lead to just-in-time, but just-in-time can't lead to quality"?

18. What does Mr. Dobyns mean when he says, "Everything in a system may meet specifications, have zero defects, yet the system may fail"? Give an example of how this might occur in your organization.

19. What, according to Dr. Deming, is a system? *See Appendix A (Sections A-D) for Dr. Deming's outline and graphics on profound knowledge*.

20. What is management's job with respect to the components of the system?

**QUESTIONS 21-25**

21. Why does Dr. Deming say that the component subprocesses of a system must be managed?

22. What does Dr. Deming mean when he says, "The aim of the system must be stated by the management thereof. Without an aim, there is no system"?

23. Dr. Deming says, "The aim proposed here for management is for everybody to win – stockholders, employees, suppliers, customers, community, the environment – over the long term:" What is the aim proposed by the management of your organization?

24. Dr. Deming says that in order to improve the outcome of a system, it is necessary to make changes. What does he mean when he says, "By understanding a system, one may be able to trace the consequences of a proposed change"?

25. Do you agree with Dr. Deming when he says that you don't need to be an expert in any field of profound knowledge in order to understand it as a system and apply it?

**QUESTIONS 26-30**

26. Compare the degree of interdependence between the component processes in your organization to that of another organization or system.

27. What does Dr. Deming mean by optimization of a system?

28. Give an example of how suboptimizing one area of your company would be detrimental to some other area, and result in losses to the whole company.

29. How does knowledge of variation help us understand the capability of a process?

30. How do you know if a process shows stable variation?

**QUESTIONS 31-35**

31. How does an understanding of common and special causes of variation relate to Question 30? *See Graphic 4*.

32. A. Give an example of a common cause of variation in your job. What kinds of losses might you or someone else incur if you were to treat it as a special cause?

B. Give an example of a special cause of variation in your job. What losses might result if you were to treat it as a common cause?

33. Give an example of how knowledge of interaction of forces can help minimize the losses from the two mistakes discussed in Question 32.

34. What is the difference between enumerative studies and analytic problems?

35. How can the Taguchi Loss Function be used to determine which quality characteristic is most critical for management to work on? *See Graphic 5*.

**QUESTIONS 36-40**

36. What is chaos?

37. Give an example of loss due to the production of chaos. (Remember: Chaos is the result of successive applications of random forces that, individually, may cause little harm.)

38. What, according to Dr. Deming, is the difference between knowledge and information?

39. Explain what Dr. Deming means when he says, "Management in any form is prediction."

40. Explain why interpretation of Me results of a test or experiment is prediction.

## QUESTIONS 41-43

41. How does the story about counting the cows in animal crackers teach us that there is no true value of anything that must be observed?

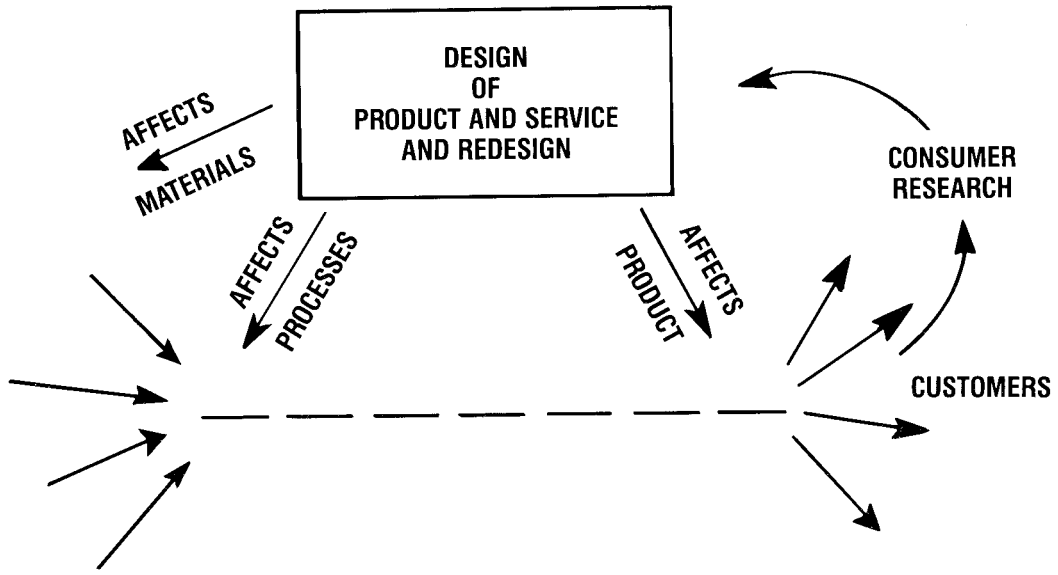
42. What does Dr. Deming mean when he says, "There is no such thing as a fact concerning an empirical observation. Any two people may have different ideas about what is important to know about any event"?

43. How might this knowledge enable management to envision changes in the system that will bring improvement?

## GRAPHICS FOR VOLUME 14

Following are the graphics that appeared in Volume 14 of *The Deming Library*. They make excellent reference notes to recall the main points of Dr. Deming's discussion. It would be useful for each participant to be able to look at them after viewing the tape and discussing it.

## GRAPHIC 1



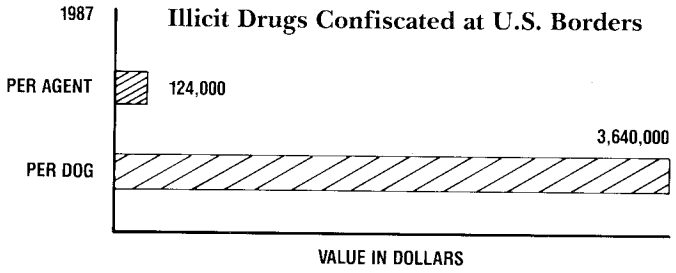
**GRAPHIC 2**

Dr. Deming explains that there is widespread interest in quality. He says, however, "Unfortunately, almost everybody has the answer on how to achieve it… .Here are some of the answers offered, all insufficient, some negative in results." Dr. Deming lists them:

• Automation
• New machinery
• Gadgets
• Computers
• Hard work
• Best efforts
• Make everybody accountable
• Posters, slogans, exhortations
• M.B.O., management by objective, management by the numbers
• M.B.R., management by results
• Merit system (actually, destroyer of people)
• Incentive pay, pay for performance
• Work standards (quotas, time standards)
– They double the cost of production be they for manufacturing or for service (bank, telephone company).
– They rob people of pride of workmanship, the emphasis being on numbers, not on quality.
– They are a barrier to improvement.
• Just-in-time
• Zero defects
• Meet specifications
• Motivate people

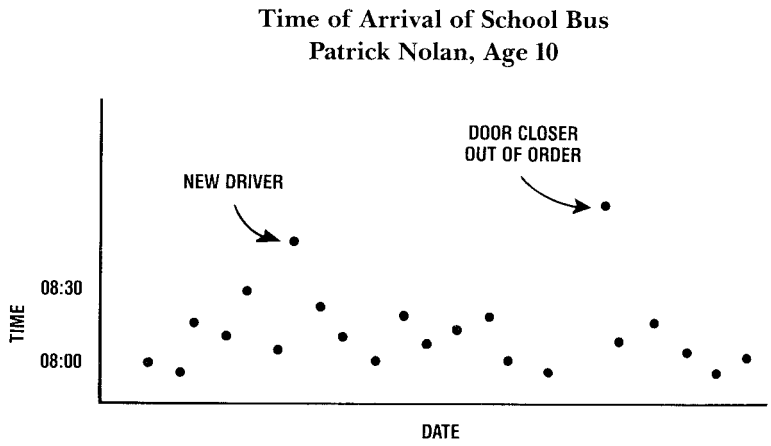
**GRAPHIC 3**

Dr. Deming shows this graphic after he lists "incentive pay, pay for performance" in Graphic 2.



## GRAPHIC 4

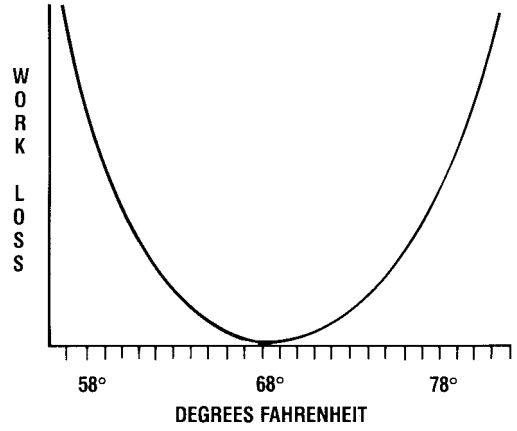
Dr. Deming gives examples of special causes of variation in this graphic.




## GRAPHIC 5

### The Taguchi Loss Function

The Taguchi Loss Function shows that the further you move away from the optimum, the greater your loss will be. In this example, we assume that 68° Fahrenheit is the optimum work temperature for people. If it were 67° or 69°, there would be an imperceptible work loss. But if the temperature were 10 degrees hotter or colder, there would be a substantial loss in work. *See Appendix A (Section A) for Dr. Deming's explanation of the Taguchi Loss Function.*



## VOLUME 15: COMPETITION, COOPERATION, AND THE INDIVIDUAL

### INTRODUCTION

In Volume 15 of The Deming Library, Dr. Deming presents the fourth part of profound knowledge – the knowledge of psychology. He explains how misplaced competition – grades, ratings, and merit systems – smother intrinsic motivation and innovation.

Dr. Deming advocates a win-win strategy of cooperation in education, government, and business. In the Deming Method, for example, companies can cooperate in areas like research and development, while they compete to produce quality and to increase the size of the market.

### QUESTIONS 1-5

1. What does Dr. Deming mean when he says, "A leader must be aware of the differences between people and use them for optimization of everybody's abilities and inclinations"? *See Appendix A (Section D) for Dr. Deming's remarks on the importance of knowledge of psychology*.

2. What are some of the different ways that people learn?

3. Why does Dr. Deming say, "Knowledge about the psychology of change is necessary"? How will management acquire this kind of knowledge?

4. Discuss how change comes about in your organization. Under what conditions will people change? What holds people back from changing?

5. How does fear affect performance?

### QUESTIONS 6-10

6. What is the difference between intrinsic and extrinsic motivation?

7. What are your earliest recollections of being intrinsically motivated to do something? What are your earliest memories of being extrinsically motivated? What is the difference in the quality of feeling that these two memories evoke?

8. How is your work affected by whether your motivation is intrinsic or extrinsic?

9. Do you agree with Dr. Deming that we are born with intrinsic motivation, self-esteem, dignity, joy in learning, and joy in work? Under what conditions can these attributes be preserved?

10. Are we born with the drive to win or best others, or is it taught?

**QUESTIONS 11-15**

11. How is cooperation taught in our culture?

12. What does Dr. Deming say is wrong about the way we've been brought up on competition? Is competition always destructive?

13. What are the personal benefits of cooperation? Can a person who is extrinsically motivated to cooperate still reap the personal benefits?

14. How are grading and rating humiliating even for the young child who is rated outstanding?

15. How does the merit system foster the kind of thinking that endorses management by the numbers?

**QUESTIONS 16-20**

16. What does Dr. Deming say we need that will replace the prevailing forces of destruction and restore the power of the individual? Why does Dr. Deming use the phrase "power of the individual"? *See Graphic 6*.

17. What is the difference between rugged individualism and empowering the individual?

18. What does Dr. Deming mean when he says, "The style of management in North America has smothered innovation, the very thing that we need"?

19. Is the desire and willingness to change and improve intrinsically or extrinsically motivated?

20. Dr. Deming says, "The way to get ahead is to expand the market, which means making product and conjuring up service that will help people live better." What are some examples of manufacturing and service companies that are doing this?

## QUESTIONS 21-25

21. What does Mr. Dobyns mean by "competitive cooperation"?

22. How does the prevailing system of reward narrow management's understanding of what cooperation, competitiveness, and winning can be?

23. What happens when a company is more concerned with meeting the competition – competing for market share – than they are with understanding their customers' future needs?

24. What does Dr. Deming mean when he says, "The Japanese had to learn cooperation. They couldn't live on that island without cooperation. We didn't have to"?

25. How can companies both cooperate and compete? Is cooperation a barrier to competition?

## QUESTIONS 26-31

26. What are some examples of cooperation between companies? Between countries?

27. Does cooperation mean collusion for selfish purposes?

28. How has the discussion of intrinsic motivation and cooperation helped you to gain insight about Dr. Deming's 14 Points?

29. What does Mr. Dobyns mean when he says, "Expanding the market should be a joint effort, part of that intercompany competitive cooperation, and that's going to require a change in Washington"?

30. Why does Dr. Deming say, "Please let us keep the government out of business"?

31. Explain what Mr. Dobyns means when he says, "The current standard management technique – in education, government, and business – is to force people into artificially created competition, to reward or punish them on the basis of artificially created results, then to wonder why as an economy and a nation, we aren't doing that well."

*See Appendix B for Dr. Deming's provocative remarks about optimizing a system.*

## GRAPHIC FOR VOLUME 15

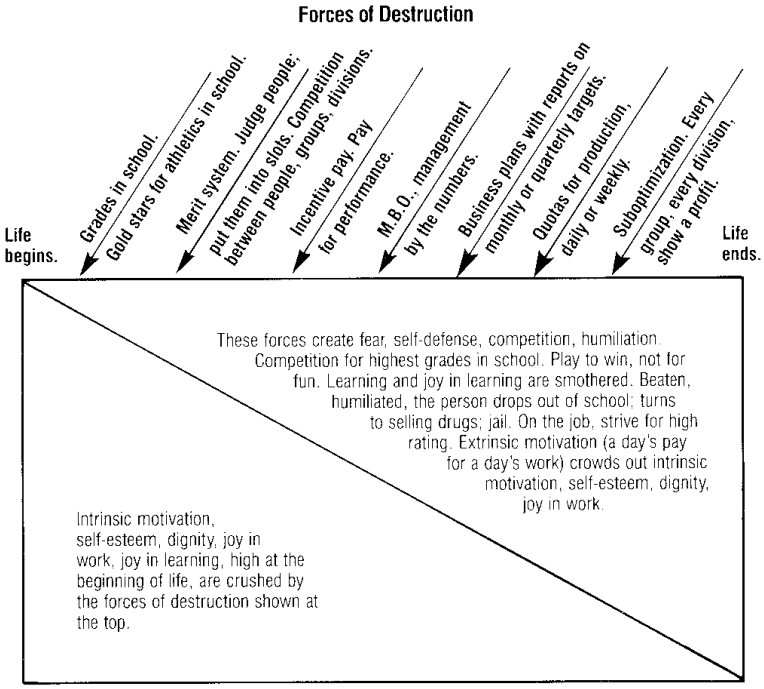
Following is the graphic that appeared in Volume 15 of *The Deming Library*.

**GRAPHIC 6**

**Gradual Ruination over the Life Span of the Individual from the Prevailing System of Reward**

The lower triangle shows the positive attributes that each of us is born with. The destructive forces that bear on the individual throughout life are indicated by arrows along the top of the graphic. The effects of these forces are shown in the upper triangle.

When life begins (on the left side of the graphic), the positive attributes of the individual are abundant. But as life goes on (moving left to right), these attributes are gradually crushed, according to Dr. Deming, by the prevailing Western system of reward.




Dr. Deming says, "The forces along the top rob the company and the nation of innovation and applied science. We must replace them with leadership that will restore the individual."

## VOLUME 16: THE QUALITY LEADER

### INTRODUCTION

In Volume 16 of *The Deming Library*, Dr. Deming describes the attributes of a successful leader. He explains why effective managers must continually increase their knowledge

and improve their leadership skills in order to boost cooperation and productivity. He also identifies faulty practices of traditional management, and provides suggestions for better practices.

**QUESTIONS 1-5**

1. Do you agree with Dr. Deming when he says, "The aim of leadership is to help people and to improve the services and profits of a company"?

2. Do you agree with Dr. Deming when he says, "The job of a leader (or teacher) is not to judge people, but to find out who is in need of special help"? *See Graphic 7.*

3. Why doesn't Dr. Deming grade his students?

4. What are some of the attributes of a successful leader, according to Dr. Deming?

5. What does Dr. Deming mean when he says that a successful leader "tries to optimize the education, skills, and abilities of everyone"?

**QUESTIONS 6-10**

6. How does a leader motivate his group to work toward the aims of the company?

7. Why does a leader who continually increases his knowledge become powerful?

8. How does personality make a leader powerful?

9. When is a successful leader obligated to use the formal power he has by virtue of his position?

10. What kinds of figures and statistical calculations are useful to a leader, according to Dr. Deming?

**QUESTIONS 11-15**

11. How should a leader create trust and encourage freedom and innovation? What kinds of risks must a leader take in order to build trust in your organization?

12. How does a good leader encourage cooperation?

13. Why does Dr. Deming say that work standards and quotas "shut off any possibility to obtain data to use for improvement of process and output"? *See Graphic 8.*

14. How do work standards and quotas rob people of pride of workmanship?

15. How might competent leadership support pride of workmanship even in the most undesirable of jobs?

**QUESTIONS 16-20**

16. What is the difference between skills and knowledge?

17. Why does Dr. Deming say that reactive management requires skills only?

18. What does Dr. Deming mean when he says that "mind" is not required to manage outcomes or results? What is the relationship of this idea to Dr. Deming's statement that experience teaches nothing without theory?

19. Why does Dr. Deming say that M.B.R. and P.R.R. (problem, report, resolution) contribute nothing toward improvement of the system?

20. Give some examples of common corrective management practices that are actually tampering or management of outcomes done too late.

**QUESTIONS 21-25**

21. Why does Dr. Deming say that regular systems of pay and leadership are better for people (and for quality) than incentive pay or pay based on performance?

22. Why does Dr. Deming liken faulty management practices to driving while looking into the rearview mirror?

23. Why does Dr. Deming say that in order to reduce failure at the source, management must understand that "costs are not causes, costs come from causes"? What are some of the "costs" that Dr. Deming is referring to here? *See Graphic 8*.

24. What does Dr. Deming mean when he says, "The performance of anyone is governed almost entirely by the system, and what we need is leadership"?

25. What does Dr. Deming mean when he says, "Those that form the system must not be ranked, because you are not ranking the people, you are ranking the system"?

## QUESTIONS 26-31

26. Why does Dr. Deming say, "You can only take what the method will deliver. If we want better results, we have to improve our methods"?

27. Why does Dr. Deming say that job descriptions are outmoded? What information do job descriptions traditionally fail to provide the worker in a company that is continually improving?

28. How can leaders accomplish change using their formal power without creating fear?

29. Do you agree with Dr. Deming when he says, "There is no difference [between cultures regarding] the things that actually count. All that people ask for is a chance for intrinsic motivation, for self-esteem and dignity"?

30. What are the most significant improvements Dr. Deming has made in his latest version of the 14 Points?

31. Has thinking about Dr. Deming's philosophy in terms of systems, what won't work, profound knowledge, cooperation, leadership, good and better practices, and the 14 Points given you a deeper understanding of it? (Please phone or write to us with your comments.)

## GRAPHICS FOR VOLUME 16

Following are the graphics that appeared in Volume 16 of The Deming Library.

## GRAPHIC 7

Some Attributes of a Leader

1. A leader and his people understand the meaning of a system, and how the work of his group is to support these aims.

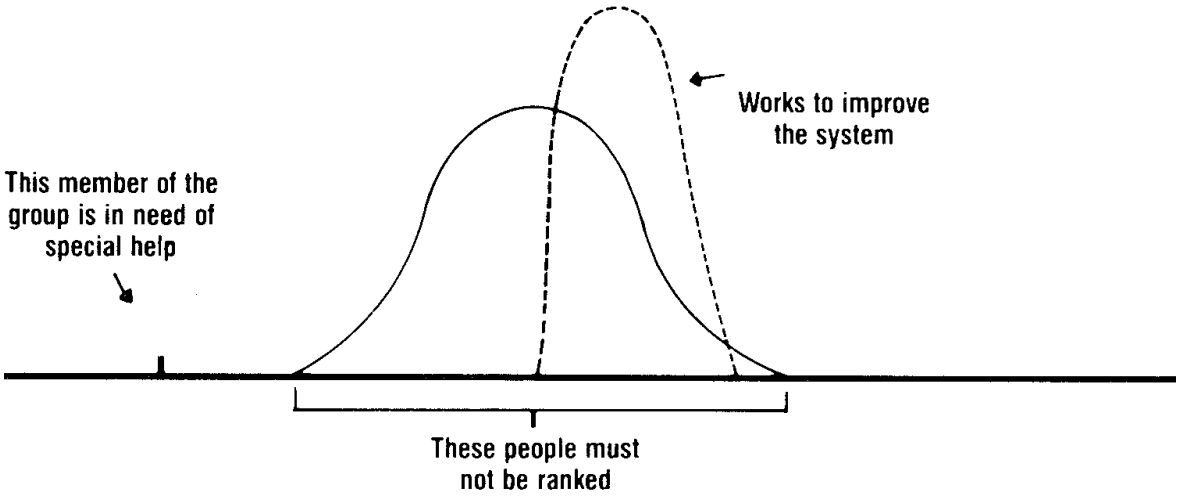
2. A leader works in cooperation with preceding stages and with following stages toward optimization of the efforts of all stages. He sees his group as a function in a system.

3. He understands that all people are different from each other. He tries to create for everybody interest, challenge, and joy in work. He tries to optimize the education, skills, and abilities of everyone to improve. Improvement and innovation are his aims.

4. He is coach and counsel, not a judge.

5. His sources of power are: (1) formal, (2) knowledge, (3) personality. A successful leader, develops 2 and 3 and does not rely on No. 1. He has nevertheless an obligation to use No. 1, as this source of power enables him to change the system – equipment, material, methods – for example, to bring improvement, to reduce variation in output (Dr. Robert Klekamp).

6. He uses, when possible, statistical calculation to try to understand the performance of himself and of his people. He will try to learn how he himself can improve his leadership. Another aim is to learn who, if anybody, is outside the system, in need of special help. Simple rearrangement of the work might be the answer.




7. He creates trust. He creates freedom and innovation. He is aware that the creation of trust requires that he take a risk (Carlisle & Parker, Beyond Negotiation, Wiley, 1989).

8. He does not expect perfection.

9. He listens and learns without passing judgment on the person he listens to.

10. He understands the benefits of cooperation and the losses from competition between people and between groups (Alfie Kohn, *No Contest*, Houghton Mifflin, 1986).

**(More on pages 117 and 118 of Out of the Crisis, W. Edwards Deming, MIT Center" for Advanced Engineering Study, 1986)**

## GRAPHIC 8

| Some Faulty Practices with Suggestions for Better Practices | |
|---|---|
| **FAULTY PRACTICE**<br>**Reactive: skills only required, not theory of management.**<br>**Mind not required.** | **BETTER PRACTICE**<br>**Theory of management required**<br>**Knowledge required** |
| Management of outcome, too late; tampering; failure to distinguish between special causes and common causes.<br>Immediate action on:<br>• Costs<br>• Complaints from customers<br>• Poor quality, in or out<br>• Accidents<br>• Emergency breakdowns<br>• Absenteeism | Work on the system to reduce failure at the source. Costs are not causes. Likewise for complaints from customers, poor quality, accidents, emergency breakdowns, absence. Avoid tampering. Instead, distinguish between special causes and common causes. |
| The so-called merit system – actually, destroyer of people. | Institute leadership. Change system of reward from rugged individualism – I win, you lose – to cooperation, everybody wins. |
| Incentive pay for the individual. Pay based on performance. The incentive is numbers, not quality. Results: backfire, loss. | Understand that performance is governed by the system. Provide leadership. |
| P.R.R. – problem, report, and resolution. Actually, this system of management by results is tampering – making things worse | Study the system. Learn methods by which the net economic loss from the two mistakes. (The two mistakes are treating common causes as if they were special causes and vice versa.) |
| Work standards (quotas, time standards)<br>• Double costs.<br>• Rob people of pride of workmanship.<br>• Shut off any possibility to obtain data to use for improvement of process and output. This is because the figures on production are forced. | Provide leadership. Everyone is entitled to pride of workmanship. Wherever competent leadership, quality and productivity have gone up, and people on the job are happier. |
| M.B.O., management by the numbers. (Do it, I don't care how you do it. Just do it.)<br>• A company will, of course, have aims; likewise an individual will have aims. But the aim should be improvement of the system, not a number.<br>• There are, of course, facts of life. Example: If we don't decrease faulty product to 5% by the end of the year, we shall not be here. This is not M.B.O. | A better way to improve the system to get better results in the future. One will get only what the system will deliver. Any attempt to beat the system will cause loss. |

# APPENDIX A: A SYSTEM OF PROFOUND KNOWLEDGE

## OVERVIEW

Following is Dr. Deming's April 1990 outline of profound knowledge. The graphics shown in Volumes 14 and 15 on profound knowledge are taken from this text.

## INTRODUCTION

The system of profound knowledge appears here in four parts, all related to each other:

A. Appreciation for a system
B. Some knowledge of the theory of variation
C. Theory of knowledge
D. Psychology

One need not be eminent in any part of profound knowledge in order to understand it as a system and to apply it. The 14 Points for management in industry, education, and government follow naturally as application of the system of profound knowledge.

The various segments of the system of profound knowledge cannot be separated. They interact with each other. Thus, knowledge of psychology is incomplete without knowledge of variation. If psychologists understood variation, as learned in the experiment on the red beads, they could no longer participate in continual refinements of instruments for rating people.

If statisticians understood a system, and if they understood some theory of knowledge and something about psychology, they could no longer, teach tests of significance, tests of hypothesis, chi-square.

If economists understood cooperation and the loss and damage from competition, they would no longer teach and preach salvation through competition. They would, instead, lead us into optimization through cooperation.

The theory of knowledge helps us to understand that management in any form is prediction. The simplest plan – how may I go home tonight – requires prediction that my automobile will start and run, or that the bus will come, or the train. Management acts on a causal system, and on changes in the causes. Grades and ranks relate to past performance, but are used without justification for prediction of future performance in another course or in a job. Likewise, appraisal of employees is used without justification as prediction of future performance.

Theory of variation can play a vital part in optimization of a system. Statistical theory is helpful for understanding differences between people, interactions between people, and interactions between people and the system they work or learn in.

Theory of variation is helpful for most enumerative studies, and for efficiency in designs of tests and experiments in medicine, pharmacology, chemical industry, agriculture, forestry, and in any other industry

Statistical theory, used cautiously, with the help of the theory of knowledge, can be useful in the interpretation of the results of tests and experiments. The interpretation of the results of tests and experiments is for future use: prediction.

## A. A SYSTEM

1. What is a system? It is a series of functions or activities (subprocesses, stages – hereafter "components") within an organization that work together for the aim of the organization. The mechanical and electrical parts that work together to make an automobile or a vacuum cleaner form a system.

There is in almost any system interdependence between the components thereof. The components need not all be clearly defined and documented: People may merely do what needs to be done. All the people that work within a system can contribute to improvement, and thus enhance their joy in work. Management of a system therefore requires knowledge of the interrelationships between all the components within the system and of the people that work in it.

The aim of the system must be stated by the management thereof. Without an aim, there is no system. The components of a system are necessary but not sufficient in themselves to accomplish the aim. They must be managed.

The aim proposed here for management is for everybody to gain – stockholders, employees, suppliers, customers, community, the environment – over the long term. For example, the aim might be to provide employees with good leadership, opportunities for training, education for further growth, and other contributors to joy in work.

The organization will require someone in the position of aid to the president, to teach and facilitate profound knowledge.

The performance of any component is to be evaluated in terms of its contribution to the aim of the system, not for its individual production or profit, nor for any other competitive measure. Some components may operate at a loss to themselves, for optimization of the whole system, including the components that take a loss.

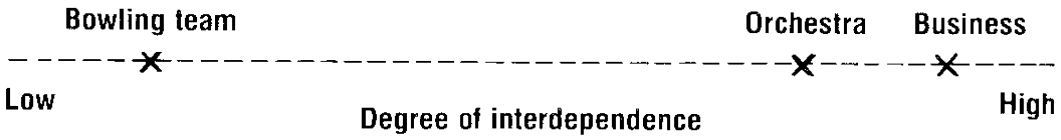
A flow diagram is helpful toward understanding a system. By understanding a system, one may be able to trace the consequences of a proposed change.

If the aim, size, or boundary of the organization changes, then the functions of the components will change for optimization of the new system. Time will bring changes that must be managed to achieve optimization.

The greater the interdependence between components, the greater need there is for communication and cooperation between them.

2. Optimization. Management's job is to optimize the system over time. Suboptimization causes loss to everybody in the system. An additional responsibility of management is to be ready to change the boundary of the system for better service and profit.

An example of a system, well optimized, is a good orchestra. The players are not there to play solos as prima donnas, to catch the ear of the listener. They are there to support each other. They need not be the best players in the country.



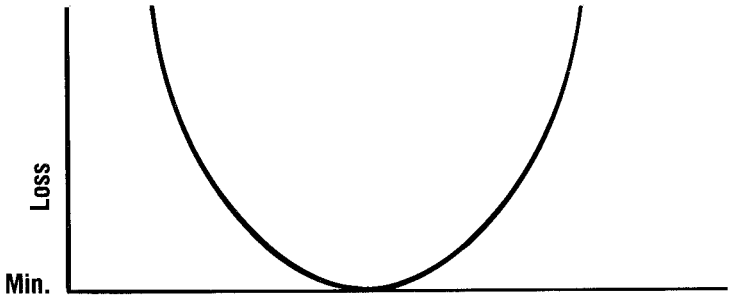

An automobile is not merely several thousand pieces and subassemblies, all individually of top quality. It is several thousand pieces and subassemblies that are designed to work together.

It would be poor management, for example, to purchase materials and service at lowest price, maximize sales, minimize cost of manufacture or design of product or service, or minimize cost of incoming supplies to the exclusion of the effect on other stages of production and sales. All these would be suboptimization, causing loss. All these activities should be coordinated to optimize the whole system.

Any system that results in a win/lose structure is suboptimized. Examples of suboptimization in the management of people include the destructive effect of grading in school, from toddlers on up through the university; gold stars and prizes in school; the destructive effect of the so-called merit system; incentive pay; M.B.O., M.B.I.R. (management by imposition of results), or M.B.R. (management by results, quotas). Other examples of suboptimization, causes of loss:

Competition for share of market
Barriers to trade

Fortunately, precise optimization is not necessary. One need only to come close to optimization. As a matter of fact, a precise optimum would be difficult to define. The Taguchi Loss Function will apply. The loss function at the bottom (minimum loss) will be a parabola. One may move away a short distance along the curve in either direction from the optimum, but rise in the vertical only an imperceptible distance.




## B. SOME KNOWLEDGE OF STATISTICAL THEORY

Some understanding of variation, including appreciation of a stable system, and some understanding of special causes and common causes of variation is essential for management of a system, including leadership of people.

1. Variation there will always be, between people, in output, in service, in product. What is the variation trying to tell us about a process and about the people that work in it?

2. Understanding of the capability of a process. When do data indicate that a process is stable, that the distribution of the output is predictable? Once a process has been brought into a state of statistical control, it has a definable capability.

3. Knowledge about the different sources of uncertainty in statistical data.
- How were the data obtained?
- Built-in deficiencies.
- Blemishes and blunders in interviewing, or in measurements. Errors in response; nonresponse.
- Errors of sampling.

4. There are two mistakes in attempts to improve a process – both costly.
- Mistake 1. To treat as a special cause any fault, complaint, mistake, breakdown, accident, or shortage which actually came from common causes (Tampering).
- Mistake 2. To attribute to common causes any fault, complaint, mistake, breakdown, accident, or shortage which actually came from a special cause.

5. Knowledge of procedures aimed at minimum economic loss from these two mistakes (Shewhart control charts).

6. Knowledge about interaction of forces. Interaction may reinforce efforts, or it may nullify efforts. Effect of the system on the performance of people. Knowledge of dependence and interdependence between people, groups, divisions, companies, countries.

7. Understanding of the distinction between enumerative studies and analytic problems. The interpretation of results of a test or experiment is an analytic problem. It is prediction that a specific change in a process or procedure will improve output in the future, or that no change at all will be a wiser choice. Either way, the choice is prediction.

8. Knowledge about loss functions in relation to optimization of performance of a system – in particular the Taguchi Loss Function. Which quality characteristic is causing the most loss to this whole system and hence is most critical for management to work on?

9. Knowledge about the production of chaos and about loss that results from successive application of random forces or random changes that may individually be unimportant. Examples include

- Worker training worker in a chain.
- Executives working with best efforts on policy, but without guidance of profound knowledge.
- Committees in industry, education, and government, working without guidance of profound knowledge.

10. Enlargement of a committee does not necessarily improve the results of the efforts of the committee. There is no substitute for knowledge. Enlargement of a committee is not a way to acquire profound knowledge.

11. As a good rule, profound knowledge must come from the outside and by invitation. Profound knowledge cannot be forced on anybody.

## C. THEORY OF KNOWLEDGE

1. Almost every act in management requires prediction. Any plan, however simple, requires prediction.

2. A statement devoid of prediction conveys no knowledge.

3. There is no knowledge, no theory, without prediction.

4. There is no observation without theory.

5. Interpretation of data from a test or experiment is prediction – what will happen on application of the conclusions or recommendations that are drawn from the test or experiment? This prediction will depend on knowledge of the subject matter, not on statistical theory.

6. Experience teaches nothing unless studied with the aid of theory.

7. An example teaches nothing unless studied with the aid of theory.

8. Operational definitions: communication.

9. No number of examples establishes a theory, yet a single unexplained failure of a theory requires modification or even abandonment of the theory.

10. There is no true value of any characteristic, state, or condition that is defined in terms of measurement or observation. Change of procedure for measurement or observation produces a new number.

11. There is no such thing as a fact concerning an empirical observation. Any two people may have different ideas about what is important to know about any event.

## D. KNOWLEDGE OF PSYCHOLOGY

1. Psychology helps us to understand people, interactions between people and circumstances, interaction between teacher and pupil, interactions between a leader and his people and any system of management.

2. People are different from one another. A leader must be aware of these differences, and use them for optimization of everybody's abilities and inclinations.

3. People learn in different ways, and at different speeds. Some learn best by reading, some by listening, some by pictures – still or moving – some by watching someone do it.

4. Knowledge about the psychology of change; difficulties of change. Frustration acts as a springboard for change. It is important that a leader, by virtue of his authority, has an obligation to make changes in the system that will bring improvement.

5. There is intrinsic motivation, extrinsic motivation, over justification.

Intrinsic motivation is a person's innate dignity and self-esteem; his natural esteem for other people. One is born with a natural inclination to learn and to be innovative. One inherits a right to enjoy his work. Psychology helps us to nurture and preserve these innate positive attributes of people.

Extrinsic motivation is submission to external forces that neutralize intrinsic motivating, Pay is not a motivator. Under extrinsic motivation, learning and joy in learning in school are submerged in order to capture top grades. On the job, innovation and joy in work become secondary to a good rating. Under extrinsic motivation, one is ruled by external forces. He tries to protect what he has. He strives for a high rating, or for a high grade in school. He tries to avoid punishment. He knows no joy in work. He knows no joy in learning. He tries to avoid punishment. Extrinsic motivation is a zero-defect mentality.

Over justification comes from faulty systems of reward. Over justification is resignation to outside forces. It could be a monetary reward to somebody, or a prize for an act or achievement that he did for sheer pleasure and self-satisfaction. The result of reward under these conditions is to throttle repetition: He will lose interest in such pursuits.

Monetary reward under such conditions is a way out for managers that do not understand how to manage intrinsic motivation.

## APPENDIX B

## OVERVIEW

The following essay is an excerpt from "Foundation for Management of Quality in the Western World," a paper that Dr. Deming delivered in July 1989 at the Institute of Management Sciences in Osaka, Japan. In this essay, Dr. Deming discusses the choices management must make to optimize service and profit of a business or system. He explains that optimization requires agreement on aims, cooperation, and the use of profound knowledge.

## SOME REMARKS ABOUT THE BOUNDARY OF A SYSTEM

If the aim, size, or boundary of the organization changes, then the function of the subcomponents will change for optimization of the new system. Suppose that a railway company were to expand its service by addition of a motor-freight business (which could be done by forming a totally new business in motor freight, or by buying an existing company that is already in the motor-freight business). The new system would be railway plus motor freight.

The expanded system opens up new opportunities for service and profit. Optimization of the expanded system would be different from separate optimizations. It might be wise, from the standpoint of service and profit for the expanded business, to optimize what is called piggyback hauling – two trailers on a flat car, to be unloaded at the destination and rolled away.

Optimization of the expanded system would require knowledge of costs. Costs would vary with length of haul by truck at both ends, length of haul by rail, and prediction of type and amount of business. Theory, possibly aided by simulation, would yield useful predictions for approximate optimum spacing between stations on the railway, and what hauls would be best made all the way by truck, with rail not involved.

All this could be done by joint work by the management of two independent companies, one the railway, the other the motor-freight business. Optimization (win-win) would be the same, whether they be independent or joined in ownership.

Thus, one might perceive that for optimum service and profit there should be no difference in operation whether the railway and motor-freight businesses were separate or both under the same management.

Would it be done by separate companies? Could it be done? Could the management of two or more separate companies agree sufficiently on aims and methods to accomplish optimization? Would they possess the knowledge requisite for optimization? Would there be interference from the Antitrust Division, on suspicion of price-fixing?

No steps will be taken either way, separate businesses or joined, toward optimization of service and profit in the absence of desire for the benefits of optimization. And as we know, accomplishment of this aim requires use of a system of profound knowledge.

What should be the boundaries of mergers of businesses from the standpoint of optimum service and profit?

Complexities increase with the size and diversity of an organization. What is the limit? The answer lies, I believe, in the ability of the human mind to understand the benefits of cooperation, and knowledge to manage optimization.

Incidentally, if management were wise and cared enough about service and profit, and possessed the requisite knowledge for overall optimization of service and profit, price-fixing would bring maximum benefit to everybody including, of course, customers. Everybody would win. The Antitrust Division would be superfluous. Does the Antitrust Division teach optimization, does everybody win?