NASA Symposium on Productivity and Quality

Strategies for Improving Operations in Government and Industry

The Capital Hilton Hotel
Washington, D.C.

Tuesday/ 25 September 1984
Wednesday/ 26 September 1984

TABLE OF CONTENTS

THE WHITE HOUSE

WASHINGTON

I am delighted to send my warmest greetings to all those attending NASA's Symposium on Productivity and Quality.

The story of America is one of unparalleled productivity. From the earliest days, "Yankee ingenuity" and hard work produced the bedrock enterprises which soon stretched across the continent. Today, as the wonders of the Silicon Valley show, our imagination and creative energies continue to dazzle the world.

Productivity -- the key to continued economic growth -- is hard won, and harder still to maintain, for we are increasingly confronted with serious competition in the world market. How we meet these challenges will be the modern test of our grit, initiative, and boldness. Following the example of our forebears, we need to rely on basics, yet dare to dream, always remembering that there is no substitute for quality. Excellence must never be compromised.

There could not be a more fitting sponsor for this exciting symposium than NASA, which for over 25 years has led our country into the frontier of space, while providing so many benefits of aerospace technology here on earth.

Nancy joins me in sending you our best wishes for a successful conference, and we applaud your commitment to keeping America number one.

Ronald Reagan

August 20, 1984

1

Message from
the NASA Administrator

To ensure that the National Aeronautics and Space Administration continues to be a highly productive and quality conscious agency, we have set as one of our highest goals leadership in the development and application of practices which contribute to high quality and productivity. We cannot ignore the fact that for the last decade the rate of growth of this Nation's productivity has been lower than that of almost every other major technological country. A quality consciousness must be ingrained in the entire work force so that we continually seek to improve our efforts. We cannot afford poor quality—it is too expensive.

Technology represents America's greatest competitive strength, and this country has a solid scientific and engineering foundation. Traditionally, we have spent more money on research and development than Japan and Europe combined, and we are the source of significant innovations achieved in this century. We should build on our solid technology base and seek to export it more effectively.

From the beginning of the U.S. Space Program, the government, industry, and academic community have worked together in a unique partnership to establish a tradition of technical excellence. We must continue in that tradition and increase our productivity so that our standard of living remains high and our industrial competitiveness is unchallenged.

James M. Beggs

August 20, 1984

2

Objectives and Approach

The purpose of the Symposium is to increase the awareness of productivity and quality issues in the United States, and to foster national initiatives through government and industry executive leadership.

The Symposium will provide a forum for discussion of white-collar productivity issues by experienced executives from successful organizations and an opportunity to share information learned through productivity initiatives in government, industry and academic organizations. It will focus on white-collar organizational issues that are common to large companies and technology oriented organizations. The Symposium program will include strategies for improving operations in government and industry and will be responsive to the management issues viewed necessary to increase our nation's productivity growth rate.

Anticipated Results

It is expected that the Symposium will produce a number of action-oriented management initiatives for government, industry and academic organizations; an agenda for action for the various Presidential Cabinet Councils and Congressional Committees. It is also hoped that it will provide a communication network for key leaders in government and industry concerned with productivity and quality.

Session Scopes and Preassigned Workshops

Sessions A, B, C and D each consist of three simultaneous Workshops. Workshops A2, B3 and C2 have been structured specifically around an interactive/participative format. Session A/Challenges and Problems: the intent of this Session is to analyze and discuss the extent of foreign competition, what it means in the long-term to U.S. industry and lessons to be learned by U.S. management. Session B/Techniques for Improvement: the intent of this Session is to highlight strategies adopted by successful organizations, put technology trends in perspective and provide guidance for education and training programs. Session C/Renewing Large Organizations: the intent of this Session is to analyze and discuss management approaches used in organizations that have sustained a long-term successful posture. Session D/Success Stories: the intent of this Session is to discuss applications of highly productive strategies that also result in enhanced quality.

All Symposium attendees have been preassigned to specific Workshops at the time of registration. In so far as it is practical, individual preferences have been honored. The productivity of the Symposium will be greatly enhanced if Workshop assignments are adhered to by the attendees.

3

Interactive/Participative Workshops

The interactive/participative Workshop format is a "change of pace" for this type of Symposium. These Workshop Sessions are intended to provide an environment that allows small groups of concerned individuals, each coming from a somewhat different experience base, to interact on key productivity/quality issues and to seek a consensus. Prior to engaging in the small group discussions, the total workshop group will be oriented and challenged by the nationally known speaker who will speak to the theme of the specific Workshop. Subsequent to the small group discussions which will last approximately one-half hour, each of the groups will have an opportunity to share its consensus with the Workshop group at large.

Registration

All attendees must register in the Mezzanine Lobby of the Capital Hilton Hotel, 16th and K Streets, N.W., Washington, D.C. and receive badges. The registration fees are as follows:

Government, Congressional and University attendees, $150. All others, $300. The registration fees cover the cost of the two luncheons on September 25 and 26, coffee breaks during the Symposium hours, and a Reception on the evening of Tuesday, September 25. It also includes a book of Symposium proceedings which will be sent to all participants following the Symposium.

Messages and Information

Incoming calls should be directed to (202) 393-1000. Callers should ask for the NASA Symposium on Productivity and Quality message center. Messages will be recorded and posted for the person on a bulletin board in the registration area. It is not possible to page conferees.

Press

By invitation only, accredited members of the press are invited to register in the Press Room (Pan American Room of the Capital Hilton Hotel). A special Symposium badge will be issued. Members of the press are invited to attend the Reception on Tuesday, September 25 at 5:00 PM in the Federal Room. They are invited to cover all sessions, as well as the luncheon addresses on both days of the Symposium; however, lunch will not be provided.

Safety

When checking into the hotel, take a few minutes time to locate fire exits nearest the meeting room or your sleeping room. Become familiar with emergency exits. Precaution against fire hazards should be of prime personal interest.

4

Message from
the Symposium General Chairman

A new, worldwide standard of quality has evolved, and our low-ered competitive position in the marketplace cannot be ignored. Our challenge is to reassert preeminence. The purpose of this Symposium is to enhance awareness of productivity and quality issues in the United States, and to foster individual, organiza-tional, and national initiatives to increase our productivity.

David Braunstein

David R. Braunstein
Director
NASA Productivity Programs

August 20, 1984

Program

Tuesday / 25 September 1984

8:00 AM	*Registration*	MEZZANINE LOBBY

9:00 AM   *Opening Remarks*
DAVID R. BRAUNSTEIN
General Chairman &
Director
NASA Productivity Programs

9:20 AM   *Welcome*
JAMES M. BEGGS
Administrator
NASA

9:30 AM   *Keynote*
PRESIDENT RONALD REAGAN

9:45 AM   *Break*

10:15 AM   *"Committing to Excellence"*
JAMES M. BEGGS
Administrator
NASA

11:00 AM   *"Management Philosophies Associated with Leading
a Successful Organization"*
MALCOLM T. STAMPER
President
The Boeing Company

11:45 AM   *Room Assignments and Afternoon Activities*
A. LAWRENCE GUESS
Chairman
AIAA Coordinating Group &
Director
Commitment to Excellence
Martin Marietta, Baltimore Aerospace Division

12:00 Noon   *Luncheon*

Presentation by
**HENRY W.
HARTSFIELD, JR.**
Commander
Shuttle Mission 41-D
*(First flight of
the Orbiter Discovery)*

and
MICHAEL L. COATS
(Commander, USN)
Pilot
Shuttle Mission 41-D
*(First flight of
the Orbiter Discovery)*

Introduction by
GERALD D. GRIFFIN
Director
NASA Lyndon B. Johnson Space Center

6

Tuesday/25 September 1984

1:30 PM **Session A/Challenges and Problems**

Session Co-Managers
C. Robert Nysmith
Associate Administrator
   for Management
NASA

Richard L. Engwall
Manager
Systems Planning, Analysis
   and Assurance
Westinghouse Electric
   Corporation

AIAA Coordinator
George J. Vila
Consultant
General Dynamics Corporation

■ **Workshop A1: International Competition**

SOUTH AMERICAN
ROOM

Chairman
D. BRUCE MERRIFIELD
Assistant Secretary for Productivity,
   Technology and Innovation
U.S. Department of Commerce

Coordinator
Ronald H. Schack
Vice President
Business Development
Martin Marietta, Baltimore Aerospace Division

"Understanding Changes in
the U.S. Competitive Position:
International Competitiveness"
ROBERT E. COLE
Professor
Center for Japanese Studies
University of Michigan

"Challenges Facing U.S.Industry"
RICHARD W. FOXEN
Senior Vice President
Strategic Management and International
Rockwell International Corporation

"Quality and Cost Competitiveness"
JOHN A. MANOOGIAN
Executive Director
Product Assurance
Ford North American Automotive Operations

■ **Workshop A2: Organizational Attitudes and Orientation**

SENATE
ROOM

Chairman
LAURENCE J. ADAMS
President and Chief Operating Officer
Martin Marietta Corporation

Coordinator
Z. Henry Hyman
Director
Engineering Business Management
General Dynamics Corporation

"Some Informal Remarks on the M-Form Society"
WILLIAM G. OUCHI
Professor
Graduate School of Management
The University of California at Los Angeles

(Interactive Participative format)

■ **Workshop A3: Management Practices**

CONGRESSIONAL
ROOM

Chairman
JOHN A. SVAHN
Assistant to the President for
   Policy Development
The White House

Coordinator
Anthony J. LoFaso
Director of Programs—A18
Sperry Gyroscope, Sperry Corporation

"Why Wrestle with Jellyfish?"
RICHARD J. BOYLE
Vice President and Group Executive
Defense and Marine Systems Group
Honeywell, Inc.

"Japanese Management in U.S."
RICHARD A. KRAFT
President and Chief Executive Officer
Matsushita Industrial Company

"Are Incentives Right for U.S. White Collar Organizations?"
F. BLAKE WALLACE, JR.
General Manager
Allison Gas Turbine Division
General Motors Corporation

3:00 PM *Break*

7

Tuesday/25 September 1984

3:20 PM   **Session B/Techniques for Improvement**

Session Co-Managers
Richard A. Stimson
Director
Industrial Productivity
Office of the Under Secretary
   of Defense for Research and Engineering
U.S. Department of Defense

Edward G. Siebert
Director of Corporate Productivity
Grumman Aerospace Corporation

AIAA Coordinator
Peter W. Wood
Senior Vice President
Booz. Allen & Hamilton Inc.

Workshop B1: New Trends in Management

CONGRESSIONAL ROOM

Chairman
ALAN M. LOVELACE
Vice President
Productivity and Quality Assurance
General Dynamics Corporation

Coordinator
David Westerman
James Forrestal Memorial Industry Chair
Defense Systems Management College

"Quality in Practice at IBM"
JOHN B. JACKSON
IBM Vice President
Quality
IBM Corporation

*"Applying Productivity Principles
to New R&D Programs,
NASA/TRW GRO Project"*
ROBERT L. WALQUIST
Vice President and General Manager
Space and Technology Group
TRW Inc.

*"Productivity Improvement
in the Acquisition Environment"*
JOHN A. MITTINO
Assistant Deputy Under Secretary of Defense-Production Support
U.S. Department of Defense

Workshop B2: Use of Technology

SOUTH AMERICAN ROOM

Chairman
DONALD R. BEALL
President and Chief Operating Officer
Rockwell International Corporation

Coordinator
Harold K. McCard
Vice President and General Manager
Avco Systems Division

*"New Technology Implications
on the Work Force"*
FREDERICK W. GARRY
Vice President
Corporate Engineering and Manufacturing
General Electric Company

"Modernization in Aerospace"
HERBERT F. ROGERS
Vice President and General Manager
General Dynamics Corporation
Fort Worth Division

"The Road from Babel: Prospects for Integrated Office Systems"
WILLIAM G. PFEIFFER
Director of Management Systems
ITT Telecommunications

Workshop B3: Education and Training

SENATE ROOM

Chairman
DAN QUAYLE
U.S. Senate (R-Indiana)

Coordinator
Eduard U. Clark
Program Manager
Electro-Mechanical Division
Northrop Corporation

"A Corporate Perspective of the Adequacy of Human Capital"
OWEN B. BUTLER
Chairman
The Procter & Gamble Company &
Vice Chairman
Board of Trustees
Committee for Economic Development

(Interactive Participative format)

5:00 PM   *Reception*

FEDERAL ROOM

8

Wednesday / 26 September 1984

8:30 AM
Welcome
DAVID R. BRAUNSTEIN
General Chairman

8:35 AM
Opening Remarks
JOHN L. McLUCAS
President
American Institute of Aeronautics and Astronautics

8:45 AM *"Renewing Large Organizations"*
LEWIS W. LEHR
Chairman and Chief Executive Officer
3M Company

9:30 AM
Break

9:50 AM
Session C/Renewing Large Organizations

Session Co-Managers

Brian Usilaner	Robert L. Vaughn	*AIAA Coordinator*
Associate Director	Director of Productivity	Joel M. Graybeal
National Productivity Group	Lockheed Missiles & Space Company, Inc.	Aerospace Engineer
General Accounting Office		ANSER

Workshop C1: Organizational Approaches

Chairman
GEORGE F. MECHLIN
Vice President
Research and Development
Westinghouse Electric Corporation

Coordinator
Bartley P. Osborne, Jr.
Chief Advanced Design Engineer
Lockheed-California Company

"Counteracting the Stifling Effects of a Large Organization"
HARVEY L. WEISS
Vice President
Mid-Atlantic & South States Area Management Center
Digital Equipment Corporation

"Building Teams and Maintaining Trust"
LEMMUEL L. HILL
Technical Director
Naval Surface Weapons Center

"Balancing Risk Taking and Encouraging Entrepreneurism"
GEORGE E. SEEGERS
Vice President
Public Issues
Citibank, North America

"Making the 'Z' Concept Work"
CHARLES W. JOINER, JR.
President
Mead Imaging Division
Mead Corporation

Workshop C2: Encouraging Innovation

Chairman
L. WILLIAM SEIDMAN
Dean
College of Business
Arizona State University

Coordinator
Richard R. Brown
Head of Applied Physics
Boeing Aerospace Company

"Encouraging and Maintaining an Innovative Work Climate"
HAROLD E. EDMONDSON
Vice President
Manufacturing
Hewlett-Packard Company

(Interactive Participative format)

Workshop C3: National Initiatives

Chairman
ROBERT L. FAIRMAN
Assistant Secretary for Administration
U.S. Department of Transportation

Coordinator
William T. Mikolowsky
Director of Business Development
Lockheed-Georgia Company

Wednesday/26 September 1984

*"Preview of the President's Commission
on Industrial Competitiveness"*
EGILS MILBERGS
Executive Director
President's Commission on Industrial Competitiveness

"Labor-Management Cooperative Programs"
JOHN R. STEPP
Acting Associate Deputy Under Secretary
Bureau of Labor-Management Relations
and Cooperative Programs
U.S. Department of Labor

*"Hurdles Stifling the Federal Manager's
Ability to Improve Productivity"*
ARLENE TRIPLETT
Associate Director for Management
Office of Management and Budget

"Productivity Initiatives at USDA"
JOHN J. FRANKE, JR.
Assistant Secretary for Administration
U.S. Department of Agriculture

11:50 AM   *Luncheon*

**PRESIDENTIAL
BALLROOM**

Address by
DAVID A. STOCKMAN
Director
Office of Management
and Budget

*"Revitalizing
Government Operations"*

Introduction by
JAMES M. BEGGS
Administrator
NASA

2:00 PM   **Session D/Success Stories**

Session Co-Managers
States L. Clawson
Director
Commerce Productivity Center
U.S. Department of Commerce

Arthur L. Welch
Director
Product Assurance
Martin Marietta Aerospace
Michoud Division

AIAA Coordinator
Dirk H. Lueders
Colonel, U.S. Army—Retired

■ **Workshop D1: Employee Involvement**
Chairman
ROY A. ANDERSON
Chairman and Chief Executive Officer
Lockheed Corporation

Coordinator
George A. Schlanert
Director
System Integration and Laboratories
Douglas Aircraft Company

**CONGRESSIONAL
ROOM**

*"Step Back into the Future:
The History of Multiple Management"*
JOHN W. FELTON
Vice President
Corporate Communications
McCormick & Company, Inc.

"Union and Management Joining Forces"
JACK SHEINKMAN
Secretary-Treasurer
Amalgamated Clothing and
Textile Workers Union

*"Sony Keeps High Quality and Productivity
in the United States"*
SADAMI (CHRIS) WADA
Vice President and Assistant to the Chairman
Sony Corporation of America

Wednesday/26 September 1984

■ **Workshop D2: Management Involvement**

Chairman
JOHN CARROLL
Executive Vice President
Communications Workers of America
AFL-CIO

Coordinator
James A. McAnally
Vice President
Defense Systems
Martin Marietta Denver Aerospace

"Keeping the Bureaucracy in Check"
KEITH A. BOLTE
Corporate Director of Productivity
Intel Corporation

"The Dana Style: Participation Builds the Climate for Productivity"
CARL H. HIRSCH
Vice President
Corporate Planning
Dana Corporation

"Contractor and Government: Teamwork and Commitment"
GERALD D. GRIFFIN
Director
NASA Lyndon B. Johnson Space Center

■ **Workshop D3: New Technology Applications**

Chairman
RICHARD D. DELAUER
Under Secretary for Research and Engineering
U.S. Department of Defense

Coordinator
Martin N. Titland
Vice President
Space Products
Fairchild Space and Electronics Company

"Paperless Office at Work"
FRANK GIANNANTONIO
Director
Information Services
Avon Products, Inc.

"CADCAM Productivity"
FREDERIC C. E. ODER
Executive Vice President
Lockheed Missiles & Space Company, Inc.

"Getting Organizations to Accept New Ideas/Technology: The Federal Express Experience"
FRED A. MANSKE, JR.
Senior Vice President
Ground Operations and Sales
Federal Express Corporation

4:00 PM   Program Synthesis Panel

Moderator
A. LAWRENCE GUESS
Chairman, AIAA Coordinating Committee &
Director, Commitment to Excellence
Martin Marietta, Baltimore Aerospace Division

Session A
C. ROBERT NYSMITH
Associate Administrator
   for Management
NASA

RICHARD L. ENGWALL
Manager
Systems Planning,
   Analysis and Assurance
Westinghouse Electric Corporation

Session B
RICHARD A. STIMSON
Director
Industrial Productivity
OUSDR&E
U.S. Department of Defense

EDWARD G. SIEBERT
Director of Corporate Productivity
Grumman Aerospace Corporation

Session C
BRIAN USILANER
Associate Director
National Productivity Group
General Accounting Office

ROBERT L. VAUGHN
Director of Productivity
Lockheed Missiles & Space Company, Inc.

Session D
STATES L. CLAWSON
Director
Commerce Productivity Center
U.S. Department of Commerce

ARTHUR L. WELCH
Director
Product Assurance
Martin Marietta Aerospace
Michoud Division

5:00 PM   *Adjournment*

11

Symposium Organization

The Symposium is sponsored by the National Aeronautics and Space Administration and is being operated by the American Institute of Aeronautics and Astronautics. Key decision makers from government, industry and the academic community have participated in the planning, organization and implementation process by serving as members of the Steering, Action and Coordinating Groups.

General Chairman
DAVID R. BRAUNSTEIN
Director
NASA Productivity Programs

AIAA Coordinating Group Chairman
A. LAWRENCE GUESS
Director
Commitment to Excellence
Martin Marietta, Baltimore Aerospace Division

AIAA Technical Committee on Management Coordinators

FRED L. ADLER
Research Fellow
Logistics Management Institute

RICHARD B. OPSAHL
Director
Technical Liaison
Grumman Aerospace Corporation

NASA Coordinator
JESSIE HARRIS
Symposium Project Manager
NASA

Symposium Press Relations
GENE GUERNY
NASA

AIAA Administrator
MIREILLE M. GERARD
Administrator
Corporate and International Programs
American Institute of Aeronautics and Astronautics

AIAA Coordinator
PAMELA W. EDWARDS
Project Manager
American Institute of Aeronautics and Astronautics

Steering Group

This is a group of senior level executives from both Government and Industry and the Academic Community serving as a steering council to assure that the Symposium program has a top down perspective on productivity and quality. In so far as is practical, Steering Group members will serve as Chairman of specific workshops.

Laurence J. Adams
President & Chief Operating Officer
Martin Marietta Corporation

Roy A. Anderson
Chairman of the Board &
  Chief Executive Officer
Lockheed Corporation

Donald R. Beall
President and Chief Operating Officer
Rockwell International Corporation

Jack Brooks
Chairman
Government Operations Committee
U.S. House of Representatives

John Carroll
Executive Vice President
Communication Workers of America
  (AFL-CIO)

Richard D. DeLauer
Under Secretary of Defense
  for Research & Engineering
U.S. Department of Defense

Robert L. Fairman
Assistant Secretary for Administration
U.S. Department of Transportation

Lewis W. Lehr
Chairman and Chief Executive Officer
3M Company

Alan M. Lovelace
Vice President, Productivity
  & Quality Assurance
General Dynamics Corporation

George F. Mechlin
Vice President,
  Research and Development
Westinghouse Electric Corporation

D. Bruce Merrifield
Assistant Secretary for Productivity,
  Technology & Innovation
U.S. Department of Commerce

Ruben F. Mettler
Chairman and Chief Executive Officer
TRW, Inc.

Allen E. Puckett
Chairman and Chief Executive Officer
Hughes Aircraft Company

Dan Quayle
U.S. Senate (R-Indiana)

L. William Seidman
Dean
College of Business
Arizona State University

Leon Skan
Executive Director
American Productivity Management
  Association

Malcolm T. Stamper
President
The Boeing Company

John A. Svahn
Assistant to the President
  for Policy Development
The White House

Bill Usery
President
Bill Usery Associates, Inc.

Joseph R. Wright
Deputy Director
Office of Management and Budget

John F. Yardley
President
McDonnell Douglas Astronautics
  Company

Action Group

The Action Group is composed of upper level managers from both Government and Industry and the Academic Community. This group is responsible to the General Chairman and is in charge of implementing the workshop portion of the Symposium program. In keeping with this responsibility, the Co-Managers for Sessions A, B, C and D are members of the Action Group.

GOVERNMENT

Karen C. Alderman
Acting Deputy Assistant
  Secretary of Defense
Civilian Personnel Policy &
  Requirements

Ernest Ambler
Director
National Bureau of Standards

Bruce Barkley
Director
Office of Management Planning
U.S. Department of Transportation

Ralph C. Bledsoe
Special Assistant to the President
The White House

Kay Bulow
Acting Assistant Secretary for
  Administration
U.S. Department of Commerce

David H. Carstater
Productivity Advisor to the
  Chief of Naval Material
U.S. Department of Navy

States L. Clawson
Director
Commerce Productivity Center
U.S. Department of Commerce

Paul Gurzo
Planning Officer
Planning Division
U.S. Internal Revenue Service

Martha O. Hesse
Assistant Secretary for Management
  and Administration
U.S. Department of Energy

Jean S. Kluttz
Planning Division
U.S. Internal Revenue Service

Alan Lau
U.S. Army Research Institute

Leon E. Lunden
Chief, Division of Research & Analysis
U.S. Department of Labor

John Marshals
U.S. Department of Education

Don E. Moore
Acting Executive Director
Quality Assurance
Defense Logistics Agency

C. Robert Nysmith
Associate Administrator for
  Management
National Aeronautics and
  Space Administration

Roger Porter
Director
Office of Policy Development
The White House

Richard J. Power
Director
Defense Productivity Programs
U.S. Department of Defense

Lynwood P. Randolph
Deputy Director, Productivity Programs
National Aeronautics and
  Space Administration

George Russell
Director, Division of
  Management Policy
National Institute of Health

Patricia O. Schoeni
Associate Administrator for
  Administration
General Services Administration

Howard E. Sorrows
Director, Office of Research
  and Technology Applications
National Bureau of Standards

Nevzer Stacey
Acting Assistant Director for
  Educational Finance
National Institute of Education

Richard A. Stimson
Director of Industrial Productivity
Office of the Under Secretary of
  Defense for Research and
  Engineering
U.S. Department of Defense

Jack C. Strickland
Director of Resource Management
U.S. Department of Defense

Arlene Triplett
Associate Director for Management
Office of Management and Budget

Brian Usilaner
Associate Director
National Productivity Group
U.S. General Accounting Office

Donald R. Williams
Assistant Director for Management
Office of Personnel Management

STATE GOVERNMENT

Judy Sardo
Director for Development
The Council of State Governments

INDUSTRY

D. C. Arnold
President
McDonnell Douglas Electronics
  Company

Jack Best
Corporate Director of
  Quality & Productivity
General Dynamics Corporation

Val C. Buonaiuto
Director of Product Assurance
Systems Operations Division
Perkin Elmer, Inc.

Dave Dallas, Jr.
Business Planning Manager
Productivity Coordinator
Ford Aerospace &
  Communications Corporation

John Donati
Director of Productivity &
  Assurance Management
Honeywell, Inc.

Richard L. Engwall
Manager, Systems Planning,
  Analysis and Assurance
Westinghouse Electric Corporation

Richard D. Gloor
Director of Design, Integrity &
  Productivity
TRW, Inc.

Robert W. Hager
Vice President, Engineering
Boeing Aerospace Company

Lloyd E. Harrison, Jr.
Director, Product Assurance
Space and Communication Group
Hughes Aircraft Company

Dale Hartman
Director, Corporate Manufacturing
  Technology
Hughes Aircraft Company

George B. Merrick
Vice President, Space Systems Group
Rockwell International

Ralph E. Patsfall
Chief Manufacturing Engineer
General Electric Company

Charles A. Rounds, Jr.
Senior Manager
Support MOSS
Bendix Corporation

Edward G. Siebert
Director of Corporate Productivity
Grumman Aerospace Corporation

Paul Tobin
General Manager
Wyle Laboratories

Robert L. Vaughn
Director of Productivity
Lockheed Missiles & Space
  Company, Inc.

Carl L. Vignali
Vice President & General Manager
Honeywell, Inc.
Space and Strategic Avionics
  Division

Craig Walter
Corporate Director for Quality
Hewlett-Packard Company

Arthur Welch
Director of Product Assurance
Martin Marietta Aerospace
Michoud Division

Earl Wojciechowski
Manager, Business, Planning and
  Productivity
RCA Astro-Electronics

William Yurkowsky, Jr.
Director
Reliability and
  Quality Assurance
EG&G Florida, Inc.

UNIVERSITY

David Bushnell
Director, Center for the
  Improvement of Productivity
George Mason University

Thomas C. Tuttle
Director, Maryland Center for
  Productivity & Quality of
  Working Life
College of Business & Management
University of Maryland

13

AIAA Coordinating Group

The Coordinating Group is composed of AIAA members and representatives. This Group is responsible to the General Chairman and is charged with managing and coordinating administrative matters, arrangements, facilities, communications, and reports. The Coordinating Group is headed up by a coordination group Chairman; and coordinators are assigned from this committee to work with the Co-Managers and Chairmen heading up the various elements of the Symposium.

Chairman:
A. Lawrence Guess
(AIAA Baltimore Section)
Director, Commitment to Excellence
Martin Marietta, Baltimore
    Aerospace Division

Members:
Fred L. Adler
(AIAA Technical Committee—
    Management)
Research Fellow
Logistics Management Institute

Joe A. Ayres
(AIAA Technical Committee—
    Management)
Technical Director—ASAT
Vought Corporation

John G. Barmby
(AIAA Technical Committee—
    Management)
Assistant Director
U.S. General Accounting Office

Richard R. Brown
(AIAA Technical Committee—
    Management)
Head of Applied Physics
Boeing Aerospace Company

Eduard U. Clark
(AIAA Technical Committee—
    Management)
Program Manager
Electro-Mechanical Division
Northrop Corporation

Joel M. Graybeal
(AIAA National Capital Section)
Aerospace Engineer
ANSER

Z. Henry Hyman
(AIAA Technical Committee—
    Management)
Director of Engineering
Business Management
General Dynamics Corporation

Anthony J. LoFaso
(AIAA Technical Committee—
    Management)
Director of Programs—A-18
Sperry Gyroscope
Sperry Corporation

Dirk H. Lueders
(AIAA Technical Committee—
    Management)
Colonel, U.S. Army—Retired

James A. McAnally
(AIAA Technical Committee—
    Management)
Vice President
Defense Systems
Martin Marietta Denver Aerospace

Harold K. McCard
(AIAA Technical Committee—
    Management)
Vice President and General Manager
Avco Systems Division

William T. Mikolowsky
(AIAA Technical Committee—
    Management)
Director of Business Development
Lockheed-Georgia Company

Richard B. Opsahl
(AIAA Technical Committee—
    Management)
Director
Technical Liaison
Grumman Aerospace Corporation

Bartley P. Osborne, Jr.
(AIAA Technical Committee—
    Management)
Chief Advanced Design Engineer
Lockheed-California Company

George A. Schlanert
(AIAA Technical Committee—
    Management)
Director System Integration &
    Laboratories
Douglas Aircraft Company

Ronald H. Schack
(AIAA Technical Committee—
    Management)
Vice President—
    Business Development
Martin Marietta, Baltimore
    Aerospace Division

John C. Taylor
(AIAA Technical Committee—
    Management)
Director of Program Management
Honeywell Military Avionics Division

Martin N. Titland
(AIAA Technical Committee—
    Management)
Vice President—Space Products
Fairchild Space & Electronics
    Company

George J. Vila
(AIAA National Capital Section)
Consultant
General Dynamics Corporation

David Westermann
(AIAA Technical Committee—
    Management)
James Forrestal Memorial
    Industry Chair
Defense Systems Management College

Peter W. Wood
(AIAA Technical Committee—
    Management)
Senior Vice President
Booz. Allen & Hamilton Inc.

For further information, please contact:

Jessie Harris
Symposium Project Manager
National Aeronautics and Space Administration
Code NAD
Washington, D.C. 20546
(202) 453-2879

Pamela W. Edwards
Project Manager
American Institute of Aeronautics and Astronautics
1633 Broadway
New York, NY 10019
(212) 408-9778

14

NASA

QUALITY PRODUCTIVITY

EXCELLENCE

Introduction to NASA Symposium on Productivity and Quality
D. Braunstein, NASA, Washington, DC

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

15

INTRODUCTION TO
NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

David Braunstein*
National Aeronautics and Space Administration
Washington, DC

Ladies and Gentlemen - distinguished speakers and guests:

Welcome to the First NASA Symposium on Productivity & Quality. We are meeting today to share strategies for improving government and industry operations. With us are 500 key decision-makers: 300 from industry and 200 from government agencies, Congressional committees, and universities. We are especially pleased with your response, considering that less than two month's notice was given. The discussions will concentrate on white-collar organizational issues common to large organizations. The program will address a number of management issues for improving our nation's productivity and quality, and therefore its competitive position.

I'm sure that most of you share my pride at being involved in an effort important enough to attract the attendance of the President of the United States, the Administrator of NASA, chief executives of important corporations, and distinguished public and private sector leaders.

I would particularly like to thank those individuals from industry and government who volunteered so much of their time to help organize this symposium. The speakers, all high level executives have contributed their time to share their experience with you. In addition, the American Institute of Astronautics & Aeronautics corporate members have helped to organize the sessions. I am most grateful for this support. For me, a large measure of the enjoyment in developing this symposium was derived from working with this motivated team of executives.

Productivity improvement and quality enhancement are not new goals to NASA or to other successful organizations. It has become alarmingly clear, however, that the United States' decline in productivity growth since 1965 gives these terms a new relevance to all of us. Not only has Japan surpassed us, but England, Italy, and France have also exceeded our productivity growth rate during this period. As the White House Conference on Productivity pointed out last September, the relatively low rates of productivity growth for almost a decade have weakened our economic vitality and threatened our standard of living and our industrial competitiveness.

The most recent eight quarters' growth rate for productivity is great news; we must make this cyclical upswing a trend for the future. We must close the productivity growth gap between us and our competitors.

One telling example of national concern for productivity growth in the United States is evident in a survey conducted by Louis Harris. The survey was completed in February 1984, involving an eighteen-page questionnaire distributed to 4,000 members of the Institute of Electrical and Electronic Engineers across the United States. A significant result of the survey was that "the nation's competitive position in world markets" was rated as the number one concern over numerous other social issues. This included the nuclear arms race, the competitive position of their company in the market place, national politics, and concerns about job security and personal privacy. Having been an engineer and recognizing the non-political attributes of engineering people, I was surprised at this conclusion. It demonstrates a real sense of urgency regarding productivity and the quality issue in the United States of America. Moreover, when the engineers were asked what could be done to enhance productivity, they listed management factors and job satisfaction rather than, say, national policies or better benefits. As far as the engineers are concerned, the major factors contributing to productivity are outgrowths of local management policy. The survey data indicates that the engineers felt productivity could be improved at the organizational level, and that this does not require national policy changes.

We at NASA know we are not automatically immune to the general decline in productivity and quality recorded within the United States. How could we be? We employ graduates from the same universities and high schools, our employees share the same goals and aspirations, and our managers have all received the same general management training.

While NASA's sucesses with our programs are well documented, let me share with you some of the quality problems we have faced in the last four years. We have welded with the wrong weld wire; built space structures with the wrong aluminum; had our computers fail due to contaminated integrated circuits; and have experienced power loss in a satellite experiment because the wrong-sized fuses were used.

It is not an exaggeration to say that we believe all the people employed in our programs — whether they are secretaries, directors, factory employees, or staff — must not only strive to do their best, they must also be trained by their organizations to set top quality as an expected goal.

The NASA Administrator has set the goal for NASA to become a leader in productivity and quality

---

improvement, and we recognize that we can accomplish that goal only with the enthusiastic support of the people we work with. This symposium is a forum to give wide attention to the management issues involved in productivity initiatives and to those approaches successful organizations have used to increase their performance.

The questions we must ask ourselves as managers and as concerned citizens are:

(1) Have some countries, industries or managers found a formula which is unique to their individual situation, resulting in greater quality and productivity? For example, is the United States at a basic disadvantage in relation to the Japanese from both a cultural and a cost position? Are there, consequently, intrinsic and irreversible reasons for sunset and sunrise industries?

(2) Are there new management approaches we should all be examining to revitalize organizations and open the way to greater productivity and quality? Are, for example, quality circles, employee suggestion programs, participative management techniques and office automation the latest fads or are they important elements of a new management approach? What type of management philosophy must permeate organizations, and what are the implications for top management?

We know a top level commitment to increase quality and productivity can make a difference. We have seen the differences in companies abroad and in organizations within the U.S. A new quality standard for product performance has evolved. Our goal should be to achieve quality and productivity commensurate with that reported by the best organizations in the world.

As for the context for today's symposium, our predecessor, so to speak, might be considered last September's White House Conference on Productivity. In some respects, our symposium is similar. We have the same overall objectives, and the participants represent, in a broad sense, many of the same governmental and industrial institutions. A major difference, however, is that the White House Conference was more general in scope, addressing such matters as broad economic issues and recommended productivity improvement roles for the major sectors of American society. In contrast, our symposium has a more concentrated focus, confining itself to the more narrow issue of white-collar productivity improvement.

The basic outline of the symposium encompasses four key aspects of the productivity and quality issues to help you to decide whether "productivity" is just another buzzword. The basic goal of the symposium is to help you determine the appropriateness of new management approaches to your organization and to encourage your efforts aiming at greater productivity and quality.

Session A reviews the challenges and problems of United States productivity. Twenty years ago, only 25 percent of U.S. industry was subject to any degree of competition on the world market. Today 75 percent of our industry is being severely challenged in this market place. The intent of Session A is to discuss the foreign competition, to determine its long-term effect upon U.S. industry, and to identify the lessons to be learned by U.S. management.

Session B is aimed at discerning techniques for improvement. Many new ideas, concepts and technologies directed at productivity and quality improvement are being introduced into the management of U.S. organizations. All of us rely on the education processes to provide us people with skills. The intent of Session B is to highlight productivity and quality improvement strategies adopted by organizations recognized as being particularly successful, to put technology trends into perspective, and to provide appropriate guidance for education and training programs.

Session C focuses on the survival of large organizations. Few of the top 25 companies from the early 1900's remain on top today — most are not even in existence! The challenge for large organizations is to develop an organizational philosophy and management style which welcome renewal and innovation to maintain a competitive position. The intent of Session C is to analyze management approaches used in organizations which have been able to sustain long-term, successfully competitive positions.

Session D highlights success stories. Significant improvements in productivity and quality are known to be keyed to the synergistic involvement of employees, management and technology. The intent of Session D is to reveal and discuss successful applications of management strategies resulting in enhanced quality and highly productive organizations.

In all the sessions, three dominant themes are prevalent for organizations seeking to have increased productivity and quality. First, the drive to institutionalize quality and innovation needs to originate with top management. In contrast to just the traditional emphasis on profits, costs and production goals, leadership has to become obsessed with making sure all decisions are driven by quality improvement, customer satisfaction and building an innovative team environment.

The second theme follows closely to the first. It recognizes that the quality and productivity commitment are long-term oriented, and therefore performance measurement and reward systems have also to be long-term. Quarter-to-quarter organizational performance or short-term employee performance appraisal are not only the wrong methods, they are also detrimental when they ignore high quality, customer satisfaction, innovations and risk-taking, and team performance.

The third theme is that the most successful

17

3

organizations have management philosophies that develop total employee commitment to their success. Employee involvement philosophies where people are given a chance to fail, and those that encourage improvement through employee suggestion programs and quality circles; and those that share the rewards of success, as do employee profit sharing programs.

Each session consists of three concurrent workshops and each of you is asked to attend those workshops indicated on your program. Papers will be published after the symposium to allow you to catch up on the workshops you could not attend. The session managers and I plan in early December to follow up this symposium with an Executive Action Plan which will address the major points brought by the speakers. In addition, each session will be video taped for wider distribution to interested organizations.

I am confident that this symposium will be more than an isolated event. I've seen the pre-prints of the papers, and I'm certain you will find them provocative, and containing many good ideas. These papers, the related discussions and the future Executive Action Plan can have a recognizable value, only if it encourages executive action. The relative decreases in our competitive positions can not be ignored — they are the challenge facing us all. We need your help and your ideas.

Now, it gives me great pleasure to turn the podium over to Mr. James M. Beggs, the Administrator of NASA, who will begin by addressing this challenge that we face.

18

Committing to Excellence
J. M. Beggs, NASA, Washington, DC

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

19

COMMITTING TO EXCELLENCE

James M. Beggs*
National Aeronautics and Space Administration
Washington, DC

Thank you, Dave. And thank you all for coming. I'm delighted to welcome you to what I hope will be only the first of such symposiums NASA hopes to sponsor nationwide each year.

We are honored, indeed, that President Reagan has agreed to participate in this symposium to underscore his personal commitment to productivity growth and quality improvement.

NASA is proud to take the lead in what is certainly one of the most challenging and most important areas of our national life, the drive for excellence in all we do and all we produce. And we appreciate the cooperation and support of the corporate members of the American Institute for Aeronautics and Astronautics in helping to make this symposium a success.

Mankind's quest for excellence is as old as civilization itself. Almost 2700 years ago the Greek poet Hesiod wrote: "Badness you can get easily, in quantity: the road is smooth and it lies close by. But in front of excellence the immortal gods have put sweat, and long and steep is the way to it, and rough at first. But when you come to the top, then it is easy, even though it is hard."

America's problem in recent years is that the climb to the top had been so easy we had come to take our economic leadership for granted. It was not hard to maintain leadership in world markets when there were few, if any, competitors.

And, given past successes, it was easy to become myopic and complacent in failing to recognize that others were gaining on us. And so, we sat back and fell asleep at the wheel sometime during the late 60s and early 70s. In the process we allowed ourselves to detour around that long, rough and steep climb that leads to quality performance and products.

Meanwhile, others were wide awake. Japan, West Germany and other industrialized nations co-opted our technology and began to translate it into marketable products; faster, and sometimes better than we could.

Industry after industry – automobiles, machine tools, steel, metallurgy, nuclear power, consumer electronic goods – all took a beating under the lash of foreign competition. And while we still lead the world in many high technology areas, our overall industrial base continues to erode, posing an ever-increasing danger to continued economic growth, prosperity and progress.

So much has been said about our competitive decline in recent years, that I believe I need not document it in great detail, especially to this audience. However, let's consider a few salient facts:

– Today some 70 per cent of our domestically – manufactured products face foreign competition and imports have won about 20 per cent of our domestic market for manufactured goods.

– With trade accounting for a critical share of our G.N.P., there is a growing gap between what we import and what we export. We have moved from trade surpluses of the past to what could be a record trade deficit of more than $100 billion in 1984.

– We are way behind our competitors in turning out new scientists and engineers, professions crucial to technological progress. In 1982, engineering and science accounted for only 20 per cent of all bachelors degrees earned in the United States. This compares with 25 per cent of all such degrees earned in Japan; 34 per cent in West Germany and more than 50 per cent in the Soviet Union.

– Since the middle 1960s, our investment in research and development in proportion to our G.N.P. has dropped sharply, while that of other major industrialized nations has increased.

– And, if as all that isn't enough to cloud our future, our annual productivity growth rates, keystones of economic vitality, while advancing solidly to 3.5 per cent over the past six quarters as we have come out of the recession, still do not measure up to those of other advanced industrialized nations. Japan's, for example, is six per cent; that of West Germany, 4.5 per cent; and that of France, four per cent. Unless we can maintain a productivity growth rate that is competitive worldwide for the long-term, we will continue to lose ground to others in world markets.

Ironically enough, our competitive decline brings us face to face with the prospects of an uncertain future, just at a time when we are in a vigorous economic recovery and when a new wave of optimism and patriotism is sweeping the land. Indeed, now is the optimum time – precisely when we feel so good about today – to put our economic house in order for tomorrow.

Clearly, if we are to keep our economy growing and prosperous and maintain American leadership in the world, we will need to rededicate ourselves to excellence in all we do and in all we produce. We will need to regain a sense of pride in our work. And we will need a renewed determination to give the best that is in us, so that, together, we can return America to the competitive position we

---
*Administrator

enjoyed just a few years ago.

For, make no mistake. If we do not, our legacy to our children and grandchildren will be lower living standards and incomes, greater unemployment, and dying industries, cities and towns. Add these all up and you get failed hopes and expectations, and a people with no faith in the future. That's not the America that you and I know. And it certainly is not the America we would want to leave to our children and grandchildren.

The stakes are indeed high and the challenge great. Fortunately, we still have time, but not much time, to turn ourselves around. We need to energize the reserves of vision, vitality and pride, which have been the essence of the American spirit throughout our history. We need to brace our shoulders and pull up our socks now and face the reality that economic leadership, like freedom to compete, is not ours by right. We must work hard to keep it. And we must work fast, because time is running out.

Where do we begin? Shakespeare could not have known that he would provide more than a hint of an answer when he wrote in "The Rape of Lucrece: "Men's faults do seldom to themselves appear; their own transgressions partially they smother."

Advertently or inadvertently we have smothered many of our transgressions in recent years. And chief among them is attention to productivity and quality improvement.

It is time now to take a deep breath, open our eyes and look hard at what we can do together, in government and the private sector to aim for optimum performance of our economic system, the greatest single engine for progress the world has ever seen.

NASA has a special stake in this effort, because, for most Americans, NASA epitomizes excellence. As a leader in research and development efforts for more than a quarter of a century, we have helped to keep America on the cutting edge of technology.

We think it important to set an example to the rest of government, to industry and to the universities, with whom we have been partners through the years, and without whom we could not have achieved international leadership in space and aeronautical technology. And, in setting that example, we hope to spark a renewed determination to improve productivity and enhance quality throughout the country.

NASA began its formal efforts to achieve that goal two years ago when we established an executive management team to study what industry was doing in this area. The team visited three companies known for their innovative management practices and commitment to productivity improvement and quality enhancement - Westinghouse's Productivity and Quality Center in Pittsburgh; TRW in Redondo Beach, and Hewlett Packard in Palo Alto.

The team learned a lot from those visits and incorporated what we learned into our own planning. Perhaps the most valuable knowledge we took away

with us was the fact that the three companies shared in common a basic management philosophy, which reflects the concept of participative democracy. That philosophy is based on respect for the individual, and a belief that decentralized decision-making and the team approach to problem-solving encourage innovation and reveal talent which otherwise might go untapped.

Our efforts throughout the agency reflect that philosophy. They are aimed at motivating employees, from top managers on down, to participate in improving overall agency performance by doing their jobs better and by doing them right.

Participation is indeed our goal - participation from every employee, including our contractors and the university people with whom we work. Because it is only through participation across the board that the effort to make the system work best will succeed. Success will mean improved quality of our products, and greater individual and institutional pride in what we do.

To foster this type of participation, we have formed our own version of industry Quality Circles, the concept Dr. W. Edwards Deming and other Americans helped to pioneer in Japan. We call our groups NETS, for NASA Employee Teams. There are now more than 80 NETS throughout the agency, composed of all classes of employees, including secretaries, blue collar workers, scientists and engineers. And we have found this voluntary team approach to problem-solving to be very effective.

Another effort to increase employee participation is our six-month-old drive to revitalize the NASA Employee Suggestion Program. This program was extremely successful in the 1960s during the Apollo program, and NASA benefited from a high rate of employee suggestions and their implementation. But by 1982, the suggestion rate had dropped dramatically.

Since May of this year, however, it has begun to pick up - so much so, that we received double the number of suggestions in the past six months than we did during the entire year of 1982.

We have also been reducing unnecessary bureaucracy by cutting paperwork, decentralizing decision-making by delegating more authority to our Centers, and installing state-of-the-art office automation. These efforts have resulted in administrative time-saving in the lead time for procurements; a 20 per cent cut in the agency-wide paperwork load and significant savings of time and effort in program planning and budget preparation.

Ninety cents of each dollar in the NASA budget is spent in the private sector, with our industry and university partners. So we believe it vital to bring them into this effort.

On the industry side, we have established a NASA-Contractor Productivity Council, which is working on ways to reduce or eliminate obstacles to productivity and quality improvement stemming from NASA-Contractor relationships.

21

Participation in the council has been very encouraging. More than 200 people from industry and our centers met this past April to discuss areas of emphasis.

The group decided to concentrate on five major areas where we believe improvements can be made: NASA-industry communication; interactions between NASA and its prime contractors and service support contractors; NASA-wide specifications and standards; identification of productivity and quality initiatives; and incentives.

With regard to the last area, I am pleased to announce that we are developing the NASA Excellence Award for Quality and Productivity. The award, similar to the Deming Award in Japan, will recognize outstanding achievements by our contractors, subcontractors or suppliers, and will be self-nominating.

As yet, we have no formal structure to work with the university community in this area, but we plan to explore ways to bring them into this effort.

It goes without saying that the whole measure of our success in the efforts I have described will boil down to quality performance. Shoddy workmanship, defective materials, inadequate quality control, cost overruns - all can be improved, or eliminated. Indeed, we already are beginning to see a greater awareness of and concentration on these problems. The bottom line will be that we hold to our schedules and perform our missions with 100 per cent success. If we can do that, not only NASA, but the nation will be the winner.

"No perfection is so absolute, that some impurity doth not pollute," warned Shakespeare's Lucrece.

Even if we never attain perfection in all things, the important thing - the vital challenge, is to continue to strive for it, in our lives and in our work. That means rededication to excellence and rededication to quality.

NASA will continue to do its part. And your presence here today proves that you share that commitment.

For, in this increasingly competitive world, Americans cannot afford to drop our guard again. To get on top and to stay there means that we must continue to give the best that is in us.

And if we do, the vision, skill and imagination that made us a great nation will continue to drive us towards even greater growth and prosperity in the future.

Thank you very much.

22

Contractor and Government: Teamwork and Commitment

G. D. Griffin, NASA Lyndon B. Johnson Space Center, Houston, TX

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

23

24

CONTRACTOR AND GOVERNMENT: TEAMWORK AND COMMITMENT

Gerald D. Griffin*
NASA Lyndon B. Johnson Space Center
Houston, Texas

I. INTRODUCTION

My assigned topic, "Contractor and Government: Teamwork and Commitment," is a subject about which I am vitally interested. The successes of the U.S. space program were built on such teamwork and commitment.

It seems only a short time ago that man's role in space was an unknown quantity. In rapid succession, however, the flights of Shepard, Glenn, and Armstrong demonstrated man's capability to live and travel in space. Consequently, we no longer live with the same awe of space.

The success of these joint industry-NASA efforts in achieving our Nation's space goals testifies to the validity of our team's past commitment, management expertise, communications techniques, and teamwork over a period of 25 years. Today, however, we are at the beginning of a new era in space which poses significantly new challenges as we move into the second 25 years of the U.S. space program.

- First, we must make use of the new technologies becoming available to improve our effective utilization of our assigned resources.

- Second, we must meet the challenge of international competition in space (a challenge we welcome!).

- Third, we must establish a permanent manned presence in space.

- Fourth, we must move from an era of primarily space exploration to an era which also optimizes the commercial uses of space.

These new challenges, when considered in their totality, constitute the beginning of a new era - the Space Business Era. They require that we reexamine, revitalize, and initiate imaginative new ways of doing business in two closely interrelated areas: (1) within the Government organization itself and (2) in our joint industry-Government partnership.

Because of my familiarity with the U.S. space program, I naturally have tended to select examples which relate to it. In some instances, these illustrations may have direct applicability to a particular organization; in other instances, they may apply only indirectly. However, the important message we all must leave with is that: To be successful in this world of new challenges, we must not only extensively reexamine internally the way we do business in order to be more effective and efficient, but, equally important, we must also find more productive methods of working together. We must seek ways to eliminate adversarial relationships. We must seek ways to develop more WIN-WIN situations.

Our intent is to get started and to set our sights high. Such an undertaking is perhaps equal to or greater than the one we faced more than 25 years ago when the space program was just beginning.

II. Improving Our Methods of Doing Business

I would like now to highlight some efforts which we have underway to improve our methods of doing business. First and foremost, the NASA Administrator has given us a major new goal: That NASA, in doing its daily business, must strive to become a national leader in development and application of advanced technology and management practices. This goal is consistent with the national goal recommended by the recent White House conference that the Government: "Provide national leadership and act as catalyst in motivating organizations to focus on productivity and productivity-enhancing activities ..."

However, attempting to achieve this new goal has proven to be a significant and difficult challenge. It is forcing us to get out of the comfortable ruts we have gradually developed for ourselves during the past 25 years. It is requiring us to change our mindsets and to continually question why we do business the way we do.

One of the most difficult problems we have to deal with is how to get decisions made at the right level. As NASA has matured over the years, too many decisions have gravitated, or perhaps have been pulled, too high up the management ladder. As a result, it is taking too long to make decisions and, in many instances, I am also concerned that maybe the best decisions are not being made.

We are attempting to reverse this process and get decisions made at the lowest effective level. However, we have no magic answers on how to achieve a proper balance. Therefore, we would welcome suggestions.

In addition to looking at our decisionmaking processes, we are exploring and evaluating for application within NASA a whole host of productivity improvement applications. These range from employee participation teams to advanced office technology such as personal computer applications and the use of computer-aided design/computer-aided manufacturing (CAD/CAM). I will review a few of these applications which I believe merit attention.

American Productivity Center White Collar Productivity Improvement Project

We have joined together with nine leading industrial firms and the American Productivity Center in a 2-year action research project. It is designed to investigate means of improving the productivity and effectiveness of our professional and white-collar workers. At this time, there are approximately 40 pilot projects in operation in such functional areas as engineering, research and development (R&D), accounting, management information services, personnel, and marketing and sales.

*Center Director

1

25

The private firms involved include such indus-
try leaders as Johnson & Johnson, TRW, Atlantic
Richfield, Northern Telecom, Ortho-Pharmaceutical,
Rockwell International, Warner-Lambert, McDonnell-
Douglas, and Armco. Although the overall project is
not scheduled for completion until a year from now,
preliminary indications are that it is already
beginning to realize its objective of improving
productivity and organizational effectiveness.

Implementing NASA/Contractor Conference Recommendations

Another major productivity improvement effort
currently underway in NASA substantially involves
and affects our relations with our partners in the
space business - the contractor community. Industry
accounts for approximately 85% of NASA's team
effort; it is the key element in achieving the
productivity and quality improvement vital to the
Nation's space program. Therefore, if we can aid
the aerospace industry in doing its job more effec-
tively and efficiently, we will be a long way down
the road to doing NASA's overall job better.

To some extent, the aerospace industry is a
maturing industry. As a result, we have built up
procedures, techniques, and operations which,
although successful in the past, may now be out-
moded. Accordingly, we must stimulate industry to
look for innovative ways of doing business and
discard the outmoded. And industry, from their
perspective, must point out to us where we, the
Government, can improve our ways of doing business.

Therefore, in a series of workshops held last
winter, we asked industry to give us their views on
the major impediments to a more successful industry-
NASA working relationship. And lo and behold, as a
Walt Kelly comic strip character once put so well:
"We have met the enemy, and they are us!" Our part-
ners came back in short order and quickly pointed to
a number of areas where we, NASA, presented stum-
bling blocks. The identified impediments were not
necessarily new concerns. For example, they
included such items as:

- We have too many different people giving
  directions to contractors.

- We spend too much time telling industry
  "how" to do things, rather than specifying
  "what" we want.

- We are untimely in our contractual actions.

The list is too lengthy to discuss in detail.
There was, however, one possible "surprise" on the
list: industry wants us to increase the frequency
with which we provide them feedback on their
performance. They want to be in a better position
to meet our requirements in a more timely fashion.

Dismayed but undaunted by this development, we
proceeded to set up five joint industry-NASA teams
to develop recommendations on actions to be taken to
eliminate, or at least minimize, these roadblocks.
These five teams presented their recommendations
late this spring in a 2-day meeting chaired by the
NASA Administrator.

In almost every instance, the teams found that
the action necessary to correct the problem could be
largely accomplished within NASA's current author-
ity. That is, no changes in Government laws or
regulations were required. These joint industry-
NASA teams were very effective in translating what
could have been platitudes into specific actions.

Beginning this summer, we began taking actions
within NASA to remove many of these stumbling
blocks. Hopefully, our industry partners will begin
to see tangible results this fall.

In August, the NASA Administrator issued a
NASA-wide action plan formally establishing our
commitment to implementing the majority of the joint
industry-NASA recommendations. In the meantime, I
had already set up an implementation committee at
the Lyndon B. Johnson Space Center (JSC) chartered
to develop an action plan to implement the recommen-
dations as they relate to JSC.

Implementing action affects two major areas:
existing contractual relations and new contracts.
In terms of new contractual relationships, we are at
a particularly fruitful juncture. We are about to
embark on a major new program - Space Station. We
are making every effort to ensure that, as the new
industry-Government responsibilities are assigned,
the joint industry-NASA recommendations are incor-
porated into our implementing actions. Our goal is
to strive to make the partnerships that develop in
these contracts a model of effective industry-
Government relationships.

Implementing the changes necessary to meet this
goal will be no easy task. We must find a way to
make all levels of our organization aware of the
issues and ideas and ready to change. However, the
benefits to be realized are too great not to commit
wholly to the necessary effort.

Creating WIN-WIN Situations

In addition to looking at procedural ways to
improve our day-to-day working with industry, we
must be more innovative in developing more WIN-WIN
situations in which both the Government, represent-
ing the taxpayer, and the firm, representing the
stockholders, can realize their objectives.

Incentive contracts have always been our
primary tool to motivate business in the R&D envi-
ronment. We are now placing increasing reliance on
this contractual tool to focus on developing even
more innovative and cost-effective ways of doing
business. In some instances, new incentives are
taking the form of increased fees based on a
subjective evaluation of a firm's initiative in
developing new and improved methods to streamline
and otherwise reduce the ultimate cost of operations
to the Government. In other instances, there is
prescribed percentage dollar sharing based on costs
saved. Generally, in these cases, the pool of funds
from which awards are made consists of otherwise
unearned award fee funds.

The contractors, in turn, are tying their own
employee bonus and reward systems to the same type
of criteria. The net result is that, more and more,
we are getting the entire space business community
to address this major productivity improvement
challenge.

26

New Dimensions for Commitment and Teamwork in the Space Business Era

So far, I have been discussing ways in which we can improve our ongoing, day-to-day working relationships. However, as we move into the Space Business Era, there are new dimensions and new challenges for teamwork and commitment. Private sector investment and involvement is essential if the enormous commercial potential of space is to be developed. The challenge to industry is twofold.

First, industry must take on broader responsibilities in managing and operating larger segments of the space transportation system. This will enable NASA, as an R&D organization, to devote a greater portion of its limited resources to the development of new technology.

Second, the potential use of space for performing commercial activities is almost limitless. The commercial development of the in-space manufacture of biological materials as well as a host of industrial materials appears among the most promising of what will be the next entrepreneurship successes. The full scope of commercial uses of space can only be surmised. The real answer lies with industry, from which the ideas will come to make a commercial bonanza of space. I would like to first discuss industry's growing responsibilities in carrying out NASA's current programs and then turn to the broader role of the private sector in the commercial uses of space.

Streamlining Shuttle Operations

For the U.S. public and the world in general, our most visible program today is the Space Shuttle. Although each Shuttle mission offers much of the same drama that surrounded the early space programs, the measures of success are becoming much more demanding.

In the past, our manned space programs have been R&D efforts. With Space Shuttle, we are evolving from an R&D effort into a more routine operation - the National Space Transportation System. The National Space Transportation System is a major national resource or capability, designed to take private, Government, and international payloads into space - on a routine basis.

This phrase "on a routine basis" provides the new, more demanding basis for evaluating our performance. "On a routine basis" is translated to mean on time and successful, with a minimum of cost and effort - that is, more businesslike.

The achievement of routine operations (which the public has already translated into a new performance standard for us) poses a significant challenge to both NASA and industry. We must not only conduct flights on a routine basis, but we must also conduct them with the same high standards of quality and reliability demonstrated in previous space programs.

Furthermore, we must be able to substantially increase the number of flights. One of our most immediate objectives is developing the capability to fly 24 Shuttle missions a year. To do so, we will have to improve on our proven method of operations by an order of magnitude. Consequently, all re-

sponsible NASA centers and contractors are heavily involved in identifying new ways to streamline our operations.

At JSC, extensive efforts are underway to reduce the time required to plan for missions, train astronauts and flight controllers, and integrate proposed new payloads into upcoming missions. At the same time, similar efforts are underway at the John F. Kennedy Space Center (KSC) to reduce the launch turnaround time as well as the time required to integrate the cargo with the Orbiter.

To achieve these reduced turnaround times, various approaches are being used. They include establishing "freeze points," or milestones in the mission preparation schedule beyond which time, hardware, software, or procedural changes cannot be introduced into the operations sequence. Standardization and automation of procedures and activities are other key elements in reducing turnaround time.

However, the streamlining of Space Shuttle operations will also involve a significant reallocation of responsibilities between Government and industry. In the long run, this reallocation of responsibilities may be of greater importance than the initial streamlining efforts briefly outlined here. We have already begun this reallocation of responsibilities. At KSC, the Shuttle Processing Contract is already in place. At JSC, industry is preparing to bid on the Space Transportation System Operations Contract and the Flight Equipment Processing Contract. These contracts involve billions of dollars.

For each contracted effort, a single contractor has been, or will be, selected to manage and provide the operations support that formerly was provided by a large number of contractors and then managed and coordinated in depth by NASA. The new contracts will allow NASA to delegate extensive management responsibilities to the contractor as NASA reduces its day-to-day involvement in operations support activities.

Contracts for as long as 15 years are planned for each activity. This duration will give the contractors the opportunity to introduce long-range improvements in management and operations to reduce costs, without sacrificing quality or timeliness of support. Later, we envision a fixed-price contract with even greater fee opportunity for the contractor. The overall objective is to inject new thinking in terms of productivity and cost consciousness and to make Shuttle mission costs competitive with those of other space transportation systems.

Incidentally, to further maximize the benefits to be derived from this reallocation of responsibilities, we are cooperating with the U.S. Air Force to determine whether similar contractual instruments can be used in support of U.S. Air Force Shuttle operations at Vandenberg Air Force Base and Colorado Springs.

By turning over more of the responsibility for management and operation of Shuttle operations support to contractors, NASA will be able to concentrate more resources on its traditional areas of research and development, especially the Space Station Program.

27

Space Station

Concurrent with the challenge associated with implementing an operational National Space Transportation System, we have also been assigned by the President the responsibility to develop a permanent manned presence in space - the Space Station Program.

The Space Station Program provides an exciting new challenge to the imagination and innovativeness of both Government and industry in finding new ways to improve the productivity and effectiveness of this entire team. NASA is committed to providing a fully functional manned Space Station in the early 1990's for a total cost of $8.0 billion (1984 dollars), less than the cost of building the Space Transportation System.

The Space Station is different from previous manned spacecraft in that its purpose is not transportation; instead, it will be a multipurpose, permanent facility, designed for use as a national resource. The Space Station must meet the requirements of a diverse user community consisting of private entrepreneurs, technology developers, and scientists. Many are interested in exploiting the advantages of the near weightlessness of space.

The task of building this multipurpose facility requires design-to-cost approaches that are, at best, only in the conceptual stages at this time. A number of preliminary ideas and concepts are under consideration to meet this challenge. One such concept is for use of "protoflight" hardware, in which the same unit used for development and certification is used as the flight article. Other concepts include extensive use of commonality, use of on-orbit maintainability, and using modular approaches to permit evolution of subsystems and space modules in space over time. These concepts involve the more innovative and extensive use of ground testbeds as technical development tools to evaluate new technology as it becomes available.

Let me expand briefly on the notion of commonality. In the Space Transportation System Program, different elements were provided by different NASA centers and different industry teams. Although an attempt was made to achieve commonality in some components, the final product, although similar, was not identical. In the Space Station Program, a 20% cost advantage for extensive use of common systems has already been factored into cost projections; thus, it is imperative that at least this level of commonality be developed.

Another concept being implemented at the outset of the Space Station Program is to make maximum use of advanced technology for management communication and data base management systems. These systems will be shared by both Government and industry to enhance the rapid and precise transfer of current information. The plan is to provide a high degree of office automation and reduce the amount of paper generated to a minimum.

In an extension of this concept to the design and manufacturing functions, the baseline configuration will be contained in a computerized data base. Use of CAD/CAM systems and software will allow easier updating of the engineering data base. This information will be readily available to all participants and should not only speed up the overall process but also ensure more accuracy than ever before.

With the advent of man living and working in space for extended durations, we are also initiating studies to improve man's productivity in space. Study and attention is being given not only to man-machine interfaces, but also to the extensive use of automation and robotics to reduce demands on the crew for routine operations and maintenance tasks. By using these techniques, the Space Station personnel will have more productive time for industrial, technology development, or scientific purposes.

With respect to the international aspect of the Space Station Program, this participation is envisioned in three distinct roles: builder, operator, and user. A number of benefits can be gained by this participation, not the least of which is to help share development and operations cost. New ideas and new methods of international cooperation will be needed to encourage and implement these joint ventures.

Commercial Uses of Space

In both the Space Transportation System Program and the Space Station Program, NASA and industry have fairly well defined tasks. I would like to turn now to that aspect of the space program where the future lies more with industry than with Government; that is, industry's role in finding ways to make beneficial use of space for commercial activities.

President Reagan, both in this year's State of the Union Address and in his recently issued (July 20, 1984) National Policy on the Commercial Use of Space, makes the expansion of private sector investment and involvement in space a major objective of the U.S. Government. The U.S. Congress has endorsed this thrust.

Concurrent with the President's initiative, NASA established a task force to develop an Agency-wide policy and program plan to enhance the Agency's ability to encourage and stimulate free enterprise in space. The task force reached three fundamental conclusions.

- First, commercial activities in space by private enterprise should begin now.

- Second, the natural and bureaucratic barriers inhibiting the commercial use of space need to be and can be relieved or removed through actions of the Government and private enterprise.

- Finally, with firm resolve and the commitment of reasonable resources over a number of years, a partnership between Government and private enterprise can turn space into an arena of immense benefit.

These conclusions led to the following five principles to govern NASA commercial space policy.

(1) The Government should reach out to and establish new links with the private sector.

4

28

(2) The Government should not be the overall judge of a project's feasibility or impede private efforts to undertake commercial space ventures.

(3) If the private sector can operate a space venture more efficiently than the Government, then such commercial utilization should be encouraged.

(4) The Government should invest in high-leverage technologies and space facilities which encourage private investment.

(5) The Government will consider a significant contribution to a private sector initiative under two conditions:

    (a) There must be significant private capital at risk.

    (b) There must be significant potential benefits, such as a contribution to economic health or to a positive balance of trade.

Thus, beginning immediately and continuing in the long term, commercial activities in space offer great promise for private enterprise. There is also great risk. To help offset this risk, the Government, as a partner, intends and is committed to support private sector commercial initiatives.

III. Summary: Challenge and Commitment

In summary, one can only conclude that the challenges of space are many, and they are manifest. The President has charted a course that opens wide the door of space for U.S. industry. NASA, as an operating arm of the Government, is aggressively seeking ways to broaden and facilitate the role of industry as a major stockholder in the business of space.

With a firm commitment over a number of years, industry, the universities, and the Government working together can turn space into an arena of immense benefit for our Nation. The question is how will industry respond to this challenge? I believe the answer will be most positive.

5

29

30

Understanding Changes in the U.S. Competitive Position: International Competitiveness

R. E. Cole, Univ. of Michigan,
Ann Arbor, MI

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

31

UNDERSTANDING CHANGES IN THE U.S. COMPETITIVE POSITION: INTERNATIONAL COMPETITIVENESS

Robert E. Cole
Professor of Sociology
University of Michigan
Ann Arbor, Michigan

Abstract

Rather than focus on statistics showing the worsening of the American competitive position, the paper stresses problems in our competitive position resulting from shortages of and mode of deployment of engineers in American consumer goods industries. Automotive industry is used as a case in point with specific comparisons between Japanese and U.S. firms reported on ratio of engineers to administrative personnel and utilization of engineers. Role of technical support personnel and role of engineers in employee involvement activities is also considered. Policy implications include the need to train more engineers, to train them more broadly, and to deploy them more effectively. Paper concludes with a discussion of the potential contribution of industrial policy and a call for a more pragmatic approach to formulating policies that will contribute to a restoration of American industrial strength.

Introduction

I am not going to bore you with statistics on how our competitive position has worsened, industry by industry, product by product, and how our rate of productivity increases has declined. You have all heard it before. If you haven't, you don't belong in a leadership position! Suffice it to say that increasingly our products have become less competitive worldwide and domestically when it comes to price, quality and even product innovation. Moreover, even in the frontier industries on the leading edge of product innovation we are starting to face a threat, especially from the Japanese. Fujitsu's recent announcement of their plans to export their supercomputer to the United States provides just one dramatic example.

There are still some people who think that the Japanese are superb copiers but they lack the pure research capabilities that will keep the Americans one step ahead of them. Such people point to the lack of Nobel prize winners in Japan. Are they in for a surprise! Even if they are right for the time being, it is almost beside the point. The English used to say the same thing about the Americans. But what happened is that they would do the pure research that led to such breakthroughs as the jet engine but the United States with its tremendous domestic market and manufacturing expertise would successfully commercialize these breakthroughs and dominate world markets. Well that is exactly what the Japanese are doing to us today. Robotics is a good example. We are apparently ahead of them on the cutting edge of technology concerned with intelligent robots (sensor-based technologies). But in the commercialization and application of simple robots to industry, they are far ahead of us.

Supply and Deployment of Engineering Talent

Let me put my head on the chopping block by suggesting that one reason our civilian manufacturing industries are doing so badly in the worldwide competition is that many of our most talented researchers and engineers have been siphoned off into the defense and aerospace industry. Our research priorities at universities have also been distorted. At my own institution, the University of Michigan, mechanical engineering had much of its research base during the postwar period supported by NASA and other government funding. These sponsors tended to direct research toward the solution of their specific problems; consequently the manufacturing engineering program at Michigan, as well as most other engineering schools, atrophied. Yet, Michigan would seem by virtue of its geographical location to have been the logical choice for providing technical support to the auto industry.

Now these are not exactly novel observations and it is not my intention to make an argument for less investment in defense and space. One can just as well argue that the solution to this problem today is not redeployment of existing engineers but an increase in the overall supply.

As I visit Japanese companies, I am struck by just how many engineers they have to throw at fairly mundane technical problems. As the President of a Japanese university is said to have remarked to the President of MIT, "when is the last time one of your graduates worked on a refrigerator?" Notwithstanding such contributions as miniturization, the space program can be seen as generating far less spin-off benefitting the civilian sector as compared to what would have been achieved if the personnel involved had been working directly on civilian industry problems. A major reason is that much of the technology of the space program is simply too sophisticated, exotic and expensive for the average private company to use or translate into meeting its own needs. By contrast, Japanese technical personnel working directly in the consumer products industries have been able to generate improvement after improvement resulting in reduced costs, higher productivity and quality.

All these matters—perhaps old hat to you— have been brought home to me recently through the data that we generated in our recently published comparative study of the Japanese and U.S. auto industries entitled The American and Japanese Auto Industries in Transition. This study has been published by the Center for Japanese Studies at the University of Michigan. Comparing major automobile companies in both countries, we found that roughly 25-33% of the labor force was white collar and there was not that much difference between the auto firms in both countries. Among the total employees, those who were technical personnel (by which we mean engineers and technical support personnel) accounted for nearly 14% of total

1

32

employment in the Japanese companies (7.6% engineers and 6.2% technical support personnel); but only 6.5% in the U.S. firms (4.1% engineers and 2.4% technical support personnel).

In Japan, throughout most of the postwar period one of the best jobs an engineer could get was seen as working for the major auto companies. The auto companies got the best talent and they worked not only on the frontiers but on improving the mundane technology. Now, incidentally, surveys show that the electronics industry has replaced auto and steel as the places to be for a young engineer. In the U.S., we have trouble getting our best students to even look at manufacturing systems engineering, much less work for the auto companies. I have talked to leading U.S. auto engineers who migrated to the auto industry from the space program over the years. A typical comment is, "It was like going back to the feudal ages." That particular remark was made with regard to the range of allowable tolerances and overall quality orientation. Fortunately, we have witnessed considerable improvement in that area recently but we still have a long way to go in catching up to the Japanese.

With regard to the data that I just cited, I should note that in the much larger and more vertically integrated U.S. auto companies, the absolute number of engineers is larger than among the major Japanese auto assemblers but this ignores both the issue of quality, the nature of the deployment of engineers, and also the very strong technical support that Japanese auto parts firms provide to the large auto manufacturers.

One interesting aspect of that data is the strength of the Japanese in the area of technical support personnel. Many of those people in Japanese auto firms, as well as other industries, are high school graduates whose skills have been built by extensive in-house training programs. They represent an enormous asset, freeing up college-trained engineers (whose relatively modest university training, by our standards, has been bolstered by extensive in-house training) for more demanding tasks. We are particularly weak in this area of technical support personnel and it reflects both the quality of our public education system in America, the weakness of our in-house technical training programs and the lack of career lines that allow high school graduates such progression in job tasks.

We also found that Japanese technical personnel and managers in the auto firms generally rotate through many parts of the organization in the course of their career relative to American engineers and managers. This increases their socialization into the firm, improving communication and coordination, as well as reducing costs of control and supervision. In the case of Toyota there are specific programs for "reverse residence" whereby manufacturing engineers are assigned to work in the design section and where design engineers are placed in manufacturing for specified periods. The payoff is presumably enhanced cooperation in the design cycle that produces designs sensitive to manufacturing concerns and with a minimum of delays and engineering changes.

Finally, since I am on this subject of technical personnel, let me make one other observation based on my own research on the diffusion of

participatory work practices in the U.S., Japan and Sweden. Japanese technical personnel have been both cooperative with, and indeed leaders in, many of the participatory work practices that have evolved in Japan. These employee involvement practices are designed to mobilize all the human resources in the firm on behalf of organizational goals. I also found this to be the case in my research in Sweden. But in the United States, engineering personnel tend to be indifferent or actively hostile to such efforts. They see their prerogatives threatened. Quality control engineers for example were in the forefront of establishing the quality circle movement in Japan. In the U.S., the initiative comes largely from human resource development and personnel department types.

The virtue of having engineers lead such developments is that they have more clout in the firm and are in a better position to translate such ideas into workable programs. If we ask why is there such indifference or hostility in the U.S., I think the answer lies in the narrower education that our engineers receive as well as their adaptation to the existing corporate culture which tends to be hostile to such initiatives. The policy implications here are that we need to train more engineers, to train them more broadly, and deploy them more effectively. And we need to broaden the base so that we provide more technical support personnel.

Industrial Policy

If I may, I would like to change direction and make some general remarks. One way to understand what is happening to our worldwide competitive position is simply to note that the dominant position we established after World War II, when we had a monopoly on capital, technological expertise and management excellence, could only be a temporary phenomenon. As the rest of the industrialized world recovered and as new nations made the breakthrough to industrialization, our relative strength was bound to diminish. This way of thinking has the virtue of making us recognize that we are dealing in part with a relative problem. It is not so much for example that the quality of U.S. products has declined--for the most part it hasn't--rather it is that the quality of Japanese and German products rose much more rapidly. This way of thinking also has the virtue of getting rid of a lot of wringing of hands and pointing of fingers as we try to identify the culprit responsible for the deterioration of our position. Is it poor labor quality and education? Is it management incompetence? Is it greedy labor? Is it an overbearing government? etc.

We do, of course, have serious problems, and we need to address them on many fronts. There are no magic keys. We have to identify our strengths and build on them. Most of all we need to be pragmatic. One of the disturbing aspects of the public debate on the decline of American industrial might is how quickly it degenerates into ideology and polemics. To be sure, this is unavoidable to the extent that public policy addresses the problem and thereby furthers some interests and weakens others.

Nevertheless, relative to Japan and Western Europe, I have been struck by the prominance of ideology over pragmatic experiments in the debate over the proper exercise of "industrial policy."

33

It has become either a good word or a nasty one to
policymakers--no middle ground. But clearly the
government does have a role to play in supporting
our competitive efforts. We need to sort out the
specific competitive efforts. We need to sort out
the specific policies that do this. But to casti-
gate government involvement completely on the one
hand or enshrine it as the savior on the other does
little to solve problems. As I wrote this talk I
had the occasion to read the July 13th editorial in
the Wall Street Journal. It attributed the economic
success of Japan among others in the Pacific Rim to
their "embrace of the market." What a simplifica-
tion of a complex process! Japanese industry bene-
fitted enormously from the almost total protection
from foreign competition it provided to domestic
producers in the 1950s and 1960s. They provided a
variety of tax benefits and financial supports to
encourage growth. Yet, it is also clear that
internal competition among domestic producers was
intense. How did they accomplish that? It would
be wrong to attribute their entire success to the
role of government or to the invisible hand of the
market. We need to understand such relationships
in a pragmatic fashion and fashion policies that
support the renaissance of American industry so
necessary to sustain our standard of living and
social fabric. To allow the conversation to
degenerate into ideological polemics does a great
disservice to our future.

34

Encouraging and Maintaining an Innovative Work Climate

H. E. Edmondson, Hewlett-Packard Co., Palo Alto, CA

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

35

36

ENCOURAGING AND MAINTAINING AN INNOVATIVE WORK CLIMATE

Harold E. Edmondson
Vice President Manufacturing
Hewlett-Packard Company
Palo Alto, California

Abstract

Innovation is not a rare phe-
nomenon that flourishes only in a
garage. Creativity can be nurtured
within a large organization. Those
who wish to manage innovation need to
do three basic tasks that consist of
good management: 1) define the role
of innovation in terms of their over-
all business strategy; 2) hire and
motivate highly skilled and creative
people; and 3) create an environment
where creativity is encouraged and
rewarded. These three steps leave
little room for "gut feel" and "play-
ing it by ear," and they should pro-
vide some encouragement for those in
large organizations. In short, to
encourage creativity, a manager
doesn't have to be a psychologist --
just a good businessman.

Text

Good Morning. My topic today is
the question of how to encourage and
maintain innovation. I'm told that I
have the unique responsibility of
representing a large organization. I
guess the assumption behind my as-
signment is that innovation is some-
what more difficult in a large compa-
ny -- that ideas germinate best in
little garages but wither when trans-
planted into the cold cruel world of
larger corporate America or
governmental organizations.

I'd like to present a thesis
this morning that may not get your
complete concurrence. Innovation --
that is, the advancement of the state
of the art in a positive way -- is
not some kind of semi-miraculous,
flash-of-lightning kind of phenome-
non. And innovative skills -- that
is, the ability of people to make
those kinds of advances -- are noth-
ing other than one of many kinds of
skills that human beings are blessed
with. They belong with the same cat-
egory as athletic ability or manage-
ment expertise, and so many of the
other human skills that we deal with
rather routinely in our daily lives.

This categorization of creativi-
ty as just another mundane human
skill has one real advantage that
should provide some encouragement to
those of us in large organizations.
That is, that if you buy the thesis
so far, it becomes a lot simpler to
manage it. We simply dig out the
management rules we've used for all
other skills, and apply them. As
such, my proposal is not terribly
innovative, but you don't have to be
a psychologist to use it, simply a
good businessman. Let me get a lit-
tle more detailed so that you can see
what I mean.

In my view, the creating and
maintaining of an innovative environ-
ment falls into three separate ac-
tivities. Let me take them in the
order in which they must be
addressed.

The first thing you have to do
is set the objectives of your or-
ganization in terms of what you want
to accomplish with your innovative
skills. What is it that your or-
ganization wants to accomplish? In
other words, what elements of your
business strategy are going to re-
quire innovation?

Certainly, I think we'd agree
that not all human endeavor is filled
with innovation. Nor, I maintain, do
we want it to be. There are a number
of activities that best meet our ob-
jectives by not being innovative at
all. Certainly, if I'm undergoing
brain surgery, I would rather the
surgeon used the best existing prac-
tices and engage in no innovation
whatsoever.

Similarly you need to decide
what parts of your organization you
want to be innovative. Obviously,
innovation frequently is accompanied
by some risk and additional expense.
Do you want to take these risks in
all functions of your company? Or
maybe you simply want to concentrate
your innovative skills in R&D, for
example, and ask your marketing de-
partment to pretty much practice the
tried and true techniques of the
times.

Perhaps the opposite is true;
you've got the product design cycle
pretty well under control but need to
devise new ways of getting the cus-
tomer and market input needed to make
those products commercial successes.

37

Once you've decided where innovation fits in with your business strategy, you need to determine when it makes sense. Are you going to want your R&D people, for instance, to continually be innovative? Or would you like to concentrate that innovativeness during the early part of a project and ask that they take the last steps of getting the product into production in a more understood tried and true fashion.

These are all difficult questions to ask and even tougher to answer. But if you agree that innovation is simply another skill, I think you'll agree that you need to have a plan for the utilization of that skill. That is, you need to know what you expect of the skill and how much of it you need.

O.K. the first step in managing for innovation is to decide where and when it fits into your organization. Once you've done that, you can move on to the second step, and that is, finding the right people to bring this innovative skill to your organization.

It seems to me the people you're going to want in your organization to perform this innovation have to have a couple of important characteristics. Obviously, they have to have innovative skills or the potential to develop those skills. How do you know there's ability or potential? There is one correlation that I have observed through my years at HP, and that is, that in general our creative, innovative people are the brightest ones. In other words, just plain intelligence, I think, will map pretty linearly with creative ability.

I think further, there is a correlation between, if we're talking about people just out of school, intelligence, creativity and good grades. We have through the years tried to attract our professional people from the top 10% of their graduating class, and I think have gotten a pretty good content of creative people this way. There are certainly exceptions, both pleasant surprises from outside the top 10%, and disappointments from within it. But, as a general rule, the best correlation I can find is that the most innovative are the brightest ones. This seems to be a characteristic you can evaluate from conversations, interviews with references, and just looking at their academic records.

The ability or potential to be innovative is one thing. But the desire to do it is another. You need to find people who enjoy creative work. This is pretty simple to say, but as is the case with most of my discussion, it's a lot easier to say than do.

Identifying creative people is a bit of a subjective call. I takes a lot of time, but here again you can gain a fair amount of insight into the individual's personality by simply talking with them. You need to find out what turns them on. Who do they look up to, and why? Are they willing to take risks? Do they enjoy a challenge?

One of my favorite methods of sizing up a person's creative urge is to see how he or she reacts to a series of guidelines for their activity. Try to evaluate if these rules make them feel comfortable by mapping out a safe territory in which to operate or if they view them as unproductive constraints. In my view, the first person will just "tweak" the technology a little bit. The second will truly try to advance the state of the art.

O.K. the first two steps in managing for innovation are first, to figure out where it fits with your business strategy and secondly, to recruit the right kind of people. The third thing you need to perform in your march to innovativeness is to set the right atmosphere, or environment, if you will.

Before I describe that atmosphere, let me tell you what it can't do for you. First of all, you obviously can't expect the environment to set your objectives for you. I don't think you can expect the organization to evolve some grassroots sort of expectations or objectives. Those are yours, or your Board of Directors, and must be done as I've described earlier as an independent function.

Secondly, the atmosphere will not provide you with the right people. If they're not there in the first place, there's nothing you can do with the atmosphere to create them.

Although your atmosphere can't compensate for your failures in strategy or lack of human resources, it is important. Let me briefly sketch some elements I believe are

38

part of an atmosphere that nurtures creativity.

First, your people need you to allow them to be creative. I think there's a technical equivalent to that business-school term, "management by objective." People are more innovative when they're given the flexibility and resources they need to get the job done -- when management doesn't provide them with some kind of step-by-step cookbook that makes the job routine. I don't know about you, but I don't feel real creative when someone is standing over my shoulder.

Practice at any skill is the best way to develop it. I don't mean giving a young engineer straight out of school the responsibility for developing your new product strategy for the decade. You have to gradually move the person up the creative ladder. But whatever you do, you have to challenge that employee to continually reach out and expand his or her creative skills with creative experiences. That's the only way to encourage creative growth.

I've said that your environment has to encourage flexibility and creativity. It also has to give those forces a direction. The environment must make your organization's objectives clear. Good communication of expectations is essential.

The atmosphere must also create a very visible measurement system that lets people know if the skills are being used and the objectives met. Such obvious things are comparing your product with the competitor's product if your objective was to stay a step ahead in performance. It's fairly easy to look at your competitor's product and look at yours and decide whether you were, in fact, more innovative than your competitor. You can probably think of other equally appropriate measures. Defining and communicating them is the best way to make sure your people are accountable.

Lastly, the major thing I want to mention is that the atmosphere must also create the rewards for successful, productive use of these skills. Here I'm referring to tangible rewards in terms of status, management recognition, resource support, and the other sorts of things we reward our skillful people with.

In addition to those, of course, I'm also referring to peer awards. If you want creativity to be practiced, you obviously have to make it socially acceptable and socially rewarding at all levels of the organization, and the most important reward of all is that you have to make innovation fun for the individual and team. There are lots of ways we can do this -- everything from an personal word of encouragement to a formal award of recognition. We can try to identify some of those methods in our discussion later. I think one of HP's best methods has been to keep its operating units small enough where the kinds of personal psychological rewards are plentiful.

All right, let's see where I've been. I've suggested the perhaps controversial view that innovation isn't some kind of rare phenomenon. I've suggested three basic activities that must be addressed -- strategy, staffing, and creative environment. Let me suggest some questions an organization might ask itself in each of those three areas.

1) Strategy. Do you have a business strategy. Where does innovation fit in it? And when does it fit in?

2) People. Do you have the kinds of skilled people you need? Are they really interested in advancing the state-of-the-art?

3) Atmosphere. Does your business environment provide the flexibility, the resources and the reward systems that encourage innovation?

I suppose, in a rather textbook fashion, I haven't left much room for such tried and true management techniques as 'gut feel' and 'playing it by ear'. I'm not so analytical that I think those techniques don't have some use in the management of innovative skills. I do feel, however, that the gut feel approach to business has its place after you have done your detailed traditional homework; in other words, set down your objectives, hired the right people and consciously worked on the environment that will enhance the development and the use of these skills.

All of this is hard work, and no step should be slighted. Certainly,

39

I wouldn't pretend that doing all these steps carefully will ensure a creative environment. Nor would I say that it's impossible to get a creative environment in a haphazard, play-it-by-ear fashion. However, I think the chances of being successful are much greater if you do a thorough planning job.

As one last footnote, in preparing for this talk, and in thinking about my experiences at HP, I suspected that I would be asked if we have a plan and if we had approached innovation in this fashion; and I would honestly have to answer, "No." I dobelieve that we did each of the steps I have mentioned pretty well.

I believe we did know what we wanted. We wanted to push the state-of-the-art in electronic instrumentation in the early days, in a fashion that always makes a contribution. I think we did hire the best people we could. I think we did create an atmosphere in which innovation was rewarded.

What we didn't do, I think, is hang all that together as a plan to provide our company with innovative skills; so in a way, I suppose, you could say that we were lucky to end up with as innovative a team as we did. We've been doing it for some 45 years now, and I don't see any sign of our slowing down.

But speaking of slowing down, it's time I did. I appreciate the invitation to share these views with you today and hope I've provided some ideas we can explore further now. Thank you.

40

-- NOTES --

41

-- NOTES --

42

Modernization in Aerospace

H. F. Rogers, General Dynamics, Fort Worth, TX

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

43

44

Modernization in Aerospace

Herbert F. Rogers
General Dynamics, Fort Worth Division, Fort Worth, TX

Good afternoon, ladies and gentlemen. It is a pleasure to have this opportunity to describe the General Dynamics Fort Worth Division's efforts in the areas of Productivity and Quality Improvement. At Fort Worth, Productivity and Quality are synonymous and are never separated. On the F-16 program, our efforts in these areas will save the DOD more than $1 billion by the end of 1981.

For you to better understand our programs, a few words about our division are in order. The Fort Worth Division of General Dynamics produces the F-16 aircraft, which is a multinational, multimission combat fighter. Additionally, we have an electronics product line that encompasses products ranging from black boxes for the F-16 to support equipment to simulated ground radars. Located at Air Force Plant No. 4, our facility was built in 1942 on 602 acres in north central Texas. There are 6.5 million square feet under roof, including a mile-long assembly line. The land, buildings, and equipment were purchased for approximately $305 million; the replacement cost is now valued at $1.2 billion. The Fort Worth Division has more than 17,000 employees; about 6,000 are hands-on production employees, and 11,000 are assigned to engineering, professional, and administrative tasks.

As of 30 August, 1246 F-16 aircraft have been delivered worldwide; of those, 350 were delivered from EPC assembly lines. (Currently, we are 14 aircraft ahead of schedule.) Eleven countries are under contract to receive the F-16, and we have firm contracts for 2031 aircraft. Seven countries are participating in F-16 production, and 29 companies are involved in coproduction.

As you can tell by now, the F-16 is our major product, accounting for more than 95% of our current sales base. As indicated in Figure 1, in 1979 the Fort Worth Division produced F-16 aircraft No. 11, which required approximately 110,000 man-hours. In 1983, we produced F-16 No. 863, which required less than 30,000 man-hours. These two pie charts show the distribution of direct labor by major manufacturing area and the tremendous strides the Fort Worth Division has made in reducing the cost of the aircraft to the United States Government. An interesting comparison of touch versus non-touch labor can be seen in Figure 2. According to this office
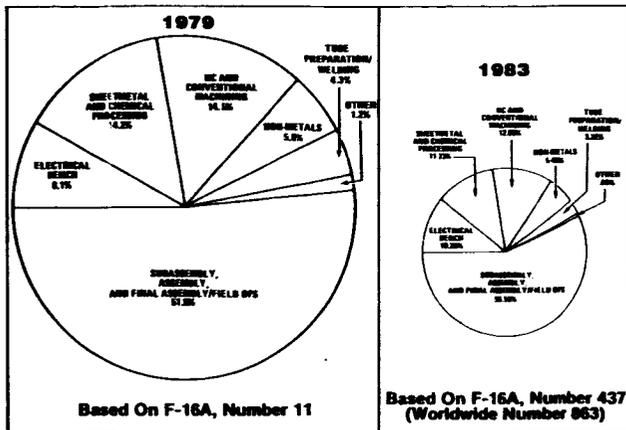
requirements analysis, in 1957 nearly three-quarters of the total work force was involved in hands-on labor. In 1969, that figure dropped to less than two-thirds. Today, it is approximately one-third, and it is projected that by 1990 just over one-quarter of the work force will be involved in touch labor. Division productivity, measured in pounds of airframe produced per production employee, has risen from 2.7 in 1957 to 10.8 today, with an expected increase to 15.5 in 1990. These improvements have resulted in large DOD savings (over $1 billion, as I mentioned before), but General Dynamics has also realized benefits, both financially and in preparation for the next-generation aircraft program. The activities we have been involved with have improved our profit posture and our competitive position and have allowed us to provide quality aircraft ahead of schedule. For example, more than half of the F-16s currently produced are zero-defect aircraft compared with 39% before 1983.
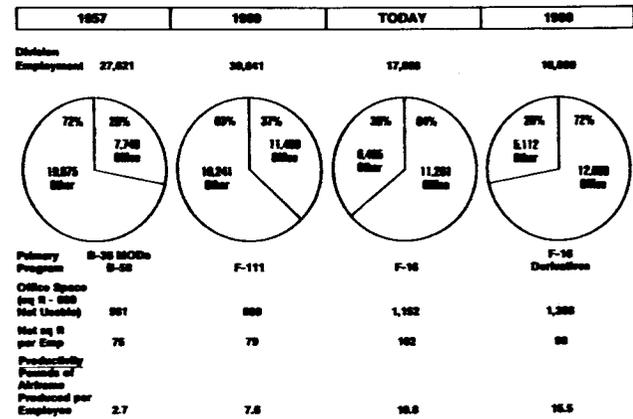

Figure 2   **Office Requirement Analysis (Seated People Vs. Other)**

The major factors in our improved productivity and quality to date are the Technology Modernization (TM) and Technology Modernization Facility efforts. The Technology Modernization Program was conceived to establish a manufacturing environment that would minimize manufacturing costs. The ultimate goal of the program was to reduce the original cost of the 1388 aircraft by $370 million – a goal which will be substantially exceeded. The principal participants in this program are the United States Air Force (the ASD F-16 SPO) and General Dynamics Fort Worth Division.

The Tech Mod program is a multiphased technology development effort including enabling technologies and a facilities modernization program. The facilities modernization effort began in 1976 with an aggressive capital facilities acquisition program. At that time, we went to a "bare floor" concept and rearranged our factory operations. Development of the Technology Modernization program served as a catalyst to drive a dynamic capital investment program. The program provided the appropriate combination of innovation and incentive for capitalization. General Dynamics agreed to invest up to $100 million in new facilities that were (1) identified by the Tech Mod program, (2) planned as a result of enabling

Figure 1   **Distribution of Labor by Major Manufacturing Area**

1

technology efforts, and (3) shown to result in significant F-16 program savings and provide a sufficient return-on-investment for General Dynamics.

As a result of the Manufacturing Technology developments and Engineering support, we were able to achieve the results shown in Figure 1. In addition, 134 other advanced state-of-the-art pieces of equipment were purchased and implemented at Fort Worth without specific development programs.

Nearly 65% of the F-16 cost is for material purchased from outside vendors. In order to expand the benefits of the Technology Modernization program, the Industrial Technology Modernization program was instituted. Led by the Material Department, the objectives of this effort are, first, to extend to the subcontractors the benefits identified in the current F-16 Technology Modernization program; second, to develop the tools, concepts, and methodologies essential to implementing such a program; and third, to plan, develop, and operate a subcontractor modernization effort that achieves reduced cost, improved quality, increased capacity, and enhanced reliability required for the F-16. Currently, more than 20 subcontractors are involved with this program, with their projected company investments in excess of $275 million. The actual government investment to date is nearly $20 million with a projected total DOD savings of over $440 million by the end of 1991 with $100 million of the $440 million projected for the F-16.

The F-16 Technology Modernization and Industrial Technology Modernization efforts are concerned with effective planning, a strong commitment to facilities investments, and the ingenuity to make the programs successful. The ultimate goal of both the in-house program and the subcontractor effort is to improve quality while reducing costs associated with the F-16 and future aircraft.

The following are some of the productivity improvements made at General Dynamics Fort Worth Division involving touch and non-touch labor activities:

Electrical Harness Data System (EHDS) – Expansion of type versions in the F-16 has significantly increased the quantity of part dash numbers in electrical wiring, assembly, and installation. Because of this increase, manual manipulation and control of wiring data has become unwieldy, and the number of errors in released data has increased. The objective of the EHDS was to develop an integrated system architecture for electrical harness design. The system provides an Engineering/Production interface between the harness design data and the computer-aided manufacturing processes. When this system was applied to the F-16C aircraft, only four ECNs resulted, whereas hundreds of ECNs would have been expected under the old manual system.

Robotics Implementation – Robotic activities at General Dynamics Fort Worth Division began in 1976 as a cooperative effort with Cincinnati-Milacron. We are currently using 13 robots in F-16 production (11 Cincinnati-Milacron robots and 2 IBM RS-1 robots). These devices are used for drilling and countersinking composite structure, drilling and routing sheet metal panels, and drilling canopy substructure. Three more robots are scheduled for implementation during 1984.

Current and Future Productivity Initiatives – As I stated earlier, approximately 64% of the labor force at General Dynamics is involved in office and technical activities. One objective of the Productivity and Quality Improvement program (we call it PIP/QIP or P/QIP) is to improve the efforts of office workers, as well as production workers, so that they can benefit from the latest advances in technologies and can change some old business practices with a positive effect. Therefore, we are adjusting the scope of the Technology Modernization program into a strategic plan for productivity improvement which will include all employees, not just those involved in direct labor. In the past, well over 90% of the Fort Worth Division resources expended on capital equipment acquisition have benefitted the touch labor force. We intend to change that posture because the ROI for capital investments in the non-touch labor area is 15 times greater than the ROI for capital investments in the touch labor area. The challenge becomes one of managing that investment and the resultant impacts on our labor force. In the future, our factory will tend to be less and less hands-on (touch labor) and, therefore, more and more non-touch labor. This will result from automation efforts and introduction of smart machinery, advancements that will require retraining employees. Specifically, General Dynamics and the Fort Worth Division are moving from efforts that will reduce touch labor to efforts that will better use non-touch labor. Non-touch labor activities of principal importance to the Fort Worth Division include efforts in computer-aided design (CAD) and computer-aided manufacturing (CAM), the computer-aided retrieval and distribution system (CARDS) and multiple access storage system (MASS), electronic mail/office system (EM/OS) and teleconferencing, automated office systems (AOS), and material requirements planning (MRP).

We are establishing an Automated Office Systems thrust. This function is part of my Productivity Director's operation. The role of the AOS group is to assist me in planning, strategizing, and implementing those concepts necessary to increase productivity of office workers. Therefore, the AOS organization is focusing on high-benefit projects that involve information processing, minimizing the redundancy and overlap of projects, and more effectively utilizing the work force for more creative work. The Automated Office System approach will allow us to deliver more creative products by challenging people, improving procedures, automating necessary tools, and delivering timely information. All the functions of the creative and support worker are affected, and some of the roles must change.

National and local surveys indicate a change in worker attitudes. Today's entrant into the work force has different needs. These changes in attitude require changes in management techniques. Management must become more attuned to these needs and address them objectively. We need to employ the whole person, not just the part from the shoulders down. As the office environment changes due to technology advances, the skills of senior employees become outdated. This is not to say that their knowledge base is outdated, but that the methods of applying that knowledge base require updating. Massive data bases which are available and capable of manipulation in extremely short periods of time all require new techniques. In order to preserve our knowledge base and not relegate all that experience to a subservient level, the holder of that knowledge and experience needs to be informed and given the opportunity to apply today's tools.

With respect to demographics, General Dynamics is no exception to the trend seen in the aerospace industry. Figure 3 shows the number of employees versus years of experience for several groups within the production organization. The alarming trend is clearly understood when considering those employees with 25-30 years of experience who will retire before we build our next-generation aircraft. To respond to this area of concern, an aggressive training and education program has been developed and will continue.
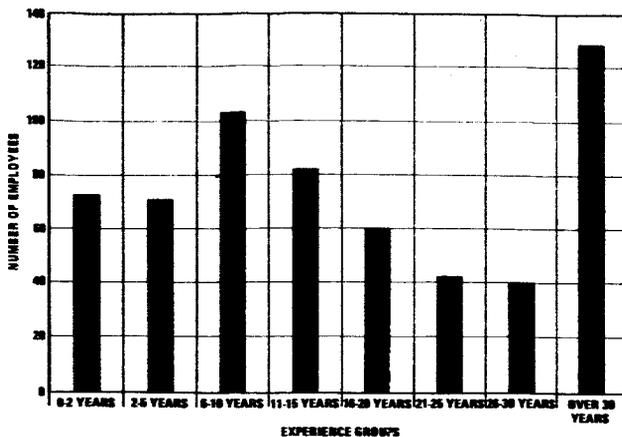
Figure 3 Number of Employees by Related
Years of Experience Groups

Figure 4 Evolution of Computer-Aided Design

An additional aspect of this labor transition is the ever-increasing amount of software needed to drive computers and run smart machinery to allow us to do our daily jobs. A large portion of our switch from touch to non-touch labor is driven by software. As a result of this training and education, along with combining the knowledge and experience with today's tools, the entire organization is changing for the better.

We are carefully tracking measures associated with productivity improvement to determine our progress. As part of this thrust, we are working to establish work unit networks throughout the division. These networks will enable individuals working on a given project to more effectively and directly communicate with each other while maintaining their physical location (when classification allows) in their operating department. We currently have a substantial electronic mail network which I will discuss further later. However, the work unit network will allow localized data processing as well as mere communication. This networking will also include our principal customer, the U.S. Air Force. We currently are processing spares procurement documentation completely electronically, and we expect to expand this capability into increasingly complex procurements.

The benefits from CAD/CAM activities in Engineering include higher design integrity, higher drawing accuracy, reduced change activity, and substantially reduced man-hours required to produce a drawing. In the tooling area, use of CAD/CAM eliminates 25% of nonrecurring cost, reduces production lead time, and results in higher tool quality. In the factory, use of CAD/CAM results in lower cost per part, reduced lead time for part fabrication, and increased quality in early units. An evolution of our computer-aided design activity is shown in Figure 4. In the early F-16 program, the horizontal tail was designed through use of the CADAM system. On the F-16XL, the wing skins and substructure were designed on the CADAM system. On our latest F-16 version, an optimized wing, fuselage sections, and tubing and routing will be designed and produced using CAD/CAM systems. In our efforts for the next-generation fighter, everything will be designed/manufactured using CAD/CAM systems.

Two major ongoing efforts in the non-touch labor area include the computer-aided-retrieval and distribution system (CARDS), which reduces the time required from Engineering Release to the factory floor from 22 days to 1½ days, and the multiple access storage system (MASS), in which documents will be stored on microfilm and made available at separate work stations. These efforts will reduce the large amount of paperwork currently needed
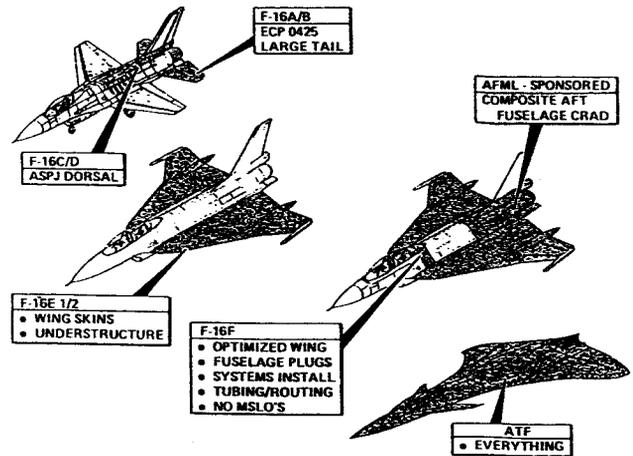
and will interface with the Air Force EDCARS system currently in work. A major issue associated with such automation is the acceptance, not only by our employees but also by the Air Force, of a near-paperless factory, including as a significant element, the concept of self-checking machines. This issue is easily understood when considering that changing the method by which we keep records, altering the audit trail, and altering authorization procedures are, in general, controlled by Air Force specifications.

The Electronic Mail/Office Systems (EM/OS) and teleconferencing activities involve installing electronic mail work stations throughout the division. Currently, more than 600 terminals are in place and more than 1250 employees have access to the system. This system allows more effective communication between organizations at the Fort Worth Division, between the Fort Worth Division and other General Dynamics divisions, and some government facilities.

The telecommunications system being implemented by General Dynamics will be expanded to the customer, associates, and subcontractors to provide faster communication and less travel cost, more complete and timely information in the correct format, and easier coordination.

Another major activity in the non-touch labor arena is Material Requirements Planning (MRP). MRP I is being installed in our Material Department in 1984/1985. Future plans call for the installation of MRP II (Manufacturing Resource Planning), which will encompass much more than just the material arena.

The combination of MRP, intelligent work stations, personal computers, electronic mail, networking of local communication, shared files, and shared resources (printers, data storage, programs, etc.) will enable us to be much more productive in the area of the office worker.

SUMMARY

General Dynamics recognizes the needs of the future. The political climate associated with acceptance of the paperless factory and the fact that there will be more non-touch workers and less touch labor must be accepted by the customer for automation to work in our aerospace industrial environment. The product line at the Fort Worth Division will continue to be a high-technology, high-quality, lightweight, multirole fighter. We will make this a cost-effective environment through technological and office innovation. The factory of the future will

3

47

require quantum leaps in technology, new tools, and streamlined techniques. It will take time before these innovations can be fully exploited. The highly successful production modernization program ran more than six years before it achieved its current level of productivity. Office automation is equally, if not more, complex but there are many opportunities for early productivity gains. Innovative technology developments and capital investments are the keys to early productivity improvements for the non-touch labor force.

We are proud of our technical accomplishments but will continue to push forward. With a high degree of automation in place (more robots introduced than any other aerospace manufacturing concern) and a large amount of CNC/DNC equipment operating, low-cost/high-quality production has been and continues to be the basic philosophy adhered to in the F-16 production program. However, a systematic technology investment strategy is needed to yield the assets necessary to win the next-generation fighter program. General Dynamics must continue to pace the state of the art in both generic and hybrid technologies and also manufacturing system integration techniques. The drive to low-cost production has led us toward updating and rearranging existing equipment, buying new state-of-the-art equipment, and using emerging manufacturing technologies as the basis for development of advanced equipment. We also recognize the trends in airframe manufacturing toward integrated manufacturing systems, the use of automated manufacturing equipment, increased flexibility, improved manufacturing support systems, and changes in materials and material forms. Our Technology Modernization and Industrial Technology Modernization activities have been very fruitful, and we intend to pursue their expansion vigorously.

As we progress in aircraft production, we recognize that our human resources are the major element of our continued success. Skilled program managers familiar with the problems associated with implementation of new and improved methods are required in transferring technology into today's worker environment. To increase our competitive position, it will be necessary to continue to increase machine utilization, more effectively use our labor force, reduce inventory, reduce engineering change to stock time, and reduce order to stock time. Through enhanced technologies, facilities modernization, production teamwork, and office automation, General Dynamics will continue to lead the development effort in emerging manufacturing and engineering technologies with the goal of reducing the cost of the fighter aircraft while continuing to meet the goals of the Air Force and the United States.

As stated in a recent editorial by William H. Gregory in "Aviation Week and Space Technology," issue of 6 August 1984,

> ". . . a chorus of crises chanting waste, fraud and abuse has left the aerospace industry floating in the kind of muddy backwater that it was in during the 1970's with overseas payment mess, complaints about overruns, and all the recriminations of the Vietnam war. The situation today is much more insidious because the charges are riddled with half-truths and over simplification. Equally often, the problem stems from a well-meaning effort to improve the situation . . ."

Mr. Gregory states that improving the acquisition process is the challenging task since key solutions often defy the system itself. The system itself, or at least a complacent attitude toward the system, may be our greatest enemy.

General Dynamics is equal to the challenge and is committed to improving quality and productivity.

-- NOTES --

-- NOTES --

50

Building Teams and Maintaining Trust

L. L. Hill, Naval Surface Weapons Center, Dahlgren, VA

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

52

BUILDING TEAMS AND MAINTAINING TRUST

Dr. Lemmuel L. Hill
Naval Surface Weapons Center
Dahlgren, Virginia

I am pleased to be here today, to discuss with you some of the efforts we have underway at the Naval Surface Weapons Center which we believe will improve both our productivity and the quality of our work.

NSWC AND THE NAVY

Perhaps I should begin by giving you a thumbnail sketch of what NSWC is and what we do for the Navy. We are one of nine RDT&E Centers within the Navy's Material Command—which is charged with acquiring all of the physical assets and resources needed to carry out the Navy's mission; that means "everything from beans to bullets," as one Admiral said once in describing the Material Command's role. These RDT&E Centers are actively engaged in a wide variety of work in the physical sciences and engineering disciplines to develop new or improved systems and equipment which, in turn, will provide the Navy the capabilities needed in the operation of their forces. The basic role of the Centers is to support the Navy in acquiring these capabilities. The complexities of today's acquisition decisions, which require the application of sound scientific and technical judgments, require the Navy to maintain a strong internal competence in all phases of research and development—including early exploratory work as well as integrative and support efforts. This competence both facilitates Navy decision-making and helps assure equitable competition among industrial firms seeking to market their products to the Navy. As you know, the Navy is heavily dependent on the production capabilities of the private sector to meet its material needs, and the Centers help to build an effective military-industrial partnership. In short, we assist the Navy in functioning as a smart buyer in a technically sophisticated marketplace.

The RDT&E Centers are full-spectrum in their operation. That is, each is charged with directing its efforts toward the solution of both near-term and long-term needs, problems, and deficiencies of the Fleet, within its respective assigned mission area. This requires each Center to carry out three broad categories of technical programs: **Science and Technology; Systems/ Subsystems Development;** and **Fleet Support/ In-Service Engineering.** These categories encompass a number of technical efforts, usually defined in classical Defense Department program budgeting terms as "research", "exploratory development", "advanced development", "engineering development", and "operational systems development."

In more descriptive terms, the actual functions performed within the RDT&E Centers include such wide ranging efforts as analysis, technology investigations, concept formulation, feasibility studies, experimentation, design, fabrication, systems integration, production engineering, technical documentation, and test and evaluation. Clearly, the Navy's RDT&E Centers themselves do not represent the only technical resources available to pursue these efforts. The Nation's academic and industrial base also serves to provide valuable research and development support across this spectrum. The fact that less than ten percent of the Navy's RDT&E budget for the current fiscal year will be expended within the RDT&E Centers is indicative of the degree to which this support is sought and utilized.

So far, I have been describing all of the Navy's RDT&E Centers. Within that family, the **Naval Surface Weapons Center**—which I represent—is responsible for RDT&E in the areas of surface ship weapon systems, ordnance, mines, and strategic systems support. Some of the major programs with which we are currently involved include:

- The AEGIS Combat System; the DDG-51 Combat System; TOMAHAWK Guidance and Control Systems; Gun-launched Guided Projectiles; the Vertical Launch System; and the STANDARD Missile family of Surface-to-Air Missiles

- RDT&E in explosives, and the development of warheads for STANDARD Missile, PHOENIX Missile, and the Advanced Lightweight Torpedo

- Development of Naval mines such as CAPTOR, QUICKSTRIKE, and the Submarine Launched Mobile Mine

- Geoballistics analyses and development of fire control software for POLARIS/POSEIDON, TRIDENT I and TRIDENT II Submarine Launched Ballistic Missiles.

What are the resources available to us to carry out these responsibilities? A major resource, of course, is funding: our current annual operating budget is just over 500 million dollars. I should point out that if you look through the Federal budget for a line item entitled "Naval Surface Weapons Center", you won't find it. In contrast to many Government organizations, we do not receive a single allocation of funds at the beginning of each fiscal year. Rather, we must sell our services each year to customers in the Naval Material Command (primarily) who are willing to pay for them. This **Industrial Funding** concept, as it is called, helps assure that we will be responsive to the needs of those customers. Moreover, we must operate our total organization within the funds provided; i.e., we are required to budget and account for all operating expenses— including

those for support and service functions, which comprise an overhead component of our cost of doing business. In my view, being held responsible for our total operation means that we have a built-in cost consciousness which is keener than that found in other Government activities. In a very real sense, it is in our own self-interest to operate our organization efficiently.

A second major resource is our physical plant and facilities. The Center is located at two principal sites: one at **White Oak, Maryland**— just outside Washington, D.C.; the other at **Dahlgren, Virginia**, about 60 miles south of Washington. We also have field stations at Fort Monroe and Wallops Island, Virginia and at Fort Lauderdale, Florida. In terms of geography, we occupy about 5,000 acres at these various locations. Our technical facilities for experimentation, analysis, and testing constitute a fundamental portion of the foundation on which the Center's capabilities are built, and enable us to conduct research and development across the full spectrum from formulating and developing basic concepts to testing and improving existing hardware. Some of these include the **Fleet Ballistic Missile Facility**, for the development, checkout, and maintenance of POSEIDON and TRIDENT fire control computer programs; **Materials Laboratories** for the formulation and testing of new plastic, metal alloys, and composite materials; **Gunnery and Missile Ranges** for the evaluation of Naval guns, ammunition, and missiles; **Wind Tunnels** for aerodynamic studies in the evaluation of re-entry bodies; **Explosives and Propellants Chemistry Laboratories** for the development and analysis of new energetic materials for weapons applications; a **Program Assurance Facility** for the development, verification, maintenance and support of digital computer software for tactical weapon systems; **Underwater Facilities** for field trials of air, surface, and underwater weapons; **Nuclear Weapons Effects Test Facilities** for the determination of the radiation effects from nuclear weapons on aircraft, missiles, ships, and their subsystems; **Hydroballistic and Hydroacoustic Facilities** for the study of physical phenomena associated with the operation of underwater weapons; a **Magnetic Structure Facility** to model and study the magnetic characteristics of ships, submarines, and satellites; and a variety of Weapon Evaluation Facilities to test and evaluate Naval weapons systems in realistic operational scenarios under precisely controlled conditions and environments.

Of course, all this real estate, brick and mortar, hardware, and instrumentation are only tools—intended for use by our third, and most valuable, resource: our people. Currently, our total employment numbers just over 5,000; this, incidentally, makes us the largest of the Navy's RDT&E Centers. The professional scientific and engineering staff of 2,300, backed up by about 700 technicians and technical support personnel, primarily consists of electronic engineers, mathematicians, physicists, mechanical engineers, and operations research analysts. They are organized into seven departments, each with its own share of the Center's overall responsibilities: **Engineering; Electronics Systems; Weapons Systems;**

Strategic Systems; Combat Systems; Research and Technology; and **Underwater Systems.** We also have approximately 100 Naval officers and enlisted personnel assigned to the Center. Finally, I should mention that we are essentially a "self-contained" organization, in that we provide our own service and support functions: personnel, finance, supply, public works, shops of all types, security and general administration. The personnel in these staff departments round out our total employment. Having these support people available "in-house" presents both opportunities and challenges to management. On the one hand, it allows us to fully utilize the skills and talents of all facets of our organization in contributing to our total responsibilities. At the same time, as I indicated earlier, we must assure that these staff functions are carried out efficiently since their cost must be met from our overall operating funds.

Now that I have painted a picture of NSWC, I'd like to discuss two major, and continuing, efforts we have underway which are intended to strengthen our organization and help enhance its continuing value to the Navy. The first concerns our people and the second our products. These are obviously two sides of the same coin and can't be separated in real life, but for discussion today I will deal first with our **Management and Team Productivity** program and then with our **Strategic Planning** efforts. They have been running in parallel and, as you will see, have been mutually supporting one another.

MANAGEMENT AND TEAM PRODUCTIVITY

Like many organizations, NSWC has been involved in team building or other organization development (OD) activities for at least 15-20 years and, by other names, I'm sure since the early 1900's when the parent organizations were formed. Although generally successful, these activities were sporadic at various unit levels and generally uncoordinated. In about 1980 we decided to plan a coordinated Centerwide OD effort with the goal of increasing our teamwork and productivity, and to improve the quality of our products and services. After a year or so of weighing and scoping the problem, we formally began our program in 1982. Like any program it had to have a name, and we chose **MTP (Management and Team Productivity).**

Considering the scope of our plans we chose to bring in an outside contractor to handle the bulk of the training, facilitating, and consulting with only a small internal staff to assist and oversee the contract.

The MTP program was "kicked off" with an organization-wide quality of worklife survey. We were not surprised by the results in that they showed the usual perception of problems with communications, conflict resolution, meeting effectiveness, role clarity, planning, and so forth. The survey was validated, work groups formed to research solutions to tractable problems and, in fact, about 50 percent of the problems were resolved through normal managerial effort. The remaining set of problem indicators formed the

54

basis of developing, with our contractor, a training and OD implementation plan. Each of our line and staff departments also developed action plans to address inhibitors and contributors to productivity. While it is difficult to describe the full range of activities of this program, some principal features include management and team productivity seminars; follow-up implementation assistance; quality circles; productivity steering committees; and the development of productivity measures.

The management and team productivity seminars are designed as team building experiences focused on the philosophy, practices and application of participative management. A common language is developed and the final day is devoted to the identification of productivity inhibitors, and action plans are developed to deal with these problems. The first seminar involved the NSWC senior management group and subsequent ones waterfalled down the organization. In all cases the seminar participants were natural teams involving two and sometimes three levels of management. About 95 percent of our managers have attended the 38 five-day seminars, to date.

Follow-up implementation assistance is provided, on request, by both contractor and the internal staff. This activity includes: consultation and/or training for managers and work groups to help implement action plans; team building sessions (about 50/year) aimed at productivity improvements; specially designed training for intact work groups (e.g., conflict management, communication, participative management, etc.); and coaching and assistance for managers on specific problems. Since most managers have now participated in the seminar training, this implementation phase is now becoming the dominant part of the program as the assistance they need to affect changes in their individual work environments.

Quality circles are not ordered but rather allowed and, once formed, encouraged and nurtured. To date eight QC's have formed, both in blue collar and white collar areas. Two of these have reached the stage of reporting out on their first problem. I have been impressed with their suggestions and rationale. Additional QC's are in the formative stage, including professional level groups, and I am looking forward to seeing how these work.

We have encouraged the formation of productivity steering committees (PSC) at several levels within the organization. These groups coordinate and track productivity improvement efforts, develop and encourage employee participation and involvement, and provide a vehicle for employee/management interaction. The groups are made up of a broad cross-sectional mix of workers and managers representing different suborganizations. They are excellent barometers of how our program is being received and working "in the trenches". We recently formed a PSC at the Center level with representatives from each of our departments. A representative of the PSC regularly attends all top management meetings, and the group provides us direct feedback of how things are going.

I have saved productivity measures for last since it is a very difficult thing to deal with in an R&D environment. There are many who say it can't be done in a scientific/engineering based operation. We simply refuse to believe that (until proven wrong) and are developing productivity indicators in both our technical and support organizations. We are still in the experimental stage, but I think the preliminary results look promising. As good scientists, we need to know where we are before we can say we've improved.

Some lessons we have learned are:

1. Work unit (or micro) measures are most useful; development of larger organization (or macro) measures is very difficult or impossible. However, work unit measures can be aggregated to provide measures for the larger organization.

2. Workers and managers together must develop the measures for them to be meaningful.

3. Productivity measurement needs to be done in those organizations where the climate is hospitable to measurement activities. In areas where serious resistance is met, your first goal is to work on improving the climate.

4. Productivity measurement can be an intervention which will increase productivity.

Our program has literally just begun as we have recognized that improving organizational effectiveness through a planned development program in a complex organization, such as ours, is a truly long term process. It is labor intensive in many phases and requires time, energy, and continual attention and commitment from all employees. Is all this effort cost effective? We've only been seriously working on it for two years, so it's too soon to tell. I do see some tangible results in our strategic planning products, our improving ability to deal with administrivia, our level of comfort with giving and receiving feedback, and our adaptability to change. The longer range goal of our program is to provide a work environment where we can develop better ideas for defending our country, and to continue to enhance our Center's history of scientific and engineering excellence and service to the Fleet. If we can do that, then it will certainly be worth the cost.

STRATEGIC PLANNING

I'd like to turn now to my second major topic—our strategic planning efforts. I recognize that discussing this subject before an audience made up largely of executives and managers from private industry may be like preaching to the choir, since strategic planning from a corporate perspective is fundamental to many of your operations. In fact, as you will see, we borrowed a page or two from private industry's book in undertaking this effort, and you may be interested in seeing how some of these business practices can be applied within a Government organization.

As you might imagine from my earlier description of NSWC, our organization encompasses an

extremely wide range of technical programs in response to many Navy needs. We have, over the years, fostered a strong **entrepreneurial spirit** among our technical staff as a part of our management and operating philosophy. This is generally recognized in the R&D business as an important contributor to technical innovation. But at the same time it can lead to an increase in the diversity of work being carried on in the organization—particularly given the large number of potential customers we have in the Navy. Moreover, there is much pressure on the RDT&E Centers from these customers to respond to their immediate or relatively short-term needs. This combination of diverse projects and short-range perspective led us, about three years ago, to question whether we were becoming too reactive in our operations.

Like any organization which expects to remain in existence, we must respond to our customers' needs. But as one of the Navy's corporate RDT&E Centers, we have a longer-term responsibility as well: to build and maintain an **institutional value** to the Navy, within our mission areas, through our ability to anticipate and help define the Navy's future needs, and to recognize and exploit technological opportunities. In short, we are expected to take an active role in shaping the Navy's technical programs and our own capabilities to meet the challenges of the future.

After a brief study, we confirmed that this long-term responsibility was in danger of being overshadowed by the short-term pressures faced by the Center, and that a **future-oriented perspective** was needed for managing our business. We decided that a Center-wide strategic planning effort would provide such a perspective and framework for decision-making. Our initial objectives were three-fold: to develop a strategic planning system and associated processes that would facilitate the generation of a comprehensive set of long range plans for the entire Center, insure their implementation, and provide for review and control; to prepare a "first cut" at a Center strategic plan which would delineate a desired future mix of problems and products, along with strategies for reaching these objectives; and to build a planning culture throughout the organization using participative planning and decision-making methods to improve organizational performance.

In essence, we were asking ourselves "where are we, and where are we headed?", and—perhaps most importantly—"where should we be headed?" We began with an examination of our entire "portfolio" of on-going work, from which we defined 35 distinct **Strategic Business Units** (SBUs): groupings of related technical programs with similar sets of product lines and customers. The SBU's were further grouped for coordination purposes into ten **Sectors.** I should point out that, although the numbers of Sectors and SBU's corresponded roughly to the numbers of line departments and divisions, the planning units were not necessarily synonymous with organizational units; often they extended across several organizational boundaries. We believe this encouraged more of a corporate perspective by the individuals involved in the ensuing planning efforts.

For each SBU, one person was designated to be responsible for leading the planning activities within his respective area. These SBU managers were all **line managers** within the organization; we recognized early on that if our planning were to be effective, it must be done by those who would ultimately have to implement the plans—i.e., by operating managers, not by a separate planning office.

We then developed and adopted a uniform planning approach to be pursued by all the SBU managers, which was widely reviewed and discussed throughout the organization before being implemented. Each SBU manager was assigned the task of developing a tentative plan for his respective area out to the year 1990. Briefly, the approach followed was to first examine and analyze long-term **Navy needs** in the SBU area; identify potential product line **opportunities** resulting from this needs analysis; assess the **relative merit** of each of these opportunities both in terms of the Center's organizational capabilities and of various external factors; select the product line **opportunities to be pursued,** based on this assessment; and prepare an **action plan** for each of those product lines. (As you can see, this process closely parallels many activities carried on in private industry, such as market analysis, assessment of competitive strength, and determination of potential market attractiveness.) The resulting action plans were to describe the time-phased steps necessary to move from the present to the desired future position for each SBU, and to identify the resources (primarily funding and manpower) which would be needed to carry out the plans. At this stage in our strategic planning, we did not place resource constraints on the SBU managers. They were free to be aggressive in their planning, within the bounds of their own judgment; at the same time, it was made known to them that they would be expected to defend and substantiate their proposed plans in subsequent presentations to Center top management.

Without exception, the SBU managers did not work alone during this process. All of them enlisted the assistance and support of other people thoughout the organization, generally in the ad-hoc groups, to contribute to preparation of the plans. Sector leaders also met periodically with their SBU managers to review the planning efforts and to integrate SBU plans into a coherent picture for each sector.

Concurrently with Sector/SBU planning, a survey was conducted among the Center's senior management to elicit their views of the organization's long-range future. Each participant in the survey was asked to examine the external environment within which the Center operates and to make projections for each of the Center's markets; to assess the Center's track records in its assigned areas of responsibility and to suggest approaches for building on the organization's strengths to meet likely opportunities; and to propose major Center thrusts which should be pursued in the future to respond to key Navy needs, Center opportunities, and major issues affecting the future of the Center. Responses to the survey were collected and returned to each participant with suggested questions for further consideration.

56

All of these planning efforts culminated in a one-week meeting of the Center's senior management personnel. The initial phase of the meeting consisted of presentations by each of the SBU managers of their respective plans. These plans were evaluated and priorities were established. Criteria for evaluation were established prior to the meeting and they, as well as all resultant worksheets and decision papers, were provided to all. There were no secret processes.

The latter phase of the meeting dealt with Center-wide aspects of strategic planning, beginning with a discussion of the results of the management survey which had previously been conducted. This led to the identification of a number of potential Center thrusts, i.e., broad areas needing greater emphasis and attention at NSWC in the future. By consensus the original list was narrowed to fourteen topics; these address both technical and management subjects. Open issues and questions identified relative to particular organizational, management, or program topics were assigned to various participants for resolution.

It is obvious, I hope, that in evaluating SBU's and adopting thrusts we, in effect, prioritized our future program endeavors. This led us to the next step, which was to decide on what current Center work areas should be divested. This was necessary for the simple reason that, unlike private industry, we—as a Government activity—cannot unilaterally plan to increase the overall size of our organization. We are limited by higher authority in the Navy with respect to the total number of people we may employ, and a fundamental assumption we made when we set out to develop our strategic plans was that our overall staffing level would remain essentially unchanged for the remainder of this decade. Therefore, in order to be able to devote more resources and emphasis to those areas of relatively greater importance to our vision of the NSWC mission, it obviously became necessary that our planning include the de-emphasis of other areas. I must admit that reaching an agreement on the latter was the difficult step. In absolute terms, all of the work we are doing is important to the Navy and some very hard choices had to be made in selecting those efforts which would be drawn down in order to make resources available for higher priority work. I'll spare you the details of the marathon meeting we went through, and just say that we did manage to agree on a set of 1990 manpower targets for each of our ten sectors—each of which calls for some degree of change (either an increase or a decrease) from present manpower levels. In doing so, we believe we have taken a major step toward defining our future responsibilities to the Navy.

We are now in the process of developing and implementing the strategies to be pursued which will help build the capabilities required to meet these responsibilities. Additionally, we are preparing strategic plans for our support areas (personnel, finance, supply, public works, etc.). Our view of strategic planning is that it strengthens the Center's resource allocation processes by helping us to balance market forces against the Center's capabilities needed—in our

best technical and management judgment—for future effectiveness. It also helps us manage our current portfolio, through articulation and balancing of our objectives, action strategies, and resources. I feel that we have made real progress in our corporate ability to manage the myriad of activities represented in our portfolio. To date, the general reaction of SBU managers to the strategic planning efforts which have been undertaken has been positive and supportive. The challenge facing top management at the Center is to maintain the momentum which has been generated so far.

ACTION AGENDA

Now, to return to the central theme of this symposium: productivity, quality, and strategies for improving operations in Government and industry. My own view is that productivity, for an R&D organization, is synonymous with organizational effectiveness—and that this is heavily dependent on the degree to which two attributes are present: dedicated, capable people; and a sense of purpose and direction. The efforts which I have described at the Naval Surface Weapons Center are aimed at strengthening each of these. We are trying to instill throughout our organization the attitude that we have both the obligation and the capacity to help create our own future, and to generate a working environment and atmosphere which will foster the actions needed to create that future.

In sum, we at NSWC are striving to build our people into more effective teams whose efforts are directed toward future products of value to the Navy. In that way, we believe we can serve our ultimate purpose—which is to continue to contribute the capabilities of a first-class R&D institution to the building of tomorrow's Fleet.

The approaches I have described—organizational development and strategic planning—are not really new, but their application within a Government organization may as yet be somewhat uncommon. Could these approaches be adopted elsewhere in the Government? I think it should be possible—particularly for those organizations which are responsible for delivering products and services to their respective agencies, and at the same time are expected to be innovative in meeting these responsibilities.

Of course, innovation in management—just as in any other area of endeavor—requires the authority to use judgment and discretion. Many of us in Government today feel that our ability to exercise this authority is being limited by an increasing variety of constraints aimed at controlling our use of available resources. I am concerned that as managers, we are being forced to become more and more resource-oriented rather than results-oriented.

Nonetheless, at NSWC—while we certainly have to live under our share of controlling rules and regulations—I do believe we enjoy a measure of flexibility in running our internal operations because of the funding concept I described earlier. The requirement that we sell our services to the Navy, and that we meet all of our

5

operating expenses--including our overhead costs--
through annual billings to customers, means that
we must take a corporate view in managing our
organization. We must, and do, make choices
regarding the application of our internal
resources to help assure that we maintain an
appropriate balance between our R&D project work
and the nontechnical support functions needed to
assist in carrying out those operations, and
between short-term efficiency and long-term
effectiveness. For example, both of the internal
efforts I reviewed here today were started and are
being pursued at our own initiative, and we
believe their cost will be outweighed by their
ultimate value to NSWC and to the Navy.

The question of whether the **Industrial
Funding** concept could be extended to other
Government activities deserves to be seriously
considered, as a means of promoting both effi-
ciency and effectiveness. In fact, I believe such
a concept has the potential for serving as the
basis for a **single control mechanism** which
could replace many--if not most--of the various
resource constraints which now exist and which,
collectively, create barriers to good management.
I'm certainly not arguing for the elimination of
control--rather, for the introduction of a
different form of control which I believe will
meet the public's legitimate expectation of
efficiency, economy, and effective use of manpower
in Government; strengthen the capabilities of
public service management officials through the
assignment of demanding responsibilities; and, as
a result, substantially improve the effectiveness
of Government operations.

While I am, obviously, a strong supporter of
the concept of industrial funding and recommend it
be employed on a much wider basis, I am not naive
enough to believe that it could or will have
universal application. There will remain large
areas of government which must operate by appro-
priated funds. That is, where senior executive or
legislative bodies will attempt to "control" the
size and nature of the work by pure dollar con-
straints. Our own experience points out that the
training and planning for organizational effec-
tiveness isn't cheap. We can, however, under
industrial funding allocate the necessary funds
(subject to review by our auditors, of course). I
am concerned that in appropriated activities this
activity of building organizational effectiveness
would not be as easy or perhaps as acceptable to
budget for. Thus I would recommend that in appro-
priated activities (and I believe this would
include subcorporate industrial activities), once
the prerequisite of enlightened leadership is met,
adequate training and planning funds be made
available.

6

Quality in Practice at IBM
J. B. Jackson, IBM Corp.,
Purchase, NY

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

59

60

QUALITY IN PRACTICE AT IBM

John B. Jackson
Vice President of Quality
IBM Corporation
Purchase, New York

Abstract

This paper discusses the excellence values of IBM and how they were made operational through quality improvement for the decade of the '80s.

First, consideration is given to the importance of underlying beliefs of a corporation that brings out the great energies and talents of its people. The most important single factor in corporate success is the faithful adherence to those beliefs.

Quality as a productivity driver is examined. The five concepts that IBM uses as a basis for its quality improvement are discussed. Tools and techniques for the removal of "defects" from non-product processes, e.g., accounting, inventory control, distribution, order entry, etc., are reviewed.

Specific attention is given to the "job process" and to complex cross functional processes that every large organization has and must manage in a defect-free manner if it is to be competitive.

Quality In Practice

Good afternoon, ladies and gentlemen. It is a pleasure to be here with you this afternoon to share with you an overview of "Quality in Practice" at IBM. Having spent most of my working life in IBM's Federal Systems Division, I feel especially comfortable to participate in a symposium sponsored by NASA -- it's like coming home.

Our subject matter today, quality and productivity, is of vital importance to the U.S., industry and government. One of the nice aspects of quality improvement is that we have everything we need within any business or government organization to make it happen.

The concepts are relatively simple; however, the practical aspects of implementation take management attention, time, focus, discipline, and great attention to detail.

In IBM quality improvement pertains to our products and services which we provide and also to the performance of every job and task by every employee in IBM.

We have a fairly simple definition of quality. It is:
Meeting the requirements of our customers for defect-free products and services.

IBM employees understand that everyone has customers, either inside or outside the company. The person who receives your work product is your customer.

And quality is everyone's job ... every individual must assume responsibility for a defect-free operation.

We have laid out five basic tenets which are the basis for everything we are doing in quality improvement. They are:
- Quality improvement results from management action;
- Everyone must be involved;
- Focus for improvement must be on the job process;
- No level of defect is acceptable;
- Quality improvement reduces total costs.

People are what the first two tenets are about. Management action, beginning at the top, and the involvement of everyone are necessary conditions for improvement.

Process is the focus of the third and fourth. These two are the quality template, the keys to unlocking true operational excellence. People and process provide the necessary and sufficient conditions for improvement.

Productivity is the result of the final tenet. We have found that quality improvement, as we practice it, is a key driver of productivity.

People

- Quality improvement results from management action.
- Everyone must be involved.

1

More than anything else, quality or excellence stems from the people of an organization: their motivation, their drive, and most importantly, the way they relate to one another.

If there is a uniqueness in IBM, it is the way that the management structure encourages effective participation by all employees.

This characteristic of IBM was molded by Thomas Watson, Sr., beginning when he took over the struggling C.T.R. Company in 1914. It was renamed to IBM in 1924. His personality and beliefs left an indelible impression on the company.

Thomas Watson, Jr., became chairman in the mid-1950s and took the heritage provided by his father and turned IBM into a modern corporation which has evolved to what we are today.

He captured the essence of IBM in a series of lectures delivered in 1962 for the McKinsey Foundation Lecture Series at Columbia University.

As part of his introduction, he stated that the difference between success and failure in a corporation is often the way that organization brings out the great energies and talents of its people and how this is sustained from one generation to another.

He said, and here I quote:

"I firmly believe that any organization, in order to survive and achieve success, must have a sound set of beliefs on which it premises all its policies and actions.
Next, I believe that the most important single factor in corporate success is faithful adherence to those beliefs.
And finally, I believe that if an organization is to meet the challenges of a changing world, it must be prepared to change everything about itself except those beliefs as it moves through corporate life."

This introduction was followed by his discussions of the basic beliefs of IBM:
. Respect for the individual;
. To provide the best customer service of any corporation in the world;
. An organization and its people should pursue all tasks with the idea that they can be accomplished in a superior fashion.

The strength and resiliency of IBM results from the first belief; respect for the individual. It manifests itself in all actions with respect to people, such as:

Our hiring practices, our no layoff practice, our merit pay system, which is tied directly to our performance planning counseling and evaluation process, and the close relationship we foster between managers and employees.

In addition, the training and education of individuals, managers and non-managers, our Open Door Policy which offers any employee the opportunity to take a grievance directly to our CEO, our Suggestion Program, our very broad employee recognition program, the fact that we are all salaried, our benefits program, our use of opinion surveys, followed with action plans, where appropriate.

All of these employee policies and practices, and there are many more, create an environment of excellent people relations and provide ongoing reinforcement of IBM's commitment to people. An environment of which all IBM managers are aware and continuously strive to improve.

IBM employees, management and non-management, provide an extremely loyal, very flexible, and highly motivated work force.

They are a set of people who foster and welcome change.

They know that their self interest and that of IBM are closely aligned. They collectively are unswerving in the pursuit of the two beliefs which address excellence.

. To provide our customers the best service in the world.
. To pursue all tasks with the idea that they can be accomplished in a superior fashion.

As we explore the process focus, I will describe more fully the nature of the involvement of people in quality improvement.

Process

. Focus for improvement must be on the job process.
. No level of defect is acceptable.

At the beginning of 1980, we started our quality improvement emphasis by focusing on products and manufacturing. By the end of 1981, we

62

had our manufacturing and development locations worldwide actively involved, and we were beginning to see significant benefits.

We realized that the techniques being applied to the products would apply to every activity; to every process in the business.

To get a defect-free product, the design and manufacturing processes have to be capable of yielding the desired (defect-free) result. The same holds true for the "white collar processes."

As we first looked at these, we found many very complex processes where defect-oriented measurements were minimal. Many processes because of constant change were ill-defined, and corrective actions only followed a crisis.

I am talking about such things as billing, accounts receivable, personnel data systems, order entry, distribution, inventory management, and information systems just to name a few.

Few understood the totality of these cross-functional processes, and no one could speak to their capabilities. A gold mine for quality improvement and resulting productivity gains.
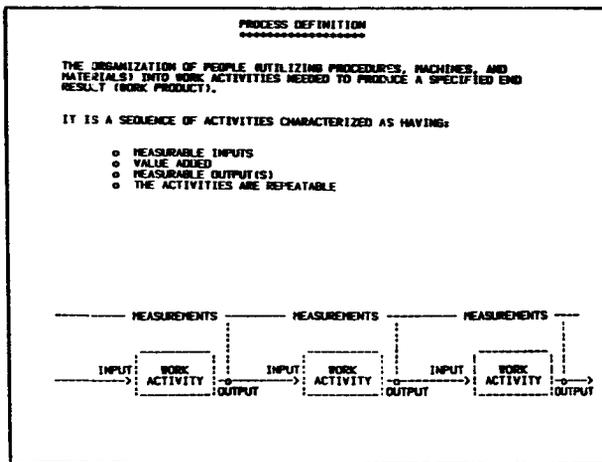

Fig. 1 Process Definition

We needed common understanding. We began with a definition of process shown in figure 1.

All work done in IBM and, in fact in any enterprise, is part of a process and falls within this definition. All IBMers' work activities are a part of one or more processes. As an added responsibility, the management must focus on the work process(es).

Many of our processes flow horizontally across organizations while we manage vertically down through the organization. This tends to diffuse focus on the management of the process and often leads to suboptimization which can be costly.

Management of processes is not a new concept, but what is new for us is that we are specifically charging the management team with the responsibility for continuously improving the quality of work products by continuously improving the capability of the work processes.

To do this, an owner must be designated, someone who is responsible for this charge of quality improvement. If the process is totally within a function, this can happen within the normal management structure.

As a process flows across organizational boundaries and geographic boundaries, this becomes difficult -- but an owner must be designated. (I can't emphasize this enough.)

This ownership will involve quality teams crossing organizational and geographic boundaries, a type of matrix management very familiar to the aerospace world.

The process must be defined and challenged: where it begins and ends, the skills its people bring to it, the information that flows through it, its structure, interfaces, and how it fits into its related business activities.

Appropriate measurements and a process control function are needed to bring focus across the process. These are a part of the horizontal matrix structure.

Processes tend to adapt for comfort with their environment over time rather than stay lean and competitive. Improving the process, through education and training (new techniques), "best of breed" tools, and better information (procedures) helps to overcome the tendencies of a process to grow fat and the management to become complacent.

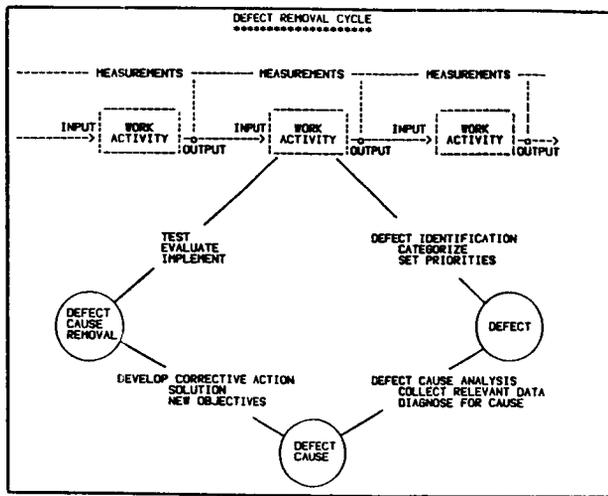Now let's take the process concept and overlay it with a defect removal cycle.

3

Fig. 2 Defect Removal Cycle

Fig. 3 Tools and Techniques

We use a four step cycle, shown in figure 2, applied to a process segment with _measurements_. We felt we needed to bring significant attention to defect-oriented measurements.

First, using the measurements, define the defects and set priorities for removal.

Second, determine what is causing the defects.

Third, identify ways to eliminate the causes of the defects.

Finally, test and evaluate the corrective action. If it works and is not a suboptimized solution, we introduce it into the process.

The defect removal cycle continues as long as defects arise for which we can assign a cause.

At each step of the defect removal cycle there is a variety of tools that are used. A partial listing of tools is shown in figure 3. They are well documented in the literature and are readily available for anyone to use. It is in this cycle that the greatest value of quality teams with everyone participating, if you will, becomes evident.
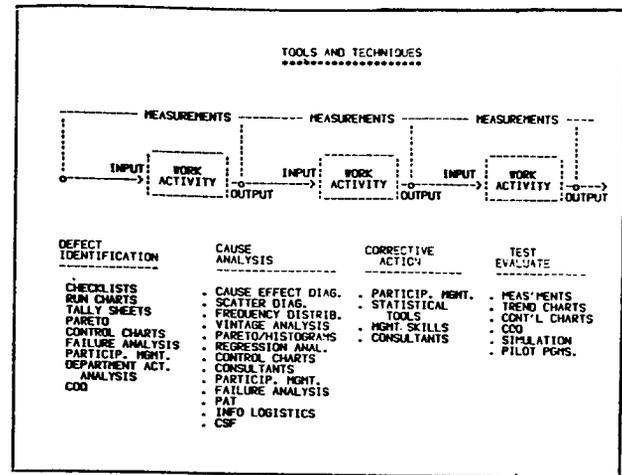
To summarize: The quality template is: _Focus on the process_, assign ownership, _utilize the defect removal cycle_ with the appropriate quality tools, including continuous measurement and ratcheting down of targets. The final objective being: _No level of defect is acceptable_.

Productivity

. Quality improvement reduces total costs.

We have made estimates of our total quality costs. These are all the dollars we spend to ensure that our services and products meet our customers' requirements, which includes the dollars we spend to rework things that don't meet requirements or to fix things that break.

We classify these expenditures in two broad categories -- costs of conformance and the costs of non-conformance.

The costs of conformance includes the prevention measures of selecting materials, education, training, procedures/systems and tools, and the appraisal measures of performing audits, tests, assurance, and inspections. Together these add up to about 25 percent of our total quality costs.

The cost of non-conformance or failure includes all repair activity (putting all of this as failure was an arbitrary choice), scrap/rework, engineering changes, problem determination, etc. A complete list would be very long.

64

This is the major portion of the quality costs, about 75 percent of it. Our total quality costs are roughly 15 to 40 percent of the revenue stream. Many companies with whom we have compared have similar costs.

Spending more on prevention to improve the capabilities of processes and utilizing the defect removal cycle (the quality template) dramatically reduces failure costs which reduce overall quality costs. We see leverage of over 100 to 1 in many cases.

After several years of experience, we believe that it is a reasonable expectation to reduce quality costs by half providing a significant productivity gain.

But keep in mind, these reductions only come as a by-product of the quality improvement efforts.

For our company the opportunity is measured in billions of dollars a year in increased productivity, as the quality benefits materialize. It is indeed a win-win game.

Now let me turn to a few examples of quality improvement. I will show only two examples in hardware. We see similar things broadly across our product line, from our PC products to our 308X systems. My major emphasis today will be on non-product processes or so-called white collar activities.

A change brought about in our quest for quality improvement is the way we set quality targets. In the past, we set targets and after we achieved them, management directed its attention to other priorities and newer challenges.

No so today. If we are meeting our quality targets, it's time to make the targets tougher. (Ratcheting down)
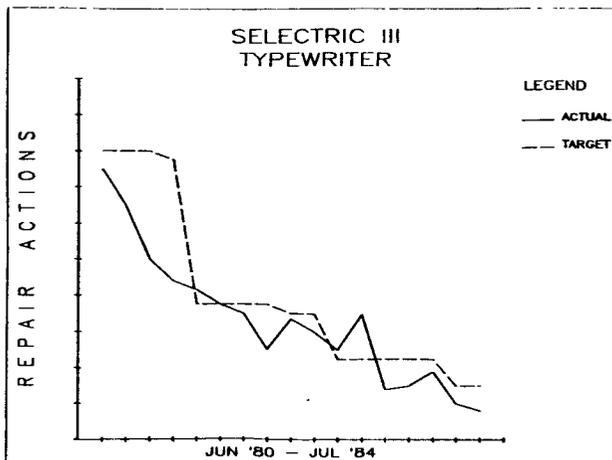

Fig. 4 Selectric Typewriter

The technology for this product has been in the marketplace more than 20 years.

At the start of 1980, the average number of repair actions during the warranty period for a selectric typewriter was low; in fact, we thought it was very good as shown by the solid line in figure 4.

When we examined the quality of this product in 1980, new targets were set. We thought these targets would be difficult to meet, as shown by the dashed line.

Well, as you can see, we've beaten the targets and set new ones on several occasions. Now we are experiencing fewer than one sixth the number of repair actions during the warranty period than we were just a few years ago.
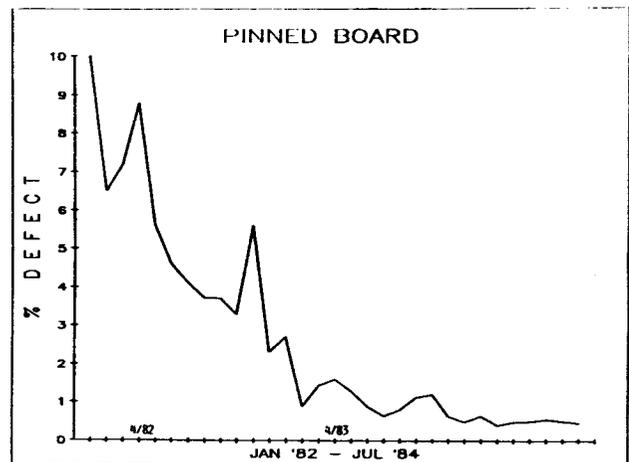

Fig. 5 Board Manufacture

We manufacture a pinned board which for years has been used as a back panel for many of our processors. This particular process has been transferred from one plant to another over the years. There's nothing exciting about it, not high technology, and it did not attract much attention.

In April of 1982, a bright young manager who had the responsibility for this project decided to address this activity as a yield-sensitive, manufacturing process. He established a process control group, in-process measurements, and management control (ownership and improvement of the process). The results were almost immediate and dramatic.

5

The measurements in figure 5 show percent defect at final test. In April 1983, the receiving plant stopped receiving inspection for the first time in over 15 years.

Currently, we are experiencing less than one-half percent defect at final test. This goal is to continue the improvement. In addition, product costs follow the defect trend. We are experiencing savings of several million dollars annually.

I showed those two examples because they are not exotic, no one had to invent anything, just focus on the basics, the process, and attention to detail. The little things added up to a lot of improvement and significant dollar gains which go right to the bottom line.
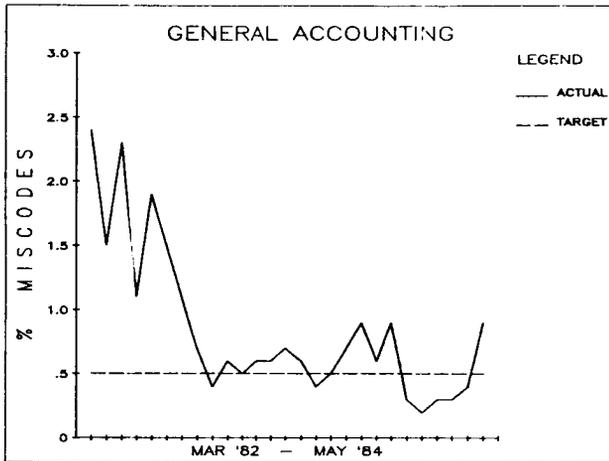
Now the non-product examples.

Fig. 6   General Accounting

This department is responsible for closing the books monthly. They receive inputs from the operating units and produce a consolidated statement for the company. The miscodes were approximately 2.8 percent. Being 97.2 percent correct by many standards is an A+.

Processing a million records a month results in 2,000 to 3,000 miscodes to be corrected daily during the closing period. Forty-five percent overtime and low morale ensued (all non-conformance costs).

A process focus was taken and the defect removal cycle applied. Analysis was performed to determine the source of the defects. Targets were set and feedback was given to the operating units who provided the input data.

As you can see in figure 6, from March 1982 to May 1984, we see a 5.7X improvement in miscodes. Overtime is down to almost zero. The last opinion survey showed this department to have the highest morale in their group.

The savings amount to more than 50 percent of the total base salaries of the department.
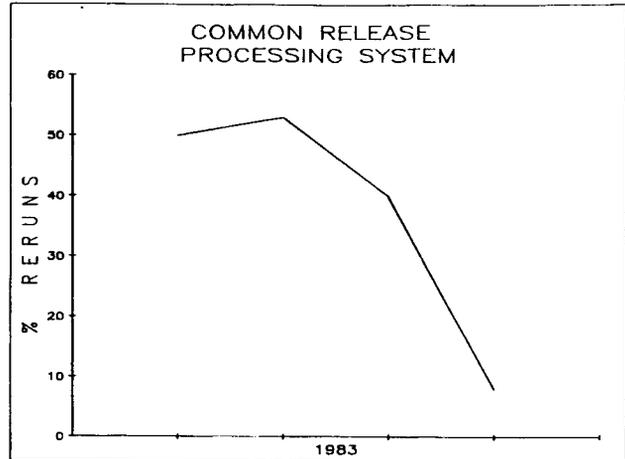

Fig. 7   Common Release Processing System

This system is a standard data processing program that is used in every IBM plant and contains product design, test, and build information.

The problem was that 50 percent of the release information had to be reprocessed due to errors.

The records group in one plant formed a quality team with the data processing people. An analysis by the team led to the root cause.

Quality targets were established jointly with the laboratories releasing products to the plant for manufacturing. They reflected accuracy timeliness, and completeness of their release information. The measurements, feedback and corrective actions are ongoing.

The result as seen in figure 7 is that reruns are down from 50 to 8 percent. In addition, there are savings of $70K yearly and a 30 percent computer time reduction with no added expense, and the improvement continues.
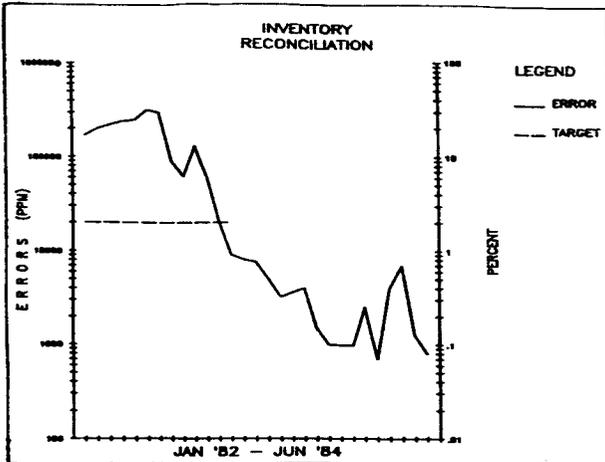
6

66

INVENTORY RECONCILIATION

LEGEND

—— ERROR

——— TARGET

ERRORS (PPM)

PERCENT

JAN '82 — JUN '84

Fig. 8 Inventory Reconciliation

SOFTWARE ORDER ENTRY

% ERROR

JAN '82 — JUN '84

Fig. 9 Software Order Entry

What you have on your books, you should be able to count on the floor. Picture a distribution center handling all IBM hardware products for a continent.

In one of our distribution areas, we had a 30 percent discrepancy, book to physical stock. A quality team was put in place and viewed inventory control as a process.

They installed statistically relevant sample measurements on a daily basis. The central location took responsibility for all the inventory data processing.

Error cause analysis showed that improper training was a major cause.

Corrective actions were implemented. The results as figure 8 indicates were that the target of 2 percent was reached within the first 7 months. Subsequently, the error rate dropped to .08 percent or 800 parts per million. This is a 300X improvement.
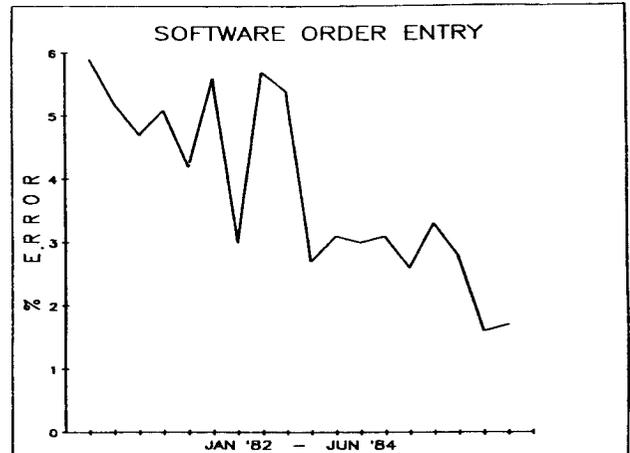
A customer places an order for software. Sometimes there are specific hardware requirements that are needed to run the software, and the order entry process does not catch this error. The error rate was between 5 and 6 percent.

A team from field engineering was assigned process ownership. The process was examined from order entry to customer delivery. Errors were catalogued by type and location.

One of the root causes was traced to two data bases in two different divisions that had to be reconciled.

The corrective actions resulted in a 3X decrease in order entry errors as shown in figure 9. In addition, we discovered about $70,000 a month in machine features that customers were using for which they were not being billed. (This is $840,000 a year added revenue.) Customer satisfaction increased significantly. Complaints decreased by a factor of 15.
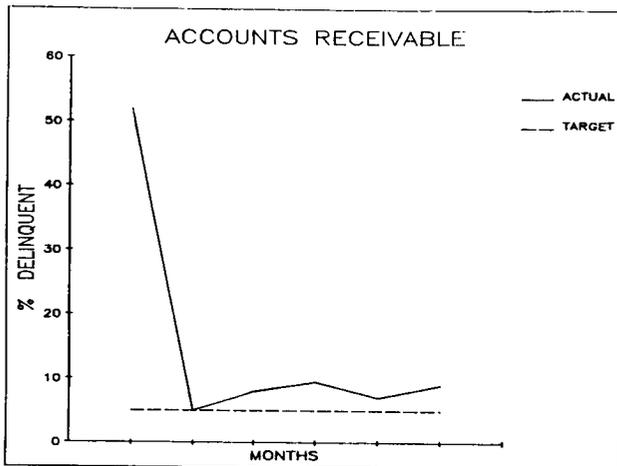
ACCOUNTS RECEIVABLE

Fig. 10   Accounts Receivable

In a branch office one customer was 52 percent delinquent in paying its bills.

We could not understand why a good customer would not pay its bills. To address this case, the branch administration manager formed a "Quality Team" which included some administration people from the customer location with the objective of solving the problem by removing the root cause.

After appropriate analysis, it was determined that the corrective action was ours, i.e., additional invoice information and mutual cross reference system.

The results as seen in figure 10 are a 10X improvement, from 52 to 5 percent in 3 months and it has been tracked since then.

Branch office administration time reduced for this customer from about 20 hours a week to less than 4. The customer also reduced administrative time in this area by 85 percent.

The examples I have shown for "the white collar area" are each by themselves a small step. We have more than 30,000 first line departments within IBM worldwide. These examples shown are at the department level and are representative. As they are replicated, the results accumulate, and the effect across the business becomes profound.

In this matter of quality improvement, we certainly don't believe that we have all of the answers. In

fact, even with the results we are seeing to date, we know that we are at the beginning.

Our greatest benefits are still ahead. Our specific implementation which focuses on people and process may only apply to IBM, but the basic principles are generic, well documented in the literature, and will work for any organization.

Thank you.

8

-- NOTES --

-- NOTES --

70

Renewing Large Organizations
L. W. Lehr, 3M Co., St. Paul, MN

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

L. W. Lehr
Chairman and Chief Executive Officer/3M
St. Paul, Minnesota

Thank you very much.

It's a real pleasure to see this many managers . . . from both the public and private sectors . . . together in one room, and committed to exploring our common challenges and our common opportunities.

For this we have NASA to thank. I, for one, am delighted to be here.

I say this, even though my subject today - renewing large organizations - is one that has puzzled both public and private sector managers for a long, long time.

It's an old story. Most organizations begin with a small group of people - people who have a strong drive for success. They build a team. There is no motivation problem, no communication problem. People deal with each other face-to-face.

But then if it's successful, if it fulfills its mission, the organization begins to grow. Gradually, things change. Informal give-and-take becomes a preoccupation with policy and control. New challenges and new ideas are walled off into separate compartments and surrounded by specialists . . . almost as if they were some kind of dangerous infection.

In a word, the organization becomes segmented . . . to use a term favored by Rosabeth Moss Kantor.

Boundaries emerge. Turf becomes all-important. Instead of designing for success, management begins to design against error. The opportunity is seen as a threat. The unusual is seen as an impossible puzzle.

It's an old story and a difficult problem. I don't need to tell anyone here that it's a problem we need to come to grips with . . . and sooner rather than later. It's a problem that cuts across the public and the private sectors. It affects our corporations, our government agencies, our great universities - virtually every organization of any size.

Hardening of the Arteries

Is it inevitable, this hardening of an organization's arteries?

I don't believe it is inevitable. There are things that management can do to slow down the process, to turn it around, or even to prevent a good deal of it from happening in the first place.

Let me suggest at the outset that we not become too entangled in discussions of organizational structures. In debates about the architecture of companies and agencies - about personnel policies, approval policies and project-review policies. These are bound to differ in every organization. And frankly, I don't believe they matter all that much.

What matters is that we understand something about the process of innovation itself. To me, that means understanding, first, who the innovators are and what they need from us. And second, where innovation is likely to come from in an organization. What are the sources of new ideas?

Why focus on the innovators themselves?

If you have read the bestseller In Search of Excellence, you may remember a story about Texas Instruments. Some time ago, the company surveyed its last fifty or so successful and unsuccessful new-product introductions.

They found one factor that marked every single failure. Without exception, every failed product lacked a zealous volunteer champion. In short, it lacked an innovator with the vision and drive to bring the product all the way from the drawing boards to the marketplace.

As one Texas Instruments executive put it: "When we take a look at a product and decide whether to push it or not these days, we've got a new set of criteria. Number one is the presence of a zealous volunteer champion. After that come market potential and project economics in a distant second and third."

Zealous volunteer champions. Innovators. Quite simply, they are the key to renewal in an organization. And we don't even need to look for them. They'll find us if we let them.

But innovators are not easy to manage. Very few organizations are set up to handle them.

First, we need to understand how they think and what they want. Then we can worry about changing structure and policy and rules.

The Innovators

What are they like . . . these innovators?

Gifford Pinchot, a management consultant who specializes in the study of innovation, calls them visionaries. By that he means something quite specific. Innovators, he says, are people with the ability to make an extraordinarily

73

clear mental model of the way things are going to be. And then they act upon that vision.

That reminds me of a saying that's popular among marathon runners. They say that the edge between real competitors and also-rans is the ability to picture yourself crossing the finish line. Apparently there are many runners who simply cannot see themselves crossing that line. And they are the losers.

Gifford Pinchot tells a story about how powerful this kind of vision can be for innovators. There is an inventor, he says, who builds a detailed model of a new machine in his mind. Then he puts it into the background and leaves it running for three weeks.

At the end of three weeks, he drags the machine into the forefront of his mind, tears it down, and checks the bearings for wear.

That may be a little farther than most people can go.

If innovators are visionaries, they are not dreamers. They spend a lot of time looking at potential obstacles and thinking about how to get around them. They work until they have their vision clear and complete in their minds.

What does this all mean for managers?

It means that innovators are driven . . . driven by their own visions. They march to their own drummers. And quite often, they march across boundaries . . . onto someone else's turf . . . and straight into trouble.

In a sense, innovation is as much a political process as a technical process. It is the manager's job to smooth the way, to protect the innovators and get them what they need. Some innovators are quite adept at finding their way through the political shrubbery of the organization. Others are not. And that's where the manager has to step in.

So one essential step in renewing an organization is to set up a system for the care and feeding of innovators. They need three things. They need a sponsor high enough in the organization to have some clout. They need proper rewards. And they need to know what will happen to them if they fail.

Let's look at each of these for a minute.

Need for Sponsors

First, sponsors. We have found at 3M that successful projects very often have a sponsor, or protector, somewhere fairly high in the organization. Someone has to help the innovator gain access to the resources he needs. Above all, someone has to be there to protect a project when it falters . . . as it probably will.

Acting as a sponsor for an untried project is no picnic. Most sponsors, I believe, tend to bet on people rather than on merits of a

specific product or service. We have a saying at 3M that, "The captain bites his tongue until it bleeds." Which is another way of saying that once a sponsor makes his bet on someone, he has to keep his hands off the project. The first virtue of a sponsor is faith. The second virtue is patience. And the third virtue is understanding the difference between a temporary setback and a terminal problem.

It is at this level -- the level of the sponsor -- that there is an opportunity to plant the seeds of innovation at the highest level by your example. And by the example of those who work directly under you. The way to plant those seeds is to make sponsoring an explicit part of the job description for every top manager. And so when managers come in at the end of the year for their appraisals, they should be asked about the number of new projects they have under their wings. The economics of the project is not the first issue to raise. Potential payoff is the first issue with projects such as these.

A Proper Reward

The second thing an innovator needs is a proper reward. We all do. But with the true innovator, the problem of rewards can be sticky.

Most true innovators seem to find their major satisfaction in seeing their visions turn into concrete reality. In his book The Soul of a New Machine, Tracy Kidder follows the development of a new computer at Data General Corporation. At one point, Kidder asks one of the young engineers what's in it for his team.

The engineer replied: "It's like pinball. If you win, you get to do it again."

So an important reward for the innovator is the "pinball reward" . . . the freedom to do it again. This may not be quite as easy as it sounds. The career track in many organizations leads a successful innovator straight into a management job that he may neither want nor be very good at.

And if you are ranked in an organization only by the number of people you supervise . . . what you will get is not innovation, but empires.

For innovators, there has to be available a career track that is separate from the management ladder, a career track that allows them to continue doing what they do best.

Of course, there are many innovators, in both technical and non-technical disciplines, who can hardly wait to get into management. But there are others who have no interest whatever in sitting behind a desk and worrying about budgets . . . and frankly, who have no talent for that kind of work. They would much rather be in the lab, or out in the field, working on something interesting.

They need a separate career path -- a series of stages which are equivalent in compensation and status to the positions of supervisor,

74

manager, director, and so forth. For these people, promotion can then be tied directly to successful innovation, rather than to their ability to manage others.

Beyond that, there is the interesting concept that Pinchot calls "earned freedom." In this approach, successful innovators are given progressively more freedom to work on whatever interests them. IBM's Corporate Fellows, for example, are free to roam the company, working on whatever interests them most, for a certain period of time.

As a variation on the theme of freedom, at 3M we encourage our technical people to spend up to 15 percent of their time in the laboratory on projects of their own choosing. It is true that a relatively small percentage actually make use of this option at any given time. But the guarantee is there, and our people know it.

Cost of Failure

A third concern of innovators is the cost of failure . . . since that is what will happen to most of them. We estimate at 3M that about 60 percent of our formal new-product programs never make it.

When this happens, the important thing is not to crucify the people on the project. They should know that their jobs with the company are not in jeopardy if they fail. Otherwise, too many would-be innovators will give into the quite natural temptation to play it safe.

It is hard to overemphasize the importance of this point. Just a few weeks ago, TIME magazine had an article on Western Europe's problems in keeping up with the U.S. and Japan in the high-technology race. One executive at a French computer firm summed up one of the basic problems. He said, "There is not a positive attitude toward risk-taking. If you have a risk and fail, you are finished."

Very few things will kill innovation faster than that kind of attitude.

So these are the three basic needs that must be met for innovators within the organization: sponsorship, rewards, and the cost of failure. How they are met does not really matter, as long as they are met. And that can take different forms within different organizations.

These needs, taken together, constitute management's commitment to innovation. Without a real commitment from the top, real innovation will be defeated again and again by the policies, procedure and rituals of almost any large organization.

Source of Innovation

The other basic question I want to address today is the source of innovation in a large organization. Where do the new ideas come from?

A lot of people think they come from thin air. There is a popular conception of the innovator as a sort of wild-eyed eccentric. An inventor, who sits up in the middle of the night with a sudden inspiration, and jumps out of bed to write down his ideas.

You know and I know that successful innovation doesn't work that way . . . at least not very often. Innovation is not a random process. When it works, it works because someone has identified a real need, and found a way to bring new ideas or new technologies to bear on that need.

That's not as simple as it sounds, of course. Sometimes needs are clear-cut and easy to identify. Sometimes they are a little fuzzy around the edges, at least in the beginning.

I well remember one of the first products I worked on in 3M's laboratories. It was a new kind of surgical tape. We knew fairly well what the medical profession wanted. They wanted a tape that would not irritate the skin. They wanted a tape that allowed air to reach the wound. And they wanted a tape that didn't hurt too much when it was pulled off.

We knew all this because we had asked the medical professionals. We were able to work back directly from these clear-cut needs to a new kind of product – Micropore surgical tape.

Other needs are not so well-defined at first. How much demand was there, after all, for instant photography, all-purpose credit cards or money-market funds before they hit the market? But someone was able to pinpoint real needs in these areas even before the needs became defined in the customers' minds. When they hit the market, these products and services became huge successes.

Is this link between need and innovation limited to the business world? Far from it?

You can page through issues of Government Executive magazine . . . read some articles on innovation in goverment agencies . . . and find that same linkage between successful innovation and the needs of various constituencies.

The Veterans Administration, to take just one example, is faced with a huge potential problem as the average age of its clientele goes up steadily. The VA can look down the road and see its hospital system facing a crushing burden as demand for geriatric services multiplies.

Apparently, the VA is determined to turn this problem into an opportunity. It is setting up centers for research and training in the problems of aging. It is bringing together community and state organizations to help develop innovative solutions to the problems of our aging society.

75

In short, the VA is turning its problem into a chance to become a national leader in health-care innovation.

Universities in the past decade have faced declining enrollments and dramatic swings in demand for particular courses of study. Many have responded by taking a close look at the needs of their clients, or potential clients. Out of this soul-searching have come a host of new programs for mothers about to re-enter the job market, for working people who want second careers, and for all kinds of other non-traditional audiences.

Tying Needs to Customers

So successful innovation is tied to existing needs. But if that is the case, why aren't large organizations . . . with their impressive market-research capabilities . . . even more imaginative than small ones?

The answer is that in many cases, the larger an organization becomes . . . the farther away its technologies move from its customers.

I'm using "technologies" in the broad sense . . . to mean the specialized knowledge that enables any organization to offer a product or a service.

Think of so many organization charts. R&D is on one side of the chart . . . marketing is on the other. And never the twain shall meet. At least if their respective vice presidents have anything to say about it.

I would guess the same process goes on in government agencies. In the very large agencies, how far away are the policy and rule makers from the field workers and the clientele?

In universities, how much face-to-face contact is there between top administrators and their clients? And by "clients" I mean not only students, but their parents, their future employers, and so on.

I'm talking about physical distances – day-to-day contact with field people and customers or clients.

It is probably safe to say that as an organization grows, its disciplines tend to move away from each other, if left to their own devices.

So a key step in renewing an organization is to set up a definite process or routine for bringing decision makers and research people into direct contact with customers. For tying technologies to needs. That is a sure way to pull an organizaton back toward its original goals.

There are any number of ways to accomplish this. The management consultant Jay Galbraith points out that at Lanier, every officer has to spend one day a month out in the field selling the product. Wang holds an annual users' conference where design engineers sit down face-to-face with customers. Grumman sends design engineers to meet aircraft carriers as they dock. Grumman's engineers get firsthand reports on how their equipment is performing.

The process is no different in the public sector.

Galbraith tells a story about World War II. It seems the British agency developing radar was moving too slowly . . . at least as far as the armed forces were concerned. Finally, someone had an idea for speeding things up. The agency began sending its scientists out on regular bombing runs with the RAF.

Somehow, after a few flights over enemy territory, things began to move faster back at the laboratory.

The process does not always need to be quite that dramatic. Our host today, NASA, has proved over and over again the benefits of working closely with its clients and customers.

Innovation at NASA

Some time ago, a manufacturer came to NASA with an idea for the first satellite for business which could be deployed from a space shuttle and then retrieved. Ordinarily, this could be the kind of project that might involve hundreds of people, a great deal of time, and a great deal of expense. But that would put the price out of competitive range.

So the people from NASA sat down with representatives from the manufacturer to see how they could reduce the costs and still produce a quality product. To provide air pressure for the attitude-control jets, they used scuba-diving tanks, which were already man-rated for reliability. Instead of designing expensive running lights, they simply adapted the lights already used on helicopters. When they needed some structural parts which were both light in weight and very strong, they found carbon-fiber sailboat masts that would do the job.

In all, it took 36 people to produce the SPAS – Zero One satellite. Thirty-six innovators who refused to be put aside, and who changed all kinds of rules for pricing, technical design, policy formulation and operating procedures.

NASA, of course, is known for its innovation in product-design. But I know the agency is also concerned with innovation in everything it does. They have a new program in place to involve teams of employees in decision-making across the agency. They are studying ways to decentralize authority – a difficult task in any government agency.

So the fundamental process of tying innovation directly to the needs of our

customers or clients can work the same way in any large organization.

Imagine what would happen if the designers of, say, an office machine had to spend one day a month in the field, making service calls or listening to customer complaints. What would happen if the people responsible for drafting regulations in an agency had to spend one day a month helping people fill out the forms and meet the requirements? Or if University deans spent one day a month talking to new graduates who were in their first year of a job . . . and beginning to find out what they don't know.

New ideas would begin coming thick and fast.

So, what are the sources of innovation? Where do the new ideas come from? Some come from inside the organization . . . from the research people and the planners. Some come from outside . . . from customers or clients.

What's important is that the climate enables the ideas to come . . . the sparks are stuck . . . and the fire to create burns when those who need and those who can provide get together.

The two areas I've covered today . . . the care and handling of innovators, and the need to bring technology closer to customers . . . do not add up to a comprehensive formula for renewing large organizations. They were not intended to be that.

What I hoped to do today was to raise some basic issues for discussion – issues about the nature of innovation in any large organization. And to suggest some practical steps toward renewal that are as valid in the public sector as they are in the private sector.

We may differ in our missions. We may differ in our ways of operating. We may differ in the ways we measure success.

The Drive to Create

But no one can convince me that the drive to create something new and something better is any different in the private sector than it is in the public sector. Or any different in large organizations than it is in small ones.

You know, it is often said that in many large organizations, both public and private, there is no incentive for innovation. The real incentive is to play it safe.

That notion reflects a basic misunderstanding of what innovation is all about. The urge to create – to solve problems – is not a function of organizational structure. It is a fundamental drive of human nature, stronger in some people than in others, but present in just about everyone.

If there is a secret to renewing organizations, it is this: Get out of the way.

You may have to set up specific mechanisms to find sponsors for innovators, to reward them properly and to protect them if they fail. You may have to find new ways to tie what your organization has to offer more closely to the needs of your clients or customers.

But basically, all this amounts to is giving people the room and the opportunity to be innovators . . . to solve problems. And then watching the sparks fly.

That is really what we're here for. Private sector, public sector, large organizations and small . . . we are here to look around this earth of ours and solve what problems we can.

In that sense, diverse as we are, there is much more that unites us than separates us.

5

-- NOTES --

Applying Productivity Principles to New R&D Programs, NASA/TRW GRO Project

R. L. Walquist, TRW Inc., Redondo Beach, CA

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

79

80

APPLYING PRODUCTIVITY PRINCIPLES TO NEW R&D PROGRAMS, NASA/TRW GRO PROJECT

Robert L. Walquist
TRW Inc.
Electronics & Defense Sector
Vice President and General Manager
TRW Space & Technology Group

ABSTRACT

TRW seeks to adhere to the highest standards in the conduct of its business. We have always placed a special emphasis on high quality products and services, with a special focus on employee relations.

The TRW challenges for the 1980's are to:

● Become more cost effective

● Maintain our high technology and quality objectives

● Continue the high quality output of our work force

● Raise employee efficiency and morale, through team building, individual recognition and incentive plans.

To meet these challenges, we intent to support our customers in the "war on cost" by achieving significant productivity improvements in our internal operations, without sacrificing the high technological performance and quality of our products and services.

Our past performance on government space systems contracts shows that while constantly on the cutting edge of technology, our systems meet their required orbital performance goals for periods well in excess of contractual lifetime requirements. Ninety percent of the spacecraft we have built and launched for the government over the past twenty years have outlived their design lifetimes.

The evolution of CAD/CAM technology over the past decade has significantly improved the productivity of our design and manufacturing processes. TRW has made, and is making, significant capital investments in plant and equipment to continue productivity improvements.

During the past few years, office automation and other types of inter/intracommunication equipment have evolved to the extent that using them on large space programs would greatly enhance productivity, yield more product value per dollar, increase efficiency, and provide more effective resource utilization, improve communications, and raise employee morale.

We have all the elements in place that can provide significant productivity improvements; now we must apply them methodically to a program from its inception, and measure the resulting productivity improvement. Such a program is the Gamma Ray Observatory (GRO).

NASA and TRW have agreed to make the GRO spacecraft program a model for new, more productive ways of doing business. Based on this agreement, NASA's Goddard Space Flight Center (GSFC) and TRW's Space and Technology Group (S&TG) have implemented the following productivity macro goals:

● Computerized Network System

- To improve communication between GSFC/TRW, a common data base has been established and maintained by a computerized network system.

● Video Conferencing

- GSFC/TRW have agreed to install full motion video conferencing rooms at both facilities as a demonstration tool for saving both travel expenditures and more efficient use of top management resources.

● "Red Flag" Cost and Schedule System

- TRW is utilizing a top level computerized cost/schedule system which pictorially allows top management to know when selected cost and schedule thresholds/gates are exceeded at any level of a program.

● Productivity Incentive Clause

- NASA/TRW have adopted a Productivity Effectivity Modification (PEM) clause to the contract which will allow TRW to receive additional monies to be distributed to TRW employees based on money-saving productivity ideas.

● Subcontractor Team Effort

- In order to develop a total integrated team effort approach, TRW conducted a two-day productivity seminar with all of its major subcontracts.

At this seminar, TRW presented a contractor/subcontractor communications plan which flows down all of the benefits of the TRW productivity plan.

A productivity incentive clause similar to that received by TRW from NASA is also being prepared.

● Individual Recognition

- To motivate and nurture cost-saving ideas within the program, several methods are being implemented. A monthly newsletter, "GRO Briefs," is published with inputs from personnel at TRW and NASA/GSFC.

● Individual Recognition (Continued)

- Every award fee period, individuals
  are recognized for productivity ideas
  and awarded desktop observatory models
  or cash awards. To date, cost savings
  greater than three million dollars
  have been realized from these suggestions.

- Both NASA and TRW are very pleased with
  the efforts already accomplished on the
  GRO Program, and are looking forward to
  a greater customer/contractor "team"
  effort during the detailed design phase.

2

82

Productivity Improvement in the Acquisition Environment
J. A. Mittino, U.S. Department of Defense, Washington, DC

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

84

"PRODUCTIVITY IMPROVEMENT IN THE ACQUISITION ENVIRONMENT"

John A. Mittino
Assistant Deputy Under Secretary of Defense
for Research and Engineering
(Production Support)

ABSTRACT

This paper discusses DoD efforts to improve defense contractor productivity as a way to reduce acquisition costs. It provides a perspective on the magnitude of the challenge and examines the unique aspects of the environment that exists. The paper surveys and describes the broad range of initiatives, programs, and activities under way aimed at fostering productivity improvement in the acquisition environment.

INTRODUCTION

Just as productivity has become a priority at the national level, so too has the achievement of increased productivity and manufacturing efficiencies become a paramount concern to the Department of Defense. It is a critical element in improving our defense posture and, most importantly, in reducing costs. Improving productivity in the acquisition environment is the key to this process. The impact becomes apparent when one recognizes that the DoD is by far the largest purchaser of systems, equipment, products, and services in the Federal government—with a procurement budget exceeding $90 billion and research, development, test, and evaluation adding another $30 billion in FY 84. The magnitude of DoD expenditures is also indicative of the leverage that the Department has in promoting productivity improvement in the commercial industrial base on which the DoD heavily relies.

General public perception of productivity improvement in the acquisition environment probably centers around the subjects of spare parts and warranties. In reality, there are many more facets of the issue and a complexity that is not always apparent on the surface. But there are tremendous challenges and opportunities—and the DoD has a variety of very aggressive programs and initiatives aimed at promoting improvements. The purpose of this paper is to foster a better understanding of the environment that exists and to describe the productivity improvement efforts that are under way.
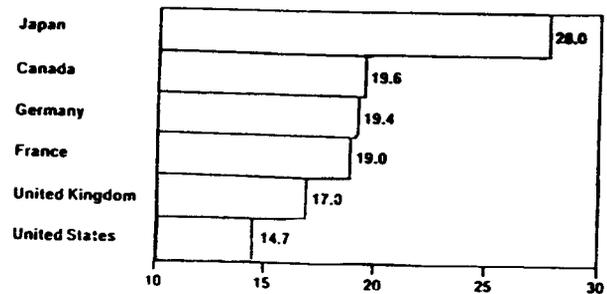
THE ACQUISITION ENVIRONMENT

The first step of any productivity improvement effort is to carefully examine the environment in which it occurs. Most observers familiar with the private or commercial sectors of our economy have a perspective that is different from that of the DoD as it pertains to acquisition. This is not meant to imply that the DoD never operates in a similar environment, because in many cases it does (particularly when dealing with lower tier subcontractors and vendors). But there are many cases where the differences are extreme—and this discussion is intended to draw out and highlight these differences. It is important to do so to understand the impediments to productivity improvement and mechanism necessary to overcome these impedients.
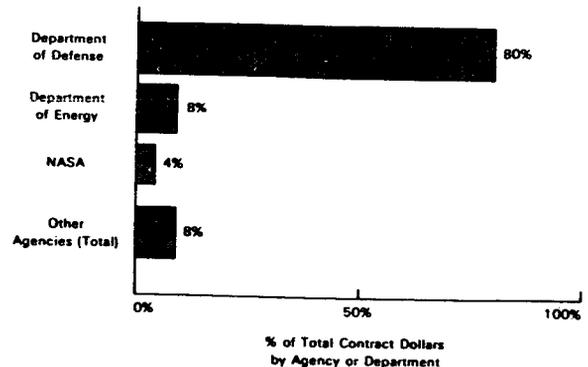
For instance, the industrial concern operating in the commercial market place typically sees either of two related forces: (1) improved productivity reduces costs and permits realization of greater profit, market share, or both depending on pricing strategy; or (2) competitive pressures necessitate productivity improvement. Prices of many DoD weapon systems, on the other hand, are negotiated such that profits are based on costs. The same incentives to reduce cost that exist in the commercial sector are not present to the same degree in many DoD procurements. A contractor who takes risks and acts to reduce cost may reap benefits on the instant contract, but may also have many of the long-term benefits negotiated away as his cost base decreases. The absolute dollar value of his profit is also correspondingly reduced.

Average Annual Rate of Capital Investment as a Percent of Output

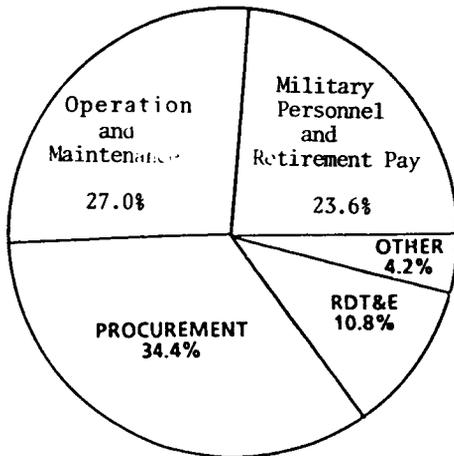| Country	Value
Japan	28.0
Canada	19.6
Germany	19.4
France	19.0
United Kingdom	17.0
United States	14.7

Source: U.S. Department of Labor

CONTRACT PROFILE BY DEPARTMENTS AND AGENCIES
(Based on Federal Procurement Data Statistics)

Agency	Percent
Department of Defense	80%
Department of Energy	8%
NASA	4%
Other Agencies (Total)	8%

% of Total Contract Dollars by Agency or Department

1

PROCUREMENT AND RESEARCH, DEVELOPMENT, TEST, AND EVALUATION (RDT&E) AS A % OF DoD BUDGET

The market structure present can be markedly different. Rather than a number of suppliers with similar products and a variety of users, the extreme that occurs in some DoD procurement is a single supplier with a unique product and only one user--the Department of Defense. Both components of the law of supply and demand are affected.

The product being produced is unique and, in many respects, is the cause of the market structure difference. The billion dollar technically sophisticated weapon system (with a seven or eight-year development span) has no parallel in commercial industry.

The preferred method of procurement for the Department of Defense is to award to the lowest responsive bidder. One problem associated with this method of procurement is that we have less latitude than private industry in buying the best product at the best price. This occurs because of the difficulties in precisely defining desirable characteristics, evaluation factors, and associated cost trade-offs. Federal procurement leaves less room for subjective judgment. Contractual enforcement features are also dissimilar in some important respects. For instance, one feature of commercial procurement is the ability to remember poor performance and to ensure that a contractor who provides substandard equipment is not afforded the opportunity to do so in the future. For various reasons, ranging from the size of the bureaucracy to political considerations, this is much more difficult in the case of Federal procurement.

Sweeping generalizations about defense contractor manufacturing capabilities cannot be made. There are many bright spots and many areas where major improvements are needed. Productivity problems and solutions in the various segments of industry vary. However, a significant portion of manufacturing done on defense programs is done in an environment that can be characterized as

utilizing outdated and inefficient capital equipment and as labor-intensive.

Batch production methods are used extensively in manufacturing for the DoD. Quantities are small and deliveries are over a period of time. Engineering changes frequently occur. It should be noted that, as a result of these factors, flexible manufacturing systems appear to offer the greatest promise in the DoD manufacturing environment. These computer-controlled and integrated machines, work stations, transfer mechanisms, and tooling allow production of a wide variety of products in small numbers.

A final but very important factor when pondering productivity improvement in the acquisition environment is the relationship of the parties involved. Most organizations (whether they are industry or government) are concerned with improving their own productivity. Benefits are usually direct and control is substantial. Improving productivity of a second party--such as a defense contractor-- is usually a matter of influence rather than control. Questions of rewards, mechanisms, and responsibilities (and the danger of diminished responsibilities to be discussed later) are critical.

The preceding discussion is intended to provide the context in which the DoD is seeking major productivity improvement of the contractors for which it is a customer. The remainder of this article highlights the activity, programs, and initiatives which serve as the vehicles to improved productivity and reduced DoD acquisition costs.

DoD ACQUISITION IMPROVEMENT PROGRAM

Three and a half years ago, this Administration entered office determined to make some significant changes in the way the Department does business. It was simply not enough to pledge to increase spending for national defense, it was essential to ensure that this be done so responsibly in ways which are consistent with the principal security concerns as well as with sound management principles. Deputy Secretary Frank Carlucci immediately took on the formidable task of reexamining the acquisition process from top to bottom. The result was thirty-two initiatives designed to shorten and simplify the acquisition process, to control costs, and to make certain that major concerns such as logistics support and competition were properly considered and incorporated into acquisition planning and implementation.

The Carlucci initiatives have undergone some changes during the past three years. Deputy Secretary Thayer reviewed the original thirty-two initiatives and decided to place priority attention on six management areas which provided the greatest challenge and the greatest potential payback. These areas include: program stability, multi-year procurement, economic production rates, realistic budgeting, support and readiness, and competition.

86

The remainder of the original initiatives, however, have not gone away and are not being ignored. Thirteen of the original 32 initiatives have been essentially completed, including initiatives to reduce Defense System Acquisition Review Council (DSARC) data, to ensure use of the proper contract type, and to tie the DSARC and budget processes together. Monitoring of these initiatives continues to make sure that they stay on track. In addition, we are also working very hard on the remaining important initiatives, such as Initiative #5 on encouraging capital investment to enhance productivity and Initiative #14 on optimizing contract requirements. These are particularly pertinent to the subject of productivity improvement and will be discussed separately later in this paper. Perhaps the most important initiative of all the original 32 is the one on which we continue to place the highest priority--implementation.

Program Stability. From the beginning, the DoD has placed priority emphasis on achieving greater stability for our defense programs. Improved program stability provides a more timely, more efficient means to achieve our military security objectives. It is also recognized, however, that a certain amount of instability is inevitable, if not desirable, in many programs. For example, programs must remain flexible enough to be able to respond to changes in the Soviet threat. We must also retain sufficient flexibility to be able to take advantage of technology opportunities. It's the arbitrary instability, particularly that brought on by fluctuations in the budget, which we are trying to minimize. Unfortunately, with so many players in the act, this is a particularly difficult objective to achieve.

It is hoped that a new effort on baselining/cost capping which the Air Force has introduced in its programs will prove to be an effective means to improve program stability. The baseline/cost cap program is designed to reach an agreement among all the major components within a program as to its scope, configuration, and cost. In order for a major change to be incorporated into a program, agreement must be reached among all the signatories to a program baseline document. Thus, the consequences of major changes are realized and agreed to by all parties before the change can be incorporated. So far, the Air Force has baselined over 70 programs and is expanding the coverage of the program each year. The applicability of the Air Force approach to the other Services is being examined.

Multi-year Procurement. One of the most successful means towards improving stability that has been initiated is the use of multi-year procurement for major programs. Multi-year buys reflect the maturity of a program and the confidence at all levels of management that a program will stay on track. In addition, multi-year procurement has the important advantage of saving everyone some money. The 23 multi-year programs which have been approved by Congress so far are expected

to save about $3.4 billion over annual contracting methods. The DoD has 12 new multi-year candidates in the FY 85 budget which are expected to save almost a billion additional dollars. This initiative requires the support of Congress to be successful and they have waivered in the past.

Economic Production Rates. Economic production rates also encourage program stability through the attainment and maintenance of cost-effective production rates. The FY 83 and FY 84 budgets contained 18 major programs which we budgeted for more economic production rates. Savings of about $2.6 billion are estimated for these programs. Unfortunately, funding more economic production rates has become increasingly difficult in the current atmosphere of budget reductions below originally programmed levels. Nevertheless, the DoD intends to maintain support for this initiative to the extent that the budget will allow.

Realistic Budgeting/Support and Readiness. The DoD has also taken some very important steps to ensure that the cost estimates used in budgeting for our programs are more realistic than in the past. We are using more realistic inflation indices, and have expanded the use of independent cost estimates. Budgeting for technological risk is being systematically applied through Service programs such as the Army's TRACE (Total Risk Assessment Cost Estimating) program. In the long run, as a result of these initiatives, there will be fewer surprises and, consequently, less instability in our programs. Similarly, our efforts to improve support and readiness continue through means such as better up-front planning and review, and greater visibility in the program budget review process.

Competition. The DoD also continues to focus on ways to improve competition. Competition has been the preferred means for acquiring supplies and services in the government for generations. However, for many years, observers have wrongly equated competition with the method of procurement-- that is, formal advertising. The Commission on Government Procurement highlighted this problem more than a decade ago. We require

DEGREE OF COMPETITION

BY ACTIONS

SOURCE: Federal Procurement Data System

3
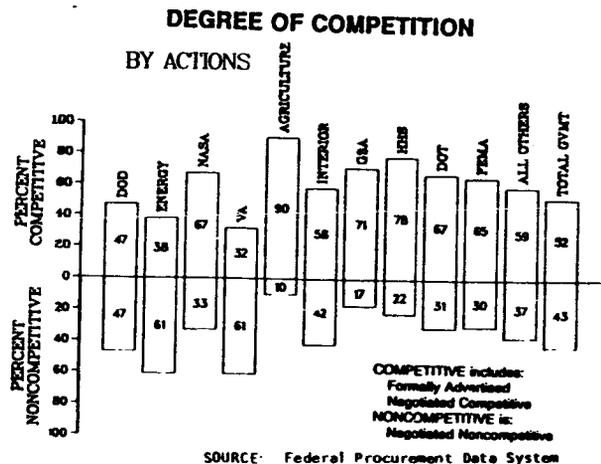
our purchasing activities to solicit competi-
tive offers whenever competition is practicable,
whether by the negotiation method or by formal
advertising. However, formal advertising is a
procurement method that is for the most part
unique to government and, even then, inappro-
priate for many of our programs and contractual
efforts.

Obtaining effective competition is a long-
standing objective. Almost all of our major
programs, for instance, had competition among
prime and subcontractors during the development
phase. Those which were not competed were sole
source as a function of necessity, not choice.
For example, only one shipyard makes nuclear
aircraft carriers--a fact which is hard to
avoid.

Nevertheless, a number of actions are
under way to improve our performance in com-
petition. The DoD Components have designated
advocates for competition within their respec-
tive organizations. Competition goals have
been established. We are working to make it
easier to determine the costs and benefits of
competition in the production phase and clarify
potential application of leader/follower and
other means of second-sourcing for programs
being planned or already in production. The
potential for savings in this area is high.

Through actions such as these, the entire
procurement process is focusing on increasing
competition where it makes sense. But we also
recognize that there are other initiatives and
efforts which run counter to this general theme.
For instance, a widely recognized way of pro-
moting increased productivity and improved
quality is for a company to work closely with
its suppliers and vendors in this area. This
involves building long-term relationships and,
in a sense, providing the same type of stability
and planning opportunities we are trying to
encourage with multi-year procurement. It
generally results in a reduction of the total
number of suppliers. The Japanese are using
this approach, the automobile companies are
using this approach, and we've seen a number
of defense contractors who have this as an
important element of their productivity
improvement program. We have to strive for
a proper balance in our approach.

Industrial Base. The Deputy Secretary
has recently created another initiative which
has been added to the list of high priority
management concerns just discussed. There
is a growing concern about the state of the
industrial base and its ability to respond
to a crisis. Deputy Secretary Taft has
directed that a high-level joint working
group be formed to establish an industrial
base action plan encompassing issues such
as funding priority, surge capability, and
minimum sustaining production rates consis-
tent with reasonable responsiveness.

INDUSTRIAL MODERNIZATION INCENTIVES
PROGRAM (IMIP)

The cornerstone of DoD efforts to improve
defense contractor productivity is the ongoing
test of the Industrial Modernization Incentives
Program (IMIP) authorized by the Deputy Secre-
tary on 2 November 1982. This program is
intended to develop and refine contract incen-
tives encouraging industry to make productivity
enhancing capital investments. The incentives
being tested include shared savings rewards
and contractor investment protection, and are
primarily aimed at motivating contractors to
invest their own funds. The program is
directed at overcoming the two problems most
frequently cited as inhibiting modernization
in defense--a profit policy which, in certain
acquisition circumstances, is based on cost
and program uncertainties which hinder invest-
ment amortization and inhibit long-term plan-
ning.

As an early step in IMIP, contractors are
encouraged to take a look at their facility in
a manner unconstrained by the "As Is" situation.
Emphasis is on factory-wide improvements with
multi-contract and multi-Service applications.
Quantum improvements are desired--not incre-
mental, isolated, machine-by-machine changes.

We in the Department of Defense recognize
our responsibilities to spur modernization and
improved productivity. We must make sure we
are always using 20th century manufacturing
methods in the production of defense products--
and we can't be considered successful if it
takes us until the year 2000 to achieve this
goal. Bruce Springsteen's latest hit record
contains the lyrics that "you can't start a
fire without a spark." The DoD is hoping
that the IMIP will provide the spark to spur
increased capital investment and reduced
acquisition costs.
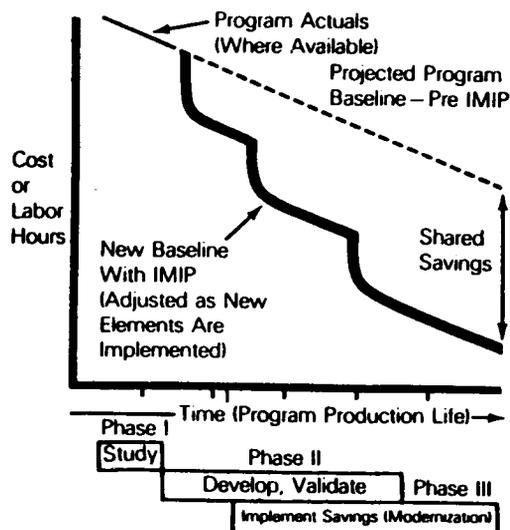
IMIP CONCEPT AND IMPACT

88

The test of the IMIP is a uniquely structured effort in many respects. Although productivity problems are well recognized and documented, solutions are not always as apparent. By providing an "umbrella" of a test, the DoD Components have the opportunity to be innovative and creative. Reluctance to try new ideas because precedents do not exist, coupled with a unipolar reward system that only penalizes mistakes, are the psychology being attacked. The incremental approach to implementation allows knowledge to develop as to what works and what does not work, and to make adjustments accordingly. It overcomes the "Catch 22" of not being able to develop policy without knowing all of the effects, and not being able to gain the necessary experience because policy is not in place. It is indicative of the "bias for action" necessary to achieve results. Success of the test IMIP may result in its being used as a model for other programs.
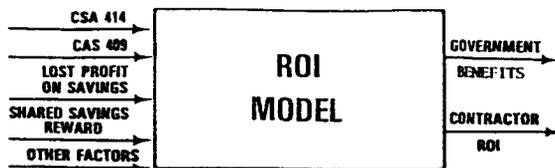
AN IMIP INVESTMENT ANALYSIS TOOL

Important new tools and techniques have been developed in support of the IMIP. A Return-on-Investment (ROI) model permits evaluation of the effects of an investment decision. It allows both the contractor and the government to understand the interrelationship of capital investment and government finance and profit policies. An innovative sharing factor approach (whereby shared savings rewards are allocated proportionately over all contracts at a manufacturing facility) is being tested to facilitate factory-wide IMIP applications.

The latter technique is particularly important since it has the potential of reaching the subcontractor and vendor base--a very high priority goal of the program. Purchased equipment and material can account for greater than 50% of the value in the production of some defense systems. The prime contractor of the B-1 bomber uses more than 5000 subcontractors, vendors, and suppliers.

A great deal has been accomplished during the IMIP test to date. There has been significant activity under IMIP up to the point of actual implementation of individual contractor capital investment plans. After this phase, with some notable exceptions, experience is more limited. However, the IMIP process is an iterative one that builds on earlier efforts. Broad implementation and maximum benefits at a particular facility are likely to span a number of years.

The most important lesson learned is that the process does work. Increased capital investment and enhanced productivity can be stimulated through efforts such as IMIP. IMIP is a viable acquisition tool that can be used when situations warrant. Flexibility must be retained to tailor the concepts to the particular application. Knowledge and good judgment are essential--and not rigid adherence to specific procedures. It will not be the answer to every problem but it will make an important contribution to a modernized efficient DoD manufacturing base where it applies.

MORE COST-EFFECTIVE CONTRACT REQUIREMENTS

An extremely important example of our efforts to improve the acquisition process deals with promoting more cost-effective definition of requirements in our weapon system contracts. This is one of the efforts which the DoD has undertaken which ties closely with a major recommendation of the White House Conference on Productivity to "consistently evaluate government actions, regulations, and legislation in terms of their effects on productivity in the public and private sector."

This initiative, authorized by the Deputy Secretary of Defense on 11 January of this year, is aimed at fostering greater attention to more cost-effective application of specification, standard, and data requirements. It will encourage greater flexibility in how requirements are imposed--particularly early in a program. We will stress progessive definition of requirements as a weapon moves into development instead of working from the start with detailed contract requirements that may turn out to be inappropriate. We will try to express our requirements more in "what is required" rather than "how to" terms. At the same time, we will encourage greater contractor participation in defining appropriate requirements and in identifying and suggesting changes to requirements which may be excessive.

PROPER APPLICATION OF REQUIREMENTS
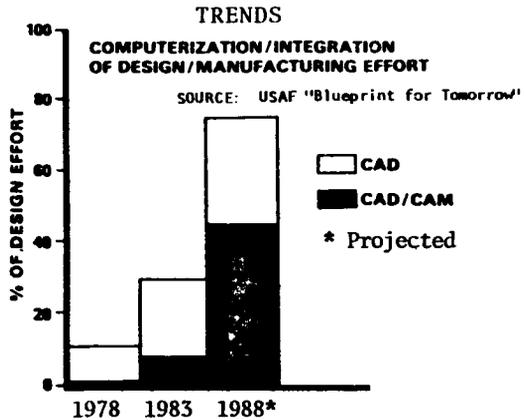A Matter of Timing As Well As Substance

5
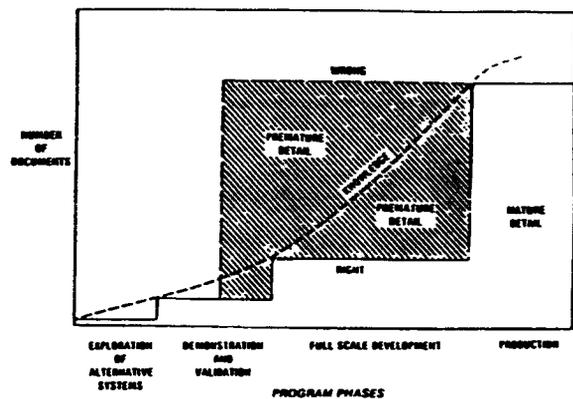
The Services have identified twelve major programs for initial application of this concept, including four of the Services' most important aircraft programs. Many companies are involved with these systems and, as such, will have a tremendous opportunity to facilitate development of new approaches and new impetus to more cost-effective contract requirements.

The DoD sponsored a workshop on optimizing contract requirements along these lines earlier this year. Approximately 150 key government and industry personnel attended with varied backgrounds in program management, contracting, and engineering. Most were associated with the twelve programs mentioned earlier. The constructive and enthusiastic atmosphere was very encouraging. Concrete recommendations on overcoming the risk adverse nature of many of our acquisition participants were made and are being considered and acted upon. We will monitor the many initiatives engendered by the conference and will provide lessons learned-- both good and bad--to as wide an audience as possible. A follow-up conference on this initiative is being sponsored by an industry association and will be held this Winter.

MANUFACTURING TECHNOLOGY

The Manufacturing Technology Program (MANTECH) is a well-established program aimed at making first-case manufacturing process and equipment improvements in the production environment. An element of technical risk is involved. Government funding participation (nominally at $200 million a year) is significant. The 400 to 500 investments active at any one time focus on a very broad range of processes and products (for example, rubber boots, TNT lines, composite aircraft skins, and rocket engine nozzles). Spinoffs into the commercial sector are significant. Indeed, Department of Defense actions in promoting the development of numerically-controlled machines (where we virtually purchased, furnished, and mandated their initial application by defense contractors some 20 years ago) provided a major impetus to modern manufacturing methods.

TRENDS
COMPUTERIZATION/INTEGRATION OF DESIGN/MANUFACTURING EFFORT

SOURCE: USAF "Blueprint for Tomorrow"

□ CAD
■ CAD/CAM
* Projected

1978 1983 1988*

(% OF DESIGN EFFORT on vertical axis, 0 to 100)

CONTRACT FINANCE, PATENT, AND TECHNICAL DATA RIGHTS POLICIES

A wide variety of activities are under way in areas such as Cost Accounting Standards, flexible progress payments, expedited paying cycles, economic price adjustments, profit levels commensurate with risk, patent policies, and technical data rights policies that have an impact on capital investment and contractor productivity. A recent revision to our acquisition regulations, which broadens those activities included in the definition of manufacturing and production engineering and their allowability in manufacturing overhead, is one example of the DoD's efforts in this area.

We in the DoD are taking another intensive look at our contract finance and investment policies as a follow-on effort to the study completed in 1976 on this subject. The Defense Finance and Investment Review will examine areas such as CAS 409, CAS 414, profit policies, and their interrelationship and impact on an effective and efficient industrial base. Extensive surveys and data

TWELVE WEAPON SYSTEM ACQUISITION PROGRAMS TARGETED FOR INITIAL IMPLEMENTATION OF THE DOD INITIATIVE TO DEVELOP MORE COST-EFFECTIVE CONTRACT REQUIREMENTS

ARMY:	LHX	EXPERIMENTAL LIGHT HELICOPTER
	AATWS	ADVANCED ANTI-TANK WEAPON SYSTEM
	PERSHING II	MISSILE SYSTEM
	MICNS	MODULAR INTEGRATED COMMUNICATIONS & NAVIGATION SYSTEM
NAVY:	VTXTS (T-45TS)	UNDERGRADUATE JET FLIGHT TRAINING SYSTEM
	JVX	JOINT SERVICES ADVANCED VERTICAL LIFT AIRCRAFT PROGRAM
	CV IZ ASW HEL	REPLACEMENT INNER ZONE AIR ASW VEHICLE
	LHD-1	AMPHIBIOUS ASSAULT SHIP (MULTI-PURPOSE)
AIR FORCE:	ATF	ADVANCED TACTICAL FIGHTER
	INEWS	INTEGRATED ELECTRONIC WARFARE SYSTEM
	ERAM	EXTENDED RANGE ANTI-ARMOR MUNITION
	AFWIS MODERNIZATION	AIR FORCE WORLDWIDE MILITARY COMMAND AND CONTROL SYSTEM INFORMATION SYSTEM MODERNIZATION

90

gathering should provide a clearer picture of the actual state of conditions and the motivators which are working (or not working) in industry. The study is currently scheduled to be completed early next year.

Overhead costs are an interesting area that illustrates some of the dichotomies that can occur. We tend to put tremendous pressure on defense contractors to keep overhead rates low--the implication being that high overhead rates are indicative of inefficient operations. The opposite may actually be true in the most advanced manufacturing facilities with their low direct labor components--possibly as low as 5 to 10% of total costs. Our pressure has the effect of creating a contractor reluctance to do anything that may increase overhead rates, and that can extend to modernization. One of the problems is a classical case of conflicting objectives related to cost account-ing. On the one hand we require consistency--the first rule of accounting. But we also desire that costs be directly charged wherever feasible. Unfortunately, whenever we deviate for specific reasons from the norm in the second instance we may be forced, for the sake of consistency, to continue allocations in overhead on a wider scale than may otherwise be necessary. We will undoubtedly have to relook at our Cost Accounting Standards as we move to next generation manufacturing techniques. It should be noted that Deputy Secretary Taft is considering establishment of a special project to promote incentives to reduce overhead costs which may have a bearing on this general area.

SCIENCE AND TECHNOLOGY

The Department of Defense conducts a wide range of projects--from basic research to advanced technology demonstrations--that have resulted in manufacturing advances. Programs involving very high speed integrated circuits, acoustics, computers, computer software, sen-sors, robotics, controls, and various materials provide new knowledge that benefits not only national security but also the private sector. The private sector carries out about two-thirds of this DoD effort, greatly facilitating the transfer of such technology to commercial applications.

The DoD continues to support well estab-lished programs like Independent Research and Development (IR&D). Despite Congressional limitations on total IR&D ceilings, we are placing special emphasis on the areas of industry/university interaction and systems readiness and support projects. We are accom-modating these special interests through our normal negotiation process with special treat-ment in the technical evaluation process. In addition, we are engaged in early discussions about the possibility of making productivity improvement a similar area of special interest.

COMPARISON OF CAPITAL INVESTMENT AS A PERCENTAGE OF SALES OF THE GENERAL AEROSPACE SECTOR TO DEFENSE-ORIENTED INDUSTRIAL SEGMENTS WITHIN THIS SECTOR

SOURCE: 1983 Federal Acquisition paper by Lt. Col. O.M. Collins
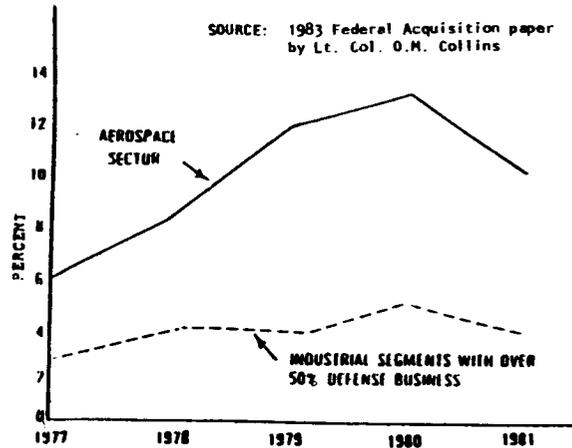
TYPICAL COMPONENTS OF MANUFACTURING COSTS
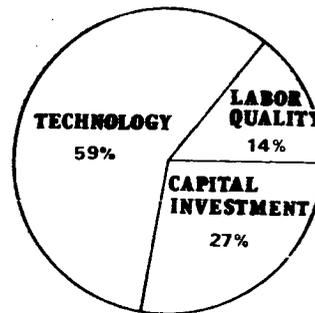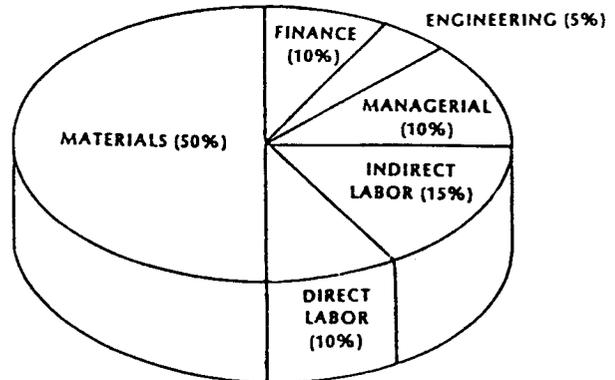
FACTORS AFFECTING PRODUCTIVITY
(COMPOSITE FINDINGS OF KENDRICK, DENISON & JORGENSON)

7

91

QUALITY

Productivity and quality are inseparable issues. Because quality has such a major impact on decisions about manufacturing processes, equipment, and supplies (and because quality has become an increasingly significant problem in defense materiel acquisition) the DoD is reemphasizing its policies and programs aimed at improving product quality. The Department encourages commitment from top management and is promoting increased awareness and attention to quality problems during design and manufacturing. DoD is also re-examining its qualification and certification programs to determine whether quality is sufficiently stressed. Perhaps most importantly, we are trying to find new ways to include quality history into our source selection process.

DEFENSE INDUSTRIES PRODUCTIVITY/QUALITY COMPUTER CONFERENCE

The DoD has taken the lead in organizing a Defense Industries Productivity/Quality Computer Conference as an outgrowth of the White House Conference on Productivity and the Defense Industries Productivity Workshop held in Houston, Texas, in July of 1983. The computer conference, which is close to operational, is intended to enhance communications and activity aimed at improving productivity and quality in the defense acquisition environment. It will be oriented toward identification, discussion, and solution of practical problems. It will serve as a stimulant, catalyst, and vehicle for necessary actions. The conference outputs are expected to include discussion and input into current issues confronting DoD, establishment of projects, assignment of responsibilities, coordination and comments on related documents (such as regulations and handbooks), communication on ongoing activities, quick feedback on issues of concern to the participants (such as reaction to proposed legislation), information and data gathering, and "case studies" of actual experiences.

Areas of interest include topics such as the Industrial Modernization Incentives Program (IMIP), more cost-effective contract requirements, integration of incentives, cost and finance principles, patent policies, data policies, competition, spare parts, warranties, Qualified Products Lists, transition from development to production, employee productivity gain sharing systems, productivity measurement, manufacturing and productivity improvement plans, R&D Limited Partnerships, Value Engineering, Design-to-Cost, and tax incentives as they relate to productivity and quality improvement efforts. Participants are expected to provide individual perspectives rather than official organizational positions.

MANUFACTURING PLANS AND EMPHASIS

Too often in the past the DoD has emphasized the performance characteristics of products it acquires rather than manufacturing efficiency. We have selected our contractors based on their design and engineering capabilities rather than their manufacturing capabilities. This is changing. We are now promoting increased attention to productivity and quality improvement plans as integral parts of our acquisition strategy. We are acting to reinforce contractor activities and foster greater emphasis in this area. Efficiency of the manufacturing process, manufacturing plans, and quality are being given more visibility. They are now increasingly important considerations during our source selection evaluations and major system reviews.

The DoD recently issued two Directives that will have an impact in this regard—DoDD 4245.7, "Transition from Development to Production," and DoDD 4245.6, "Defense Production Management." Both are the result of a recently completed Defense Science Board study on the problem of transitioning from design to production. The study recommended the use of a series of templates for design, testing, production, facilities, and capital investment. These templates will enable a contractor to assess and compare his facility and thereby identify desirable improvements. The government benefits as well in that the templates give productivity factors greater visibility and provide the tools by which manufacturing risk can be progressively minimized.

INTEGRATION OF CONTRACT INCENTIVES

The DoD is revitalizing the Value Engineering Program and, as previously mentioned, is developing new incentives under the Industrial Modernization Incentives Program. These actions highlight concern that the Department has numerous contract incentives, all developed in isolation, which are neither always understood nor congruous. These include design-to-cost goals, reliability incentives, award fees, potential quality incentives, and cost-plus-incentive contracts. At present, the DoD is developing guidance on the systematic use and interrelationship of incentives.

PRODUCTIVITY MEASUREMENT

Productivity measurement is usually one of the first subjects that all organizations must grapple with in establishing a productivity improvement program. The DoD sponsored a study under the cognizance of the Army Procurement Research Office (with support from the Air Force Business Research Center) to develop practical measures of productivity relative to defense contracting that can

92

support both overall baseline assessments and Industrial Modernization Incentives Program negotiations. One of the not too surprising conclusions is that improvements in this area are needed. It is a difficult subject and much remains to be learned.

SPARE PARTS AND WARRANTIES

Spare parts is a highly visible and controversial subject that is also very indicative of the problems and complexities we face in improving our acquisition process. The "horror stories" have permeated the media during the past year. The full story has rarely been told--that DoD employees found the examples of overpricing, that they represent only a small percentage of our purchases, that DoD employees found the examples of overloading, and that we've already taken steps to solve the problems. But the fact remains that there have been problems and we must do everything possible to make sure necessary improvements are made. We also have to be careful that the cures we institute to correct the problems do not overcompensate to the point of reducing overall efficiency and productivity.
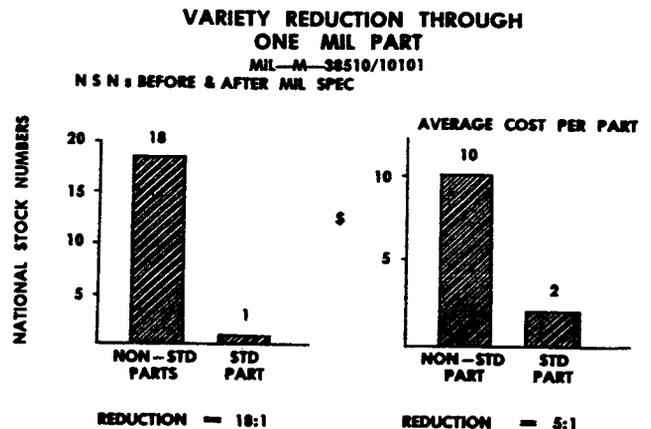
Accordingly, last year Secretary Weinberger instituted a conscientious and responsible 10-point program to reform spare parts procurement. It provides for a variety of measures--incentives to employees who detect and correct over-pricing, hotlines for them to check on questionable prices, the appointment of competition advocates to challenge sole source procurements, tighter contracts to provide for future spares competition, sanctions against irresponsible contractors, and continuing audits to review our progress in correcting problems.

Value Engineering is one of the programs we are emphasizing in this regard. We recently issued a new directive on this subject, are sponsoring a major workshop on Value Engineering in early November, and expect in the near future to establish and test a comprehensive Value Engineering data base as part of Government Industry Data Exchange Program (GIDEP).

Another example is our Parts Control Program where we strive to promote the greater use of standard parts in our equipment. This allows us to make larger quantity buys and reduces our inventory costs. It also supports competition because we typically have technical data available to allow procurement of these items. We estimate that through the Parts Control Program alone the Department of Defense saved well over $100 million in 1983.

Warranties present a different challenge to the DoD. Section 794 of the Appropriations Act has required that in addition to design and workmanship warranties we also obtain a performance warranty on all weapon systems and components. We in the DoD have utilized warranties very effectively for many years, and thus continue to support their use where appropriate. The Air Force alternate fighter engine warranty is just one example of the

kind of warranty that is in the public's best interest. However, everyone needs more experience in tailoring warranties to the specific situation. To the extent that they foster or encourage greater acceptance of contractor responsibilities in ensuring quality, reliability, and productivity objectives are achieved they will be successful. If, on the other hand, they function as the traditional insurance policy (where in a probabalistic sense expected costs exceed expected benefits) they will be inefficient.

VARIETY REDUCTION THROUGH ONE MIL PART
MIL—M—38510/10101
N S N : BEFORE & AFTER MIL SPEC

REDUCTION = 18:1   REDUCTION = 5:1

OTHER INITIATIVES

In this article, an attempt has been made to outline the breadth of activity under way in the DoD to improve productivity in the acquisition environment. Space does not permit an exhaustive discussion of every subject. The following are examples of additional topics, some less well defined than the aforementioned, that are receiving attention and may be expected to receive additional visibility as productivity improvement efforts proceed. They include:

o   Production engineering talent, capabilities, and availability.
o   Program manager training.
o   White-collar productivity.
o   Human resource programs.
o   Inventory cost reduction.
o   Methods of motivating acquisition participants.
o   Scrap and rework reduction.
o   Contractor productivity centers
o   Incentive and bonus systems for both productivity and quality.
o   R&D Limited Partnerships.
o   Factory of the Future.
o   Productivity in U.S. Naval Ship-building.
o   Education, training, and DoD/University interactions.

9

RESPONSIBILITIES

Because of the nature of the system, the DoD has a more intensive relationship with its contractors than may typically occur. Part of this is due to our program management structure and involvement. Other reasons include general public attitudes and pressures. It is important that overall responsibilities are not diminished, obscured, or lost. For instance, modernization is first and foremost an industry responsibility. We in the DoD don't want IMIP to inhibit industry from moving out aggressively on its own. Indeed, IMIP is most appropriate when a company can demonstrate that it is already making significant strides to improve productivity. IMIP is a way for us in the DoD to demonstrate that we recognize our responsibilities and to reinforce on-going contractor activities. Another case in point is illustrated by an example that parallels our focus on more cost-effective contract requirements. Recent problems of soldering on one of our weapon systems was attributed by some to be the result of relying on a contractor's procedures rather than imposing the DoD specification on this subject. Ultimately, however, the contractor has the responsibility of furnishing equipment to the government meeting performance requirements--regardless of whether the military specification was imposed or not. Unfortunately, the message to government personnel will probably be that they cannot afford to relax this requirement under any circumstances because in one instance a problem occured.

A related concern is that we in the government may be trying to operate from too many lists of initiatives and recommendations. The DoD Acquisition Improvement Program, the White House Conference on Productivity, the Defense Industries Productivity Workshop, the Grace Commission, Reform 88, most likely the NASA Symposium, and numerous other forums generate initiatives and recommendations. There are already enough recommendations to keep people busy for years. Few people try to relate or integrate these recommendations or build on earlier efforts. Most try to portray theirs as the immediate answer to all problems. Others are busy generating new recommendations; however, initiatives and recommendations are the easy part of the process. Real progress is made by actually doing all of the detailed work associated with implementation. Proper implementation is the key to success and the most difficult task. To the extent that the proliferation of initiatives and recommendations keeps us from focusing on specific actions (usually accomplished one at a time), we detract from our ability to effect change. More attention needs to be placed on assignment of responsibilities and follow-through than is currently always the case.

CONCLUSION

The Department of Defense is committed to productivity improvement and is attempting to factor the effects on productivity into all relevant decisions. The Department believes that determinations based on narrow issues are unacceptable unless the broader consequences are also considered. Admittedly, some areas are going to be beyond control, but in most instances, improvements are possible. Productivity is not, however, being pursued for its own sake, but rather as a way of reducing DoD acquisition costs.

Discussions with defense contractors who have excellent productivity improvement records indicate that it is the "little things" that cumulatively result in large productivity gains. Much can be achieved from small investments in the right equipment and from creating an environment in which all employees have the responsibility and opportunity to make needed changes and produce quality products.

The goal is to make defense contractors aware of the importance of enhancing productivity, to focus attention on what specifically can be done to effect improvement, and to overcome complacency. A steady, long-term, and iterative approach is necessary--with a great deal of attention paid to detail. Leadership, commitment, dedication, and cooperation between the DoD, industry, labor, Congress, and the other Federal agencies are essential.
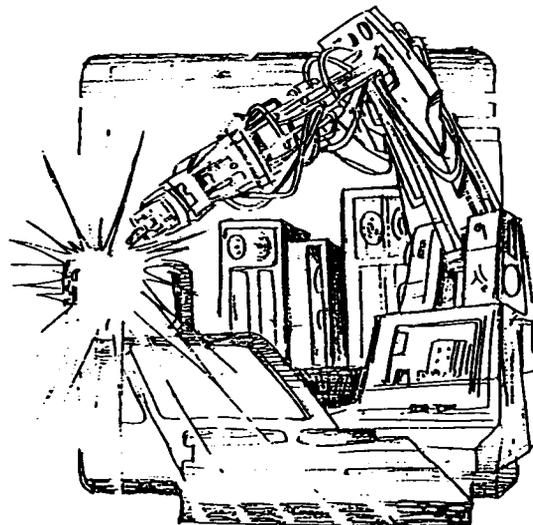
CADCAM Productivity

F. C. E. Oder, Lockheed Missiles
& Space Co., Inc., Sunnyvale, CA

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

95

96

CADCAM PRODUCTIVITY

F. C. E. Oder*
Executive Vice President
Lockheed Missiles & Space Company, Inc.
Sunnyvale, California

Abstract

The purpose of this paper is to present some specific results where productivity has been improved by the application of computer-aided design and manufacturing techniques at the Lockheed Missiles & Space Company (LMSC) in Sunnyvale, California. We have the opportunity to apply these techniques, both to moderate production rate programs such as the Fleet Ballistic Missile Program as well as relatively low or limited production programs such as are common to space programs. In addition to examples from both of these, I will discuss an integrated application of computer-aided design and manufacturing in the production of digital electronic equipment.

It is important that productivity activities be viewed from a correct perspective (Table 1). An important goal of productivity is to reduce actual labor content by improving its effectiveness. For most aerospace products, direct and indirect labor is not only an essential ingredient, but it is a primary element of program cost. At this time, and quite likely in the future, the aerospace industry will not be oversupplied with skilled engineers and technicians, thus emphasizing the need for more labor efficient methods if we are to do programs important to our country. Computer-aided methods of engineering and manufacturing contribute to these efficiencies and, furthermore, are conducive to a better product via improved accuracy. All of this is conducive to maintaining competitive position both within the industry and nationally.

At LMSC, we seriously began to apply computer-aided techniques to various design activities during the '70's. At the same time, we began modifying our methods, processes and facility to apply computer-aided systems to the actual manufacturing process. Computer-aided planning was also introduced into the manufacturing process during this period.

TABLE 1   PRODUCTIVITY PERSPECTIVE

1. For most products, labor is an essential ingredient and primary cost factor.

2. Skilled engineering, manufacturing, and test labor is in short supply.

3. Computer methods can lead to more accurate results and better products.

4. Lowering labor content:

   a. Makes timely accomplishment more feasible

   b. Reduces program cost   ·

   c. Maintains competitive position and/or improves profit

---

* Fellow AIAA
** Registered trademark of Lockheed Corporation

The first step is the design phase. Many claims have been made about the improvement in productivity in the design process, and in our case this is no exception (Table 2). For some time, we evaluated the process and the results are represented in "productivity ratios" whereby we compare the number of labor hours necessary to produce drawings by the previous manual method as compared with those on the CADAM** terminals which we now have operating in many parts of Lockheed. The source of the data on the chart shown comes from our Economic Evaluation Handbook for certain size drawings. "E" size drawings in our parlance are drawings of 34" x 44". The resources required, as shown in Table 2, are a function of whether the drawings are new or are revisions and whether or not they are simple or complex. The data in "Manual Hours" were developed over many years and have been used as a basis for cost estimating that part of the engineering process. The "CADAM Hours" are likewise used for estimating purposes and are also the result of experience in these same categories. You can see that the productivity ratios range from 2.7 to 8.0 and, as a matter of fact, I believe that these numbers are quite conservative since we have had experience in other cases where the productivity ratio has been even higher, particularly in the case of drawing revisions.

TABLE 2   PRODUCTIVITY RATIOS

LMSC ECONOMIC EVALUATION HANDBOOK
(E-SIZE SHEETS)*

	MANUAL HOURS	CADAM HOURS	PRODUCTIVITY RATIO
● NEW DRAWINGS			
— SIMPLE	30.0	11.1	2.7
— AVERAGE	50.0	15.6	3.2
— COMPLEX	75.0	23.0	3.3
● REVISIONS			
— SIMPLE	16.0	2.0	8.0
— AVERAGE	27.5	3.4	8.0
— COMPLEX	35.0	4.3	8.0

*SIMILAR NUMBERS ARE AVAILABLE FOR SHEETS OF OTHER SIZES

At the inception of the Trident II (or D5) Fleet Ballistic Missile Program, it became clear that we were going to be in a position to realize the benefits of these productivity improvements in terms of the engineering drawing process involved in that program. Figure 1 shows the flow diagram by which the savings analysis was approached on D5. Using this technique, it can be seen from Table 3 that, for the engineering drawings alone, we projected a saving of in excess of 2.6M hours. Add to
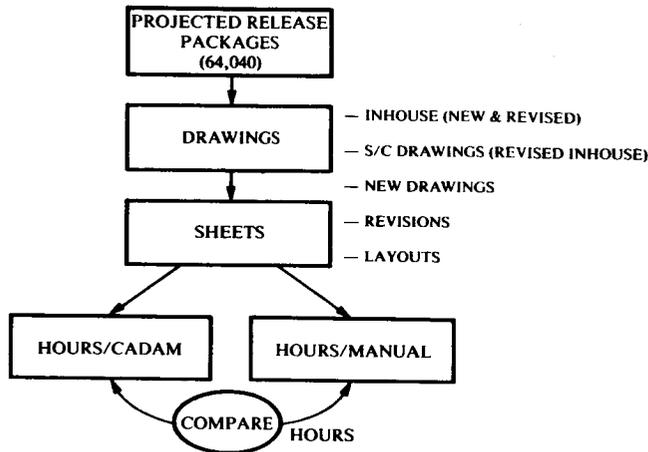
FIGURE 1   D5 SAVINGS ANALYSIS APPROACH

FIGURE 2   MSD ENGINEERING SAVINGS TIME
PHASED (EP)

TABLE 3   D5 PROJECTED SAVINGS

ENGINEERING DRAWINGS

HOURS COMPARISON

DESCRIPTION	SHEETS (000)	HOURS (000)		
		CADAM™	MANUAL	Δ
NEW DRAWINGS	30	457	1,389	932
REVISED DRAWINGS	48	164	1,329	1,165
LAYOUTS	10	238	776	538
	TOTAL	859	3,494	2,635

this savings in areas such as mass properties analysis, tool engineering, N/C part programming, gauge design and technical publication illustrations, we forecast a saving of some additional 595K hours. The way in which these spread as a function of time in terms of headcount by calendar year is seen in Figure 2. Also plotted is the actual realization of assigned engineering manpower which you will see compares favorably with the manpower requirements curve with CADAM as projected. The program is on schedule and, therefore, we can confidently expect that we will realize the savings that we had estimated in the beginning. There are some other savings which result from the plant space saved that we would have otherwise had to assign if we were to have hired the additional personnel. Using our standard space allocation per person, we find that we save some 32,000 square feet of plant space and, very importantly, contribute to a quality product.

The next illustration is a picture (Figure 3) of the five-story building housing the D5 engineering crew. There is not a drafting board in the place. There are, however, 89 CADAM terminals, and this number will increase to 108 by year-end 1984.

In the case of the space systems activities at Lockheed, our savings are no less dramatic. In one major classified program, the savings, depending upon the nature of the particular design problem, range from 16% to 87%. These statements come from meticulous evaluations of the "with" and "without" computer-aided design in the process. Let me give you a couple of examples. In one case, a specific designer during a period of eight days in August of 1983 designed propellant loading interface connections, including the plumbing assembly details, schematic design and parts list. He did this at a total labor cost of 46 hours and associated computer time which totaled $4,524. Both he and his supervisor separately estimated the cost to produce this design manually, and they came out slightly under $7,100, thus the saving was some 36%. In another case and at the same general time period, another individual did a weight support bracket design, including the drafting analysis and layout, for both labor and computer costs totaling $618. The estimated cost to perform this design manually was over $2,200, for a cost saving of 73%.

FIGURE 3   BUILDING 157

98

By using computer-aided design linked to a large flatbed plotter, we can produce mylar plot outputs to eliminate "hard" templates for such things as thermal blankets, rivet patterns and bolt holes and locating parts and components. We have thus saved $280,000 in Space Telescope in manufacturing thermal blankets and, in other space programs, the annual saving in templates is in excess of one million dollars.

Similarly, in Space Telescope, all the mechanical and layout design was performed on CADAM scopes. The estimated savings were in excess of 10:1 versus manual methods.

Now let me turn to the production of digital electronic hardware, both in the design and manufacturing sense. A little over four years ago, as then General Manager of LMSC's Space Systems Division, I outlined a concept for an integrated approach to the computer-aided design and manufacturing of electronic equipment. The problem in space systems, of course, is that you seldom have a large production run of any given electronic assembly, and thus one needs a design, manufacturing and test system which is not only low cost but flexible and accurate. Accomplishment of all of these goals is aided by the use of computers. Electronics parts design can easily be broken down into the elements which are found in every design regardless of function or purpose. In this age of very large-scale integration, this tool becomes particularly indispensable. The design of VLSI components into printed wire assemblies can be quickly and effectively done by computer, necessary routings established, and circuits even tested in both normal and stressed usage on the computer before the actual hardware is produced, thus allowing performance margins to be accurately estimated. The same data determines packaging and assembly steps. Finally, these data can be used to generate the necessary test stimuli and response determination in an accurate fashion and avoid the error-prone problem of transferring test data or test planning from engineering designs by manual means. I challenged our engineering department and our manufacturing department to develop a specific program to bring this about. It did not happen right away. We had a couple of false starts, but finally got an activity going which has brought us to where we are now. We now have all the design functions as well as the packaging and layout design capable of being accomplished by an integrated computer system. This is now being integrated with a robotic printed circuit board parts insertion facility and converted as well into the necessary test software. We will have the pilot line of the integrated digital electronic design and manufacturing facility on line by the end of this calendar year with a capability of some 50 printed wiring assemblies per eight-hour shift at much lower labor costs than we have previously needed for a similar productive work.

Now for the results in detail starting with electronic design phase:

Automation in Electronic Analysis and Design (LEADS)

We have created the Lockheed Electronic Analysis and Design System (LEADS), which provides a modern computer-aided electronic design facility. It is composed of work stations for performing analog and digital circuit design and implementa-

tion of these designs in boards, hybrids or VLSI devices. LEADS is also linked to mechanical design work stations for layout, wire wrap or printed circuit design, and thermal analysis.

The use of computer-aided engineering work stations eliminates the need for drawing logic diagrams and schematics and performing lengthy timing and other verification analyses by manual means. This has reduced typical design hours from 680 to 352 hours or a saving of 48.2% for a 175 IC design.

LEADS also provides the capability for evaluating circuit design performance through simulations prior to committing to hardware fabrication. This eliminates the need for breadboarding and testing in most cases. This is a saving of 355 hours for the example used above and represents a saving of 25% in overall development hours.

The use of computer-aided mechanical design for auto-routing of printed circuit boards (pcb) also reduces this design time from 336 to 240 hours, or a saving in this phase of 28.6%. If the circuit is implemented as a VLSI design instead of a pcb design, an additional 168 hours are removed, or a saving of 78.6% for this phase of development.

In summary, the demonstrated design productivity improvement, using computer-aided engineering, has been shown to be about 50% for digital designs employing printed circuit boards and over 60% for implementing the equivalent board in VLSI.

Automated Development of Firmware

Most advanced signal and data processing subsystems have some degree of software which is implemented in imbedded read-only memory (firmware). This code provides the control program for microprocessors, state machines, logic switching or other similar decision process. For very sophisticated processors, the firmware development is a major system cost. Therefore, Lockheed has concentrated efforts in improving the productivity of firmware engineers.

To date, eight programs have been supported with the development of 15,030 lines of micro-code and 19,415 lines of assembly code. The micro-code is the most primitive of the programming languages but gives the best control for speed and performance. It is estimated that the average programming rate is 2.8 lines per day for micro-code and 4 lines per day of assembly code; for reference, high-level languages such as Fortran can be produced at about 8 lines per day. These values include development of requirements, logic design, simulations of performance, integration into hardware and documentation in addition to the actual coding time. To support these eight programs then represents 10,319 days or 516 man-months. By using an integrated approach and a common development system for all firmware, there is the sharing of elements of logic and code from one development unit to another. It is estimated that an average of 15% of the code has been used in common between applications. Within a given application, the commonality has been as high as 30%. This represents a saving of 82 man-months. In addition to this, there is also a saving in training and response time to new applications which will continue to improve productivity.

Automated Hardware/Software Development Integration

In present advanced signal and data processing systems, the development of hardware and software is performed concurrently. In the past, first the hardware was developed and debugged, then the software development began.

This is ineffective for complex systems now being developed; there are just too many steps to permit a sequential development process. The integrated facility permits the use and reuse of flexible software and hardware interface modules to permit cooperative simultaneous development of hardware and software. This permits rapid iteration between hardware and software design to shorten the development span. It has been shown that the development time has been reduced by 25% using this approach.

Automated Testing of Microprocessor Systems

Our Space Systems Division has implemented an integrated approach to design and test of microprocessor-based systems in a manner which provides real savings in manhours to accomplish tasks. For example, in a recent large ground electronic system, a 5-board (5" x 7") microprocessor-based signal processing and data handling subsystem was required. The system consisted of many channels, each with this 5-board set of microprocessor boards. The design and development were performed in an integrated hardware/firmware facility using computer-based work stations. The same work stations and software were used for the automatic testing and fault location for the large number of processing boards built in the manufacturing facility. Manufacturing operated a simple go/no go tester at the end of the fabrication line. Those boards which failed the test were sent to the integrated facility for further testing and identification of faults. Manufacturing would then make the corrections and retest.

To date, 915 boards have been tested by the integrated facility with an average time of 3.5 hours per board. Many of the failures were very complex and without the automated testing work station would have ended with the boards scrapped. If general test procedures were followed using standard electronic test equipment such as logic analyzers, word generators, scopes, etc., it is estimated that the average time per board would have been 49.6 hours.

The use of the automated work station then represents a saving of 46.1 hours per board, or over 42,000 hours for the 915 boards. It is also noteworthy that this computer-aided testing is conducted by non-degreed technicians and not highly skilled engineers which represent even further savings. This therefore represents a productivity improvement factor of approximately 10 to 1.

Automated Integration and Testing of Large Electronic Board Assemblies

Another example is that of the integration and testing of large (16" x 16") electronic board assemblies which contain substantial parts counts including VLSICs. A set of 25 large digital processing, memory and control boards was involved. In order to test, check out and integrate these boards into a system, flexible computer-aided test work stations were developed. This required 17 stations including hardware and software. Each of the combined hardware and software work stations required an average of 4 man-months hardware effort and 8 man-months software development. For the 17 work stations, this is a total of 204 man-months. The major emphasis was on the software control to permit flexibility and adaptability to multiple boards wherever possible. Significant savings were achieved through the use of this approach over traditional methods which would have required 25 dedicated, all-hardware test work stations. In essence, the all-hardware test work stations are a replica of the control, interface and input/output functions of the actual hardware and, therefore, are almost as complex as the system to be tested. If this approach had been taken, 21 man-months would have been required per work station. The 25 dedicated work stations would have required a total of 525 man-months. The computer-automated approach saved an estimated 321 man-months of effort, reduced the development time of the hardware, and provided a more efficient test and integration capability.

The Lockheed Missiles, Space and Electronics Systems Group is making a major commitment toward productivity improvement in the design and production of sophisticated electronics. Key steps have been taken in implementing innovative techniques and technologies for automated electronic system developments, beginning with the concept phase and extending through manufacturing and quality assurance. Progress in increasing productivity has been significant by incorporating automation in key design phases of development and is continuing into the manufacturing phases.

The manufacturing aspects of our programs have similarly profited by effective application of computer tools. In the case of the LI-900 tiles used as a key part of the shuttle orbiter's thermal protection system, Lockheed as a subcontractor manufactures the tiles to Rockwell engineering and delivers the finished tiles to Rockwell who, as prime contractor, installs the tiles on the orbiter. Nearly all of the 29,000 tiles we build differ from each other dimensionally. It was important that an unambiguous method be devised which would convey Rockwell's design to Lockheed and, at the same time, allow us to derive NC machining instructions and automatic inspection data. This has been done by a master dimensioning data tape system and a master dimension data book which defines each tile's geometry supplemented by engineering drawings defining various major structural areas of the shuttle. In addition, some tiles are so complex that they require individual drawings. An added complexity comes from the fact that all of this dimensional data is for the finished tile, and it is necessary that the NC instructions consider adjustments for shrinkage during the manufacturing process. Shrinkage is not linear and is dependent upon tile geometry, thickness and fiber lot. Tiles are processed either in array assemblies or individually. Our people programmed the outer and inner mold line of arrays and boundaries of each tile using master dimension data for NC machining which, when combined with shrinkage data, provided a basis for driving our 3 and 5 axis machines and establishing automatic measurement standards. Not only can we produce tiles very accurately but, when replacement tiles

are required, the computer-supported process, which has each tile's data individually recorded, allows production of the necessary tiles in very short time spans. Without the power of this application of computer-aided manufacturing, it is very doubtful that the orbiter's thermal protection systems could be as optimized as it has been.

In my opinion, computer-aided design and manufacturing is most effectively applied when company-sized units are involved. It does not preclude, however, productivity gains if applied in individual smaller units; however, certain labor, equipment and software costs are minimized if it is applied broadly and consistently. Not only is our system applied in our main Sunnyvale, California, operation, but we are tied by the Lockheed CADAM Network (Figure 4) to other corporate companies and, in addition, to certain key subcontractors. This network allows sharing of workload and resources to accomplish design, manufacturing (both tooling and numerical control) and software tasks. The network allows the transfer of drawings, software load modules and source code, documentation and computer data.
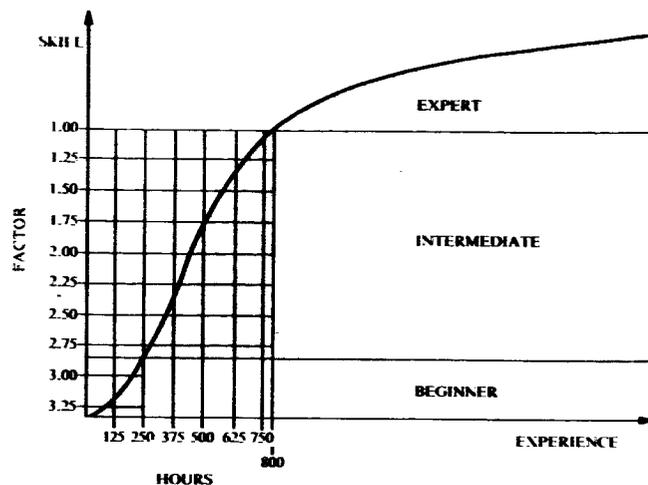
FIGURE 5   CADAM OPERATOR LEARNING CURVE

TABLE 4   CADAM OPERATOR PROFILE

FIGURE 4   LOCKHEED CADAM NETWORK

Clearly, trained people are essential to the effectiveness of such a scheme. System productivity is largely influenced by operator skill. Figure 5 shows a plot of skill factors versus experience. Note that, on average, an operator goes from "beginner" to "intermediate" with 250 hours of experience and, after 800, from "intermediate" to "expert." At the current time at LMSC, out of a population of over 28,000 people (Table 4), we have 1,600 trained CADAM operators of whom some 1,020 are active. Note that 90% of these are engineers and that the median operator is still a beginner.

In terms of equipment, note from Figure 6 that we are still growing in numbers of terminals. A relatively small number of these are stand-alone installations serving classified efforts with the bulk of the terminals tied to central large machines. As can be seen from Figure 7, usage is growing exponentially. Our plot output is over one million sheets in 1984. This takes the form of
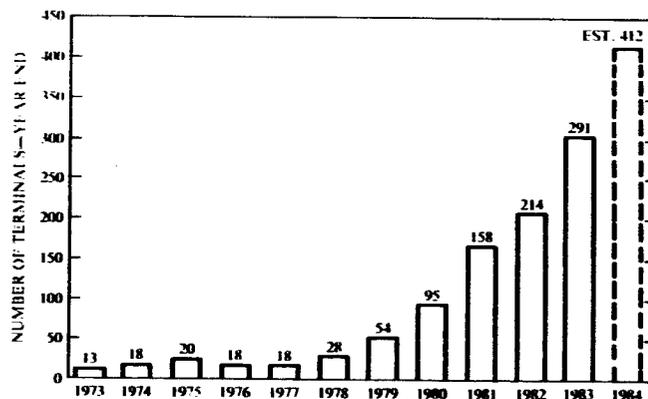
FIGURE 6   LMSC CADAM TERMINALS

15,000 sheets of microfilm per week, 5,200 sheets of electrostatic transfer process sheets per week, and 20 mylar sheets per week from the flatbed plotter which are generally used directly as manufacturing templates.

5

101
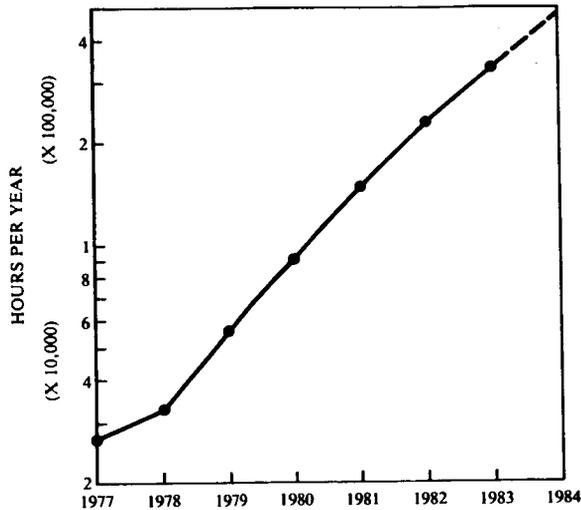
FIGURE 7   LMSC CADAM USAGE GROWTH RATE

In order to get these benefits, certain costs are entailed. The estimated replacement value of computer-aided design (CADAM) equipment at LMSC in terms of computer systems, storage and peripheral devices, display stations and output devices is presently $25.8M. The annual support costs (not including direct operator costs) are $10.6M and include labor, overhead, lease, maintenance, depreciation, software, etc. The cited costs are for the LMSC CADAM activities only and do not include all computer-aided design, manufacturing and test costs at LMSC.

In conclusion, we at LMSC have achieved many significant and measurable productivity gains through the application of computer-aided design, manufacturing and test initiatives. I have given you some examples of those initiatives in this paper. With high confidence, I can predict a continual growth of productivity by these means. I would like to acknowledge the help of Messrs. Miles Berg, John Gavin, Robert Perri, Howard Trudeau, and Robert Vaughn in gathering the data used in this paper and the help of Ms. Linn Motko for putting the printed words together.

102

Counteracting the Stifling Effects of a Large Organization

H. Weiss and R. L. Hill, Digital
Equipment Corp., Maynard, MA

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

104

COUNTERACTING THE STIFLING EFFECTS OF A LARGE ORGANIZATION

By Harvey Weiss, Vice President
Mid-Atlantic and South States Area Management Center
With Richard L. Hill

Digital Equipment Corporation
August 10, 1984

Abstract

In recent years, organizational behaviorists have written literally millions of words concerning the "large" organization, its behavior, and techniques to manage and renew its effectiveness. This paper carries a basic premise: that organizations, whatever their size, should exist and be configured to enhance the effectiveness of the individuals in that organization. Three specific concepts are explored, with actual examples shown, and a call to action in each area is defined:

1. Think differently; the way you did it last year may not be the best way to do it this year.

2. Invest in people; capital invested in "people" may produce larger returns than you ever thought possible.

3. Keep focus on the mission; we may mistakenly encourage people to stray from the desired "mission" of the enterprise through the structure, the measurement system or the reward system we put in place.

Introduction

My presentation this morning will focus on three primary topics. First, I will take just a few minutes to place my remarks in context by telling you about Digital Equipment Corporation. Second, I will discuss three specific concepts that are based upon our experience in growing into a large company. Third, I will suggest some specific action steps that have worked for us and can be applied to your organizations to counteract the stifling effects of the size of the organization. Throughout my remarks, there will be an underlying theme: managers must always remember that the organization exists to support individuals. We often forget this concept and tend to "put people" in various slots to support some form of organization, whether it be effective or not.

First, a word about Digital Equipment Corporation, to establish a basis for my remarks today:

o We supply computer equipment, software and allied services to all markets;

o We are the world's second largest computer manufacturer, and the world's leading supplier of computer terminals;

o We are an international corporation, doing business in all of the free world;

o We have in excess of 80,000 employees worldwide, with yearly sales of over $5 billion;

o We have been in business just over 25 years.

So, Digital is a company that has grown rapidly, and because of the very rapidly evolving technology we sell, it has been necessary for us to continually look at our organization and its effectiveness in accomplishing the mission of our company. For discussion today, I have selected three concepts that Digital has employed, in specific situations:

1. "Think Differently." American businessmen and government leaders have been educated and brought up to think about organizations in a certain way. Even though this approach has been very successful, the way we "think" about the way to organize to get things done may not be the best way to do it.

2. "Invest in People." America has been characterized by many economists as a "capital intensive" economy. Over the past decades, we have invested significant capital in "the shop floor," to increase the productivity of our manufacturing operations. Today, however, the largest percentage of a company's outlay may be in the salaries of its "white collar" or "knowledge" workers. We must now invest in the tools to make these workers more productive and effective.

3. "Keep a focus on the Mission." As organizations grow to meet corporate needs, it is easy to lose sight of the "mission" of the enterprise, for a variety of reasons. This is often the most obvious characteristic of a true bureaucracy. The people within the organization do not understand the mission of their organization, much less that of the company.

Let us explore each of these concepts in more detail, with actual examples from Digital's history.

1

The Enfield Plant

(The way we did it last year may not
be the best way to do it this year!)

In 1981, our capacity requirements dictated that we open a new manufacturing facility for mass storage subsystems. The natural inclination, of course, would be to organize that new plant in the traditional "American Way," proven so long ago by Eli Whitney and Henry Ford. It is worthwhile to take just a minute to examine this "traditional" manufacturing organization.

Under this design, each person performs a "simple" task on the overall assembly as it passes by that person's "station". Only this task or process is performed by that person, many, many times each day on the various assemblies that move through the individual's station. That person may not (and usually does not) have any idea of the role that their task has in the overall production process. Because of this, we provide that person with "tolerances" to which they may perform this task, and "layer" a coordinator (usually called a supervisor) on several of these people who perform adjacent tasks in the process, to make sure that the group of serial tasks has an acceptable result.

Depending upon the complexity of the overall process, we may then layer on some number of additional coordinators (or supervisors, if you will) to tie the process all together. This approach ultimately results in the typical manufacturing organization.

Because quality is so important in the manufacturing operation, we may then layer on quality control structures to validate the acceptability of the subassembly as it passes through more and more processes towards its final configuration. This adds even more complexity to the organization.

Thus, we have our traditional manufacturing organization. Individuals who do "small" or manageable "tasks" with little or no knowledge of the role that they play in the overall success of the operation, with supervisory levels layered on to these individuals to provide direction, training and coordination with other tasks in the overall process. The result . . . a large and hierarchical organization with the typical problem of motivating individuals to do their task in such a way that the overall process produces working and quality products, whatever they may be.

And, as the manufacturing processes get more complex, or additional capacity is required, we simply do more of the same. More "task" segments, more coordinators, more levels of coordination.

This organization often results in high turnover, job satisfaction problems, and general boredom at nearly all levels.

With our Enfield Mass Storage Manufacturing facility, however, we decided to "think differently." Instead of building our final product by having many people do one task in the overall flow, we designed the plant and trained each person to take the manufacturing process completely through all of the steps necessary to build and test the product.

What is the result of this "pre-Eli Whitney" organizational structure?

First, the ten levels of organization that are often found in a large organization have been replaced by three: the Plant Manager, production supervisors, and manufacturing people!

Second, the Enfield plant average yield, as defined as products which come off the line that require no repair or rework, is two to three times as high as that of many plants, which use comparably complex processes. People who really "own" what they are building take pride in its workmanship and quality.

Third, we have maintained the same production output levels with half the number of people and in half the floor space, as other plants designed more traditionally.

Now, this increased yield and productivity per person did not just happen. A significant investment was made in those people who work there. You can train an individual to do a simple "task" in one day, and sit them down at an assembly line station. They become productive right away. To train an individual to "do the whole job" takes three to four months, however.

The results strongly illustrate my underlying theme. The design of the Enfield operation, and the investment in the people who work there is an example of an organization existing for the individuals who work in it. The environment and investment in training allow these employees to accomplish their "mission," the production of mass storage products, in a way that is motivational and satisfying to them, and which provides an attractive return to the company.

So, the bottom line in this example is that by "thinking differently" than we might be expected to think, designing a new plant in an "unusual" way, and investing in the people who work we were paid a rich dividend, in efficiency, in effectiveness and in job satisfaction.

Perhaps one of the reasons that we frequently use manufacturing examples in

2

organizational discussions is that the result is easy to measure. The products that come off the line can be examined, tested, costed and compared with others produced using different approaches. It is much harder to do this with white collar or knowledge workers, but with the cost of these people becoming a larger and larger percentage of the total cost of doing business, it is important that we also focus on these people. This brings me to my next point.

Electronic Mail at Digital

(An investment in people's effectiveness.)

Several sessions at this conference will address the use of various kinds of technology to enhance productivity. But, at Digital, we have found that technology can not only enhance productivity, but breathe new life into what might become a stagnating organization.

Nearly seven years ago, Digital began an electronic mail pilot within the corporation. Since that pilot, the number of subscribers has grow to over 25,000 and every employee in the company, worldwide, has access to electronic mail. During these years, a number of studies have been completed to determine how electronic mail effects the way people work, and how effectively they work, with the use of this technology.

Managers and professionals at all levels have contributed to the learning experience. In particular, managers feel that by using electronic mail (we call it EMS), they are able to accomplish tasks they could not otherwise do. Of prime importance is more timely information exchange and the ease in distributing information to multiple addressees across many (worldwide) locations. Many report that EMS increases the speed and quality of their decision making, because information collection and staff coordination is facilitated. EMS also allows lower-level managers to communicate with managers at higher levels. The impact of EMS on job satisfaction is always cited as important. Secretaries, especially, have mentioned the decrease in menial, mundane tasks now delegated to EMS. Examples are reduction of typing, reproducing and addressing interoffice memos. We have found that most employees use EMS themselves. Even Senior Managers read, forward, route and assign action through EMS. The secretarial time saved can be used for more interesting or more challenging work. And, over time, the computer literacy of our entire work force has been increased.

We consider electronic mail an important investment in people: in our executives, managers, professionals, and staff people. Besides the basic targeted increase in productivity (time saving), we have found that the application of electronic mail technology has resulted in

an entire organization that is better informed and that communicates, at all levels, in a significantly more efficient, effective and complete manner. There is a more subtle benefit to the EMS "culture" caused when faster communications help people understand their mission better, especially their role in conjunction with others.

Which leads me to my third point.

The Area Management Centers

(Focusing on an organizational mission.)

Traditionally, Digital was organized by Product Lines, groups that created the strategy of the company. We either had 18 or 36 market segments, depending on how we counted them, and in each segment there was a Product (or Market) Line that held the strategy for the corporation in that segment. Each had a model of the business, set the prices, and laid out the expenses for engineering, marketing and all the costs. They planned the growth and the investments. They were also very close to the customers, so they were the ones who followed the needs of the customers and integrated them into the strategy.

This Product (Market) line strategy worked extremely well for Digital as we grew. We grew by adding side-by-side organizations. To focus on an emerging market, we could create a Market Line to specifically address that market, and measure its success by examining the profit and loss statement that resulted. Return on investment could be measured on a Market Line basis, and investment trade-offs made on a company-wide basis. And, the measurement of the managers was straight forward: the profitability the business they managed.

There came a time, three years ago, when we looked closely at this Product (Market) Line structure. Two things had emerged that we wanted to examine closely. First, having measured Product Lines, for almost two decades, on the profit they made, we found that the managers spent most of their time and deployed their strongest resources on this measurement. This is an excellent example of the situation in which a measurement becomes a "mission." We also knew that the marketplace and the competitive environment had changed and was continuing to change rapidly and in a very dramatic way. The strategic element of the mission of the Product (Market) Lines was becoming ever more important to the corporation and its success.

As our business and customer base grew, we found that a single Product (Market) Line did not provide a one-to-one mapping onto the needs of a specific customer. For example, a large

3

university, who was the responsibility of our Educational Market Group, would buy our laboratory equipment, our educational products, our office automation or information management products, and was often funded by a government agency, each of which was addressed by a specific Product (Market) Line.

Three years ago, we made an organizational adjustment which addressed these issues. We changed it first in Europe and it worked very well. We then set about changing the way the Product (Market) Lines were measured, and established a customer-focused organization which encompassed our field organization.

It wasn't a major change, but the results are good. We evolved the Product Lines into Strategic Marketing Units. They are the basis of our strategy, our model building, our planning and the programs to implement the strategy. They focus on the marketplace, the competition, and overall customer needs.

We created geographic "Management Centers," at the Vice President level, to address all the needs of a given customer within their geography. The Profit & Loss statement is managed by these field organizations, and these centers are thus provided with all the resources, including specific business decisions, required to satisfy all needs of our customers. We currently have three such centers in the U. S., and a parallel organization abroad, with major countries constituting a management center, and groups of smaller countries within one center. These management centers, with their geographic focus, are able to provide the unique products, services and sales activities most appropriate to the culture and needs of the geography and the customers within that geography. This is especially important inasmuch as Digital is an international company with a significant business activity outside of the U. S.

As the result of this organizational structure, our field managers focus on customer satisfaction and short-term revenue goals, while our Product (Market) Lines (now called Strategic Marketing Units) are measured on strategy and the company's ability to penetrate, gain market share, and make money, with a given product or in a given market segment. Their measurements encourage behavior in a way that reinforces their specific "mission" in the context of Digital's overall business objectives.

Call to Action

With these thoughts in mind, I would call each of you to action in your own organizations. The specific examples, within Digital, that I have cited, bring some of these to mind.

o   Renew the vigor of your organization by thinking in creative and not necessarily "traditional" ways. Examine a given task and structure an organization in such a way that the people who must make it work have the best chance to do so. Be very careful of "plugging available people into a pre-defined organization." Clearly, I am not advocating that we all go out and reorganize. Rather, I would urge you to examine what you have to accomplish and think about it in new ways. Start with a pilot within one of your functional groups. Then, measure the pilot objectively, as well as talk to the people who were effected to find out how they feel about it. You may find your expectations exceeded, as we did at Enfield and in the Area Management Centers.

o   Invest in your people. Listen to the other sessions within this Symposium and, especially, what has worked for others. Investigate how to provide productivity tools for your managers and professionals. Try automating one department. We found that the electronic mail system at Digital did indeed breathe new life into a large organization through wider and faster communications, and an ability of more people to communicate with one another. At Digital, we have taken several more steps in this area. All secretaries in many departments have word processors, connected to the EMS system, instead of typewriters. Most professionals and managers have personal computers or terminals tied to departmental systems. The impact on our organization has been really significant.

o   And, take a close look at the style of your organization. Does the measurement of your people and managers reinforce the mission, or contradict it. We seldomly do this on purpose; however, over time, we often let the direction of our organizations go astray, for many reasons. At Digital, we felt this issue was important enough to restructure our company, at the Vice Presidential level. The results of doing so have been very positive, renewing and productive.

108

In Summary

And, keep in mind my underlying theme this morning: organizations exist to support the <u>individuals</u> within them. To make these <u>individuals</u> more productive, more effective. The organization should reinforce its mission, well-deployed tools should be made available to white-collar workers as well as production workers, and the measurements applied should elicit behavior which accomplishes the mission of the enterprise. In my short time this morning, I have but scratched the surface, of course, but, I am hopeful that the real-life examples of concepts that have worked for Digital will stimulate your thinking as you examine your organization and its effectiveness.

I will be happy to answer any questions you have about any aspect of my brief remarks, at the appropriate time in the program. In addition, I would invite any of you to have a more complete dialog with me at your convenience.

Thank you.

109

-- NOTES --

110

Keeping the Bureaucracy in Check
K. A. Bolte, Intel Corp., Hillsboro, OR

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

112

"KEEPING THE BUREAUCRACY IN CHECK"

Keith A. Bolte
Corporate Director of Productivity

Intel Corporation
Hillsboro, Oregon

Intel Corp., with not one job lost, says program to cut administrative costs has saved it $17 million in 4½ years.

It has been said that good management is nothing more than the application of common sense to the obvious. If there is much truth in this axiom then the middle management of most corporations has suffered from a common-sense deficiency over the past decade regarding white collar productivity. More important, however, is that senior management has allowed it to happen by accepting the myth that nothing much can be done to reduce administrative costs.

Such was the case at Intel Corp. until July 1979, when we decided it was time to destroy the myth. Over the previous 10 years, we discovered, our allocation of human resources had subtly shifted. Whereas administrative workers had once represented about one-third of our U.S. payroll, they now accounted for almost two-thirds. Management was shocked at the extent of this administrative overhead. The explanation was that while we had effectively implemented manpower controls and productivity measures on the factory floor, we had virtually ignored the administrative side.

As we began to explore potential ways to contain the "administrative marshmallow", we found there was very little practical information available on how to measure and improve white collar productivity and how to limit employee growth. In our research we found no companies that had developed a key that would open up this "black box" called white collar productivity. So we developed our own approach to the problem.

This approach rests on two basic principles: avoid the exotic and you cannot improve what you cannot measure. In the 4½ years since our effort began, we have achieved more than $17 million in cost savings without laying off a single employee. All payroll reductions have come through attrition. Better yet, we expect to eventually attain a 30% productivity improvement throughout the company that will yield $60 million a year in direct cost reductions, equal to a $277 million annual sales increase.

How are we doing this? By applying common sense to the obvious. We have brought proven factory management techniques to white collar areas by unravelling any procedures that seemed overly complex and then applying measurements that quantify the mission of the operation. Simple? No. Cost justified? Yes. The chart on page 4 demonstrates Intel's success in decreasing both administrative expenses and administrative payroll as a percentage of the total.

In my contacts with other companies over the past 4½ years, I have discovered that lack of commitment from the top is the major impediment to getting a productivity program off the ground. If there is not an active and demonstrated commitment from the president and/or CEO on down, forget it. Employees will perceive the effort as just another scheme that, not unlike the common cold, soon will pass. This means that senior management must set realistic corporate goals for productivity improvement throughout the administrative side of the business and be willing to hold middle management accountable for performance against those goals.

Understand what it is

After winning top-level commitment and visibility, the next step to success is making sure the person picked to run the program has experience. You should look for someone who has worked with white collar productivity before, has line management experience and a solid statistical or financial background.

Next comes execution. Before trying to improve productivity you must understand what it is and is not. Productivity is not revenue per head, cost of sales indexes, cost of payroll, or any other financial term. Productivity is simply output divided by input, nothing more mysterious or complex than that. In administration, input means employee hours. This classic definition is understandable, controllable, and implementable at the first level of line management. That is where productivity improvements take place.

After defining productivity, define "white collar". At Intel, anyone who does not directly manufacture or sell a product is "white collar" or "administrative/indirect labor". This includes operations ranging from accounts payable to production planning and control to test engineers.

Assembly line office

The next step in execution is to view administrative areas as "paper processing factories" with specific inputs and required outputs, much like an assembly line, so you can apply production line techniques. But to apply these techniques first means changing the way the administrative side of the business is run.

The biggest hurdle here is administrative managers who are not trained in the basic art of operational management. Most of them have come up through the ranks and are professionals in such specific disciplines as marketing, finance and personnel.

To compensate, we have developed a series of training courses on such subjects as "What is productivity and why is it important?", "How do you measure productivity?" and "How do you improve it?" Once a manager and his key staff have gone through these courses they tend to become less resistant to the idea of doing things differently. At this point, the actual productivity program can begin in their area.

113

In line with the principle that you cannot improve what you cannot measure, you must now quantify the mission of the operation. At Intel we do this by establishing an administrative productivity indicator (API) expressed as hours-per-unit. For example, the mission of an accounts payable group is to pay vouchers. A baseline of performance can be established by selecting a reference period of time (quarter, six months or year), determining how many vouchers were paid and how many hours were worked during that period, and dividing the number of vouchers by the number of hours to find the hours-per-voucher processed.

This amounts to a historical benchmark. A productivity improvement would show up as a drop in hours-per-voucher.

Once you have a baseline, you are ready to start the real productivity exercise. This starts off with streamlining the business, or eliminating the unessential and simplifying the essential. To shed the unnecessary, question the value that each task adds to the mission of the organizaiton. If there is no value added, eliminate it. During one of our accounts payable work simplification sessions, for example, someone asked why Intel employees had to fill out an expense report for a business lunch and wait to be reimbursed. No one had a reasonable answer. The decision thus was made to immediately repay any expenses under $100 from petty cash. Expense voucher volumes fell by 14% in 30 days.

Before we started this work simplification process, the literature distribution group at Intel did not realize that it took 198 steps and 40 hours a month to handle its monthly billings. When the group finished simplifying this work flow, the steps had been reduced to 14 and the process time to 42 minutes. How could this happen? The work flow had been divided among three persons and no one could see the big picture.

In another example of simplifying the essential, obtaining a $2.79 pencil at Intel used to take 95 steps and 12 pieces of paper. Today we only need eight steps and one piece of paper. We did this by making a diagram that shows every step of a work process and then cutting out the unnecessary steps.

Capacity planning

After streamlining the business you are ready to develop staffing algorithms, a process we call capacity planning. This is a management tool that helps an organization define exactly how much labor it needs to get a job done. By showing how often each task is done and how long it takes, capacity planning helps managers determine the number of employees required to do a specific volume of work. This ensures that the payroll grows or decline with the amount of work to be done. And you can now compare how long one unit of work should take versus how long it has taken historically and establish an hours per unit goal for work processed.

At Intel, we first applied capacity planning to our material services operation, which handles shipping, receiving and warehousing. The technique pointed up an excess of 92 employees. Through attrition we shrank the headcount to 184

from 276, gaining an immediate annual saving of $1.2 million. And the imposition of further capacity plans yielded another $1.4 million in savings.

Weekly review

Organizations that know all the tasks necessary to accomplish their mission are better equipped to respond to workload cycles. A brief weekly review of the work planned and under way allows managers to assign their employees to the specific areas where they are needed to maximize output. A capacity plan also provides a quantified method of determining staffing requirements, eliminating the need to "negotiate" for additional staff, and an information base for short- and long-range planning. And during recessions, when payroll expenses usually must be cut, capacity planning offers an attractive alternative to the reductions-in-force approach that cuts an indiscriminate swath across a company.

Essential to implementing the productivity plan is monitoring the results. Unless productivity and quality reporting become part of the routine operating style, the mindset created during the initiation of the program will disappear. Productivity goals must become integral to planning. Our experience has taught us several lessons. For one thing, we now know that administrative organizations represent a fertile opportunity to improve productivity, and that they can be measured. The payback can be staggering. Conservatively, we estimate that payroll costs can be reduced by 25%-35% through this type of effort.

Since it is rather difficult to improve something you don't understand, we have also learned that the first step must be to establish a common definition of productivity and explain why it is important. View it as trying to sell a new product to an uneducated consumer. Do not assume that people understand what productivity is and why it matters.

To produce an effective and long-lasting productivity program, you must change the company's culture, or style of management. Staff have to develop new ways of thinking about their work in terms of hours of effort required to turn out a product. The cultural change will happen when productivity becomes part of how the company evaluates and rewards its management team.

Do not try to accomplish too much too fast. Go into one department and demonstrate that significant results can be achieved. This will be a learning experience and will build credibility for the approach throughout the company. Focus on getting an early success story by going after a ripe opportunity, such as where large concentrations of staff perform similar functions – finance, facilities, or materials handling.

Gambling odds

Remember that productivity improvement means change and that people resist change. Be patient, firm and consistent. You will need to establish "top down" goals for "bottom up" implementation.

Be sure to conduct a high-visibility reporting system that monitors progress and results.

Intel's productivity group comprises 10

professionals serving more than 12,000 administrative staff in 22 countries. This proves that a white collar productivity program needn't involve a large new structure.

Few areas in business can produce the return on investment of a well-executed productivity improvement plan. It is a much-neglected opportunity for streamlining of operations. The efforts are heavy but the investment is low and the return is high. Even the most conservative gambler can live with those odds.

115

HOW THE ADMINISTRATIVE 'MARSHMALLOW' SHRANK OVER THE 5 YEAR PERIOD
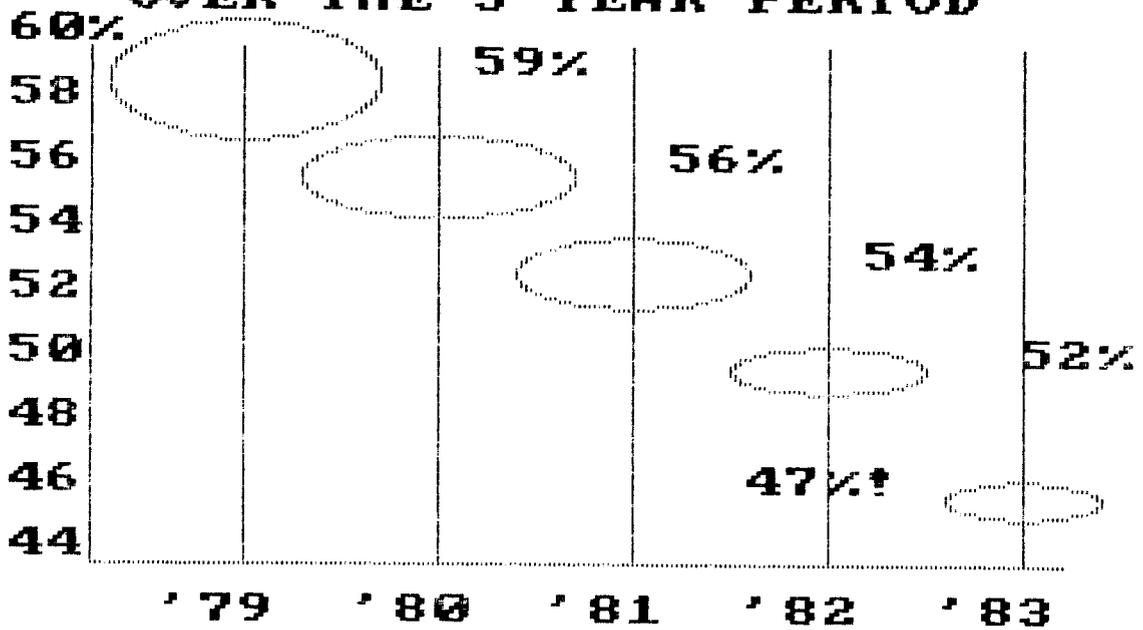
WHITE-COLLAR HEADCOUNT AS PERCENTAGE OF TOTAL PAYROLL

116

Making the "Z" Concept Work
C. W. Joiner, Jr., Mead Corp., Dayton, OH

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

119

120

MAKING THE "Z" CONCEPT WORK

Charles W. Joiner, Jr., President
Mead Imaging Division, Mead Corporation
Dayton, Ohio

Introduction

There are no magic machines, no secret formulas for success. Excellence in any business enterprise simply requires the cooperative effort of many people through organized activity. Today I cannot offer you any startling new discoveries, but I can tell you how I made the proven theories work. Leading change in an organization to achieve excellence is not complicated -- it is incredibly simple.

Whenever the Japanese are used as an example of enlightened management, most U. S. managers groan: "We have heard enough!" Most of us know that probably half of what we've heard is a myth. Those of us who have spent time in Japan know that there are great cultural differences between our nation and theirs. Any attempt to adopt their approach as our own is just another management fad. The fad of the 60's was marketing management where sexy images replaced quality product development. The fad of the 70's was financial management, where managers learned how to advance careers through the buying and selling of companies. Japanese management is the fad of the 80's. But why does it get so much attention? Have the Japanese learned something important about managing complex organizations? The answer is definitely "yes" and, more importantly, they learned it from us!

We must never forget that America was built on the strength of human ingenuity. It is the value Americans have always placed on individual creative effort that has made this society so successful. As Americans we are a people with the freedom to pursue our interests and apply our ingenuity in providing valued goods and services for others.

Ironically, the Japanese secret is not Japanese, but American. This has been best demonstrated by Dr. William Ouchi in his development of the Theory Z approach to managing organizations. Theory Z was formulated through a study of the Japanese system and similar management approaches in the U. S. The Theory Z approach calls for organizational decisions to be made by consensus with broad participation and a long-term view. It is no mistake that the best run American companies, as identified by Peters and Waterman in In Search of Excellence, use a management system similar to that outlined by Ouchi in Theory Z.

The basic principles of Theory Z are as follows:

- Long term employment
- Relatively slow process of evaluation and promotion
- Broad career paths
- Consensus decision making
- Implicit controls with explicit measurements
- High levels of trust and egalitarianism
- Wholistic concern for people

I am convinced that Ouchi has captured the essence of the organizational concepts that are critical to the most successful American business organizations. The critical challenge for managers today is learning how to lead change within their organization in order to achieve a Theory Z type system.

The origin of the best system is not the real issue. The important task is learning how to get all employees committed to business goals that will make a difference and how to train them at becoming the best at achieving these goals. Managers must learn how to reconcile the rugged independence of the American spirit with the needs of a highly efficient and competitive business organization. An organization's long-term goals can only be realized by gaining the commitment of its employees. Gaining that commitment can release boundless human energy and focus it on the accomplishment of important organizational goals. To put it simply, a manager is a coach struggling to build a team from a number of talented individuals. It will take each team player pulling on the oars together with maximum effort to win the race.

During the last 15 years, I have had the pleasure of successfully leading change in several large organizations. My experience with leading change began at Chrysler back in 1970 where I was general manager of service and parts. There we moved from a low-service, high-cost operation to a $100-million organization that provided superior service. This was accomplished by implementing the principles of Theory Z. My next challenge came at Mead where I was president of Mead Merchants, a $500-million wholesale distribution company. Again, by implementing the principles of Theory Z, earnings were doubled and the organization moved from one with declining sales to one with a growth rate in a commodity business surpassing 15 percent. Today, as president of Mead Imaging, I have an exciting challenge leading a new high-tech business venture. Our team at Mead Imaging is bringing to market a revolutionary new invention, developed at Mead's central research labs. We are building from the ground up a hundred-million-dollar new business unit and basing this new business organization on the principles of Theory Z.

Leadership of Change

As a result of these experiences, I have learned much about leading change. It is clear to me that organizations can be changed and it is not difficult.

Anybody can do it. All that it takes is good common sense leadership.

Good common sense leadership requires two things -- strong beliefs in people, and a commitment to excellence. This means getting people to do their best; to build the best quality; to give customers service; and to eliminate waste. It means doing things right!

Central to the leadership of change is a strong belief in people. This sounds so obvious, but it is so often only given lip service. A leader must believe without question that people are the most important asset to the organization. There can be no question that people want to be and must be involved in business issues in a meaningful way. There can be no doubt that people do their best in a climate of openness, honesty and trust. The leader must be convinced that people want to contribute to the business objectives and grow to the limits of their ability. There must never be a hesitation to make continual investment in the education and development of people because the skills of employees are the true competitive edge. Finally, above all else, the dignity of each individual must be protected at all costs. These basic beliefs in people are fundamental. They can never be questioned. These principles were first documented by Douglass McGregor in the 50's, coincidently at the same time the Japanese were rebuilding their industrial base.

To put it simply, leaders of change must be willing to entrust employees with a job, provide them the proper training, and then trust them to do it!

A firm commitment to the pursuit of excellence is the second prerequisite. Unfortunately, excellence has also become a hollow slogan in too many organizations. Any company that thinks it has already achieved excellence is probably no longer pursuing it. The best companies know that excellence is a continual pursuit. At IBM, 3M and Hewlett-Packard change is a never-ending process. The best companies in our country are continually seeking improvements and always changing -- often in significant ways.

The pursuit of excellence must be a working philosophy. My philosophy is one of seeking continual incremental improvements. Excellence is not a state, but an ongoing process. The idea is simple:

1. Dream of the perfect world - excellence
2. Assess the reality of the present and determine the gap that exists
3. Use this gap to motivate continual change
4. Plan step-by-step actions to close the gap

By accepting the fact that a gap always exists, between what is and what might be, the deficiencies of the present are no longer threatening. Instead, they become a motivating force for continual, meaningful change.

Organizations become great through gradual step-by-step improvements. Greatness is not attained through one, fine strategic move. The pursuit of excellence philosophy allows people to dream of an

ideal future, to be motivated by the gap between excellence and reality. It improves the current state step by step. It is interesting that this concept was described many, many years ago by organization researchers Blake and Mouton. Guess who studied the work of Blake and Mouton and integrated it into their business philosophy? Why, the giant Japanese companies of today, of course.

The leadership of change in large organizations requires a comprehensive effort. The following are steps that I have found to work. Though they are listed sequentially, I can assure you that the actual process is not necessarily as orderly:

Build a Team

The first step is to build a cohesive management team at the top. Leadership is never the result of one person, but of several who collectively have the power to make significant changes throughout an organization. At both Chrysler parts and Mead Merchants, our team was built through sheer hard work, open and honest dialogue between members that led us to understand and accept differences. We found that working together as a team was critical to our success.

We employed an outside facilitator to help us. Our first meetings were tough and full of game playing. We needed time to get to know each other well enough so that we understood each other's true motives. We simply needed to develop the trusting relationships found in mutual friendships.

In the process, we learned some new skills; we worked on effective two-way communications, we learned how to tap into feelings and non-verbal communications. We practiced group leadership skills and learned how to make decisions by consensus. We practiced group problem solving which included effective methods of brain-storming. This team building effort took about one year of intensive effort. Once the team was functioning it was then possible to begin moving the "Z" concept down through the organization.

Create a Vision

The second major step in the leadership of change is creating a strategic vision for the organization and communicating that vision in a way that it is relevant to each individual's job. As the old saying goes - "If you don't know where you're going, any road will take you there." Every organization needs a strategy to gain a competitive edge. All employees need to understand this strategy so that they can perform their jobs in a way that supports the effort of the whole.

The vision must be exciting. It must represent a future that inspires career commitment and the pursuit of excellence. The leader is the architect of that vision and, above all else, he or she must be for employees the shining example of permanent human aspiration -- inspiring employees to devote their powers to jobs worth doing. Only the leader who can develop excitement in the minds and hearts of employees about the future of the organization can tap the vast amount of human

122

resources that follows from employee commitment to common organization goals.

It has been my experience that, once the top management team has jelled, the determination of a sound business strategy takes at least six months of effort. The strategy is best developed through a participative process, using internal resources and task teams working from the bottom up.

Once the future course has been determined, it must be shared with all employees through an intensive communication process. Communications efforts should explain the strategy, plan and specific goals. This message can be delivered through regular formal employee meetings, ongoing management process, the use of video tapes, internal newsletters, company brochures and individual meetings. No chance is too small, no person is too insignificant to miss. No opportunity should be overlooked to repeat the strategic plan for the future. In this way, a vision is created in the minds of employees that permits them to mesh their own personal goals with the goals of the organization. It is this meshing of personal and organizational goals that builds the level of commitment that will eventually release human energies for the accomplishment of the organization's most important common tasks.

Establish Strong Personnel Systems

The next major step is to enhance the work environment through the establishment of strong personnel support systems. This involves creating an environment where careers can be made, where individuals can continually grow personally and continually learn new specialized skills important to the organization. This requires a sense of security about the future of employment, especially during times of rapid and radical change. Employees need to know that management of the company will not use them for short term gain and then discard them. To gain employee commitment, management must be willing to make a commitment to their employees' careers. This in reality is a commitment to a life-long career.

Bill Ouchi identified long-term employment policies as one of the key elements of successful Japanese and U. S. firms such as IBM, 3M, Hewlett-Packard. This is only a common sense policy that many companies have chosen to ignore for short-term gains. I believe that managing a business in a way that protects long-term relationships of many kinds is one of the most critical issues facing American businesses today. Over a long period of time, employees of successful firms develop specialized skills. These specialized skills yield the true competitive edge for successful companies.

In my view, as a matter of policy, we need to seek ways to encourage the stabilization and training of our workforce within firms. We need to discourage those practices that contribute to instability in the workforce -- the frequency of corporate mergers, hire and fire policies, executive compensation plans that reward only short-term profit taking. We need longer-term supply agreements to ensure greater continuity of production.

Today, there are too many uncertainties for an organization that have nothing to do with competitive forces, but are the result of managers implementing short-term policies for personal, financial, or political gain.

To create a trusting work environment, the manager's behavior must remain consistent with the stated beliefs in people. Actions speak louder. To encourage consistency, I have found several personnel support systems helpful. These systems were designed to help supervisors while discouraging them from practices that were not consistent with the basic beliefs of the organization. The primary personnel systems include:

1. Regular organization effectiveness surveys that measure the overall health of our people-management systems and provide supervisors with regular and ongoing feedback they can use in making continual improvements. The surveys are analogous to an annual physical check-up.

2. A fair and competitive compensation program that rewards employees through a bonus or profit sharing plan tying employees closer to business goals.

3. A broad and formal selection and job placement process designed so that all employees have the opportunity to nominate themselves for positions that they feel qualified for, and to allow people to move across functions and organizations. This provides the opportunity to build a career and develop employees who have a broad understanding of the organization.

4. Effective regular performance reviews as well as employee development reviews that give feedback useful to improve individual performance and facilitate long-term development. Reviews must be done for all employees and not just a select few. Managers must be required to take the time to conduct these reviews. It must be recognized in a formal way (in job descriptions, evaluations, etc.) that performance reviews require a significant amount of a manager's time and are an important part of every manager's job.

5. Specific educational opportunities that are made available through a formally managed educational program. We established an internally funded unit that had the responsibility to manage organization-wide education and development programs tailored to the business goals and specific skill needs of the organization. I have received only one major criticism as a manager and that is for spending too much money on education and development of people. This is a criticism that I am proud to have received.

6. View each personnel transaction as a significant opportunity to reinforce the organization's basic beliefs in people. Every hire, promotion, demotion, termination, or development assignment is subject to the scrutiny of so many employees. Information travels like wildfire through the informal network. This network can also be used in a positive way to demonstrate management's fairness and concern for employee's careers.

123

7. A formal employee <u>speak-up program</u> to deal with people issues in real time. Such a program provides employees with a "safe" way to raise current troubling issues to a level in the organization where they can be handled. Speak-up is not used often, but when it is, it is an important signal. The old saying is true: "Where there is smoke, there's fire." Any action taken to correct a wrong spreads through the informal network with amazing speed, making a very positive impact.

Build Participative Structure

With sound personnel support systems in place, the next major step is to create a participative organization structure. Most long established organizations are not designed for a participative management approach. The first lesson that I learned was that "too many cooks spoil the broth." Organizations tend to be overloaded with meddling managers and staff that too often do more harm than good and add major expense burdens to an organization. I found it necessary to <u>reduce the number of reporting levels</u>, broaden the span of control and cut back on the number of <u>staff personnel</u>. Unnecessary overhead limits responsibility of the person doing the work and complicates the communication process. It is important to entrust a person with a job and then trust him/her to do it without unneeded bureaucratic red tape or management hierarchy.

Even more importantly, a <u>participative organization</u> is not a free form structure. Rather, it is rigidly structured with a disciplined management system. In order to trust a manager and delegate important issues, you need to have an agreement on the basic plan of action, the general magnitude of resources that are to be utilized, and a non-meddling way of staying in touch. I found that by installing a systematic approach to planning, budgeting, coupled with formal periodic reviews of progress, responsibility can be delegated effectively. Instead of being involved in every action, managers can define a broader arena for subordinates, and then let them alone to apply their American ingenuity and implement the details. A good plan provides an initial understanding of the task and approach, the budget identifies the resources required, and the regular reviews of progress permit continual adaptation as circumstances change, as well as a continual focusing of organizational activities on the issues that count in gaining a competitive edge.

At Mead Merchants we developed an annual plan that included specific change actions supported by a profit budget. In depth, face-to-face reviews were held quarterly where modifications were made to the basic plan. Monthly, a formal and quick review of the progress on specific planned actions was reviewed. Then day-to-day the manager was expected to be in touch and available for coaching. This idea of "management by wandering around," provides the needed personal support and motivation.

A well thought out management system permits the delegation of responsibility, giving others the freedom to operate their own show without the interference by nit-picking staff or meddling bosses. It stimulates creativity and individual initiative. Organizations must be participative and flexible, yet at the same time structured and disciplined.

We had to work hard to make sure that the management system was not viewed as restrictive, but was viewed as an important disciplined process. It helped all of us focus our efforts and communicate problems and opportunities in our mutual pursuit of excellence. This system must never become bureaucratic or impersonal. It must be alive and human in nature. This concept is consistent with another principle of Ouchi's Theory Z: the need for informal and implicit controls coupled with explicit measurements of progress.

Finally, to assure broad participation, every leader must formally create the proper forums for participation. This involves establishing coordinating committees, policy boards and task teams. These can range from a daily get together to address quality issues in production, to monthly executive policy meetings. Task teams can be used to address issues ranging from redecorating the cafeteria to the development of a business strategy for a new product line. These groups need to be formally structured. I found it useful to think in terms of structuring the time that certain people are together to address mutual problems. Structuring the time spent together facilitates the ongoing communications and consensus-building activities.

Conclusion

Theory Z is an American concept that works. It works because it deals with the issues that are required to gain employee commitment and mesh organizational goals with individual goals. Every leader can put it to work. All that is required is a <u>strong belief in people</u> coupled with a commitment to the continual pursuit of excellence. The steps are as follows:

1. Build a cohesive top management team.

2. Create a strategic vision and communicate it effectively.

3. Build <u>strong personnel support systems</u> in the organization that reinforce the beliefs in people, and permit employees to build broad careers.

4. Create a <u>participative organization structure</u> to facilitate problem solving and consensus building.

The other essential ingredient required is <u>leadership</u>. Leadership requires caring and believing in people, wanting to be the best, and a commitment to action. I can attest through personal experience that the bottom line of Theory Z is the creation of a highly competitive organization through greater utilization of the organization's human resources. By following these simple steps for change, a more human organization can emerge where people really do count. People's energies

124

become more focused on activities that count
toward building a competitive edge.

There is a bonus to this planned process of change.
Because the employees involved in a Theory Z
organization feel better about themselves, they
also become better contributors to society. By
building Theory Z organizations, managers have a
unique opportunity to change society and make it
a better place to live. The time to begin is now.

Issues For The National Agenda

The key issue in building highly competitive
industries lies in the development of longer term
relationships among employees, customers, owners,
and suppliers. Relationships that are mutually
satisfying. This has a few national policy
implications:

- We need to stabilize the ownership of firms
  and discourage gross financial manipulation
  that takes place regularly on Wall Street.

- We need to stabilize our workforce by
  imposing penalties beyond the marketplace
  for firms that follow a hire and then fire
  policy.

- We need to support internal firm-specific
  training and education.

- We need to develop long-term supply relation-
  ships. Government contracts should be
  placed with the idea of providing stable
  and long-term employment within a single firm.

- We need to encourage cooperation within in-
  dustries to facilitate the development and
  implementation of new technologies.

We simply need to gain a better understanding
about the source of our competitive edge as
individual firms and as a nation. It must be
recognized that true competitiveness comes from
people who collectively possess unique knowledge,
who know how to work together, and are afforded
the organizational flexibility to apply it, and
the commitment to accomplish tough goals.

5

125

-- NOTES --

126

Sony Keeps High Quality and Productivity in the United States

S. Wada, Sony Corp. of America, New York, NY

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

128

Sony Keeps High Quality and Productivity in the United States

Sadami (Chris) Wada[*]
Sony Corporation of America
New York, New York

1. Quality and Productivity Depend upon the Management

Good quality control results in good productivity. There must be a certain quality standard for which a quality system can be established. With such a quality control system, neither unnecessarily higher or lower quality material or parts than the desired quality standard will be put into production. Unnecessarily higher quality input will increase the cost while lower quality input will create waste, both of which result in bad productivity. Quality control and productivity cannot be separated. This is especially true when we are discussing competitiveness. You must deliver high quality at competitive price.

At Sony, the responsiblity for productivity is believed to rest with the management for the most part. Productivity and quality have no nationality. U.S.-made products in California and in Alabama by Sony favorably compete Sony's made-in-Japan products. It is good business for us to manufacture high quality TRINITRON color televisions in San Diego, California, not only to sell in the U.S. but also to export to Canada, Latin America and other parts of the world. It is also a good business for us to manufacture video cassettes and audio cassettes with high technology in producing highly sensitive magnetic recording tapes in Dothan, Alabama, for the domestic as well as international market including Canada, Europe and Mid East countries. In those overseas market, made-in- U.S. Sony products win the market competition with products by world's leading manufacturers. We at Sony believe the productivity and the quality are the responsibility mainly of the management.

2. People's Dedication is Most Important

You raise capital for your machine, automated control system, or computer-controlled robots. You can have technology purchased or licensed with all documents and schematics you want, but, without people's dedication, there will not be quality nor productivity. You cannot buy dedication from people. I mean true and sincere dedication. Only genuine dedication to the people win their dedication. This is true with your workers in the plant as well as with suppliers of material and parts regardless of their size. How can you receive support beyond the call of duty or beyond the call of contract.

[*]Vice President, Assistant to the Chairman

If the relationship is one of those adversarial confrontation attitude, you will have no high quality or high productivity. You will have continuing problems in production and will not get near the international competitiveness in the keen market. It seems to me that this adversarial confrontation attitude is getting very popular among all kinds of people's relationships, such as between management and employees, government and people, parents and children, teachers and students, and everywhere you can find even a small conflict of interest. It is important that we have a common goal and a common pride that will help us override conflict of interest by making honest and sincere efforts. Management must show and prove their dedication to the people at the same time giving them pride for the common goal.

3. Our Experiences at San Diego and Dothan

We have very successful experiences in terms of relationship with the people, quality of products and their total productivity. Certainly we have very high manufacturing technology and equipments of highest quality in those places, but without the kind of dedication we have with our employees, we would not have our high quality and competitive productivity. Through our experiences with them, we say that we have earned it. We may also say that they reciprocated our sincere interest in their welfare with their dedication.

This exchange of dedication has been going on since founding of those two plants in the atmosphere of everyone finding pride in the quality of Sony products in general. In this atmosphere quality and productivity make the basis for our pride. All human beings need basis for pride. We are far more than an animal. We do not live for bread alone. We do not live for adversarial confrontation either. We have something else at San Diego and Dothan.

4. San Diego Plant and Dothan Plant

At San Diego Plant, we have 1,800 people and at Dothan Plant we have 1,700 people. At both plants, we have a very small number of Japanese personnel; about 40 or less than 3% at San Diego plant and only one permanently stationed Japanese with several visiting transient personnel from Japan at Dothan Plant, which make it even less than 1%. The 4,500

1

employees of Sony Corporation of America are proud to be contributing to the international position of the U.S.

5. Sony Family

We call our company and our asociation Sony Family. By this concept, you are trusted and respected as a member of the Sony Family. You are not a number or a computer card. Supervisors and managers pay utmost care and attention to their people. Individual preference is respected as a member of the Sony family and an individual is never treated like a piece of machinery. Therefore, once hired, people generally stay with Sony, and at San Diego plant except for reasons of marriage or transfer of military spouses, they do not leave Sony. In Alabama, Sony plant is so popular, we constantly have so many people wanting to have jobs with us. Since we started our magnetic tape plant in 1977, 35,000 people have applied for the current maximum of 1,200 or so jobs. One of the Dothan employees says, she has gotten her daughter on, and her son-in-law and her sister, too. She says, "If they have got any regrets, I just haven't heard about them." Another, who operates a special machine that Sony developed for making broadcast tape, says, "I feel more respected here, more important." She, also says, "They talk about the Sony family and all that. Listen, I believe in the Sony family."

One of the supervisors at San Diego plant promoted internally, as most of them have been, from line work in response to a question; "What impresses you the most about working for Sony?" says, "The top management people. When I came to work here, they would say 'Hi' and then 'How are you?' They really make you feel at home. The first day I was here, I knew this was really like a family. We all can help others."

Neither at San Diego nor at Dothan, we find any job-hopping to other companies. At San Diego plant, our popular and well-like No. 2 man, Mike Morimoto, our Vice President, is so dedicated to this cause that he can call several hundreds of the Sony Family members there by their first names. He is familiar with employees' individual situations and their families. He mixes actively and affectionately jokes with them, all the while keeping his door open to our people at the plant. He certainly does not affect any of the stiff and auster formality that we regularly find, in fact, expect with Japanese in high positions. He relates directly and encourages his supervisors and managers to do the same to fellow workers as members of the Sony family in the spirit beyond the employ-

ment contract.

In this regard, at both San Diego and Dothan, we make it a matter of great concern for the whole family of Sony, to constantly demonstrate the human factor and personal aspirations as well as self-esteem of all our Sony family members. Here the most important concept at both San Diego and Dothan, as well as throughout the entire Sony is this Sony family.

6. No Layoff

When I first heard about the common American way of hiring and laying off so easily, I thought it was a paradise for businessmen. Now I know why some American companies do not receive dedication from their employees usually with results in poor quality and sad productivity.

Neither at San Diego television plant nor at Dothan's tape plant have we laid off our people. We are proud of it. How could you readily lay off members of your family? We hear and read about American companies laying off people so readily after a week or so of bad business. When railroads or ports are struck, many companies lay off people so readily. You say the Government takes care of them, but how could do this to your family members? What happens to their feelings--their self-esteem?

At San Diego, during business downturns rather than layoffs, we create work opportunities within, such as cleaning machines and equipments or even painting the plant. When we had a real business slowdown several years ago, we thought of rearranging work shifts since we had three operations at our picture tube plant. But, we did not do this as such a change of shift would create an inconvenience for their private lives, such as the arrangement of baby-sitters and the like. As a result, we created other work opportunities, such as cleaning and painting of plants that were in need of refurbishing.

Our people understand our sincere and genuine concern and our effort in trying to avoid any layoffs to the extent possible. It is a matter of wise business judgement and strong determination on the part of the management. In this process, we create the spirit of Sony family.

7. Pride in Quality Rather Than in Volume

If you had walked through our San Diego plant for color television a few years

2

130

ago, you would have seen a very conspic-
uous large sign reading; "This is it.
Assembly Line #2. 200 days without a
major defect." Achieving 100 days is a
very difficult task. This Assembly Line
#2 at San Diego holds the Sony worldwide
record for quality.

Sony is built upon research and quality.
Therefore our staff visits suppliers of
parts and components to make sure they
have right systems for manufacturing
parts and components that fall into the
required quality standard. Screening
by rejection only increases cost, there-
fore, efforts must be made to manufacture
right the first time. This is the real
quality control. You must be able to
attain desired level of quality with
least waste. So we have very close com-
munication with suppliers.

Our managers, supervisors and foremen
are thoroughly educated in the policy
that quality is the very life of Sony
products. They were brought to our
factories in Japan to experience them-
selves how much effort goes into keeping
our quality. They are also trained in
the field to understand how important
quality is for sales and for after-sales
service.

Another important concept is housekeeping.
At San Diego, this principle of house-
keeping governs the task of keeping the
work site neat and well arranged in the
belief that high quality products can
not be expected from sloppy, dirty work
site. Its side effect is also important.
Our workers begin to regard his workshop
like his own home or room and such an
attitude tends to boost the morale and
productivity further more.

We also emphasize completing the job be-
fore leaving his workshop. There was
a habit of stopping work in the middle
of doing something at the bell for
break or the end of the day's work.
This habit has been changed to complete
the work before leaving. This greatly
contributed to the improvement of
quality.

Our people at San Diego are happy when
they see Sony TRINITRON color television
sets, highly priced for first rate
quality, prominently displayed in the
premium place of major stores, attract-
ing sophisticated buyers who demand
top quality. They realize this is the
value of quality. Pride grows
naturally in us.

We give special recognition to quality
achievements by awards and plantwide
celebrations. Sony San Diego and Sony
at Dothan make it their commitment
to keep the quality of their products

high. At Sony San Diego they compete,
in-house, among lines and various pro-
duction units. Here you do not have to
worry which color televisions were made
on Monday or Friday. They are made in
San Diego and are all good regardless of
which day of the week they were made.

8. Interested in Job and Morale is High

I have some feedback from an independent
outside researcher who reported that
employees at the Sony San Diego plant
were, on the whole, better educated than
those at other television producers.
Moreover, they show a thirst for variety
and enjoy changing positions in accord
with their preference. Automatic and
systematic rotation is avoided and in-
dividual preference is repeated. This
policy enriches knowledge, skill and
broadens the competence of our people
and results in their deeper and wider
understanding and commitment to our
entire operation. Basically, this is
the respect to the human dignity.

Our assembly lines at San Diego demon-
strate unhurried efficency. This is
because the lines move slowly enough
to allow each worker to perform an
average of ten or so operations. This
measured speed of our assembly lines is
very important to morale. When you move
the line fast, workers feel hurried and
each worker will have less operations
in a more routine manner. Interest in
work will decrease and morale will go
down. Workers will be anxious to see
the line come to a stop. Their sole
interest tends to become volume-oriented.
You may achieve volume but not high
quality. You cannot have both in this
way.

At the Dothan plant for video cassette
and audio cassette with magenetic
recording tapes, they hold monthly meet-
ing of all employees. Since we have
three shifts, we hold three meetings at
which everyone attends with no exception.
It runs about one hour. Their top man-
agement reports to them all about sales,
production, problems, new developments,
new planning, and any other related
matters. All promotions are announced
at this general meeting and those being
promoted from one level to another are
called forward for recognition. The way
we do this is very sincere and we are
all happy about these things. We also
make it a point that at these meetings,
manager gives his presentation on qual-
ity control or any suitable subject to
his fellow workers. This meeting
strengthens our united spirit and keeps
up our morale.

At the Dothan plant, we also have what

3

we call Round Meeting. It is a monthly meeting of top management and twenty workers selected at random. No supervisors or managers of these twenty are present because the whole purpose is for the top managment to find out what they must do to make their place of work the most pleasant. The communication is literally direct and the top management is placing themselves in the position where no excuse is possible. Problems and questions take the least amount of time to find the answers. Naturally, therefore, morale is high and all those 1,200 workers selected out of 35,000 applicants are interested in improving their operation with the top management.

At San Diego, its No. 2 man has the open-door policy and anyone can go through his door for quick and immediate answer for his or her questions. At San Diego no one feels uncomfortable talking to this No. 2 man and that is his valuable asset. A certain professor of Stanford University, who has studied Sony's operation extensively, says, "That man is a genius. He is the finest example of what I call an 'integrator' necessary for a company to relate Japanese traditions and management to American ideas."

He has created our San Diego style management, which is not Japanese management style nor American management style. It is uniquely San Diego style. It is different from Dothan style. Sony creates the style of management best suitable to each case and location. But, regardless of the style, Sony has sincere and genuine concern for the best of the people we work with. We are highly people-oriented at Sony.

This particular supervisor, whom I quote here, came to San Diego plant after her sister told her how nice Sony was. She says, "Yes, it (meaning being a supervisor) is at times very hard. You always worry about quality and quantity, but most of all you worry about the people, how they react."

You can see how we are people-oriented from top to bottom. We all like it and want to keep it that way.

Because we value people most, we do many things in our effort to reach them and to hear their problems. In this effort, at both San Diego and Dothan, we have our hot line. In San Diego, you dial 600 and in Dothan 300. Both are hot line numbers to get the quickest answers for your questions. The recording is checked everyday by the Personnel Department and the employees so communicating receive their answers within a few days. If the message is anonymous, the company news, Sony NewsBoy, in San Diego and

Playback in Dothan, will carry the answers. Our employees are very pleased with this. This once again shows the company's open attitude and eagerness to communicate with everyone in the Sony family.

9. Conclusion

I would like to give the recommendations our Chairman made at the Japan-United States Economic Relations Group as one of the so-called Wise Men's Group. He made these recommendations for increasing quality and productivity.

(1) Take personnel expenses as fixed costs, rather than variable cost.
(2) Educate workers at all levels.
(3) Let every worker be conscious of quality.
(4) Let every worker have the sense of participation.
(5) Try to increase the flow of communication.
(6) Show the direction the company is taking towards the future.
(7) Make generalist at every level.
(8) Understand that in the total process, productivity is not only a matter of efficiency but also of human nature.

Once again, I would like to repeat that quality and productivity are inseparable and that they are mainly responsiblities of the management, and also that even if you secure needed capital, unless you have the heart of the people, you cannot make it. Adversarial confrontation attitude is the worst enemy. You must have people-oriented management, even at the cost of dividends, bonuses and executive salaries. Management must have courage and determination for it.

Thank you.

132

-- NOTES --

134

The Dana Style: Participation Builds the Climate for Productivity

C. H. Hirsch, Dana Corp., Toledo, OH

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

135

136

THE DANA STYLE:

PARTICIPATION BUILDS THE CLIMATE FOR PRODUCTIVITY

Carl H. Hirsch
Vice President, Corporate Planning
Dana Corporation
Toledo, Ohio

Abstract

The Dana Corporation is a manufacturer of traditional vehicular and industrial products. Yet Dana is also widely recognized as having one of the most innovative programs in American business for building productivity through people. Called "The Dana Style," this program emphasizes that any person is the best authority on how to do his or her job.

Two key elements of The Dana Style are productivity through people, and autonomy & entrepreneurship. The former works through an employee stock purchase plan, quality circles, productivity gain sharing activities, continuous communication, and similar efforts to tap the skills of all Dana people as the company's most productive resource. The latter defines an organization in which management is reduced through regionalization, task forces, councils, and committees.

Each element is intended to remove the management barriers to the productivity gains of which every person is capable.

Text

In an era of computer technology and explosive service industry growth, the Dana Corporation at first glance seems a little out of date. Our size is significant, but hardly unusual: we are the 138th largest industrial corporation in the United States, and expect 1984 sales of around $3.5 billion. Our scope of operations is worldwide, but hardly on the scale of IBM or Exxon: there are 25,000 Dana people at work in the United States, and another 10,000 people in 23 different countries around the world. And finally, our products are sophisticated, but hardly "high tech": Dana's business is the manufacture and marketing of power transmission products for the highway vehicle and industrial equipment markets. As our own corporate statement of direction states, our goal is to be leaders in the mainstream of technology, not on the cutting edge.

Beneath our surface appearance, however, Dana is a highly unique company. What makes us unique is the way we create a climate within Dana for productivity and for growth. We call our approach "The Dana Style," and it has been our guiding philosophy for most of the past two decades. The Dana Style is founded on a common sense realization that far too few organizations put into practice: each person is the best authority on how to do his or her job. The founder of our company, Charles A. Dana, said a half century ago: "There is only one thing really worthwhile about an organization, and that is its men and women. No one knows better than I the value of advice direct from the workman." That approach is the basis for The Dana Style. Here's how we put it today in a booklet on The Dana Style that is given to every Dana person: "The people of Dana, who are doing the job, know best how it should be done. Dana people share the responsibility to decide what their job is, and to judge how well it is being done."

We think The Dana Style has been responsible for our success as a company, and so do the authors of the best seller, In Search of Excellence. They described Dana as "one of the most impressive success stories in people and productivity," including us in their list of 15 examples of American corporate excellence. And their evaluation has been supported by other business analysts who have examined Dana. In the past year, we have been included in a book discussing The 100 Best Companies to Work For in America; we have been cited by Fortune magazine as having one of the ten best managed manufacturing operations in the United States; and we have been placed by Savvy (a magazine for executive women) on their list of corporate meritocracies--"companies that boast an environment where opportunity, progress, recognition, and profit are available to any employee willing to make an investment of intellect and energy."

The key ingredient in all these evaluations of Dana is their recognition of the importance we place on Dana people and their participation in the life of the company. If we have been cited for excellence in management, it is because every Dana person is a manager--of his or her productivity. This type of participation is true excellence in management, and is the essence of The Dana Style.

1

Excellence, of course, is a characteristic that is difficult to define precisely. Messrs. Peters and Waterman set In Search of Excellence's definition of excellence as the attitudes and beliefs within a company (what they call "culture" and Dana calls "Style") that allow it to respond adroitly to continuous change in the company's operating environment. Peters and Waterman singled out eight characteristics of the excellent companies that they examined:

- A bias for action: do it, fix it, try it.

- Stay close to the customer: learn from the people you serve.

- Autonomy & entrepreneurship: foster company leaders and innovators.

- Productivity through people: do away with "us versus them" attitudes.

- Hands on, value driven: manage by wandering around.

- Stick to the knitting: stay close to the businesses you know.

- Simple form, lean staff: avoid the matrix organization.

- Simultaneous loose-tight properties: control only what's important.

That's a thorough list, and we at Dana believe that all of them are important. We have a brief list of "40 Thoughts" that summarize our operating philosophies, and all eight of the In Search of Excellence characteristics are well represented there. But, of the eight, two are absolutely crucial elements of The Dana Style: productivity through people; and autonomy and entrepreneurship. The rest of my presentation will focus on these two key values, giving the practical way that we make them work to encourage productivity through the participation of all Dana people.

Dana does not impose corporate-wide rulebooks on its managers. We give each of them a one-page statement of policies and philosophies as their basic operating guide. Close to the top of the Policy Sheet is this statement: "We are dedicated to the belief that our people are our most important asset." That is a noble sentiment, and one would be hard pressed to find a company that does not endorse it to some extent. The Dana difference is that we view it as a hard-headed, dollars and cents business necessity. We believe that the productivity performance of Dana people determines whether we will be competitive enough to achieve our stated purpose as a company: to earn money for our shareholders and increase the value of their investment.

Our experience has shown us that the best way to get that kind of productivity performance is to rely on our people to set their own goals and judge their own performance. No executive, no consultant, is as knowledgeable about a particular business operation as the person who actually does the work--whether the work is running a machine, auditing a financial statement, or making a sales call. To show what that means in practice for a basic manufacturing company like Dana, let's look at three different sizes of Dana facilities and how they make The Dana Style work.

Our Engine Products Division plant is Hastings, Nebraska is representative of a smaller manufacturing operation in Dana. The plant is fairly new, having opened in the mid-1970's. It's basic products are piston rings and pistons. Hastings has 115 people, who work with the least supervision of any major plant in Dana: the plant's ratio of indirect to direct labor is just 0.21. Hastings has no foremen or supervisors, no expediters, no receiving clerks, no gage attendants, none of the many traditionally indirect people. Daily work effort is directed and coordinated by working shift leaders and working group leaders. Shift leaders are selected by the plant manager for their leadership abilities. Group leaders are selected by their peers for a three month period.

Hastings has no time clocks--everyone in the plant is on salary. We have an employee stock purchase plan in Dana that makes Dana shares available through payroll deduction, along with a company matching payment of 30%; company-wide participation is 75%, Hastings participation is 100%. The people of Hastings are currently evolving their own quality circle and statistical process control programs, but their achievements already are significant enough: productivity has tripled since 1979 (sales per person in real terms have risen from $36,000 to $106,000) and plant-wide absenteeism last year was only 0.7%. Hastings people make The Dana Style work.

Our Spicer Clutch division plant in Auburn, Indiana, is a good example of a medium-sized facility within Dana. Auburn is an old-line automotive components plant making medium and heavy truck clutches. It has 425 people, and the hourly work force is represented by the United Auto Workers union. Auburn is also the plant that Fortune cited as one of the 10 best-managed factories in America. It was the first plant in Dana to develop quality circles: the people of Auburn launched their own program in January of 1982, after a year of planning

2

and study. Today Auburn has 22 quality circles with 250 members, each of whom gets one paid hour off a week to participate in quality circle meetings. The Auburn quality circle members have developed their own logo for the program, a circle that contains four words: trust, job security, communication, and teamwork. Circle members wear T-shirts with the logo while on the job and at meetings.

It should be noted that no one in Dana puts any restrictions on the kind of programs that a plant can institute to improve productivity and quality. About one-third of our plants use the Scanlon Plan of productivity gain sharing, and other plants have their own unique versions. Our second clutch manufacturing plant, located in Colorado Springs, Colorado, now has task forces of people working to combine their Scanlon Plan with quality circles to form a new animal—Scanlon Circles. The choice, and the results, are their responsibility.

Certainly, at Auburn, the results are impressive. Overall plant productivity has gone up 7% annually in real terms since the quality circle program started. Unit productivity (clutches per person per day) is up 26% in the same time period. Auburn has received special quality awards from such major customers as Ford and John Deere (the award from Deere was the first given to any plant in the country). And quality circles have brought some intangible benefits, too. Grievances have fallen from 168 in 1978 and 83 in 1981 to 1 last year and 0 so far this year. And in the past year, 27 hourly people (including one union steward) have sought management positions. Auburn is living proof that old dogs can be taught new tricks; but Auburn's tricks are self-taught.

Dana has its share of large manufacturing facilities, and one of the largest is our Parish Frame Division plant in Reading, Pennsylvania. Parish is one of Dana's oldest operations—it joined the company in 1919 as one of Mr. Dana's original acquisitions. Reading has nearly 2,000 people; the hourly workforce is unionized.

The people of Reading have taken responsibility for one of our most important efforts in Dana: total quality. Their vehicle is statistical process control—otherwise known as the Deming method. Over 250 people at Reading are trained in SPC, and one-fourth of all manufacturing operations have their quality charted by the machine operator. Such individual responsibility for quality has made Reading the only frame plant in the world with Ford's Q-1 quality award; its

General Motors quality rating is 142 on a scale of 145 (compared to 24 for its nearest competitor). Productivity improvement is also a Reading specialty: 1/3 of all salaried people are involved in a productivity gain sharing program to cut costs, and hourly people have their own productivity improvement program where the number of suggestions doubles annually. The result is one of the best productivity performances in Dana, with a plant return on investment of 46%.

The Reading emphasis on quality and productivity suggests a third characteristic—involvement. Over 87% of the people own stock in Dana. And 39 people have taken all the required courses on asset management, cost control, and problem solving at our training center, Dana University, enabling them to become Dana Certified Supervisors—the most at any plant. The impersonal nature of large plants can breed apathy or hostility. Reading has found participation to be the cure.

In discussing the specifics of participation and productivity at Hastings, Auburn, and Reading, I mentioned several factors that are important company-wide elements of The Dana Style. Our stock purchase plan gets people to identify with Dana by making them owners of the Company: last year Dana people put out $17 million of their own money (along with $5 million in Dana's 30% matching contribution) to buy 846,000 shares of stock. The Scanlon Plan is a productivity gain sharing program in which all people in a plant suggest ways to cut costs and improve output; when dollar savings rise past a base rate, the amount is divided between the people and the company (usually on a 75%-25% basis) as a "bonus." And our total quality approach encompasses quality circles, statistical process control—anything to make people see that quality is essential to every activity in the company.

But the key element that makes productivity through people possible is communication. Communication is stressed at every level of the company. A plant like Auburn is a good example. In addition to regular group and department meetings, Auburn holds 6 plant-wide meetings a year in which everyone is told the details of the plant's financial performance, marketing plans, and competitive position. A closed circuit television system in the plant gives everyone ongoing information on Dana stock, plant performance levels, and general news items. And there are 20 or more special plant meetings a year on specific topics like the stock purchase plan.

Supplementing the communication activity at any plant is Dana's company-wide communications effort. The chairman of

the board sends a quarterly letter to every person's home, to discuss company performance and philosophy. A monthly communications newsletter goes to every Dana supersivor, providing information on finances, markets, products and strategies that can be passed on to those reporting to the supervisor. Our annual and quarterly reports are aimed at communicating directly with Dana people (of whom, again, 75% are shareholders). And every year our chairman and president make over 50 visits to Dana plants. At large facilities and small, they walk through the plant to greet everyone one on one (often arranging their schedules to meet people on all 3 shifts), then conduct a plant-wide meeting (complete with question and answer period) to discuss strategy, performance--and The Dana Style.

The bottom line of our communications effort is a statement from The Dana Style booklet: "There are no secrets at Dana." It is impossible to create the trust and participation that bring productivity gains without full and open communication. Productivity through people doesn't come by magic, and we don't claim to be perfect, but we know full well that without such a complete and constant effort, the Dana Style wouldn't work.

The second characteristic of excellence that I wish to discuss, autonomy and entrepreneurship, is really the flip side of productivity through people. To make productivity through people work, people must have the freedom to do their jobs in the best way they know how. If every person is truly to be the manager of his or her own productivity performance, corporate organizational structure must be such that individuals have the maximum self-responsibility. Here's how the process works at Dana.

Dana is a decentralized company. Our corporate staff is a group of just 85 people, who largely do consolidation and reporting. Operating divisions do not report to a single individual at the corporate level; divisional performance is reviewed by a group of 9 top executives which we call the Policy Committee. They create Dana's basic strategy, and the divisions create the tactics to carry the strategy out. We have no detailed strategic planning or procedures manuals. The only printed guides given every manager are:

- Our one-page sheet summarizing policies and philosophies toward earnings, growth, people, planning, organization, customers, communication, and citizenship.

- A one-page summary of "The Direction of Dana," emphasizing broad strategic guidelines to shape divisional tactics.

- A 12-page booklet, mentioned several times previously, that gives the basics of The Dana Style.

Corporate staff does little directing of divisional activities. Many functions that are ordinarily staff-directed (like engineering research, management training, and benefits administration) are free-standing, with services to be paid for by the divisions that choose to use them.

If our divisions don't report to the corporate level, where do they report? The answer lies in our own twist to decentralization: regionalization. Our worldwide operations are divided into four global regions--North America, South America, Europe, and Asia/Pacific. Every region has its own president, who chooses his own operating committee of regional managers. It is this committee that is directly responsible for overseeing and taking action on divisional performance. The yardstick by which performance is judged is an annual budget forecast that every division prepares for its regional budget review session--which we call Hell Week. At the Hell Week budgeting sessions for any region, only the regional officers themselves are present; there is no direct corporate involvement. At the midpoint of the following year, every division attends a regional Midyear Review that is open to all Dana people. There the divisions report how well they are performing compared to their Hell Week forecast; they also report new product, marketing, and productivity developments, and demonstrate whether they are fully implementing The Dana Style.

Obviously, a reporting system like this places a premium on divisional initiative and entrepreneurship. The performance forecast is the division's own; and performance evaluations place a premium on the division's drive and determination to meet its stated goals. To make sure that there is the necessary coordination between divisions and regions, we use a group monitoring system called Market Councils. There are seven Councils, one for each of our major product/market groups. The Council chairmen are top regional executives; and Council members are the division managers themselves. The Market Councils provide an ideal forum for the division managers to hash out the details of marketing tactics, capital spending coordination, and product development. They allow Dana to maintain control over a diverse group of operations, each striving to advance its own best interests. The Councils' motto is another one of our "Forty Thoughts": Do What's Best for all of Dana."

4

140

As should be apparent, Dana's organizational goal is to operate with as little formal management as possible. When specific issues arise that demand intense study and coordinated action, we create temporary task forces that deal with the issue and then disband. Using task forces, councils, and similar participative groups, we have lowered our company-wide indirect/direct ratio to a low 0.75. Our organizational goal is to have no more than 5 layers of management between any Dana person and the chairman of the board: (1) a first line supervisor; (2) an area manager who supervises groups of operations in a facility; (3) a facility manager; (4) a division manager; (5) a regional president. The Dana Style is based on the belief that the organizational barriers which inhibit productivity must be broken. Pushing responsibility to the farthest points of the organization is the best way to make entrepreneurship a reality.

Productivity through people. Autonomy and entrepreneurship. These two ingredients for excellence are also key ingredients of The Dana Style. The brief discussion I've given here demonstrates how one company has learned to pursue excellence by entrusting the pursuit to everyone in the organization. It's an unconventional approach; but, for every company (and every organization of any kind) in this nation, "business as usual" is an attitude we can no longer afford.

We increasingly function in an environment where excellence is not enough, because of increased competition--in the global economy, in the financial allocation of resources, in the demands of our society. The only way any organization can hope to meet the challenge is to utilize fully the most important resource available to us--people. To use our people to the fullest, we need their fullest participation in creating quality products, quality services, quality in everything we do.

The pursuit of quality is never finished, because the capacity of our people to produce quality is virtually unlimited. That's why we at Dana will not stop evolving and striving toward the goals of The Dana Style. It may be good-- but excellence is never really enough.

5

-- NOTES --

142

Getting Organizations to Accept New Ideas/Technology
"The Federal Express Experience"
F. A. Manske, Jr., Federal Express Corp., Memphis, TN

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

143

144

GETTING ORGANIZATIONS TO ACCEPT NEW IDEAS/TECHNOLOGY
"THE FEDERAL EXPRESS EXPERIENCE"

F. A. Manske, Jr.
Senior Vice President, Ground Operations and Sales
Federal Express Corporation
Memphis, Tennessee

I. Introduction

There are two types of change which occur within an organization. The first is "social change," which relates to how the people affected by a change think it will alter their established relationships in an organization. An example would be reassigning employees to new work groups away from their friends or close associates. For many employees, the enjoyment of interacting with others while working is a primary need. The second type of change is "technical." It involves making measurable modifications to the physical routines of a job. Federal Express Corporation's recent experiences in introducing massive technical change is the subject of this presentation. The principal focus will be on the actions taken by the Company's management to ensure acceptance of new technology which significantly affected the day-to-day activities of its 12,000 courier workforce.

II. The Company

Federal Express Corporation provides overnight, door-to-door delivery of time-sensitive goods (150 pounds or less) and documents throughout the United States, Canada, Europe, the Far East and the Middle East, using an integrated air-ground transportation system.

It operates a fleet of 37 B-727 aircraft, 11 DC-10's and 10,000 pickup and delivery vans. During the fiscal year ending May, 1984, over 67 million packages and documents were delivered. Since its inception in April, 1973 the Company has enjoyed a compounded growth rate in excess of 50 percent.

Besides its highly efficient air-ground system, much of Federal's success can be attributed to a highly motivated, non-union workforce which provides service unequaled in the industry. In addition, the Company has been extremely aggressive in applying computer technology. Federal Express is the largest user of privately-owned telecommunications in the country, as well as the largest generator of on-line data transmissions - over 600,000 transactions a day. There is approximately one computer terminal for every two employees -- far higher than business in general.

III. The New Technology

In early 1981, Federal Express decided to invest $1.2 billion over a ten year period to provide electronic document transmission service throughout the world. The service (marketed under the name "ZapMail") combines sophisticated facsimile equipment, an extensive packet-switched network and the company's enormous pickup-and-delivery force to provide a two-hour, coast-to-coast pickup and delivery of high resolution copies of documents. If picked up and delivered the cost is $35 for up to five pages. For customers willing to drop off the document to one of the 600 Federal Express Business Service Centers or offices, the cost is $25, and the delivery service commitment for documents of up to 20 pages is one hour. These new services were initiated in the United States on July 2 of this year.

IV. The Mission

ZapMail required substantial change in courier operating procedures and methods in contrast to the established system of physically moving packages and documents. With this in mind, it was decided to concentrate considerable effort during the early planning and implementation phases of the project (code named "Gemini") to developing widespread organizational acceptance and excitement for ZapMail. Below is a comparison of the major changes in courier/dispatcher job routines required for ZapMail, versus the existing package delivery service.

Overnight Package/ Document Service	Two Hour ZapMail Service
Most of the work load (approximately 75%) is known in advance so that the number of pickups and deliveries can be divided equally among the couriers. This enables the couriers to pre-plan and sequence the work so as to provide relatively smooth work days.	None of the work load is known in advance so that it can be pre-planned or sequenced. In order to meet the standard of transmitting documents within two hours, couriers must immediately be dispatched to make pickups and deliveries. The "drop everything and respond" requirement makes the work day hectic and unsettling to many couriers.
Couriers have minimal interface with electronic equipment.	Couriers are required to operate the electronic transmission/receiving machines and a computer keyboard by themsleves at unmanned mini-offices. They must also understand how to restock and unjam the machines.

In addition to making substantial changes to job routines, management was concerned that the couriers would be apprehensive about ZapMail eventually replacing physical pickups and deliveries. This raised the specter of possible layoffs and/or diminished opportunities for promotion.

In 1981, Federal Express management was faced with the enormous task of successfully introducing the most widespread technical change in the history of the Company. To many outside analysts, this was a high risk venture. As time progressed toward "Z" Day (July 2, 1984), the Company moved on a deliberate, planned path to ensure success in two key areas.

1) Equipment technology

2) Courier acceptance and enthusiasm

The purpose of this presentation is to focus on _how_ courier acceptance and enthusiasm was successfully accomplished by applying various strategies for introducing technical change.

V. The Building Blocks

Before discussing the strategies employed to introduce the changes required for ZapMail, it is appropriate to first comment on the characteristics of the courier workforce and the Federal Express corporate culture. An understanding of both areas is necessary to understand why certain strategies were utilized. The overall strategy was to build on the existing positive feelings in the organization and address areas of possible resistance to change in advance.

Federal Express has a young workforce: 75 percent of the couriers are under 35 years of age. Sixty-five percent are male, and 35 percent female. Racial minorities account for 25 percent of the population. The typical full-time courier is 29 years old and earns approximately $28,000. They are expected to maintain a high level of physical appearance and to provide exemplary service to their customers. Some journalists described the Federal Express courier work group as the "backbone" or "spirit" of the Company. The July 9, 1984 issue of _Business Week_ talked about "Federal Express' vaunted courier force."

As in all organizations, there are a number of prominent feelings or attitudes about what the Company stands for that influences how one should act in performing job assignments. The corporate culture at Federal Express is characterized by its often-used slogan of "People, Service, Profit." A long record of tangible actions has reinforced this "People-First Philosophy." A few examples are as follows:

1) There is strict adherence to policies that prohibit special perks for management. For example, there are no designated parking spaces at any Company facility. Also, all employees have equal access to jumpseat riding on Company aircraft.

2) A Guaranteed Fair Treatment Policy was introduced several years ago that enables employees to present grievances to top management without fear of reprisal.

3) Since Federal Express was founded, there has been a "Promotion from Within Policy" that ensures that most, if not all, promotions into the management ranks come from within the Company.

146

4) Employee briefings are conducted several times a week at every station to bring the workforce up-to-date on the latest developments in the Company. These briefings are supported by corporate-prepared video tapes and local management presentations. All officers, irrespective of job function, are expected to make station visits quarterly.

5) Every six months there is a distribution of a certain portion of the profits to everyone. The amount depends on the overall corporate profit level and the salary grade of the employee.

6) The size of existing Field operating stations is deliberately kept small (from 30 to 80 employees) in order to maintain the warmth and goodwill that usually occurs when everyone in an organization knows each other.

There is also a very strong service and sales orientation in the Company. One courier summed it all up when he told me, "I've stopped an entire office of people from working by telling them about our Hub and package sorting capabilities. On a crowded elevator, I've sold Federal Express to a captive audience while riding between floors. When I can't find the correct address in making a delivery, I keep trying even if I have to call the shipper or go across town to find the person."

"My route," "my customers" and "my Company" are statements prevalent throughout the system.

Finally, it is important to note that change has been a way of life at Federal Express since its inception. With a 50 percent plus compounded growth rate over the years, we are constantly outgrowing our facilities and procedures. New systems and service enhancements have been introduced at a rapid rate -- almost to the point that some people thought it couldn't be done. Time and time again, the "reservoir of employee goodwill" enabled the Company to maintain its competitive superiority.

For example, in October, 1982, it took only six weeks for the Company to change its service commitment for Priority One packages from 12:00 noon to 10:30 a.m. Over 1,500 couriers were hired and trained during this period, in addition to massive rescheduling of hours for the existing courier workforce. And, it works today as though we always had a 10:30 delivery commitment.

With this cultural back-drop, the Company embarked on its course of introducing ZapMail -- the most significant technical change experienced to date.

VI. Strategies Employed to Introduce the ZapMail Required Changes

There were six key strategies that were utilized to gain acceptance among the couriers for the changes in work methods required by ZapMail. At this point, I would like to discuss how each strategy was implemented to overcome various potential barriers to successful change introduction.

147

"ZAPMAIL" CHANGE MODEL

POTENTIAL BARRIERS	STRATEGY	ACTIONS TAKEN
I. COURIER INSECURITY o At worst, resistance to the ZapMail changes; at best, less than enthusiastic acceptance of the new product. o Concern that the widespread growth of ZapMail would eventually cause furloughs and/or diminished career opportunities as more and more documents were electronically transmitted from customer-owned or leased machines rather than physically transported by vehicles and aircraft. o As in all work groups, there are a number of employees who are content to do the familiar. In these people there is a strong sense of emotional security in knowing the ropes and a feeling of confidence that they have mastered the situation. When change is suggested, psychological security is threatened --	A) BE HONEST WITH EMPLOYEES B) CHANGE/REVAMP POLICIES TO OVERCOME SECURITY CONCERNS	o As soon as the features of the ZapMail product were developed, the details were communicated to everyone. Employees were told that initially many new jobs would be created and that some existing document shipments would be replaced by machine-to-machine transmissions. This straight-forward approach was well received. o In May, 1982, a new employee handbook was introduced that contained a special section titled "Your Job Security". The first paragraph reads: "Federal Express is dedicated to providing the maximum job security for each of its employees. The assurance of a stable and steady income is a critical element in reinforcing our People philosophy. To these ends, the Company will make every effort not to lay off employees except in the most extreme circumstances."

4

POTENTIAL BARRIERS	STRATEGY	ACTIONS TAKEN
o either directly or indirectly. The thought of changing established routine patterns of work conjures up the fear of the unknown.	B) CHANGE/REVAMP POLICIES TO OVERCOME SECURITY CONCERNS	o In December, 1983, a revision was made to the policy that governed how long a part-time employee had to work full-time hours before being automatically upgraded to full-time. The change enabled over 1,000 part-time personnel to become full-time prior to the introduction of ZapMail.
	C) DESIGN JOB(S) WITH EMPLOYEE NEEDS IN MIND	o A new product introduction strategy was adopted that limited the initial ZapMail product to a pickup and delivery service or a customer drop-off and delivery service. This ensured that the couriers would be involved in producing the product from day one -- a thought that was appealing to many.
		o Many of the technological changes necessary to successfully implement ZapMail were introduced well in advance of the July 2, 1984 start-up date. For example, dispatch computer terminals were installed in the courier vans during 1983 and the first half of 1984. The computers simplified the pickup portion of the couriers' job, thereby making the after-noons smoother and less hectic. An intensive campaign to sectorize delivery areas was begun at the same time the vehicle computers were installed. Sectorization enabled the automatic assignment of pickups by small geographic areas. This also resulted in smoother work days for couriers and dispatchers.

5

POTENTIAL BARRIERS	STRATEGY	ACTIONS TAKEN
I. <u>COURIER INSECURITY</u>	C) <u>DESIGN JOB(S) WITH EMPLOYEE NEEDS IN MIND</u>	Many employees began to feel that if such innovations for ZapMail made their jobs easier, they were all for the new product. o A ZapMail operating procedure was adopted that required the delivering courier to give the document to the addressee in person or to call the addressee if the document had to be left at a reception desk or with a secretary. Although it was deemed impossible to do this 100 percent of the time, the policy was designed to force a high level of interaction between the couriers and the document recipients. Because ZapMail is a radically new service, customer reaction to it was anticipated to be very favorable, thereby providing frequent positive strokes for the couriers.

6

150

POTENTIAL BARRIERS	STRATEGY	ACTIONS TAKEN
II. LACK OF COURIER ACCEPTANCE AND EXCITEMENT FOR ZAPMAIL DUE TO JOB CHANGES BEING FORCED ON THEM	A) INVOLVE THOSE RESPONSIBLE FOR PERFORMING THE NEW JOB(S) IN DEVELOPING THE CHANGES	o Despite the need to maintain secrecy for competitive reasons, it was decided to involve as many first level managers and couriers as possible in developing the new work methods and procedures.
o When change is forced on an employee, it often makes him/ her feel like a serf in a feudal management environment -- a victim of management's whims. Forcing change precludes participation/ involvement. This results in the employee feeling no ownership nor any importance in making the changes work.		A Field operating director, manager and courier were assigned to the Electronics Products Division to shape the general guidelines for handling ZapMail. Their role was to continually communicate with local operating management to obtain their ideas and input on the feasibility of various approaches.
		- In three cities, different work approaches and methods were tested. The participating couriers (over 100) were involved in all aspects of the test and the evaluation of same. Their input was instrumental in developing a system ZapMail operating manual.
		o In November, 1983 (eight months prior to the ZapMail start-up), all the operating managers in the system (approximately 300) attended a two-day workshop to develop their local resource plan (number of new employees and vehicles required). The managers were also asked for their opinions about the recommended systems and procedures that came out of the three city test.

7

POTENTIAL BARRIERS	STRATEGY	ACTIONS TAKEN
II. LACK OF COURIER ACCEPTANCE AND EXCITEMENT FOR ZAPMAIL DUE TO JOB CHANGES BEING FORCED ON THEM	B) COMMUNICATE IN A COMPREHENSIVE, INTENSIVE MANNER	o Early selection of the internal code name (Gemini) for the ZapMail product development implied that both the existing transportation business and electronic ZapMail would be twins or equally needed product partners in the Company's future. The cosmic implications of the name Gemini created a feeling of a futuristic, radically new product.
		o The corporate goal was revised as follows:
		"Federal Express, based on a strong adherence to its People-Service-Profit philosophy, is dedicated to offering competitively superior, highly integrated, and broad based networks for the totally reliable movement and transmission of high-priority business goods, documents and messages."
		o The philosophy behind the new goal was discussed at management meetings and employee briefings throughout the system in late 1981 and early 1982.
		o Approximately one year prior to the introduction of ZapMail, the operating officers conducted a series of employee meetings throughout the system to explain what the new product meant to the future of the Company and to everyone's job.

8

152

POTENTIAL BARRIERS	STRATEGY	ACTIONS TAKEN
II. LACK OF COURIER ACCEPTANCE AND EXCITEMENT FOR ZAPMAIL DUE TO JOB CHANGES BEING FORCED ON THEM	B) COMMUNICATE IN A COMPREHENSIVE, INTENSIVE MANNER	o In addition, a series of video tapes were produced and distributed to all Field locations to explain the nature of ZapMail, how it would work and its strategic implications. o In June, 1984 (one month prior to starting the new service), the largest live satellite company meeting in history was held for all employees and their families to announce the ZapMail product name and present the promotional plans. This was done prior to any public press releases or public announcements.

9

POTENTIAL BARRIERS	STRATEGY	ACTIONS TAKEN
III. POSSIBLE EMPLOYEE FEELING OF LACK OF CONFIDENCE IN THEMSELVES AND MANAGEMENT o With limited knowledge of the new product procedures (many of the procedures could not be finalized until tested under real-life conditions), couriers might become frustrated or concerned about their inability to immediately perform satisfactorily when the product was launched. o The often daily revisions to operating procedures because of the newness of the product could cause the couriers to lose confidence in management.	A) MAKE EMPLOYEE FEELINGS AND PERCEPTIONS A CRITICAL FACTOR IN MAKING DECISIONS RELATIVE TO CHANGE IMPLEMENTATION	o The decision was made to roll out the new product slowly -- market by market -- so as to provide time for all employees to build their new skills slowly and with minimal disruption to their daily routine. o In March, 1984, a massive training program was initiated to teach over 12,000 Field employees how to operate the new ZapMail machines. Over 150 instructors were involved in this effort. o A systemwide Field test was conducted in June, 1984 to eliminate as many bugs as possible in the new systems and to provide practice on how to operate the machines. o In each operating station one courier or agent was selected to become the ZapMail expert to assist in the follow-up training and communications. It was important to provide a peer expert for the couriers to turn to if needed. o A centralized "help" desk was established in Memphis with technical and operating experts to answer questions about how to operate the ZapMail machines. Phones were installed next to each machine in the Field so the couriers had ready access to needed assistance.

In review, the six key strategies used to
develop courier acceptance for the
technical changes required to successfully
implement ZapMail were:

1) Be honest with employees.

2) Change/revamp policies to overcome
   security concerns.

3) Design job(s) with employee needs in
   mind.

4) Involve those responsible for
   performing the new job(s) in
   developing the changes.

5) Communicate in a comprehensive,
   intensive manner.

6) Make employee feelings and
   perceptions a critical factor in
   making decisions relative to change
   implementation.

VII. Results

Obviously, with only two months experience
with the new ZapMail product, it is
impossible to determine if it will be
successful in the long run.

A number of outside communications experts
consider ZapMail to be a technological
breakthrough in the electronic transmission
of documents. Already major stories about
the product have occurred in The Wall
Street Journal and Fortune Magazine. The
volume of documents handled has been
building steadily as Americans learn about
the product's many and varied applications
to enhance communications and reduce the
costs of doing business.

One thing is certain, the overall objective
of generating high level initial acceptance
and excitement for ZapMail among the
personnel responsible for handling it has
been achieved. In fact, the couriers have
enjoyed working with the new product so
much, they have gone out of their way to
seek additional volume by talking it up to
their customers.

Only time will tell if the early excitement
can be maintained. Certainly, the newness
will eventually wear off, but the long-term
success of ZapMail has been greatly
enhanced by a very successful start-up.

11

155

-- NOTES --

156

-- NOTES --

-- NOTES --

Quality and Cost Competitiveness
J. A. Manoogian, NAAO, Ford Motor Co., Dearborn, MI

159

160

"QUALITY AND COST COMPETITIVENESS"

J. A. Manoogian, Executive Director, NAAO Product Assurance
Ford Motor Company
Dearborn, Michigan

Introduction

When I was contacted by David Braunstein of NASA, I was very pleased to accept his invitation to address such a distinguished group of people from private industry, government and the academic community.

We agreed the subject of my talk was to be "Quality and Cost Competitiveness". As the Executive Director of Product Assurance for North American Automotive Operations at Ford Motor Co., I knew I wouldn't have any trouble talking for 20 minutes on this subject, but I was concerned about how best to reach an audience with such a diverse background.

If you were members of the general public, or were unfamiliar with the strategies and weapons used in the "Campaign for Quality", I could center my talk around catchy "buzz words" like:

- "Do it right the first time", or
- "Quality is everyone's responsibility", or
- "Reduce waste and error", or
- "Do the right things and do things right", or even
- "Let's win this one for the Gipper".

But you've all heard phrases like these many times before. In fact, even though these phrases are based on sound principles, we've heard them so often that they tend to turn some people off. Why? Because they sound so simple; yet those of us involved in achieving world-class levels of quality and productivity know that the task is very difficult indeed.

On the other hand, if you were largely a group of statisticians, I could talk at length about Statistical Process Control, or Design of Experiments. But again, such an approach might turn this audience off. You're probably not involved in the direct application of statistical techniques. In fact, you're probably familiar with people in your own organizations who are turned off by the mere mention of statistics because to them it sounds like some form of black magic.

So where did this thought process leave me? I didn't want to turn you off. And more importantly, none of us should turn off the people in our organizations. Our job is to turn our people on. We won't be competitive in quality, productivity and cost by wishing it.

With that in mind, let me try to strike a middle ground between "buzz words" and technical discussion in this presentation. I'd like to:

- First, discuss the strong interrelationship of quality, productivity and cost, and the need for improvements in these areas; and

- Second, share the approach Ford has used to achieve dramatic quality improvements. Many of our approaches should be applicable to your businesses.

Quality/Productivity/Cost

Interrelationships

First, then, let's look at the relationship among quality, productivity and cost.

Let me begin with my interpretation of the scope and meaning of "quality" so we can have a common understanding.

The scope of "quality" applies to products and services, as well as to processes:

- The quality of products and services is the extent to which they meet customer needs and expectations, related to both function and appeal. This definition goes well beyond whether a part is defective and includes, for example, whether the product is aesthetically pleasing.

- The quality of processes refers to the efficiency and consistency with which they produce products or services. By the way, "processes" include management systems and operating practices as well as the manufacturing processes themselves.

If you fully appreciate the broad scope of our interpretation of quality, the inseparable relationship to productivity and cost should be clear:

- On the one hand, high process quality increases productivity and lowers costs through reduced scrap/rework/and inspection, and lower manpower and facility requirements.

- On the other hand, high outgoing product and service quality increases productivity and lowers costs through reduced repairs under warranty, and through greater market share due to an improved product reputation.

161

Ford fully recognized this need several years ago, and we've made some pretty dramatic improvements. For example, owners of our 1984 cars and light trucks report roughly 55-60% fewer things-gone-wrong with their vehicles than did owners of our 1980 models. And independent market research supports our advertising theme of having the best American-built cars and light trucks.

Need for Improvement

Having covered the relationship among quality, productivity and cost, I'd like to briefly touch on why improvements in these areas are vital.

In the case of private industry and the academic community, these improvements result in customer satisfaction and cost competitiveness with other organizations—factors that form the foundation for the continued viability of these organizations.

In government, waste and error result in low quality and productivity, with disastrous effects on costs and the speed with which needed action can be taken.

As an illustration of the negative impact on costs, the President's Private Sector Survey on Cost Control (popularly known as the Grace Commission) reported that one-third of all taxes are consumed by government waste and inefficiency. Even if this estimate is high, there's room for improvement.

I'm sure we can all think of examples in our own organizations where effective action was delayed because of low efficiency. However, an amusing recent article in the Wall Street Journal on the Colt .45 reinforces this point.

Apparently, the Pentagon has been trying unsuccessfully since 1979 to replace the Colt .45 with a 9mm pistol as the standard issue for the military. But it was reported that a combination of "interservice rivalry, politics, nostalgia and American Chauvinism" has blocked the demise of the Colt which was originally adopted by the Army in 1911 because it was powerful enough to drop a horse during a cavalry charge.

The issue of whether a handgun as powerful as the Colt .45 is even needed in the military anymore is still open. According to the article, the last time the Colt was usefully employed was in 1983 when a Marine stopped an Israeli tank in Beirut by banging the butt of his unloaded pistol on the hull of the tank until it stopped.

It's clear to me that the white-collar productivity associated with resolving this handgun issue has been extremely low.

Ford Approach to Quality Improvement

Operating Philosophy

Enough on the need for quality, productivity and cost improvements.

At Ford, we've made progress and I'd like to describe the approach we're using to achieve continuing improvements, in the hopes that you may find some applicability of these concepts in your own organizations.

In discussing Ford's approach, I will first cover our new operating philosophy, and then cover the implementation of that philosophy.

The new operating philosophy, or value system, that we established is to meet customer needs by encouraging all employes to pursue continuous improvement in the quality and productivity of processes, products and services through preventive actions within Ford, our supply base and our sales and service outlets.

I will explain only briefly why the elements of this philosophy are important because each one is based on common sense:

1) The customer is the final judge, so it is better to determine needs from the customer's viewpoint than from the viewpoint of the person or activity doing the work.

   The term "customer" refers not only to the external purchasers of our products, but also to our internal customers — the next person or organization in every stage of our business and manufacturing process.

2) All employes perform work, so it is better for all employes to reduce waste and error in their functions than it is for only certain departments to assume responsibility for quality. "All employes" must include the Company, it's supply base and sales and service outlets since they all affect the quality perceived by customers.

3) It is difficult to predict what competition may do or how customer needs may increase, so it is better to pursue continuous improvement than to reach an arbitrary goal and stop working.

4) It's inefficient and impossible to find and fix everything after waste or errors have occurred, so it is better to prevent them at every stage of the process. And,

5) As I previously explained, the quality of processes, as well as products and services, is important in remaining cost-competitive.

Implementation of Philosophy

Once the appropriateness of this operating philosophy has been established, the real work begins—how can we as members of management assure that these principles are put into practice within our organizations which have thousands of employes and many products?

In a nutshell, we have to recognize that change is required and that we've got to manage that change through effective leadership. Since I'm sure you'd appreciate more specific advise, I have a few helpful suggestions to offer you which fall within the following broad areas:

1) Commitment
2) Customer Needs
3) Employe Participation
4) Defect Prevention
5) Management Reviews
6) Suppliers and Sales and Service Outlets

Commitment
First, the subject of commitment.

It is vital that top management make a true commitment to quality/productivity leadership. This must be a long-term commitment that isn't compromised by pursuit of other short-term goals. And this commitment must be communicated to all employes, and reinforced through management's actions and involvement. Make no mistake, employes can discern whether management is just paying "lip service" or is genuinely committed. If the Chief Executive Officer isn't committed, the employes won't be either.

Customer Needs

Second, the subject of customer needs.

Your external and internal customers' real needs must be determined in detail through phone, mail or face-to-face interviews. These needs must then be systematically translated into objective product and process quality characteristics, with appropriate acceptance values and improvement objectives established.

This process is required to assure that all employes are working toward objectives within their specific areas that are consistent with the overall company's objective and achievement of customer satisfaction.

Employe Participation

The next subject relates to the promotion of employe growth and participation. Essential programs in this area include:

1) Education and training programs tailored to each activity's specific needs to assure all employes are familiar with basic problem solving and prevention techniques.

2) Employe Involvement, quality circles and other forms of teamwork to tap the knowledge and experience of all employes in cooperative efforts. The key here is to get all activities involved from the inception of a program, with a stronger interaction.

3) Recognition programs to provide a positive incentive for quality improvements efforts.

4) A participative management style to assure open communication and freedom from fear or punishment.

Defect Prevention Tools

The next category of implementation actions relates to defect prevention. Essential tools in this area include:

1) Statistical thinking and managing-with-facts to minimize the causes of variation, prevent historic and potential new problems, and make designs less sensitive to production variability.

2) Expanded application of technology to achieve efficiencies and reduce variability.

3) Product complexity reduction to achieve manufacturing cost and quality efficiencies.

4) Just-in-time manufacturing to improve balance, synchronization and smooth flow in manufacturing and purchasing functions.

5) Emphasis on controlling critical part characteristics with ongoing efforts to reduce variability.

6) Building quality into the design and employing capable processes to reduce the need for after-the-fact corrections.

163

Management Reviews

Another category of implementation actions relates to management reviews.

It is vitally important that all levels of management review the business processes, as well as the bottom-line results, to promote continuing improvements in both areas. These reviews should be conducted at key checkpoints in the development and prove-out cycle, should be based on managing with facts related to quantifiable measurements of process effectiveness, and should result in revisions to the operating and management systems to remove inhibitors to progress.

Suppliers and Sales and Service Outlets

Finally, fuller participation of outside supplier and sales and service outlet personnel in the quality/productivity/cost improvement efforts can be facilitated through actions such as:

1) Rating of supplier quality to recognize achievement and give preference in sourcing future business.

2) Longer-term contracts with fewer, high-quality suppliers to stabilize/reward quality suppliers.

3) Sharing our training and quality management approaches with suppliers and sales and service outlets, so they can be responsible for the quality of their own products or services.

4) Simplified diagnostic procedures to improve dealer repair capability.

5) Programs that provide a convenient mechanism for customers to register dissatisfaction with product repairs.

Conclusion

To sum up, I've covered the following points:

1) Our job as managers is to turn our people on to the need for quality, productivity and cost improvements.

2) Quality, productivity and cost improvements go hand-in-hand and are required for survival.

3) An effective operating philosophy should be based on:

   . Satisfaction of the customer's needs;
   . Involvement of all employes, suppliers and sales and service networks;
   . Striving for continuous, never-ending improvement in processes, as well as products and services; and
   . Prevention of waste and error.

I hope I've provided you with some thought starters that would be useful in your own organizations. Bottom line -- we've got to change, we think we know what the blueprint for change is, and we've got to manage that change with effective leadership.

That concludes my formal presentation, and I thank you for your kind attention. I'll be happy to answer any questions you may have or listen to your suggestions on this subject.

164

-- NOTES --

165

.. NOTES ..

166

Some Informal Remarks on the M-Form Society

W. G. Ouchi, The Univ. of California, Los Angeles, CA

SOME INFORMAL REMARKS ON THE M-FORM SOCIETY

William G. Ouchi*
The University of California
Los Angeles, California

Abstract

The paper describes the business-government relationship in Japan and compares it to similar relationships in the United States. In particular, the paper analyzes the impact that this relationship has on joint research and development in both defense and non-defense sectors.

When I was sitting down to write the last chapter of Theory Z some three and a half years ago, I intended to make it a grand statement on what I thought the role of government should be in restoring the competitive edge to American business. I said to myself, "Just suppose that every manager and every company in America were to do everything exactly right, then would all of our problems go away on the economic front?" And I concluded sadly that they would not. They would not because there remains a very serious problem of coordination between business and government.

Every company operates with a large number of common endowments. Some of them are physical, such as plentiful energy, land, and clean air. Others are social endowments, such as universal literacy, well established higher education with a research and development base, and honest and stable government. But there is one further endowment which we do not possess, but which other countries do. That endowment is the capacity for collaboration between business and government.

Professor Jay Barney and I have spent the last three years with a team of sixteen scholars at UCLA trying to learn something about business-government relations. As we looked more deeply into the problem, I reached the conclusion that it is entirely possible that your children and mine will never be able to look forward to the day when they will enjoy two cars, a boat, and a three-bedroom house in the suburbs. This is because a good deal of the prosperity that we have enjoyed for the past several decades has come about for reasons largely of industrial monopoly.

Before World War II, only 5% of the total GNP of the U.S. depended on trade. In 1950 it was still only 5%, and in 1960 it was still only 5%, but today it is 14% of our GNP. This is higher than most European nations and approaches the 17% of Japan. At the end of World War II, anyone who wanted to buy a ship, airplane, or ossiloscope had to buy it in North America. Much of the industrial plant of Germany, France, the U.K., and Japan had been destroyed. For nearly 40 years now, we have enjoyed an unprecedented period of industrial monopoly. While those countries were rebuilding, we supplied their needs.

Each of us can think of a time when there has been a monopoly, perhaps because a company had a better product or because it had government protec-

tion. Whenever there is a monopoly the stage is set for superstitious learning. In the case of a company it means that when there is a monopoly the management can stay home and watch reruns of "Let's Make a Deal" and yet sales and earnings continue to rise each year. But typically the management won't stay home, instead they'll come to work. they'll work hard, but no matter what they do, sales and earnings will rise. In consequence they will learn, and learn deeply, that they know how to manage that business. But that learning is in every way superstitious. It is just as superstitious as the learning by a primitive tribe that knows that if they perform a ceremony each evening the sun will return 12 hours hence. Probably one member of that tribe, an intuitive scientist, said, "I bet this is a bunch of hooey. I bet if we cut out this ceremony the sun would be back anyhow." And probably one of his colleagues said, "I bet you're right, but why take a chance?" Superstitious belief is difficult to change.

It occurs to me that a good deal of what we believe today about the underlying nature of our economy and how it should run is superstitious belief. We have on the one hand, an economic superstition which declares that the way to maintain the economic vitality of our economy is to cause each company to act entirely on its own in every way. In any industry, companies "A" and "B" should be made to stand in opposite corners with government in another corner. No combination of the three should be permitted to come together because what results will not be good. On the other hand, there is a superstition which argues that political-economic gridlock is the inevitable price of democracy.

This political-economic superstition has been expressed most recently and forcefully by Mancur Olson, a distinguished political economist at the University of Maryland.[1] Olson observes that in any country that has a long period of peace, those who are like-minded will find one another and form a special interest group. In time, these special interest groups will come to oppose one another. They will grow like weeds and ultimately will choke off the capacity of the nation to arrive at a national consensus, and therefore choke off the capacity to maintain economic vitality. He observes that in every Western nation, such as in the U.S., there has been a period of prosperity after the nation either lost a war or suffered a revolution. Those two catastrophic events are so completely upsetting that they will disorganize the existing interest group politics and make it possible to form a new national consensus. That will produce many years of economic growth until the weeds grow and once again choke off further growth.

What does this mean in the terms of an industry? It means that an industry that is young needs a certain form of regulation on the one hand, and of support on the other. But when that industry

1

matures, it needs a very different form of regulation and of support, if it is to maintain its competitive vitality. It means that we cannot sustain competition unless we can change the rules of the game to meet the conditions at hand.

Baseball remains the great American game. It remains competitively vital in part, because the rules are changed from time to time. When the pitchers got too big and strong, the mound was lowered. When the pitchers became too specialized, they introduced the "designated hitter." Basketball retains its competitive vitality because when the players got too big, goal-tending was outlawed and when the game became too defensive they put in the shot-clock.

If we can't change the rules, we can't maintain the vitality of any competition. What that means is that as a nation, we must be able to focus our most scarce resource, which is not air, water, or land, but political will. If we can focus our political will, then we can bring about the changes in the rules that are necessary to allow each sector of our economy to retain and regain its vitality. But to focus in that way, we must engage in social choice. The implication is that we're not going to answer everyone's problems at once, but rather that we're going to focus our energies on solving one set of problems at a time. Then next year we will focus on the next set of problems.

In a democracy, we cannot engage in social choice unless those not chosen will support the designated choice. But who will support a choice that leaves him or her with an empty bag? No one, unless they know with certainty that there will be serial equity. Each party must be certain that over a series of events, decisions, and years, that their sacrificial support today, or their selfishness today, will be remembered and re-paid in kind tomorrow. How can we know that there will be serial equity? Only by constructing units of social memory, the institutions which have the stability to remember and to re-pay both those who have been flexible and those who have been unreasonably rigid. What does it mean to think about putting in place a structure like this? Whenever we think about the problems of managing our economy, we turn by tradition to political scientists or to macroeconomists, but never to the scholars of business. Today some of our largest companies exceed in size and complexity some of the smaller national economies. You can't push the analogy too far because even the largest company is much simpler than the smallest nation or state. But we have learned some important lessons about how to manage and organize a large complex enterprise. These may be important lessons for managing our nation.

The research of the last seven or eight years has produced some tremendously important innovations in the microecnomics and the sociology of large important innovations in the microeconomics and the sociology of large organizations. One of the most consistent findings is that there are only three forms of corporate structure that are possible in the large enterprise.[2] The simplest and most familiar of these is the U-Form or unified organization, more commonly known, perhaps as a functional organization. It is called unified because the operating units have to stand as a group. None of them can exist or survive on its own.

Furthermore, it is impossible to assess the performance of any one department in a clear manner. As a result, when there is a dispute between functional departments, the only person in the organization who has the right set of incentives and information to make the trade-offs between them is the chief executive. One consequence is that as a U-Form company grows, the number of decisions that must be made by the CEO becomes overwhelmingly large. Then the company bogs down.

The second pure form of organization is the H-Form or holding company. In the true H-Form company the operating units have come in by acquisition and are involved in unrelated businesses. That means that there is no transferring of intermediate products or services between them. It means as a result that it is possible to measure with some precision the profitability and the return on investment attributable to each operating unit. The major task of the executive office is to conduct an internal capital market. It announces for example, "we have a capital budget of $50 million this year, gentlemen, submit your bids." The operating units bid for capital by offering promised rates of return, "I'll earn you 28%, 29%, or 34%. The task of the financial staff is to cast a cold and skeptical eye on these typically optimistic expectations, boil them down to something more readily believable, and then allocate capital on the basis of expected return. However, in an H-Form company the capacity of the units to coordinate together is very limited so that the corporate office, representing the organization as a whole, contributes little beyond summing the pieces. The research of the last several years very strongly implies that large companies of U-Form and H-Form are low-profit performers in the long run.[3]

The high performing type in the long-run is the M-form, for multidivisional organization. In the true M-Form company the operating units are semi-autonomous, that is, each stands alone and makes its own product line, but all of them draw upon some common resources such as corporate laboratories, marketing staff, or some manufacturing plant. One result is that the company is in an intermediate stage between centralized and decentralized. It is decentralized in the sense that each division is asked to operate as though it were a small entrepreneurial business so that the benefits of nimbleness and flexibility can be obtained. But on the other hand, because it is impossible to measure with precision exactly what has been contributed by each unit, it is necessary that all behave together as a team, and that there be some substantial capacity for memory about the subtleties of who has been flexible or too rigid in the past.

When an M-Form compnay works well, it is because the middle managers work as a team. To work as a team does not mean that they all share the same goals, nor does it mean that they love one another and walk arm-in-arm toward the future. It means, simply, that they trust one another sufficiently to be willing to confront one another directly and argue toe-to-toe when they have a dispute, for example, over the design of the new information system. If they will work together as a team, confront one another, and fight out their differences, then they can make a joint recommen-

170

dation to the executive office and the company works well. But if the middle-managers will not do that, but instead each attempt an end run and go directly to the chief executive and say, "Please do it my way", the result will be that (1) the corporate staff will balloon in size in order to study all of the claims and counterclaims, (2) the decision making will become more and more centralized in the chief executive, and (3) soon the middle-management will start to complain that the company is top-heavy, the staff intrusive and decisions too slow, without realizing that they themselves have created the problem. Another way to say this is that the essence of the M-Form organization, when it succeeds, is that it achieves a balance between competition on the one hand and teamwork on the other. That is precisely the problem that we face in our government.

The Japanese Diet is a bicameral legislature. It has 763 members and meets in a one-year session. In a typical one-year session, the Diet entertains 150 proposed new bills. Of those, on the average, 100 are proposed by the Ministries and 80% of those pass into law. Of the remaining 50, which are proposed by the Diet members and which are of the "pork-barrel" variety, on the average 18% pass into law. Overall 60% of the proposed bills pass into law.

The U.S. Congress is also bicameral, has 535 members, and meets in a two-year session. There are 22,000 bills proposed in the typical two-year session. Of those, on the average, 2.5% pass into law.

It is relatively simple to construct a situation in which there is only competition between individuals and no teamwork. It is also relatively simple to construct a situation in which one emphasizes only teamwork without individual competition, but neither of those works very well. It is extremely difficult, whether in an economy or a company, to have simultaneously an emphasis on a great deal of competition and on a great deal of teamwork. The M-form company can do both. That is the lesson of business that can be applied to the governance of our nation.

What does the M-form suggest at the level of an entire industry, rather than at the level of a single firm? Consider the structure of the microelectronics and computer industries in Japan. The computer industry was born in the U.S. in 1944 with the design of Mark I, a joint venture between IBM and Harvard University under a contract from the federal government. In 1946 the first commercial prototype machine, ENIAC, was built by the Univac Corporation.

The computer industry in Japan was born roughly 12 years later, the first computer being produced by a joint venture between NTT and the University of Tokyo. That first computer in Japan was followed by both individual company research and by a series of joint research and development projects with acronyms such as FONTAC, DIPS, and PIPS. In 1964 the Japanese computer industry was just starting to get off the ground when IBM introduced the System 360. The 360 was so vastly superior to any business machine on the market that it and its successors drove GE and Xerox out of the computer business and threatened to destroy the Japanese

computer industry as it was being born.

The Japanese responded with a strong form of protectionism which no one would argue was fair to IBM. In addition to protectionism, they began a new joint R&D project in 1965, the Super Computer. This was to be a copy of the IBM 360, but the Super Computer came to fruition just as IBM introduced the next generation, the System 370. It had such a superior price-performance ratio that it laid the Japanese flat once again. They responded with yet more protectionism, and also with two new joint research and development cooperatives, the three company CDL group and the company NTIS group in 1971. By 1975 the situation in Japan looked dark for the Japanese. IBM held 70% of the domestic Japanese computer market and the seven Japanese makers as a group held the remaining 30%.

In 1975 most observers were predicting that the Japanese would never succeed in the computer business. In 1975 one of the fathers of the U.S. semiconductor industry said to me, "Bill, the problem with the Japanese form of management is that it is so group-oriented and so consensual that it takes too long to make a decision. The semi-conductor business requires the capacity to turn on a dime, and that is why the so-called Japanese threat in semi-conductors will never develop."

The problem facing the Japanese in 1975 was simple. The first generation computer had been based on the vacuum tube, the second generation on the transistor and the third on the integrated circuit. It was clear to everyone in 1975 that the fourth generation machine would be based on very large scale, or VLSI integration. In all of Japan there were probably not more that 100 scientists capable of working at the forefront of VLSI technology and they were distributed across so many companies that no one company had enough scientists to represent a critical mass, capable of achieving a breakthrough. The seven companies approached their government and said, "Please bestow upon us large sums of money so that we can go out and recruit, hire, and train many young scientists and in a decade each of us will have two or three hundred scientists." The response of the government approximately was, "You must be kidding. First of all there isn't enough money in the bank, and second, if we were to give big handouts to rich companies like you the public would run us out of office. But if you can form a consensus", they said, "maybe we can help."

If we were faced with a similar problem in the U.S., how would we respond? Let me illustrate with an example. Today the U.S. is in danger of losing both its textile and apparel industries because the average wage in those industries in the United States is $6.85 an hour and in the People's Republic of China it is $.16 an hour. Despite that fact, our textile companies are competitive because of their tremendous automation. But the apparel makers, who are not as highly automated, are increasingly going off-shore. These foreign apparel makers buy their textiles off-shore and as a result the U.S. is losing its textile industry as well. The answer, in part, is for us to figure out how to build the fully automated sewing plant of the future. Then we can keep part of the industry in the U.S. by using our natural strength for those parts of the industry that belong here.

3

171

Several people have offered this suggestion to the members of the administration and of the Congress, "What do you think about sponsoring such a project and putting up some money?" Their response, "We'd love to do it. We will line up laws if necessary and put up the money. We'd love to see that happen, but here's the problem. What you're talking about is a project that would require the bringing together of companies producing apparel, textiles, fibers, sewing machines, robots, machine tools, lasers, computers, and software, along with several unions. There isn't any way for us to gather all of those poeple in and get them to agree on how to do this. If you can find a way, let us know."

That is precisely the problem which faced the Japanese computer makers in 1975. What did they do? They turned, first of all, to JEIDA to formulate a plan. JEIDA member companies agreed on a plan which involved a joint VSLI research association. Then, on behalf of its members, JEIDA went to the next higher level trade association, the EIAJ, which represents the makers of not only computers, but of consumer electronics, power generators, and the full range of electrical goods. They said to the members of the EIAJ, "Would those of you not in the computer industry temporarily set aside some of your own pet projects so that we, as a group, can get behind the VLSI joint R&D idea? In other words, would you stand aside so that the traffic may flow through the intersection, rather than everybody trying to jam into the intersection at once saying, 'me, me, me', thus producing political-economic gridlock." And the members said "Yes."

Then the EIAJ, on the part of its members, went to the Keidanren, and asked for their support. Here we need some explanation about the Keidanren, because there is nothing like it in the U.S. The Keidanren is a private organization initiated by business. It is organized a little bit like the United Nations. The "security council" equivalent consists of 812 of the largest companies of Japan, typically not more than 3 per industry. There is a small staff of perhaps 50 professionals, and there are 110 general trade associations which hold membership. Each of these associations has as its members specialized trade associations and they and their members represent one million medium-sized and small companies.

The Keidanren is not a unit of central planning, but instead resembles a great big "boxing ring." When there is a dispute between the chemical companies and the mining companies, between the life insurance companies and the securities companies or between the banks and the thrifts, they can step into this "ring", put up their dukes, and have it out. When there is a dispute between big business and small business they can step into this "ring" and they can "duke around." If and when they reach a consensus, they can go with one voice to speak to their government and lobby as a group.

The seven companies approached MITI through two separate avenues. The first avenue was through the MITI staff, which, unlike the U.S. Department of Commerce, invites participation from business. The MITI staff is organized in the simplest matrix one can imagine. There are several industry bureaus, each of which is subdivided into industry

specialties so that if you are in the shoe business, there will be two or three staff members who do nothing but maintain contact with and know everybody in the shoe business. Then there are several issue bureaus which cut across industries, but all you need is your contact man in the shoe section and he can instantaneously, through this matrix, put you in contact with everyone who will be important in whatever it is you have in mind. With a big issue like VLSI, however, you go, in addition, to the MITI Discussion Councils.

MITI maintains 38 Industry Discussion Councils, of which the most important is the Industrial-Structure Council. The one which deals with the computer industry is the Aircraft-Machinery Council. The several proposals currently before the U.S. Congress have called for the formation of a National Economic Planning Board whose membership would be one-third labor leaders, one-third business leaders, and one-third government officials. Compare that and think about its implications for the structure of the Industrial Structure Council. The Industrial Structure Council has 82 members of whom none are government officials. It is a private voice. It is a boxing ring into which come 28 representatives of trade associations, 20 people representing their own manufacturing companies, 11 university professors, 4 leaders of major labor federations, 3 leaders of the largest consumer groups, 2 senior members of the press, and 14 others representing groups such as the Council of Mayors and the Council of Governors. Now imagine such a diverse group achieving a consensus; it then needs no power beyond the power of free speech to attract the attention of the appropriate government officials.

The computer companies were able to activate a network that was already in place instead of having a chaotic scramble in which everyone is standing up and shouting at the same time. There was more reasoned dialogue and communication among all of the parties who had an interest in this problem. In addition, these institutions possess a stability and permanence which comprises a social memory. As a result, everyone has an incentive when entering into this discussion to behave in a reasonable way.

Agreement was reached that there could be a 4-year project from 1967 through 1979 and that the technology goal would be to move an order of magnitude from the then state-of-the-art 16K RAM, to the 100K device, and from the 100 gate to the 1,000 gate logic device. Here, we might think were all of these Japanese competitors linking arms with one another and marching off down the road happily together. We can't possibly imagine IBM, DEC, Honeywell, NCR, and Hewlett-Packard contemplating such a thing.

Upon closer inspection, however, what we see is not seven companies happily expressing their allegiance to country and to emperor. What we see, instead, is something much more familiar. We see seven companies, each of which at the outset intended to send to the project their least experienced young scientist, each hoping to contribute as little as possible and get back as much as possible. What we see is the normal amount of pettiness, of jealousy and elbowing for position. What we see is perfectly normal self-interested human behavior,

4

172

but working within a system that has a memory.

One of the first disputes was over the composition of the project. Of the seven possibilities, one company, NTT, didn't want to join. NTT had the most advanced microelectronics research and felt that they had little to gain and perhaps a lot to lose. Because the other six companies were all big suppliers to NTT, they couldn't put pressure on them and NTT never did join. Oki, on the other hand, wanted very much to be in the project, but the other companies didn't want Oki in. So they got together within JEIDA and drafted an agreement that said, "Any company may join this project as long as it possesses this specific set of technology," which they knew Oki did not possess, and Oki was cut out.

The five remaining companies then said to the government, "Now we're ready, we have the consensus, send us the money." And the government said, "Not so fast. Where's the joint lab going to be?" The companies said, "What joint lab? You're going to send us the money. We're going to do the research in our own labs and we're going to meet once a month and exchange papers." And the government said, "You must really think we're dumb. The public is not going to stand for large outlays of public funds for your companies. There has got to be a joint physical laboratory with human bodies in it that gives at least the appearance of true teamwork." The companies had been intending to focus their research on the 64K RAM, but when they heard this they realized that if there were a joint lab in which they worked on next year's products, they might lose some proprietary "Know-how." So they changed their target to the 1000K RAM, which was so distant technologically that there was little know-how to lose, and all agreed that there would be a joint lab.

But where was the lab to be? The 3-company CDL group insisted that it had to be their location. The NTIS group insisted that it had to be their location. They argued for several months, but there was no hope of compromise. Finally in desperation they turned to the head of JEIDA and said, "You choose and we'll abide." After a little study and a lot of fancy footwork, a location was picked. Everybody moved in.

When they moved into the laboratory, everyone knew that their plan would be to send their least experienced and youngest scientist in order to contribute as little as possible, and get back as much as they could. The laboratory chief scientist was a highly respected man from the Government Electro-Technical Lab, the ETL, named Dr. Tarui. Tarui did two things. First, he started out with the fact that there were only three research projects but there were five companies plus ETL. He specified six separate research projects so that each of the participating groups would have a project director. Then he announced that he would personally interview each of the scientists sent to the joint lab. He did not imply that he had the right to choose or to refuse anyone, but the simple knowledge of certain discovery within this system of memory, was sufficient to deter such behavior, and everyone sent their best.

The lab opened up, but the walls between units were thick, so thick that most of the scientists didn't come to the lab in the first year. Many were afraid that their friends back at their own corporate labs would think them of questionable loyalty. Mr. Nebashi, the lab director, responded to this problem. He insisted that the executive and operations committees, which consisted of top executives from the five participating companies, must have monthly meetings at the lab. As they came each month, they began to see that the other scientists were at least as good as theirs and that they had a good deal to learn. They started to pass down the word, "perhaps we should really work together. Perhaps we should open up." Meanwhile, each night Nebashi began a practice which he called "Whiskey Operations." This involved gathering up a couple of armloads of scientists each night, taking them out and drinking with them. After a couple of months of this, the walls came down, and people went to work.

At the end of 4 years, the joint lab had filed 1000 patent applications, from which they expect ultimately to achieve 500 patents. They had achieved the technology for the 256K RAM and the 1000 gate logic device. At the end of the project in 1979, the lab closed and the scientists went home. Dr. Tarui took a position at the Tokyo University of Science and Agriculture. Nebashi took a job at IBM/Japan.

In the interest of candor and of balance, note that Oki, which was not a part of the project, was the first company to test the commercially viable 256K RAM. But consider the implications of this example. In 1975, many observers were predicting that Fujitsu would fail. Fujitsu was the main Japanese computer maker. In 1975 many in Silicon Valley were saying that the so-called Japanese threat in semiconductors would never come to pass. By 1982, Fujitsu had replaced IBM as the major vendor of computers in Japan. The Japanese makers as a whole had taken over the home market.

During this period, it appears that IBM and other U.S. computer makers suffered from unfair treatment and protectionism. In addition, throughout this period, the U.S. Government had IBM under the threat of a Department of Justice anti-trust suit. So on the one hand, IBM was working against its government and against seven Japanese companies who were working together and with their government. Yet IBM held its own reasonably well. On the other hand, it is undeniable that what we see here is a new way to think about managing an economy and it is a view which violates some of our most deeply held underlying beliefs about what works and about what should be. If we find this example to be troubling, worrisome, and fearsome in some respects, perhaps that is because it works.

What do we do in the U.S. when we're faced with a problem like this? Consider an example. In 1978 the U.S. was, we thought, in the grip of the OPEC cartel. The public was clamoring for energy independence and the U.S. Congress had to act. There was the sun shining away, 12 hours a day. In 1978 the American Physical Society published a report on photovoltaic solar energy, in which they contended that it was impossible that photovoltaic solar energy could account for more than 1% of the total electricity needs of the

5

U.S.A. in fewer than 50 years. What was needed, they said, was a steady stream of financial support for basic R&D, $20-$30 million a year for the next twenty years. In that same year the U.S. Congress allocated $1.5 billion dollars for photovoltaic solar energy research in the U.S. over a ten year period.

Have you ever asked yourself how we distribute R&D money in the U.S.? Do we do it the way the Japanese do? Is there a dialogue, a discussion, a debate with the government? How do you distribute $1.5 billion of R&D money in America? The way they did it was to make an arrangement with four labs that at least knew something about photovoltaics, the M.I.T. Lincoln Lab, Sandia, Solar Energy Research Institute, and J.P.L. These they assigned to review the applications. The scientists at those four shops knew a lot about photovoltaics, but they had no political power and no reason in the world to deny a company a project since that company might be a future supporter of theirs. The result was that in the first two years of the project, they granted 402 research contracts to 250 different organizations. There was no provision for any form of conversation between them, and no attempt at coordination. Many experts would say that in the year 1978 there were not 250 individual scientists in the U.S. capable of photovoltaic solar research.

The whole project was such a disappointment, despite several individual successes, that it was cancelled by the Congress in the third year of its operation, except for $32 million a year of basic R&D funding. The real tragedy of this example is what we learned from it. The scientific establishment learned once again that you can't depend on government funding. The Congress learned once again that business will always over-promise and under-deliver. The public learned once again that you can't trust any of them.

But the story isn't always a disappointing one: consider another example. The Soviets have more ships, more airplanes, more men under arms, and more tanks than we do, and probably always will. Our military edge is a technology edge, primarily an electronics edge. That edge used to be 12-15 years, now many people would say it's down to 2-3 years. The problem is that in 1960 the Department of Defense purchased 60% of all of the output of the U.S. semiconductor industry and so they got exactly what they wanted. But today the non-defense uses of semiconductors are so much more vast, that the D.O.D. now buys only 4% of the industry's output and has to take what it can get off the shelf. What it can get off the shelf is not radiation hardened and doesn't have the tremendously high speed that is needed for weapons guidance, control and detection. The semiconductor devices must be radiation-hardened and capable of executing 12 billion additions or subtractions per second and be on a chip the size of your thumbnail. The problem is that the semiconductor firms that have the technology don't understand weapon systems and don't want to learn how to navigate Pentagon bureaucracies. The computer companies who understand the software don't have the semiconductor technology, and the defense contractors who understand the Pentagon don't have the computer or the semiconductor technology.

The solution is that for the first time in the history of our republic there are six company teams comprising the very high speed integrated circuit (VHSIC) project. Each team combines the knowledge of the semiconductor hardware, computer software, and defense system knowledge. Working across the three military branches, everyone is a team (I.B.M. has the only 1-company team). Although the project is only half completed, the early reviews suggest that it is succeeding well.

But let's return now to thinking more generally about the model of business-government relationship and what it means. What we see in Japan is approximately an M-Form structure. First, in the business community the principal group is the Keidanren which I have mentioned already. Then there is the Keizai Doyukai, which consists of a thousand individuals rather than corporate members who conduct studies and issue position papers on more general topics such as an aging population, cost of health care, or the need for green space. Next is the Chamber of Commerce with 478 chapters across Japan which represents small and medium businesses primarily. Finally, thhere is the Nikkeiren, a federation of 30,000 companies which exists for the purpose of carrying out a dialogue with the major labor unions. There is conversation between them other than that which occurs across the bargaining table. Because this structure is in place, the "boxing rings" are available, and the system has a memory, there can be a conversation rather than a chaotic yelling of everyone at once.

Some might think that the Japanese don't care about small business. There are many ways to define small business. One standard definition is any business with fewer than 20 employees if it is in manufacturing or fewer than 5 if it is in service. By that definition, 20% of the U.S. labor force works for a small business as compared with 50% in Japan.

What the Japanese have done for small business is impressive. Japan has 47 prefectures, each roughly akin to a state in the U.S. In each prefecture there is a federation of the many different kinds of organizations which are intended to help small business. In the larger cities there are Chambers of Commerce, an average of 10 in each prefecture. In the small towns which do not have a chamber, there is a Society of Commerce of Industry, an average of 82 in each prefecture.

The local government bureaus coordinate with the national small business organizations such as the People's Finance Corporation, which makes loans to small business. There is also a Small Business Corporation owned by the government to make small business loans. Then there are three MITI councils which are exclusively devoted to the interests of small business as well as a whole bureau within MITI that does nothing but focus on small business. All of these resources are brought to the local level through the coordination of the prefectural federations.

What structures do we have in place in the U.S.? We have the basic units necessary for an M-Form organization. We have the National Federation of Independent Businesses with 600,000 small business members, the Business Roundtable which represents 196 of the biggest companies in America, the

6

National Associaton of Manufacturers with 50,000 manufacturing members, the Chamber of Commerce with medium and small business members. Within one industry, the electronics industry, we have several specialized associations, such as the EIA, AEA, SIA, SAMA, and CBEMA. But they won't work through their own specialized association. Everybody wants to go directly to government because they know that there is no social memory in place. If they get into a "boxing ring" or a group process they will be asked to wait, and they know that if they wait, they won't be remembered. If we don't have the units of social memory, then we condemn ourselves to the kind of political-economic gridlock that Mancur Olson foresaw.

If the Department of Commerce isn't presently very useful, that's because the business community doesn't care and doesn't put pressure on it to get organized and properly staffed. If the trade associations in America aren't useful, that's because the business community doesn't care and doesn't put pressure on it to get organized and properly staffed. If the trade associations in America aren't useful, it's because their members don't care. Last year I spoke at a meeting at one of the major U.S. trade associations. It was a typical association meeting, the time was winter and the place was Florida. I spoke one morning and they played golf in the afternoon. They had another speaker the next morning and then they played tennis. They had a speaker the third morning and then they went fishing. Now, I love fishing, golf, and tennis, and I'm not trying to be goodie-two-shoes about this, but I said to these fellows, "Look, when you're out on the golf course this afternoon waiting to tee-up, let me ask you to think about something. Last month I was in Tokyo where I met your counterpart association which has the 200 companies who are your direct competitors. While you're out on the golf course this afternoon, they're back there in Tokyo having meetings from 9:30 AM until 10:00 PM, Monday through Friday, for 3 months straight. They are sorting out their product standardization policies, just as you're trying to do, so that a customer can buy an oscilloscope from one vendor and an instrument from another vendor and plug them together. They're trying to sort out their recommendations to the government on product safety standards instead of arguing before a federal board for 12 months about what the safety standard should be and holding up everybody in new product introduction. They're trying to "duke out" their differences on what they really want by the way of export assistance, legislative reform, and so on and so forth, so they can go to the government with one voice. You tell me who's going to be in better shape 5 years from now.

I don't believe that the idea of national central planning is any wiser than that of corporate central planning. No one can see into the future. In a large company, the people who are best equipped to see into the future are the 23 year-old "rookies" who are working close to the customers and the technology. But they don't have the wisdom to make major policy judgments. The best "strategic plan" is to have a good conversation between the rookies, who know that they're doing, and the top executives, who may not know what they're doing, but who have the wisdom. As long as

there is conversation between them, the organization will make its way to the future.

The best national economic policy is an involved citizenry. Durkheim predicted that, in a mass urban nation like ours, if the only form of political participation most people have is to vote, then the democracy will wither because voting is a too impersonal and too distant form of democracy. There must instead be a host of intermediate organizations which knit people and interest groups together.

Another way to put the problem of industrial policy, in my view, is to observe that we don't have enough special interest groups in America. I don't belong to a special interest group because there isn't one that fits enough of my interests closely enough to get me to join. There are 12 pizza parlors within ten minutes of my house, so I can get any kind of pizza that I could possibly want. There aren't that many civic or interest groups in my neighborhood. Why? Because none of these special interest groups talk to each other and as a result none of them has much influence. If none of them has much influence, who will want to start up yet another special interest group that's going to also have no influence? Nobody. If we can knit them together, then they will all have influence on one another. Then there will be a tremendous flowering of new kinds of special interest groups, or intermediary institutions. This network can knit our society together. Right now the only people who have reliable influence in Washington are the 85 or so companies that can afford to maintain large permanent staffs. If you can't afford a 40-60 person staff in Washington you aren't a player. That means that the other 99% of us are locked out of a part of the political process. What we need to do is to lower the cost of political participation by building the institutions that can make it easy for people to participate.

I visited the headquarters of Tohmatsu, Awoki and Company, the largest CPA firm in Japan and a division of Touche, Ross International. I sat down with five of their senior partners who said to me, "You must understand that in Japan nobody cares about reported company earnings. Therefore, the fundamental job of the CPA is different in Japan than it is in the U.S. In the U.S., the stockholders of a large, public company know so little about the business that they must rely on the accountants' definition of earnings. Therefore, the chief function of the CPA in the U.S. is to come up with a completely understandable and standardized definition of earnings. But in Japan, the owners of the company are so well informed and so close to the company, that they already know how it's doing this year and how it is going to do next year as well. There's very little that the CPA can add to their understanding. His task, instead, is to help them build the information system that keeps them informed everyday."

Our research team studied the financing of the 814 publicly listed electronic and aerospace companies in the U.S. and in Japan. We found that the weighted average cost of capital, of equity and of debt, is far higher for the U.S. company that it is for the Japanese company. It trans-

175

lates into a major competitive disadvantage. Why is that? The reason in essence is that there cannot be an effective relationship between the owner of a company and the manager of the company at arms length, but that is what we have in the U.S. Another way to say it is that in the U.S. the typical company, say a big chemical company, will have 300,000 shareholders. If you have 300,000 shareholders, what is the likelihood that they are going to know what's going on in the company? Suppose you're the management and you say, "I want to communicate to my shareholders some of our five year plans for capital investment and automation. Let's send them a 50-page report." What are they going to do with that 50-page report? They're going to throw it in the rubbish can. If you only own 1/300,000th of a company you have no incentive to spend more than two minutes discovering what's going on, let alone attempting to influence the management. It's easier to sell your shares and buy something else. That is what produces the short-run pressures on American management.

But you might say, "Wait a minute, that chemical company is probably financed 30% through debt. Certainly the bank, even though it isn't allowed to own shares, must be governing the company." Not so. The bank in the U.S., as our bankruptcy law has evolved, is not allowed to try to influence the management of a company to which it makes the loan. If the bank can't influence the management, and the owners can't influence the management, that means that nobody "owns" American business. No one can exercise the rights of an owner over these companies. Now I ask, how can you have a free enterprise system, based on private property, if there are not effective property owners?

Akio Morita, the chairman of Sony, remarked several months ago, "Our lead bank is the Mitsui Bank. They own some of our shares. They represent the other banks that own some of our shares. Their chief function is to keep an eye on me, the chairman of the company, and to look out for the rights of all of the other owners of Sony, as well as the customers, employees, suppliers and everybody who has an interest in the corporation. If they conclude that I'm not doing my job right, they can kick me out. In most American companies that's not possible."

The only remedy we have is the unfriendly takeover, but things have to get extremely bad before that remedy comes into play. The situation in the U.S. is one in which even the big stockholders, such as the bank trust departments, pension funds, and insurance companies, which among them own more than one-third of all the equities in American business, are fiduciary trustees. They are not able to exercise any governance over the company whose shares they own. As a result, there is nobody who oversees the operations and behaves like an owner of many of the largest U.S. firms. Our largest businesses are so large today that it is typically not possible for a single family or a few individuals to own them. There needs instead to be some institutional form of ownership, and the most logical institution is the bank. We prohibit banks from doing that by law.

Why do we prohibit banks from owning the equity shares of non-bank businesses? The restriction is rested in the National Banking Act of 1864. It was the end of the Civil War and the U.S. Treasury had been depleted. In addition, it was very important to symbolically reunite the nation. The big banks of the day were issuing their own bank notes as their private currency. In order to solve both problems, the Senate passed a bill which put a tax on all private bank currencies and allowed banks to obtain the new U.S. bank notes primarily by buying securities of the U.S. Treasury.

In 1865 a federal court held that because the law had not given banks the explicit right to own nonbank securities, they were thereby forbidden to do so, because they would be competing against the Treasury Department for scarce capital. That need has long since passed, but the law is still on the books. It seems to me that it's another example of a change that we need to make and that needs to be carefully examined.

These examples, I hope, have been stimulating, but many will feel that, "This simply lies too far beyond the American experience. There's something about it that's too collective, too homogeneous, not individualistic enough."

Let me tell you a little bit about Minneapolis. Minneapolis is a city of 500,000. The Twin Cities have about a million people. They haven't had an easy time of it economically in Minnesota. Seventy percent of the state of Minnesota is covered with trees. Their first industry was timbering. They clear cut the forests, used their assets, and they had nothing. Then they found the Mesabi Range, the richest deposit of iron ore in the world, 30 miles long by 1 mile wide. It supplied 65% of all the iron ore used in the U.S. until about the turn of the century. Once again the money flowed East and afterward all they had was a big hole in the ground. The other major industry was grain. By the year 1900 there were 500 flour mills operating in Minnesota. Today Minnesota is a center of electronics, financial services, and retail industry. Four out of the five major computer mainframe makers in the U.S. have either their corporate headquarters or a major plant in Minneapolis.

How did they accomplish what every other American city would like to accomplish? Minneapolis is anomalous in yet another way. In 1965 General Mills moved its corporate headquarters out of the center city to the suburbs. Everybody feared it was the beginning of the end: the loss of tax base, white flight, and urban decay. Today Minneapolis has a thriving downtown. It has the $400 million Nicollet Mall and a pedestrian skyway system which connects the 40 blocks of the center of the city. The skyway keeps pedestrians away from the cold, above the traffic and they've stayed downtown to live, work, be entertained.

Minneapolis-St. Paul is thriving. How did they do it? Minneapolis is anomalous in another way. The average U.S. company donates .6% of pretax earnings to charity each year. The estimates are that there are approximately 100 companies in the U.S. that donate 5% or more of pretax earnings to civic groups each year. Sixty percent of those companies are in Minneapolis.

176

How do we explain that behavior in this day of self-seeking, profit-minded, individual firms? When we look closely at Minneapolis what we see is a structure of social memory that very closely resembles what we find in Japan. In Minneapolis the Citizens League consists of 3000 ordinary citizens like you and me, each of whom pays $20 a year to join. Anybody may join a study group for the purposes of writing a position paper on the need for downtown parking, greenspace, pedestrian circulation, or better elementary school education.

The Chamber of Commerce runs the Five Percent Club and brings together the small and medium businesses to fight out their differences with one another and then go to the other groups. The Downtown Council consists of the small shopkeepers and the big bankers, everybody who cares about the future of downtown. Their president one year was the head of a local coffee shop, the year before that the head of the largest bank, and another year it was the head of the Lutheran Brotherhood.

The Minnesota Association of Commerce and Industry, MACI, brings together the farmers, manufacturers, and service companies so that they can "duke it out" when they have a difference. The Minnesota Project on Corporate Responsibility brings together 200 companies so that they can be educated several times a year on what it means to be a good corporate citizen and on how to make it happen.

The Minnesota Business Partnership consists of the 42 CEO's of the biggest companies in Minneapolis including the heads of General Mills, Pillsbury, 3M, and Honeywell. What do these 42 do when they get together? Do they scheme, do they plot? Do they figure out how to grind the common man down? Not at all. They go out on field trips like so many school children. They get together in groups of 3, 4, and 5 and call on the mayor, governor, legislative leader of the opposition, and heads of the major labor unions; the kinds of people whom each of them individually would be reluctant to see, and who are never going to come to see them. They establish a dialogue between business and government. Because each of these organizations is linked to the other, there are not only a host of "boxing rings", they also have become the social memory in Minneapolis.

It seems to me that we have before us a national agenda. In outline it really isn't very complex. We need to build the units of social memory which will enable us to engage in the process of social choice. Through social choice we can focus our scarce resources, and it is that focus that will allow us to achieve prosperity. The basic building blocks are in place. In the business community we have the American Business Conference, the Conference Board, National Association of Manufacturers, Chamber of Commerce, National Federation of Independent Businesses and the Roundtable. Most of them are new organizations, formed to meet a new need. They ought to be linked to one another. If they will confront one another when they have differences and "duke it out", nose-to-nose, we'd be going a long way in the right direction.

Business is only a part of the solution. There needs to be as well a means through which we can connect the other semi-autonomous units of an M-Form society to one another. We need to have in addition to the business organizations, a similar network within the labor community. There must also be an organization that causes the farmers to fight out their differences with one another. The municipalities and the states, because we are one nation undivided, have to have a way to interact within this network. The consumer and civic groups must be involved.

Last spring I had a parking lot conversation with a friend. It was one of those fifteen minute discussions at the end of an evening, an extended good-bye. I was talking to a fellow named John Doyle, who is the vice president for R&D at the Hewlett-Packard Company. He oversees the stream of inventions that is his company's lifeblood. It was the kind of discussion that is best held in the semi-darkness of the parking lot of a Chinese restaurant, where the dim light conceals your commonness and permits you for a moment to discuss matters of state, to pretend you're Hobbes, Locke, or Adam Smith. Five years ago John was reading books on management, on productivity, and on creativity at work, but more recently he has been reading books on economic history. Most of the books explain in painful detail why our current economic malaise is both inevitable and irreversible, why we should gracefully accept our fate of poverty as the British have learned to accept theirs. But John has the mind of a scientist. He is a skeptic. He is skeptical that anything is impossible, that anything is inevitable, that anything widely believed, is true. He said as he headed for his car, "You know that the really important inventions have all been impossible. It was only after they appeared that the scholars rushed around to construct new theories to explain their existence."

It seems to me that it is that spirit of pragmatic and optimistic skepticism with which we should approach our perhaps superstitious beliefs about what it is that makes our economy tick and our nation survive. We owe it to ourselves to search for a better way.

References

1. Mancur Olson, The Rise and Decline of Nations, New Haven: Yale University Press, 1982.

2. Oliver E. Williamson, Markets and Hierarchies: Analysis and Antitrust Implications, New York: The Free Press, 1975.

3. See, for example Richard P. Rumelt, Strategy, Structure, and Economic Performance, Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1974.

4. Original sources for this and other specific facts may be found in William G. Ouchi, The M-Form Society: How American Teamwork Can Recapture the Competitive Edge, Reading, Mass: Addison-Wesley, 1984.

177

-- NOTES --

Why Wrestle with Jellyfish?

R. J. Boyle, Honeywell Inc.,
Minneapolis, MN

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

180

WHY WRESTLE WITH JELLYFISH?

Richard J. Boyle
Honeywell Inc.
Minneapolis, Minnesota

Abstract

Based on experience with stimulating organi-
zational change, the author suggests that execu-
tives should make sure they are devoting their
attention to the right things -- culture, quality
and management systems. Eight pitfalls that
accompany dealing with change are noted, and eight
corollary lessons are offered.

Introduction

Everyone in this room today is here because
we recognize---intellectually and intuitively---
that our organizations must change.

I think that all of us recognize the connec-
tion between productivity and quality, and the
importance of that connection to American Industry.
The executive's bookshelf groans with the accumu-
lated analysis of academics, consultants, gurus,
assorted CEO's and popularizers. The White House
Conference on Productivity has issued its report
and recommendations, and the Defense Logistics
Agency recently held its third conference on the
subject of quality---Bottom Line III. Seminars
and symposia on productivity may be one of the
growth industries in America's heralded shift
toward an information-based, service economy.

Our problem isn't recognizing the forces
driving us toward change. It's recognizing them
soon enough.

Our problem isn't understanding, or even
getting our employees to understand, about pro-
ductivity and quality. It's putting our under-
standing into practice.

For executives, that means the way we manage.
And from the way we manage---the directions we
indicate, the expectations we project, the dimen-
sions of behavior we value---our organizations
take their cues and start working on things.
We want to be certain that people are working
on the right things.

The Jellyfish of my title is the uncertainty
we all wrestle with when the need seems apparent,
the objective seems clear, and yet, we're not
sure where to start.

Today, I hope to put some structure in that
blob of organizational change for you. I'll do
it by talking about my experiences in my own
organization, and I'll share with you some of
the pitfalls we encountered and the lessons we
learned in getting ourselves out.

Finally, I'll draw back from that experience,
and offer three broader conclusions about direc-
tions in which we should be steering our organi-
zations.

Even though I have spent most of my 20-plus
years with Honeywell in management positions,
I never thought I would be in Washington addressing
such a distinguished audience on the subject of
management practices. In fact, until relatively
recently, I never thought much about management
practices at all.

For most of my career, I thought about the

work I was doing. How do I get more product out the
door? How can I add more features for the same
cost? How can I make this unit a financial success?
How can I staff my program with enough engineers
to meet the schedule?

I was project- or task-oriented. Management
practices were my tools to get things done. I
cranked here, and my result came out over there.
I pushed this button, that happened. I made this
noise, got that response. Some tools were for
fixing, some for preventive maintenance, but manage-
ment practices were no more mysterious or complex
than oversized organizational wrenches.

But in the past four years, some events occur-
red that have spurred me to deepen my thinking
about management and to change my own management
practices.

For instance, an array of economic and politi-
cal forces in the world, coupled with increased
competition in the marine business, caused the
near-evaporation of the offshore energy market
that one of my divisions serves.

One other large unit was experiencing major
performance problems on a critical program, and
I felt first-hand the clash of financial pressures
to perform now against the need to invest in an
entirely new way of thinking and working.

And I worked with some high level executives
who were very young for a company as established
as Honeywell. I learned that these people had
different values from mine---and although we shared
the same business objectives, we went about eval-
uating and satisfying them differently.

I learned from these experiences, and from
working next to other people who were struggling
with some of the same problems. From our Honeywell
experiences and our exposure to the thinking of
others, we eventually learned how to spend most
of our time working on the right things and avoid
wasting too much time on the wrong things.

In a moment, I'll describe some of the wrong
things we found ourselves working on, along with
the lessons we learned. But first, please allow
me to generalize about what we decided were the
right things.

The Right Things

They were: culture, quality and management
systems....

Here's my definition of culture: "The system
of values, beliefs, myths, tools and practices
through which we respond to our environment."
The organizational culture influences how we get
things done. In some cases, it is the way we get
things done. It encompasses the trivial, like
whether everyone wears white shirts or blouses
to the office, and it encompasses the critical,
like how we make our decisions. Regardless of
what it says in the employee handbooks and policy
manuals, culture tells people what is permitted
and what is taboo.

1

If your environment changes, or if you need to respond to the environment in some new way, you can install new procedures, but you'd also better understand the culture and work to change it, if need be.

Quality. At Honeywell, like many other companies, we have put a lot of effort into understanding performance improvement, and we have come to the conclusion that a strategic and integrated approach to quality should receive our long-term attention.

When we talk about quality, we're not just talking about products. We're talking about three elements that must be present in all our quality improvement efforts---quality of work, quality of work life and quality of management.

Quality of work is what most people mean when they speak of quality. Does the work meet the requirements? It applies to products and services that we deliver to our customers or to each other in the process of completing the job.

We use quality of work life to describe the degree to which the work environment encourages employees to contribute to the success of the organization. Does the environment offer challenge, responsibility and appropriate rewards? Do people feel good about what they do each day?

Quality of management is the key to sustained quality improvement. It involves fostering leadership that has the technical and intellectual skills to set the course for the organization. And it means developing the human skills to bring others along.

Management Practices

That leads me to the third area to which we have been devoting our attention---management practices.

We realized that we had to work on the entire system, not just part of it. And we came to realize that we needed to establish and articulate a set of common goals for our efforts.

We had to provide structures for managing and communicating the change process.

And, we had to encourage---and then take advantage of---the involvement of our people in answering the questions "What needs to be changed and how?"

First, we had to ask ourselves what we were trying to do.

Goals

These goals---or management principles, as we call them---are what we think will help us attain the kind of organization we want. Most organizations can come up with similar statements. Ours aren't particularly magical. The important step is the next one...

Our strategy was to state the management principles from the top down, but to have them defined from the bottom up.

For each principle, we set up one task team composed of a broad cross-section of employees. Their job was to define issues keeping their principle from becoming a reality and what actions would get us where we wanted to be. We identified the issues that seemed to be hampering the realization of several principles, and we established new task teams that addressed these major areas of common concern.

These new teams could form action plans, make recommendations, design systems, even spend money.

But we discovered soon that participation of this sort needed guidance, support and controls. In other words, it needed to be managed.

Support Structure

We had been actively and by example encouraging this approach to organizational problem-solving. People responded enthusiastically throughout the operation, and we soon had more task teams than we knew what to do with. We had no clear idea who was working on what.

Ideally, of course, the functional organization and the problem-solving organization are one and the same. But some issues cut across traditional functional lines. We had lacked a "coupling mechanism" to connect the cross-disciplinary activities to the daily operations of the business.

So we created parallel organization of senior line managers to provide this linkage. Their job is to oversee policy development and to help steer employee problem-solving efforts in the right directions. The steering committee is the coupling mechanism between the formal, hierarchical organization and the flatter, more flexible informal organization.

This steering committee consists of myself and others from the top tiers of management. We have responsibility for initiating strategies, approving proposals for the creation of new task teams and generally making sure we are working on the right problems.

Managing participation is like managing any of your other resources---it requires the same disciplines of goal-setting, defining accountabilities and using a strategic planning approach. It sets limits, requires formal plans and reports from the teams and makes sure that results of their work are incorporated into ongoing operations.

People Involvement

The third key ingredient is people involvement. I probably don't need to tell you about how sometimes the best systems, ideas, technologies and processes can fail because people won't use them, because they have no ownership of the problem or its solution.

Well, as I mentioned before, our visible management support of the participative process helped stimulate all kinds of grassroots task teams. This resulted in what I call the percolator effect.

Look at the system as a percolator that circulates innovation throughout the organization...

The support structure must allow the innovative percolations from the grassroots to surface, find their way to the top of the organization, and if appropriate, be re-circulated across the entire organization.

Quality Circles in our Honeywell Minneapolis operations began this way, for example---the result of a grassroots decision by a factory manager to try something new in his department, instead of waiting for a corporate pronouncement.

This has been a very quick overview. I haven't spent much time on the mechanics of our approach or the specifics of our results, because I think that the mechanics and specifics are less important than the attitudes and commitment you bring to the process. But let me show you a chart that we use to track our overall progress in the aerospace and defense part of our business.

It shows value added sales per employee rising at a real rate of better than 5 percent a year.

182

Scrap and rework is also improving, right around our goal of 25 percent annually. All across our programs, managers are proudly showing quality curves that go up and cost curves that go down. And the result is showing up in the P&L's.

One drawback in trying to paint the big picture is the tendency to focus on what we ultimately accomplished---and to minimize the false starts, wrong turns and mistakes we made along the way. I'd like to emphasize that our journey thus far has not been a straight line, and we don't claim to have found all the answers, by any means.

But we have arrived at some lessons from our experience that I think will prove useful to you.

Eight Pitfalls

We've identified eight pitfalls that lie before managers and their organizations who are trying to change their culture to a more participative one. I'm sure there are more than eight, but these are the ones that gave us the most headaches. I'll describe the pitfall, and then tell you what we learned after we dug ourselves out of the pit....

The Terminology Pitfall: "How can you do it before you know what to call it?" There are all kinds of labels and terminologies floating around. Quality of work, quality of work life, participative management, employee involvement, and so on. We tend to want things in neat packages. We like slogans. We like playing cheerleader. We like programs with clever names, so that everyone knows what they're signing up for. We spent a good deal of time agonizing over what to call our process, and finally settled on "it."

Lesson Learned: "The process is more important than the package." When we insist upon a name, and a slogan, and a prefabricated identity, we are creating a program---a bandwagon. Programs wind down. Bandwagons run out of steam and cheerleaders get tired of jumping up and down. I've noticed that many tribal cultures refer to themselves in their own language simply as "the people." I think the same thing holds true for the employee involvement process. If it's real, it doesn't require a label or special packaging.

The Full Speed Ahead Pitfall: "Let's humanize this place---and make it snappy!" When we started, we had some idea that it might take six months to really get things rolling. It's taken much longer.

In the excitement of this undertaking, there's a danger, too, in attempting to shed all of the past. We had labored under a rather autocratic management style, and we wanted to see that gone.

Lesson Learned: "Even when going forward, you need to check the rearview mirror." We quickly learned that revolution wouldn't work. We couldn't heave over all our organization's culture, because we needed to retain most of it. We needed an appreciation of the values we had developed over the years, and an understanding of how those could be the underpinnings of our future way of working. And we had to remember that many people who had grown up under one style of management- both managers and non-managers---might be threatened by the idea of greater autonomy in the workplace.

It was a bit like driving on the freeway. We were caught up in the fast pace of change around us. But we couldn't change lanes only looking ahead. We had to keep an eye on what was behind us as well.

The Procedural Pitfall: "Finally, we've discovered the right way to do things around here!" Once things started to work, we had to be on guard against the tendency to assume that we had discovered the answers. Other companies wanted to find out what we were doing. People were writing about us. All of a sudden, we were being regarded as experts. The danger here---and it will always be a danger---lies in deciding there is one best way to do things...and we found it. So everybody better fall back into line.

Lesson Learned: "Divergent paths may reach common goals. One size does not fit all." That's just autocracy in disguise. If we've learned anything from employee involvement, it's that there are many paths to a goal. Management can point the way, it can help, it can even help cut back the underbrush to make a certain route more attractive. People will find their own solutions. Often they're better than yours, sometimes not---but you will have reached the goal, if you emphasize goals rather than procedures.

The Laissez-Faire Pitfall: "Management intervention will stifle participation." This pitfall is related to the last lesson. Don't make the mistake that management belongs off to the side somewhere. We stepped back to let things happen, and before we knew it, we had hundreds of task teams all over the organization, and not all of them were productive.

Lesson Learned: "Participation must be managed ---just like the other resources of the organization." I've already described for you how we've chosen to do that.

The Measurement Pitfall: "If you can't measure it, it can't be happening." Whenever people gather to talk about improved performance or productivity, they also talk about how to measure it. I believe that you should try to measure improvement whenever possible, just as you measure the results of other aspects of your operations. But don't get too hung up on measurement.

Lesson Learned: "Improvement is often the accumulated product of the mundane and the invisible." You might end up spending all your time trying to find the unfindable. So much of what is happening in a participative environment has to do with attitude and the quality of thinking. Those things are hard to measure. I suggest focusing your attention on more general measures that indicate whether you are getting better or getting worse. The work units can discover what kinds of measurement have any meaning for them.

The Priority Pitfall: "Participation is fine, but we don't have the time/money/people." In the crush of day-to-day crisis, it's not hard to push the employee involvement process to a back burner. It's often slow and clumsy, and you often need results now---absolutely, positively overnight.

Lesson Learned: "The payoffs of employee involvement are long-term." Focusing time and attention on the short-term payoffs rather than long-term payoffs is one of the legitimate complaints against American industry. We have to recognize that investment in our people, just like investment in technologies, equipment and processes, will ensure our long-term survival.

The Titanic Pitfall: "You're not being participative!" Changing an organization's stripes is not easy, and once you've announced that you're committed to change, you'll have plenty of help from employees reminding you when you're not being participative. I call this the Titanic Pitfall, because there are some times when you can't be

3

participative.

Lesson Learned: "Sometimes employee involvement is not appropriate." This is sort of the flip side of the priority lesson. You have to establish when employee involvement is appropriate, and when it is not. But if the rationale for the decision is clear, the process is working and the commitment to people involvement is genuine, people will understand and support you, even when they're not involved in making a decision.

The Point A to Point B Pitfall: "How will we know when we're there?" implies that somehow this will all be over once a certain point is reached.

Lesson Learned: "Change is a process, not a destination." The line is certainly not straight, and it has no end point. There is no final destination. As long as the organization survives, it will continue to grow and change.

Conclusion

Armed with an awareness of these pitfalls, we can aim our organizations in directions that will produce the best quality products and services and will resuscitate our lagging national productivity improvement.

As I indicated earlier, the three areas in which our attention is urgently required are Culture, Quality and Management Practices.

We must become more creative in dealing with the cultural barriers that tend to produce "non-quality." For example, we should continue the trend away from the past adversarial relationships of labor and management. In our own company, union leadership and plant management looked critically at impediments to productivity. We had 35 job codes in that factory. We cooperatively addressed the problem, and discovered we could be more productive with fewer distinctions between jobs. That plant now has four job codes.

We must recognize that quality is not just for the factory. In the aerospace and defense industry, approximately two-thirds of our people and our costs are non-manufacturing related. We need to address quality in engineering, administration and other disciplines as well as within our factory operations. And, we must share what we've learned with our suppliers and subcontractors, because their quality has an impact on our productivity, too. We are also sharing with companies in other industries---such as Proctor and Gamble and International Harvester--- and even some of our competitors, because quality improvement is a national issue.

And finally, we must translate national priorities and corporate commitments into meaningful, consistent and innovative management actions. We must accept that change will be required of us personally, and that we must be leaders, not cheerleaders, who manage the process of employee involvement. We must create a stimulating supportive environment in which our employees can become the sensors and masters of change rather than its victims.

Then we will see progress. We will exploit trends before they become megatrends. We will know the results of productivity improvement without waiting for reports from the Bureau of Labor Statistics. And, we may even look back with nostalgia on the days when Japan Incorporated struck fear in our hearts.

4

184

-- NOTES --

-- NOTES --

186

Japanese Management in U.S.
R. A. Kraft, Matsushita Industrial Co., Franklin Park, IL

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

187

JAPANESE MANAGEMENT IN U.S.

Richard A. Kraft
President & Chief Executive Officer
Matsushita Industrial Company
Franklin Park, Illinois

Abstract

Japanese manufacturers are gaining worldwide recognition for their outstanding quality and productivity achievement in many industries.

Japanese management techniques have frequently been identified as a main contributor to this accomplishment.

Matsushita has achieved a notable result in the reconstruction of a television manufacturing operation which it purchased in 1974, located in Franklin Park, Illinois.

This company today is a profitable, high quality producer of television products and microwave ovens, after a history of losses prior to its acquisition.

Certain Japanese management practices have been identified as making a significant contribution to this improvement including:

1. Management focus on product, rather than on other business activities designed to show short term gains without substantive contribution to improve the product, process or people.

2. Management patience to accept and support long term plans.

3. Management focus on cooperation, rather than on confrontation, to facilitate smooth operations and smooth relationships between all participants in the business system.

4. Management attention to detail, but not inundation in detail. Much more analysis and study is carried on by the employees to clarify the meaning of the detail.

5. Management's will to study and learn, from all available sources, and to apply or adapt the information in a disciplined system.

6. Conduct of managerial activities under the guidance of a clearly defined and consistent corporate philosophy.

Japanese Management practices have become a controversial topic for discussion in any forum relating to productivity and quality in the United States today. Some U.S. managers seem to feel that the very essence of the Japanese worldwide competitiveness lies in these mysterious management practices. Some U.S. managers see differences, and advantages in Japanese management practices, but conclude that many of them are successful because of the character, background and environment of the Japanese workers, and therefore are not applicable in the U.S. And others say that Japan's success in quality and productivity is unrelated to management, but rather is the result of Japanese government control and support.

I will preface my comments today by saying at the outset that I do not know a simple answer to this controversy. However, for the past 10 years I have been employed by a major Japanese electronics company, and have participated at a high management level in the restructuring of a major U.S. electronic manufacturing company which has been transformed into a strongly competitive, profitable producer of consumer products of the highest quality.

Focus on Product

One of the major points that I have observed is the management focus on Product. Japanese managers, especially at our company, recognize that the product is the foundation of the company's contribution to society. As a result, individuals at the highest management levels are familiar with many details about the contents of the product, its costs, its expected quality, performance and reliability and its manufacturing process. In addition, they participate importantly in the planning process, studying and understanding the competition and helping to formulate the company's strategy to meet the competition and studying the consumer in order to identify the needs and desires that will make the product more attractive and useful.

Many other managers tend to neglect the product, viewing management as a profession unto itself and believing that pleasing the stockholder thru short term profit achievement is the most important goal of the business.

In our company, profit and increased market share are viewed as the rewards that are earned by providing the consumer with products and services which satisfy the consumer more efficiently and more effectively than the competition.

Management thinking guided by this philosophy tends to focus on a continuous activity to improve the product and the process, and to upgrade the people rather than to focus on activity to achieve an improved P and L by accounting manipulation, tax adjustment activities, legal maneuvers, and other activities which can positively impact short term results, but add little substance to the business for long term success.

Patience

Another Japanese Management point that I have observed is patience. I am reminded of a seminar that I participated in a few years ago. In the question and answer session that followed my presentation, one of the audience commented that "it must be pleasant to work for a Japanese company - I understand that they are very patient".

I replied that there might be some misunderstanding about the actual situation. My experience has shown that my Japanese managers are patient in the sense that they can be persuaded to accept and support a plan that may require years to fulfill, and may require extended periods of loss before a profit can be realized and the losses be recovered. However, my experience has also shown that after the plan is approved, there is no patience for lack of timely and complete performance to the plan.

Both good luck, and bad luck are expected and accepted. Managers are expected to profit from the good luck, but not be lulled into a sense of self-satisfaction or complacency as a result. Managers are expected to recognize and overcome the bad luck. If unforeseen problems occur, it is expected that immediate countermeasures will be developed and implemented to bring the activity back on target at the earliest possible time.

This combination of patience to accept and support long range plans, but impatience regarding the accurate and timely execution of the plan is an important element of Japanese management effectiveness.

Focus on Cooperation

Another Japanese Management point that I have observed is a focus on cooperation.

Mr. K. Matsushita, the founder of our parent company in Japan, teaches the employees that "alone we are weak, together we are strong. We shall work together as a family in mutual trust and responsibility. An association of talented men is but an unruly mob unless each member is imbued with this spirit".

This spirit of cooperation, and mutual responsibility, strongly influences relationships throughout Japanese business activity - between management and employees, between one department and another, between the company and its vendors, between the company and its customers, and between the company and the community.

Cooperation is encouraged and enhanced by an organization and by a management philosophy that promotes effective horizontal communication. This effective horizontal communication occurs at all levels of the organization, and helps to keep all members of the organization informed about the business around them, and their responsibility to the organization to help keep it running smooth -ly and efficiently. In addition, it serves as a vehicle for rapid and accurate feedback, infor- mal and constructive, so that problems can be anticipated, and avoided, or at least be identified and resolved.

Cooperation between the company and its vendors has been a major contributor to the high quality levels enjoyed by major Japanese manufactu -rers today.

Instead of issuing a demand to a vendor for quality achievement, the more effective approach has been to establish a quality improvement plan, including a series of targets for improvement which can be mutually agreed upon between the company and the vendor. This plan usually includes a system for rapid and accurate feedback between the company and vendor so that problems on either side can be identified and acted upon, suggestions for improvement can be exchanged and progress can be tracked. The result is step by step improve- ment, with benefits received by both the company and the vendor.

The key is cooperation, rather than confron- tation and the superior results are clearly evident, especially in the consumer electronics products from Japan, with which I am familiar.

Another Japanese Management point is pain- staking attention to detail, but not inundation in detail. The Matsushita managers that I work with fully expect that each detail of a plan or report will have been developed to support every item in the plan or report, and they will occasionally test to confirm that this is true.

However, when this plan or report is present- ed to them, it must be condensed to its essence, usually no more than 4 to 6 pages even for our Division Annual Business Plan. This requirement for brevity forces the employees to deeply study their plans, to consolidate, condense, and eliminate until only the important points remain, and these points are crystallized into numbers and statements that clearly illustrate the key points to be understood.

This condensation is very difficult - it would be much easier to "broadcast" all of the facts and figures in a voluminous publication and let each person receiving the volume sift thru to try to find the important points. I have seen many cases where the time spent to analyze and condense the information took far longer than the time it took to generate and accumulate the information.

However, the result of this effort is a plan

189

or report that is easy to understand and communicate. It then becomes a relatively easy task to explain to, and receive support from all members of the organization.

Will to Study and Learn

Another Japanese Management point is the strong will to continuously study, learn and apply all available knowledge. In addition, this knowledge is accumulated, organized and systematized so that it will continue to be applied in an effective and disciplined manner even though individuals may come and go.

W. Edwards Deming, Dr. J. M. Juran and others inspired Japanese management with lectures about statistical quality control, quality control management, and the importance of superior quality to help gain competitive success. The principles that they taught in Japan were the same as they taught in the U.S. before and after the awakening of the quality consciousness in Japan. However, in Japan the messages were absorbed and transformed into action which finally resulted in the achievement of quality levels which are the envy of the world. The Japanese managers listened and accepted the premise that the effort to achieve high quality would more than pay for itself with both tangible and intangible rewards, and would create worldwide demand for their products because of their high quality reputation.

Another Japanese Management point is the existence of a substantial corporate culture in many major companies, which provides unity of purpose and a common understanding of the principles of the business to all members of the organization. Mr. Konosuke Matsushita, the founder of our parent company, developed the Matsushita corporate philosophy over a period of many years, based on his own practice and experience. This philosophy is presented to all Matsushita employees thru a variety of communication means including training classes, internal publications, company meetings and other means. It is also shared with the public, as well as the employees, thru a monthly magazine called PHP, now achieving a 1.5 million circulation. At our company in Franklin Park, we have worked to understand and apply this philosophy to improve our operations.

We have not attempted to mimic Japan - we do not recite the company creed each morning, or sing the company song. However, we have worked closely with our Japanese associates, continually learning their ideas and thinking, and continuously developing our own American management style to be in harmony with the corporate philosophy.

My experience has convinced me that a clear management philosophy can allow managers to be confident in their business activities, and guide managers to speak and act honestly with both customers and employees. In a constantly changing society, the basis for properly handling a

continuous series of problems is the management outlook of the enterprise. The corporate culture and philosophy well communicated to, and understood by the company's employees, is a strength developed by many major Japanese companies.

I have touched on some management points that I have found to be important in my career as President of our company in Franklin Park, Illinois as a Division of Matsushita in Japan. Our company was acquired by Matsushita in 1974. In the 10 years since, our company has been reconstructed, with the full support of our parent company in Japan, working with our excellent cadre of experienced employees in Franklin Park. During those 10 years, we have made dramatic improvements in quality, productivity, reliability and cost.

We are now building Panasonic and Quasar Color Television Receivers and Microwave Ovens with quality levels and productivity levels that closely approach the levels achieved by our related factories in Japan. In addition, we have improved our profit performance, rising from the steep losses of 10 years ago, to a financial standing that is profitable and is recognized as above average for all of Matsushita's operations outside Japan.

In conclusion, I would like to emphasize that there are no easy answers, no simple formula that I can give you to quickly achieve improved quality and productivity using Japanese Management techniques. However, I can tell you that there are things to learn, as new information and as a catalyst to re-awaken old ideas that you may not be applying effectively. I would recommend that you study Japan as they have studied the U.S., grasp the ideas that have potential for you, modify and adapt the ideas if necessary to fit your environment or people, and then apply them with your utmost effort and dedication.

190

Are Incentives Right for U.S. White Collar Organizations?

F. B. Wallace, General Motors Corp., Indianapolis, IN

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

191

192

ARE INCENTIVES RIGHT FOR U.S. WHITE COLLAR ORGANIZATIONS?

F. Blake Wallace
Allison Gas Turbine Division
General Motors Corporation
Indianapolis, Indiana

Abstract

In response to the workshop's objective -- to
explore challenges and problems which may impede
white collar productivity -- attention is directed
to the effectiveness of white collar efforts and
the creative results which they achieve. Tenden-
cies in our current management systems may place
undesired incentives of short- vs long-term
emphasis on strategies and investments, or may
stifle risk taking, creativity, and entrepreneur-
ship. These management practices are discussed,
as are avenues for continuing the progress cur-
rently being made in U.S. organizations.

Discussion

The subject of this workshop is challenges and
problems in productivity and, specifically,
management practices as they may impede white
collar quality and productivity. I would have
preferred to talk about solutions rather than
problems because we at General Motors, and
specifically at the Allison Gas Turbine Division
which I manage, have made great progress in
meeting many of these challenges.

The auto industry's challenges resulted from Japan
producing small cars in a protected environment in
the 50's and 60's, and then the changing shape of
world events in the 70's amplified the worldwide
opportunities for their export expansion. Some of
their success came from this fortunate position-
ing, but primarily their success resulted from
excellent planning and equally excellent execution
of these plans. In aerospace and other high tech-
nology fields, we have also seen expanded inter-
national competitive challenges as many countries
seek to increase their efforts in high technology
industries. Again, a primary contributor has been
planning, coupled with Government policies to fund
critical technology development and subsidize
product development in a fashion which has allowed
market entry without the same economics as would
be required in private ventures. We at G.M. are
overcoming these challenges with good planning and
good execution of our own and, as I said, I would
have preferred to spend all my time discussing
that progress.

But, the question I propose to address today is
to identify management practices which may serve
to hinder the productivity of U.S. industry and
Government efforts -- practices which must be

altered if we are to overcome the external com-
petitive challenges. Defining white collar
productivity in the broadest sense requires that
we look beyond the cost to perform a given
function and its improvement through "hustle" and
use of office automation. It also demands that
we look at the effect that we achieve and, in the
final analysis, this may be the overriding con-
sideration in improved white collar productivity.
For marketing, the measure is not cost so much as
it is innovation leading to new business ventures
or markets. For management, it involves placing
the right emphasis on use of resources and making
the right decisions. And, Engineering must be
judged in broad terms of productivity -- a trouble-
free product or service rather than just the cost
of fielding a new design. We need effective re-
sults which meet the needs of the organization in
a balanced fashion.

The emphasis placed by people on their jobs is the
direct result of the incentives offered, with the
stimulus of management approval and the compensa-
tion system being the primary tools available to
direct this emphasis. In my opinion, management
practices used in the U.S. often give the wrong
signals and produce false economies or non-optimum
emphasis. I would like to enumerate some of these
tendencies that occur all too often in business and
to some extent in Government, and discuss the
opportunities for improvement through changing
incentives.

1. Long- vs Short-Term Emphasis -- We all agree
with the need to plan for the long-term. The re-
sult is that virtually every organization now has
a long-range strategic plan. But the operating
systems of most organizations place maximum
emphasis on the present. It starts with compensa-
tion systems that reward management for the current
year profit performance. This is followed up by
single-year budgeting wherein short-term budget
problems are resolved by using funds from the long-
term projects which have a lower sense of urgency.
Solutions require cultural changes wherein incen-
tive and merit compensation reflect the true
balance between the long- and short-range desired
by management and shareholders, and the financial
systems must clearly separate the allocations made
for long-range growth from funding of current
operations. Only where we have changed the incen-
tives -- the criteria against which performance is
measured -- can we expect the long-term emphasis
required for effective U.S. competition in the
international market.

*General Manager
Member AIAA

I

2. ROI Analysis and Rapid Payback -- Much has been written on the evils of excessive emphasis on meeting strict payback criteria for return on investment (ROI) calculations, particularly with regard to purchase of equipment and machine tools. Let me add my voice to the chorus, since excellent examples abound of milking annual profits out of old equipment, until a business or an entire industry is obsolete and fails in the face of foreign competition. The solution which we at G.M. are using, and I believe many others in the industry are applying, is not to abandon the ROI analysis, but to supplement it with a clearer picture of our aspirations for 5, 10, or even 15 years in the future and make appropriate factory modernization decisions to reflect those aspirations.

3. Functionalism -- Popular management philosophy today seems to favor the establishment of small project teams as the most efficient management system. This is probably appropriate for some of the emerging technologies, but simply is not applicable for such gigantic efforts as developing and producing a jet engine or conducting the affairs of a large Government organization. The incentive may exist in these large organizations that individuals are rewarded for contribution to their functional department and lose contact with the best, integrated course of action. How can these incentives be changed? One of the best approaches is through innovative organization structures which reflect the unique balance of goals of the organization. Since we at G.M. have recently instituted such a reorganization, let me spend a few minutes describing it and how it meets the special requirements of G.M.'s automotive business.

The new organization consolidated G.M.'s North American car, body and assembly divisions into two car manufacturing groups, each having greater automony over its total operations. Each group -- the Chevrolet, Pontiac and G.M. of Canada Group, and the Buick, Oldsmobile and Cadillac Group -- will function as self-contained business units.

Each will be totally responsible for its products, including engineering, manufacturing, assembly, and marketing, and each will be accountable for its quality, performance and profitability.

Recognizing different characteristics of the more prestige-conscious buyer and the entry level, young buyer markets, the new organization allows G.M. to concentrate on the special characteristics of each, rather than dividing its talent among several units that produced ooth types of cars.

G.M. Chairman Roger B. Smith has commented on the objectives of decentralization of management, few levels of organization, and more autonomous operations as follows: "Decentralization is what our new G.M. organization is all about. We've got to move faster in designing new products and bringing them to market. We've got to cut out bureaucracy, eliminate redundancy, and make more efficient use of our people. And probably most important of all, we've got to uncork individual talent ... by giving our people

the opportunity to take risks, assume responsibility ... and earn rewards."

4. Creativity/Entrepreneurship -- Large Government and industrial organizations seem in uniform agreement that new ideas and entrepreneurial actions to champion these ideas are essential to growth of U.S. industry. But, the truth is that small organizations currently produce most of the new ideas, based on such criteria as number of patent applications and rate of business growth. Why? I submit that the principal problem in Government and large organizations deals with the dis-incentive for taking risk. On behalf of the initiator, staff consultants, or executive reviewers, the adverse impacts of a failure are likely to outweigh the benefits of a success with the result that approval of financing of such risky projects is potentially a minefield of delays and questions. This is one of the most difficult areas to change incentives and requires careful consideration in each organization. Among the potential benefits are easy access to internal venture capital allocations, and changes in the merit evaluation procedures to specifically encourage risk-taking.

In conclusion, there are many encouraging signs that U.S. industry is rising to the challenge of the competitive environment and is making real progress toward a balanced policy of long- vs short-term investments, more effective organizational structures, and the encouragement of entrepreneurial activities. It is my hope that the remainder of this symposium can further highlight the actions by industry and Government to move the incentives of the U.S. white collar work force to reflect our competitive needs. This focus, while retaining the free thinking, independent, and creative spirit that pervades the ranks of U.S. management, can and will prevail in adapting to the new worldwide challenges which we face.

2

The Road From Babel: Prospects for Integrated Office Systems
W. G. Pfeiffer, ITT Telecommunications, Raleigh, NC

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

195

196

"THE ROAD FROM BABEL: PROSPECTS FOR INTEGRATED OFFICE SYSTEMS"

William G. Pfeiffer
NASA Symposium On Productivity and Quality
Section B: Techniques For Improvement
Workshop B2: Use of Technology

Good afternoon. . .and thank you for this opportunity to share some thoughts on a subject that's of vital interest to all of us who are concerned with quality and productivity.

Let me begin by summarizing my presentation in a format that's fairly popular nowadays -- the fantasy epic.

A long, long time ago, in a galaxy far, far away, there was a very advanced civilization -- so advanced, in fact, that most of its people worked not with their bodies at all, but with their brains. But as time went by, their work became extraordinarily tedious and complicated. Too much effort was expended; far too little was getting done.

Thus it was, that a secret cadre of brilliant sorcerers decided to create a collection of marvelous and powerful machines. . .machines that held out the promise of great benefit for the people. But as is so often the case in this kind of story, there was a catch: the full power of these ingenious devices could be unleased only if they could connect and communicate with each other. Unfortunately, the sourcerers had worked separately. They had built their machines so that communication was difficult or impossible.

Seeing this predicament, the three Wizards of Ultimate Magic began to turn their enormous talents to the search for a solution. And that's where my tale leaves off. The ending has yet to be written. So let me now go back and talk in terms of 20th-century reality.

The "office of the future" -- as typically conceived of and confidently promised by the office-automation press -- has, alas, not yet arrived. But the good news is that the technologies necessary to create it have been around for about ten years. What's missing is the "glue" -- in electronic terms, the systems architecture that allows equipment from different vendors to work together, and the acceptance of procedural and organizational changes to accommodate the technologies.

In other words, we have a hodgepodge of technology -- an electronic Tower of Babel, if you will. We've been working our way out of it, gradually and not very elegantly, with ad hoc solutions of hardware and software.

Let me be a little more specific. A particular problem in office systems integration can often be solved by building a hardware device, a "black box". This takes about nine months, and, as I say, it is an ad hoc, not a systems solution. But what's worse, my black box doesn't integrate with, let's say, Dr. Word Processing's black box. And Dr. Word Processing won't give me the protocols -- the rules -- that allow the integration.

My response is to get the signals coming out of his box, and then write a software program that will make them work with my device. Again, an inelegant and ad hoc solution. And this one is far more costly, mainly because we really don't have cost-effective design and development tools for software products. Furthermore, this strategy will probably take me twice as long -- perhaps 18 months -- and that may be too long for it to be of any real value, because, by the time I get my program written, somebody else may have come out with something better.

Let's use our home stereo system for a minute, as an example of what I would call level 1 solutions, but not necessarily the full systems approach. It's really quite easy for me to assemble a system with components from different manufacturers, simply because they have all agreed on an architecture that lets the signals move smoothly through the system and out the speakers, but today with our changing life styles, even this accepted architecture shows cracks. In a many room house, how can the varied demands of the active family be met from a single system delivering different signals to different rooms from tape, record, video and radio. This makes us consider a hierarchy of architectural levels as we develop and evolve our strategies from the local office building to the community of facilities in a sprawling local.

Well, what's going to happen? My answer begins with certain developments that are already underway and that will

certainly continue over the next few years. Specifically, computer and telecommunications technologies are converging. And as they do, we're getting hybrid devices that incorporate the best of both.

In the second half of the 80s and the early 90s, we'll see a lot more computing capability built into PABXs. And, from the user's viewpoint, that will mean much more flexibility in manipulating and processing information.

We already have voice input on a fairly elementary level. Some of our high performance aircraft, for example, have certain routinized functions -- turning a switch on, getting readout from a dial -- that respond to voice commands. There are telephones that can be voice-dialed by people with visual or muscular handicaps. And one of ITT's personal computers, the XTRA, has a voice card that allows me to issue simple voice commands which activate certain computer functions. And there are many more possibilities -- eventually, we might even be able to have a printer transcribe a phone conversation as it's going on!

This convergence is driving the PABX, the computer, and the telephone handset together into one integrated device. Imagine it sitting there on your desk -- CRT, keyboard, everything you need for total productivity. The numeric keypad on your computer can dial telephone numbers. And you'll have more versatile and powerful voice functions -- voice mail, for example, which will go a long way towards eliminating the frustration of telephone tag.

As we at ITT Telecom see it, the communications integrator of these future systems -- their "spinal column," you might say -- at the base level will be the PABX, as opposed to the local-area network, or LAN. We believe the PABX will integrate into broader scoped telecommunications networks and public networks which do not hold the restrictions and potential conflicts of the party line LAN. Remember the "good old" party line telephone with Aunt Sara? Can we afford that world again, via the "party line" LAN?

The reasons lie partly in the nature of the thing itself. The wiring of the PABX is ubiquitous; it can reach any location where communications functions have to be performed. Secondly, PABX control computers are general-purpose machines that can control whatever peripheral devices may be provided for them. Also, the concentration ability of the PABX approach lets a great many users share resources cost-effectively,

and especially when this PABX is an integration of a broader private and public telecommunications architecture.

Finally, most of the newer PABXs, such as ITT Telecom's System 3100, are digital. That means they can be used for both voice and non-voice transmission, with equal facility. LANs can do that only with some difficulty. But the office that already has a modern digital PABX also has a built-in local network that can transmit data at low cost. In fact, if an organization uses non-voice communication -- electronic mail, facsimile, teletype -- a PABX can easily handle these, in both the direct and the store-and-forward mode within its local building wiring, while integrating into the broader public network.

The superiority of PABX over LAN is being proven in real-life situations. The Ontario Center for Advanced Manufacturing uses a digital PABX -- a System 3100, in fact -- to link together its mainframe computer, printers, plotters, and various workstations into an extensive voice and data communications network. And it does it at about 1/5 of the per-line cost of a LAN.

That's not an isolated example, either. It symbolizes a trend. A management consulting firm called Venture Development Corporation recently predicted that "even in 1987, the PBX market will be ten times as large as the LAN market. This will be the case despite the explosive-growth forecasts for LANs and the moderate-growth forecasts for PBXs." I can't believe we will accept Aunt Sara's party line communication system.

The PABX itself is getting better, too. We're packing more and more intelligence into it, so that eventually it will be able to bring the dissimilar architectures into harmony -- to perform the necessary translations with its own computing power. Very soon now, the digital PABX will be able to handle the interface between asynchronous and bisynchronous signaling. By the second half of 1985, it will also have the SNA facility as well.

So my near-term prediction is that traditional computing and traditional telephony will converge, in products that will meet the needs of the knowledge worker, in a far more graceful manner than is the case in today's supposedly integrated offices. But in order for this to happen, three other developments will have to take place, in addition to the technological trends I've been describing.

First, we're going to need information management facilities that are truly easy to understand and use. Right now, we can store a whole lot of information in a very small space. But we really haven't given knowledge workers the tools to get at it and to move it back and forth between mainframes and their personal (or portable) computers.

By that I mean software that lets you file, retrieve, and transmit documents, by subject, date, author, or whatever criteria you choose. You would do all of this with simple, English-language commands, and with no more effort, thought, or instruction than you'd need to stick a paper document into a filing cabinet or stuff it into a company-mail envelope.

So far, a promising approach, for example, in today's market, is the Golden Gate product offered by Cullinet, It's a database-management program that lets you pull information from a host computer down to your PC, and then interact with considerable ease.

But we don't have the ideal answer quite yet. And we really won't, until we can integrate all of these operations through a highly intelligent PABX workstation that integrates into a broader networking strategy. That's what I would like to see - and what's more, it's the direction in which we in the industry are headed.

A second requirement: the office systems supplier must support and promote this convergence I've been describing. The company that intends to be a real force in this industry cannot be content with offering only pieces of the system. Instead, it must bring together its hardware, its software, and its communications system, so that its products can indeed do all that the knowledge worker needs done. When you probe this very few in the industry can infact deliver a total package.

Finally, and most important of all, a standard systems architecture must evolve. This will almost certainly happen in the latter half of the 80s, as ITT, IBM, and AT&T -- whom you may now recognize as the three Super-wizards of my fantasy tale -- begin to attack the interconnectivity problem.

These are the companies that are best-positioned to bring about the necessary integration. They not only have the integrative capability -- they also have computing and the communications expertise necessary to carry off this formidable task. And increasingly, they are playing in each other's ballpark.

IBM has gained communications knowledge through its relationships with Rolm and Mitel. AT&T now has its computers and PCs out in the marketplace.

And ITT, of course, is, outside the U. S., the foremost communications company in the world, with state-of-the-art PABXs and other pieces of the total system coming from companies within the corporation. Our System 1240 is a formidable computer let alone a fully integrated yet fully distributed communications system. Courier's terminal facilities are getting more and more intelligent, so that they can communicate with multiple computers. And Qume has an expanding line of office products that will ultimately interface with the PABX. In fact, interface arrangements that are now in operational trial can print material that's been word-processed in one office on a printer in another office. The printer and terminal are from Qume, and part of the processing comes off the Courier product with the PABX from ITT Telecom.

Still, the final step remains to be taken: the Big Three must evolve a standard architecture, so that we aren't forever trying to splice up the world. . so that we don't continue to deny our customers the rational means to link their office together. And I think that this overlapping that's now taking place means that the technological convergence of computing, data management, and communications is being reflected in a marketing and product thrust. Standardization of architecture will simply clear the way for this thrust to proceed to its logical conclusion.

Clearly, we're in for some profound changes, in both technology and office life. As I said earlier, we must rethink our procedures and organizations.

Portable computers will grow more powerful and more portable as well. We can expect major growth in memory capacity, perhaps by a factor of four to eight. Personal computer storage capacities of 50 to 100 MB and greater are not far off. Look at the emerging optical disks and place them in your portable PC with read and write capability within this decade. Processing speeds will increase exponentially. In the latter half of the 80s, voice/data processing will emerge. We'll be able to transfer and manipulate voice messages, much as we now do with data. And we'll carry all of this computing power we now do with data. And we'll carry all of this computing power in a briefcase -- or slide it into a desk drawer when the work day is over.

199

One result will be a dramatic reduction in the amount of paper in the office. The totally paperless office is probably a pipe dream; paper documents will always have some unique advantages. Still, there's the hope that we'll have a lot fewer of them to cope with.

Another development: the portable office, the virtual office, the electronic cottage -- call it what you will, technology will allow many of us to do our work away from a central location, at least part of the time. This even more makes us drive for a network and office systems architecture following such paths as the ITT Integrated Services Digital Network (ISDN) thrust.

Now, not all of us want to take our work with us. I look around the cabin of an airplane and see a lot of eager young middle managers, furiously computing away at 35,000 feet. Personally, I'd rather sit back, have a drink, and watch the movie. But my point is that we will have this option, and it's up to individual organizations to make of it what they will.

Many executives -- and I'm among them -- see significant productivity gains in, say, giving knowledge workers a PC to use at home. DEC, for example, has a communications network for its marketing reps. They can enter data, get mail, and not come into the office for days at a time. Of course, there's a trade-off in accountability and control, and each organization has to decide whether it has the motivation to experiment with the possibilities, and whether its employees have the self-discipline to take advantage of them effectively. We must consider that we are toying with a critical communications element - body language - so necessary due to the impreciseness of our language when we move into this virtual office world and must look to fully integrated communications and computing to deliver the total package.

They say that every silver lining has a cloud. . .and there are a few remaining problems which have to be resolved, even as we make progress towards integrated systems and standard architecture.

Problem #1 has to do with the display screen. Today, I can give you a very small, very powerful personal computer at a reasonable cost -- as long as you don't insist on a full function display screen that's also small, thin, and sturdy enough to be stuffed into briefcases or stuck under airline seats. We are, after all, talking about full portability. Right now, the cost of such an item is prohibitive. But we'll

solve this one, and certainly before the end of the 80s.

A second problem is consistent user interface. A system should appear the same to the user, regardless of its components. You and I shouldn't have to start the learning process all over again, each time a new piece is added.

Problem #3, and one I'm especially emphatic about, is the need for security. Now, even with all that's been said and written on this subject, I still want to point out that there will be widely-dispersed -- even mobile -- users communicating with a central database. All of the possibilities, from human error to intentional fraud, must be guarded against, and with methods that are both secure and simple. We want to prohibit unauthorized activities -- but we don't want to make things too difficult for authorized users.

One solution that I like is memory burn-in: in the read-only memory of a PC, a terminal, or telephone of the future we "burn in" the information that's unique to that device, so that it knows the identities of everyone who's authorized to use it. We might even be able to take advantage of each person's unique voiceprint.

Now, the engineers tell me that this is too expensive. But according to the FBI, the average take from computer crime is over $500,000 per occurrence -- compared to $3200 per bank robbery. This being the case, I think some serious risk analysis is in order. The cost of protection could very well be less than the cost of doing without it. I will realize that total systems management is expensive and I must evaluate what I get but it must be addressed.

At any rate, security is something that should be on our minds, especially when you consider that we're raising a generation of young people who are extraordinarily computer-literate. Of course, much more is involved, starting with the whole ethical climate of our society. But we'd be foolish not to put locks on the doors to begin with.

The last problem has little to do with technology and a lot to do with people. We simply have to make the necessary investment in the preparation of knowledge workers; we have to prepare them for the new environment we're surrounding them with. Once again, I offer that we must also rethink our organizations their operating procedures and realignment of functions.

All too often, machines and people are brought together with no idea of how the former can help the latter. And that's now even considering the cultural resistance. What good does it do to plunk down a flashy new state-of-the-art computer and communications system on the desk of a manager who's 56 years old and who has for 30 years believed that dialing a phone and operating a keyboard are things that only secretaries do?

I'm not sure what the answer is. Probably we ought to start by not calling it "training." My point is that if a company really wants to make work easier by making people more productive -- as opposed to just selling products -- then it should pay more attention to explaining to people how their work world is being changed, and why.

At this point, I'd like to pause and see how well I've followed Franklin Roosevelt's advice for public speakers. That advice was, "be sincere. . .be brief. . .and be seated." Well, I've done the first, but not the second. So now I'm going to try for two out of three. But before I do, let me summarize my message in four short maxims:

> Computing without communicatins is gone forever.

> Communication without systems is unthinkable.

> Systems without a family of support hardware can't be realistic.

> And hardware and systems without an architecture is folly.

The next stage of the Information Age is now clear: computing, communications, and the various office facilities are moving very rapidly along paths that lead to convergence. But this convergence cannot really work for your benefit unless we industry folk work our wizardly magic and built the common architecture that's needed.

The story that I started telling at the beginning of this session is thus still unfinished. But it's an exciting one, and I'm pleased and grateful to be helping to write it.

I thank you for inviting ITT to participate in this conference, and I wish you every success in taking advantage of the many opportunities that lie ahead.

5

201

.. NOTES ..

Balancing Risk Taking and Encouraging Entrepreneurism

G. E. Seegers, Citibank, N. A.,
New York, NY

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

204

BALANCING RISK TAKING AND ENCOURAGING ENTREPRENEURISM

George E. Seegers
Vice President
Citibank, N. A.
New York, New York

Abstract

Must there be a conflict between risk-taking and entrepreneurism in large organizations? Not necessarily, says this paper by a Citibank executive. The way to encourage entrepreneurism is by making prudent risk-taking not just possible, but potentially rewarding as well. "Give people enough rope, then see whether they build a swing or a noose," the author says, the result might be a better mousetrap--benefiting the entire organization.

Mr. Chairman and Distinguished Guests:

If you want to see the modern American bureaucracy in its rawest state, you need look no further than the Federal Express commercials we see all the time on television.

In these commercials the rules of the large organization are laid out in stark clarity. For one thing, speed is important--not the speed with which you do your job, but rather the speed with which you get problems off your desk and onto someone else's. Send your problems on down the line and let some other unfortunate boob deal with them. Talk fast, move fast and pass the buck fast. And woe be unto you if, when the music stops, the president catches you with a problem still on your desk.

Federal Express does us a great service in these commercials by demonstrating just what we're up against when we try to encourage entrepreneurism in a large, bureaucratic organization. They show us what happens when otherwise competent managers become part of a large, functional management structure: A manager's normal instincts to look at The Big Picture--of extending his or her vision to every possible factor that might influence the success or failure of the project--shuts down. And the manager's focus instead becomes: How can I get this problem from point A to point B without meeting disaster? After it gets to point B, "Hey, that's your problem, Fella. Don't bother me."

I share these thoughts with you today not to bemoan the bureaucratic tendencies of large organizations, but rather to give you a little insight into the state of mind of the people who do the yeoman's work in any large organization: the middle managers. The spirit of entrepreneurism may start at the top, but it is in the middle levels where the attention to detail and commitment to quality make or break an entrepreneurial dream.

My assignment for today is to discuss the issues of balancing risk taking and encouraging entrepreneurism in large organizations. Now, the very wording of this assignment implies that there is some inherent conflict between containing risk and encouraging entrepreneurism. I'm not at all convinced this is the case. After all, what is "risk taking"? Does this mean that an executive takes a couple of million bucks from the corporate treasury and heads for the Atlantic City blackjack tables--all to try to improve corporate earnings? For some companies this might not be such a bad idea, but most managers I know would be reluctant to pursue this kind of creative investing.

I submit that containing risk and encouraging entrepreneurism are actually different elements of the same equation: Companies move ahead when they take risks and succeed. A certain number of new ideas will always fail. Hence, companies that take risks generally prosper. The _true_ risk for any company is to believe that risk-taking is unnecessary for long-term growth and survival. If you doubt the truth of this statement, may I refer you to the sad saga of Central Leather, at one time the 24th largest company in the United States, larger even than General Motors. Central Leather failed to adopt new shoemaking techniques and equipment and some time ago took its rightful place in the graveyard of companies that decided to "play it safe." For some companies, complacency has all the appeal of using a lighted match to check whether there's some gasoline left in the gas tank; the results may be less explosive, but they are no less deadly.

Now, I happen to work at Citibank, a very large organization know for taking large risks--and often succeeding. Of course, there's no assurance that taking risks will end up positively for the risk-taker. Even Citibank has been known to stub its toes sometimes. But we succeed more often than we fail, and there are some solid reasons for these successes.

First, risk-taking is a way of life at Citicorp. When I read in a newspaper

1

about a "risky investment" or "risky loan" some bank has made, I have to smile. The writer does not seem to realize that these phrases are as redundant as talking about a "one-story bungalow."

All investments and all loans are risky because they are all based on educated guesses about the future rather than the certain knowledge of what will happen. Despite the most sophisticated market research, no one really knows if the public will buy the product or use the service that a company is about to produce.

The new product might be an Edsel with a $400 million price tag, or it might be a Southern artist's brainchild known as a Cabbage Patch Doll.

But Citicorp is in the businss of assessing risk. When we make a loan-- whether it's a ten-million-dollar loan to a corporation or a ten-thousand-dollar loan to an individual, we're taking a risk. We constantly teach our officers how to assess risk and how to avoid making bad loans. But, the truth be told, we will always make a certain number of bad loans. We're not perfect. In fact, the only banks that are perfect are the ones that ve gone out of business. They don't have to worry about bad loans anymore, because they don't make any loans. Period.

Now, in addition to risk-taking being a way of life, another advantage we have at Citicorp is what one of our esteemed leaders once called "our unique capacity to act." By this, he meant that a manager has the authority to follow through on his or her vision, without a corporate chaperone keeping an eye on things every step of the way. If you do your homework, if you put together a detailed template containing all the steps that would be necessary to absolutely minimize risk--such as the Gershfeld Chart contained in Figure 1--if you envision an ideal strategy for success and then develop a realistic plan for implementing that strategy, then you don't have to worry about a lot of hand-wringing back at corporate headquarters over every little decision you make.

Citibankers are measured by their success, not by whether they follow any particular process exactly. So if you've done your homework, you can skip certain steps in the template you've already set down. In other words, you can't be sloppy in your planning, but you're allowed to be flexible in implementing your plan.

Another aspect of our capacity to act is the fact that when someone has a good idea, we've got the funds to give it a try. I've often remarked at the irony that in a small company, where one individual has more clout to affect the company's fortunes, there usually isn't the capital on hand to put a good idea into effect. On the other hand, at most large organizations, the capital is there, but people's hands are tied--metaphorically speaking--and no one person has the power to spend the money and put the idea into practice. We like to think that Citicorp combines the best aspects of both large and small organizations. There are the funds necessary for innovation and the power to use those funds for a new idea. This is "capacity to act" at its best.

Coupled with Citicorp's capacity to act is our broad actuarial base. With thousands of corporate customers and millions of consumers, we have the resources to absorb occasional losses that might cause problems in smaller organizations and to stick with a project we believe in despite initial losses. Our sources of income are spread across many product lines, in 41 states and 94 countries around the world, serving clients from the smallest individual accounts to multi-billion-dollar corporate and governmental accounts. By fostering such a broad base, we insure ourselves against unforeseen disruptions in any one particular area. And we insulate ourselves--and our shareholders-- from the effects of any specific act of risk-taking.

Finally, and probably the most important element in our method of risk-taking is the fact that Citicorp is what we like to call a "meritocracy," where overall success--and not single, one-time failure--is the determinant of one's career. While sloppy planning and poor execution are never acceptable, we realize that innovation, risk-taking and occasional failure are inseparable parts of the same equation.
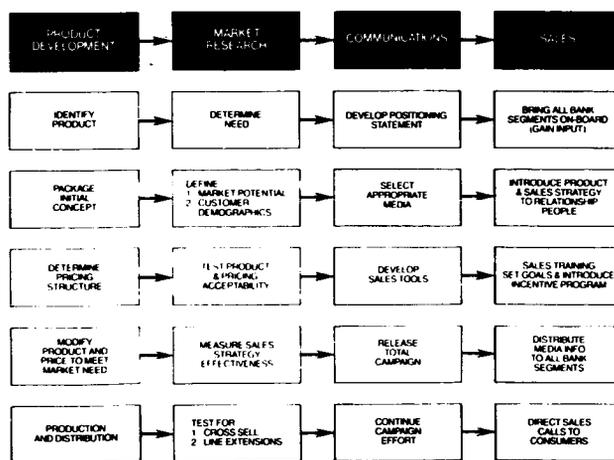

Figure 1: Gershfeld Chart

206

At Citicorp, people who jump into the pool and swim are rewarded. People who jump in and have to be pulled out are encouraged to try again. But people who are afraid to get their feet wet soon move on to another company.

Our former chairman, Walter Wriston, is fond of quoting G. Warren Nutter, who said, "Good judgment comes from experience, and experience comes from bad judgment." People at Citicorp are allowed to fail, if they had a good idea to start with--and if they don't do it too often. Our newly elected chairman, John Reed, for several years ran our consumer bank, which sustained heavy losses in the late 1970s. Yet, despite this setback, John continued to command the confidence of the bank's management and staff. The consumer bank eventually turned around, and this year will earn about $200 million for the corporation.

Now, I want to move from a specific view of one corporation to the broader view of other organizations, and especially government. But before I do, let me describe an extraordinary example of risk-taking that has fascinated me.

The situation is this: A very large organization gives a mandate to a small group of futuristic thinkers. That mandate is to make a technological breakthrough within a short period of time. The small management team assembles a group of experts, and work is begun. Before long, it becomes apparent that the effort will take longer than expected. There are many unanticipated difficulties. Delays ensue, and costs mount dramatically, rising into the millions of dollars. Others in the organization question whether the group will ever reach its goal. Interpersonal tensions build within the group, even as pressure from outsiders to kill the program grows in intensity. Some people quit, others are asked to leave. New people are brought in. But through it all the president remains true to the original vision. And, of course, after many months of delays and tens of millions of dollars in expenditures, the project succeeds, changing the course of history at the same time.

The name of this risky project that eventually paid off? The World War II Manhattan Project to develop an atomic bomb.

Under the most difficult circumstances imaginable, with wartime resources pinched in the extreme, and at a time when our best scientists were desperately needed in other, already proven scientific endeavors, the U.S. Government embarked on an unproven, extremely risky venture of developing a weapon that only existed in theory--and it succeeded.

The point I'm making here is that Government is capable of the kind of risk-taking that is usually associated with private corporations--if the conditions are right. And the conditions are: a precisely defined objective and a strong mandate to reach that objective.

For those who say the Manhattan Project is only an exception that "proves" the rule that Government cannot take big risks, let me point also to NASA's own Apollo Project to send men to the moon, despite the enormous technological problems that the project involved. For another example, look at the Peace Corps, a hopelessly romantic and unproven concept about extending good will and technological expertise across cultural and geographical borders--a project that succeeded immediately upon its inception in 1961 and continues to this day.

Again, my point is that risk-taking is possible within government, despite the problems former DuPont chairman Irving Shapiro has outlined in his widely read book America's Third Revolution. In this book, Shapiro notes that "in the private sector, there is no need to apologize for projects that are losers. Taking chances is part of the game, and any large, old company has at least one giant failure in its closet: Ford's Edsel; DuPont's Corfam poromeric material, a substitute for leather; Polaroid's instant color movies; GM's developmental project on rotary engines....In the public sector, though, errors far more modest than these can lead to exposes, Congressional investigations, and ruined careers. Open admission of error is thus to be avoided at all costs.....Moreover, it is rarely easy for a government official to retreat gracefully from any project, because most Federal program dollars go to pay people, and what one man calls waste another man calls his paycheck.....Thus, we are governed by people programmed to be less concerned with being right than with not being found wrong, and by agencies locked into old programs, however outdated the rationale. Alexander Pope's lines are modified by government to read: Be not the first by whom the new is tried, but be sure to be the last to lay the old aside."

I submit that Government enjoys a number of real advantages over a private organization. For one thing, the resource base is exponentially larger. At $140 billion in assets, Citicorp is a sizable organization. But even Citicorp is dwarfed by the trillions of dollars in taxable income that the Government has some kind of jurisdiction over. The resources are there. The mandate can also be there in the form of laws and regulations. However, where Government can learn from private enterprise is in the execution of the mandate.

At Citicorp, the first lesson we learn is that you must have a detailed, well-thought-out template—along the lines of the Gershfeld chart I've previously mentioned—for reaching your objective. The second lesson we learn is that you have to know when to follow the plan, and when to ignore parts of it. This is the essence of risk-taking.

Risk-taking is going out on a limb, doing your homework, then taking a chance that a short-cut will pay off. The idea is to spend your time creating, not thinking up ways to, in the business vernacular, cover your backside. Why take risks? Because you get things done faster and more efficiently. And that moves the organization forward.

Having managed the multi-company "Summer Jobs for Youth" program in 1982, I saw firsthand that at most companies people spend fully one-half of their time covering their backsides. Some do it by making sure they don't get blamed if something goes wrong. The better ones do it by spending that same time thinking of other ways to succeed.

Too many people—in fact most of the people—who work in large organizations are more concerned with protecting their backsides than with taking the chances that advance an organization's fortunes.

This brings us back to the Federal Express commercials. The people in those commercials run away from problems or pass them on to someone else. What's really needed is for just one of them to say, "This is my problem and I'm going to solve it." Owning the problem is the beginning of risk-taking—and success.

Once someone has owned the problem and said, "My reputation is going to stand or fall on how I handle this," then you have an incentive for creativity. Instead of a problem, the matter becomes an opportunity. And if a person can turn a disaster into a triumph, not only does this help the organization and the people it's serving, it also helps the person's career.

Now I don't mean to suggest that risk-taking is easy. Quite the contrary, it's lonely being the point man when the army is marching onto an unknown battlefield. Our economic system, like our political system, is untidy; it offends people who like tidy, predictable outcomes. We make a lot of mistakes, and we have a lot of failures. But as George Gilder has argued,"...such waste and irrationality is the secret of economic growth. Because no one knows which venture will succeed ... a society ruled by faith and risk rather than by rational calculus, a society open to the future rather than planning it, will call forth

an endless stream of innovation and enterprise."

In any large organization, the inertia is on the side of those who play it safe. But for the person willing to take a risk—and succeed—then the rewards can be impressive.

What every large organization—and especially the Government—need are periodic reviews of all activities, just to make sure that an obvious, somewhat risky, but better way of doing things is not being overlooked. At Citicorp, we have semi-annual shake-ups called "reorganizations." Government could use a dose of the same medicine once in a while, whether through "sunset" legislation, zero-based budget reviews or some other, as-yet-unnamed process of lighting a fire under people and seeing what happens.

So to summarize, the way to encourage risk-taking and entrepreneurism in large organizations is by making such risk-taking not just possible, but potentially rewarding as well. Change the emphasis from protecting your posterior to rewarding innovation. Give people enough rope, then see whether they build a swing or a noose. Loosen the purse strings a little and give a few people some money and see what they do with it. They might build a better mousetrap—and then the entire organization can benefit from one person's inspiration.

Citicorp's attitude toward risk-taking and entrepreneurism can be summed by the letters O, C and B:

O means Owning the problem.

C means having the Capacity to act.

B means having a Broad actuarial base.

Working in today's large organizations, going to meeting after meeting, making compromise after compromise, we tend to forget the spirit of enterprise that turned this raw continent into a great nation. The whole of this country was opened up by people who were at once adventurers and people trying to improve their own fortunes. It seems to me we could, in some small way, recreate that spirit of enterprise in the organizations we serve today.

Or as Walter Wriston said in a speech on a similar topic a few years back, "It is almost impossible to exaggerate the importance to the general welfare of the willingness of individuals to take a personal risk. The worst thing that can happen to a society, as to an individual, is to become terrified of

uncertainty. Uncertainty is an invita-
tion to innovate, to create; uncertainty
is the blank page in the author's type-
writer, the granite block before a
sculptor, the capital in the hands of an
investor, or the problem challenging the
inventive mind of a scientist or an
engineer. In short, uncertainty is the
opportunity to make the world a better
place."

Walt, I couldn't have said it better
myself.

Thank You.

209

-- NOTES --

210

Labor-Management Cooperative Programs
J. R. Stepp, U. S. Department of Labor, Washington, DC

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

211

212

LABOR-MANAGEMENT COOPERATIVE PROGRAMS

John R. Stepp
Acting Associate Deputy Under Secretary
Bureau of Labor-Management Relations and Cooperative Programs
U.S. Department of Labor
Washington, D.C.

Abstract

The Department of Labor is working to
facilitate the development and adoption of
innovative forms of labor-management
cooperation to foster the welfare of workers,
increase productivity and contribute to the
development of a mature system of
labor-management relations. Its activities
include the creation of an information exchange,
the support of research, participation in
conference and other public forums and the
development of training materials. The
establishment of new relationships between
workers and employers will be a critical
component of the reorganization of work
necessitated by new technology. The change
toward more cooperative forms of
employer-employee interaction will in many cases
require a concomitant change in an
organization's cultural framework and will
transcend traditional blue-white-collar lines.
The paper discusses some prerequisites of
cooperative programs at the firm level as well
as some institutional changes at the national
level that may be necessary. National level
changes include a reconsideration of some
current labor laws and the provision of
incentives for employers and employees to solve
their own problems with less regulation. The
Federal Government must also work to foster
increased trust between business and labor by
finding ways to reward cooperative behavior
and establishing itself as a model employer.

Presentation

Thank you for the opportunity to
participate in this workshop on National
Initiatives.

As many of you may be aware the Depart-
ment of Labor is working to facilitate progress
in the development and adoption of innovative
forms of labor-management cooperation
throughout our economy.

I believe the Labor Department's involve-
ment in the labor-management cooperation
movement is a natural extension of our basic
mission. That mission is to foster, promote,
and develop the welfare of the wage earners of
the United States, to improve their working
conditions, and to advance their opportunities
for profitable employment. In this respect our
efforts offer a number of unique opportunities.

One of these is to contribute to the basic
well-being of workers by providing more
meaning, more fulfillment and more feelings of
self-worth and dignity from the half or more of
their waking time that is devoted to work. We

find that workers are striving for an often
frustrated opportunity to develop and apply
their skills, to participate in the determination
of the organization of their work and the
conditions under which it is performed, and to
more rationally resolve the inconsistencies
between their work and nonwork lives. Having
made great progress in protecting workers in
the areas of safety and health, unfair
discrimination, abuses in wage, hour, and
pension practices, and having provided a
measure of income security through unemploy-
ment compensation and employment and training
assistance, we can now well afford to pay more
attention to those psychic elements of work
which are essential to both individual and
organizational well-being.

Secondly, I believe we can make a major
contribution to increased productivity and
economic competitiveness. Studies have clearly
shown that companies which utilize sincere,
cooperative labor-management mechanisms can
experience reduced costs, improved product
quality, and fewer work disruptions, in addition
to a better quality of working life for all
employees from the bottom to the top of the
organizational ladder. In our present inter-
nationally competitive environment the increased
productivity and the increased flexibility to
respond to economic and business conditions
which can result from labor-management
cooperation may well make the difference
between jobs or unemployment for many
American workers.

Finally, I believe that we can make a
significant contribution to the development of a
more mature and more viable system of
labor-management relations in this country. We
are now witnessing a system in flux, where the
parties are experimenting with various types of
behavior and mechanisms, some of which are
inconsistent with each other. Past patterns and
practices have clearly been broken. Our
industrial relations system as heretofore known
has ceased to exist, and we will likely never go
back to it. At the same time, no cohesive
replacement has yet emerged from among the
various new forms of behavior we have
observed.

I am hopeful that the Department of Labor
can provide, at least in part, the vehicle for
the establishment of a new industrial relations
system -- a system which draws on the best of
the past in terms of collective bargaining and
the protection of the rights of workers and
their representatives and the best of the future
in terms of labor-management cooperation in
sustaining a robust business climate. The new
system will continue to be a mix of union and

nonunion enterprises, and there will continue to be some disagreements between employers and employees. I am convinced, however, that the majority of interactions between workers and their employers will in the future emanate from the increased realization that their economic fate is intertwined and that both have common needs and objectives. As responsible servants of the public we must nurture these positive developments and strive to identify and place into effect those institutional arrangements which will allow them to continue and prosper.

The Department of Labor's labor-management cooperation program had its genesis in 1982 when Secretary Donovan assembled more than 40 nationally prominent authorities on industrial relations to review the current and future status of labor-management cooperation. Over the course of a three-day period they examined several impediments to the wider adoption of cooperative practices and considered some excellent suggestions as to the kinds of strategies that might best cope with them.

Particularly instructive to us were the recommendations advanced regarding the appropriate role for the Federal Government, and especially the Department of Labor, to play in facilitating progress in this area. Among them were widely agreed upon proposals (1) that we create an information exchange that makes readily available to all who request it data on current and emerging industrial relations issues, new collective bargaining developments, and recent experiences with various kinds of cooperative programs; (2) that we conduct and support research designed to fill the many knowledge gaps that already have been identified in the fast developing area of labor-management cooperation; (3) that we organize and sponsor national and regional conferences to promote the widest possible dissemination of information about new concepts and programs among practitioners, third-party consultants, researchers, and government officials; and (4) that we develop and lend support to the development of training programs and materials which can enhance the capability of union and management officials to design and administer their own cooperative programs.

Since 1982 the Department of Labor has made a credible start in carrying out the kinds of activities discussed at the Secretary's symposium. A new organizational component, the Bureau of Labor-Management Relations and Cooperative Programs, has been created through the realignment and refocusing of existing expertise and resources within the Department. This Bureau is attempting to stimulate interest among business and labor leaders to explore cooperative modes of interaction, and we are providing them with meaningful information on a variety of cooperative options so they can assess the appropriateness of each to their particular circumstances. In many cases we are working with and through trade associations, labor unions, regional productivity and quality of work life centers and area labor-management committees with the objective of establishing

within them an indigenous capacity to reach a far broader constituency than we could serve directly.

We have published two editions of a Resource Guide to Labor-Management Cooperation, describing significant examples of cooperative efforts, and are developing a more extensive computerized data base of cooperative initiatives and employee participation efforts that will be made accessible to all interested parties. In cooperation with the National Association of Broadcasters, the Bureau has prepared public service announcements which are being aired on radio and television throughout the country. A complementary print media effort is also proceeding in several major business and trade journals. This outreach project has spawned hundreds of requests from employers, workers, and unions to whom we have responded with specially developed information packets.

The Bureau hosted a state-of-the-art conference in September 1983 at which twenty-five selected representatives of labor, business, and academia met to examine controversial issues associated with improving the environment of work and to evaluate the effectiveness of current quality-of-work-life initiatives. We are now cosponsoring with the American Productivity Center a one-year computer teleconference on changing union-management relationships. The findings of the conference and recommendations for future action are scheduled to be presented at a face-to-face meeting of key chief executive officers and international union presidents in the spring of 1985.

In concert with American Telephone and Telegraph and the Communications Workers we have sponsored an extensive study of the effectiveness of quality of work life programs in the telecommunications industry, and we have contracted with the Sloan School of Management at MIT for a two-year study of changing practices in industrial relations among various major private firms. Secretary Donovan has also committed $250,000 of Job Training Partnership Act funds for area labor-management committee demonstration projects to test ways of minimizing the impact of plant closings and expanding employment opportunities in local labor markets.

We have sponsored in conjunction with the Department of the Air Force a Federal Sector Conference on Employee Participation and Cooperative Labor-Management Initiatives. This was the first conference to focus entirely on Federal initiatives and was designed to provide practitioners an opportunity to exchange information and ideas on increasing employee participation. We have also recently cosponsored two major conferences with the Federal Mediation and Conciliation Service.

We are in the process of developing orientation and training materials which will facilitate the design and implementation of cooperative programs by union and management

214

practitioners which are tailored to their own particular environment. We are also participating with the University and College Labor Education Association in the development of education and training curricula on cooperative programs. In addition we have designed and tested our own three-day workshop to prepare state agencies to assist employers and unions involved in plant closing situations to jointly deal with the problems of dislocated workers. Workshops have thus far been conducted in Ohio, Illinois, Utah and Arizona.

We are excited about the potential of our program for improving productivity and the quality of working life. Moreover, we are seeing increased support for a prominent Federal role in encouraging greater cooperation between management and labor. Recent reports issued by the White House Conference on Productivity, the National Productivity Advisory Committee and the President's Commission on Industrial Competitiveness show a developing consensus among our Nation's policy makers that labor-management cooperative efforts are in the public interest and that Government has a legitimate and vital role in encouraging and supporting these joint initiatives.

The technological revolution which looms on the horizon of the workplace also will necessitate new types of relationships between workers and employers. New forms of programmed automation will likely change the entire organization of work. There will be a need for a comprehensive rethinking of competitive strategies, manufacturing processes, and employee-employer interactions. The white-collar component of most organizations will undergo as much or more change as the blue-collar. One study by the Institute for Economic Analysis at New York University predicts that as the result of increased automation over the next 20 years, professionals as part of the work force will increase by 15 to 17 percent, while clerical workers will decrease by 14 to 18 percent.*

As these changes in the organization of work and the utilization of workers and their relationships with each other occur, we have an obligation to strive for change for the better. There is a risk that as machines are substituted for people that they will be used inefficiently to perform tasks which humans can do more proficiently. We must not ignore the less dramatic but effective option of improving human performance through proper human resource management.

Although we are primarily concerned with white-collar and technology oriented organizations in this symposium, it would be a mistake to think of labor-management cooperation in

exclusively white- or blue-collar terms. When we speak of change towards more cooperative forms of behavior, we often talk in terms of a cultural change in the true anthropological sense of the term. This means that we are speaking of the total body of norms, values and beliefs held by the entire organization as well as the accepted modes of reasoning and interaction which prescribe individual behavior in that organization. A true change toward labor-management cooperation affects all of these variables and therefore all members of the organization no matter what their rank or what the color of their shirt.

Because labor-management cooperation involves a change in an organization's cultural framework, it is not something which can be instituted rapidly or without a considerable amount of preparation, planning and commitment. Indeed, serious thought must be given to the system-wide organizational changes which may be necessary and the extent to which the organization's leaders or its constituency will be willing to accept them. Experience has demonstrated that cooperative or quality-of-work-life programs which are instituted in a limited or segmented manner will soon develop internal contradictions that will make the program unacceptable to both the employer and the employees.

We recently published a summary of some of the issues discussed and conclusions reached at our state-of-the-art conference on quality-of-work-life efforts and similar employee involvement and cooperative labor-management programs.** One of the major conclusions was that a QWL or cooperative effort may clearly challenge the traditional values of an organization and will require a significant commitment by senior management and union representatives. Senior management must not only declare its new values and operating philosophy but must also commit resources for training supervisors and employees as well as support the initiative through the active selection and advancement of managers who model behavior consistent with the new values. Unions, on the other hand, must develop a broader scope of their responsibilities beyond limited economic or institutional issues and become responsive to employees' need to seek fulfillment and personal development from their jobs.

Other conclusions reached were equally instructive. These programs are based on a consensus brought about through trust and the extensive sharing of information. Clearly such a situation cannot be reached until workers and managers at all levels have a reasonable measure of job security, and labor unions, if present, are accepted as legitimate and permanent partners in the venture. The information sharing must be uninhibited and

---

*Leontiff, Wassily and Faye Duchin, "The Impacts of Automation on Employment, 1963-2000," Institute for Economic Analysis, New York University, New York, New York, 1984.

**Bureau of Labor-Management Relations and Cooperative Programs, U.S. Department of Labor, "A Conference on Quality of Work Life: Issues Affecting the State-of-the-Art," Washington, D.C., 1984.

215

nonselective. Typically it will extend to such heretofore guarded information as per unit labor costs, profit margins, marketing plans and capital acquisition plans. A successful cooperative or QWL effort will lead to a diffusion of decisionmaking throughout the organization with the workers' role ending up somewhere beyond simple consultation and participation but likely short of total self-determination. In addition, financial benefits which the organization derives from the program must in some measure be shared with the workers if their goals are to be joined with those of the organization. Although such aspects of the program as trust, respect, involvement and achievement are in themselves rewarding to employees, the absence of a financial reward system is likely to be perceived as a form of exploitation.

Having discussed some of the prerequisites of cooperative programs at the firm level, we must consider what might be done at the national level in terms of institutional arrangements to facilitate the adoption of cooperative labor-management techniques. Clearly our present system of labor laws is designed to regulate conflict between management and workers rather than encourage cooperation. As democratic institutions, unions should have more latitude to make difficult choices benefiting the larger interests of the majority of their members without the restraining influence of potential breach of fair representation suits. Managers in nonunion firms should have freer collective relationships with their employees as long as they do not inhibit workers' right to form or join labor unions. Finally, Government regulation of the workplace should provide more incentives for employers and employees to solve their own problems within broad parameters set by statutes and their implementing regulations.

At some time in the future I am hopeful that business and labor can be brought together in some sort of a national dialogue on the state of our current labor relations system. Those companies and unions which are engaged in some of the most creative and most successful cooperative efforts have already stepped beyond the current body of law, policies and procedures comprising our industrial relations system and are adapting it to the imperative of meeting their numerous common and complementary needs and goals. We must begin to ask ourselves if our formal labor relations system should be revised or rebuilt to facilitate and sustain these cooperative trends.

We must first, however, work to establish and expand the trust between business and labor which will make such a dialogue possible. Among those who have taken the high road in coping with their economic and competitive problems, we have noted an increased sense of mutuality in their relationship. We must high-light and find ways to encourage and reward this type of behavior. We should do what is possible to make the Federal Government an exemplary model with respect to its human resource policies and involvement of its workers and their representatives in productivity and quality-of-work-life programs. In addition, we should take the opportunity to involve workers in the development and implementation of new technology at the workplace, not only to ensure its most effective utilization, but also to assure workers that they will be part of the future world of work.

Thank you for your attention.

216

218

Productivity Initiatives at USDA
J. J. Franke, Jr., U. S. Department of Agriculture, Washington, DC

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

219

220

PRODUCTIVITY INITIATIVES AT USDA
by John J. Franke, Jr.
Assistant Secretary for Administration
U. S. Department of Agriculture
Washington, D. C. 20250

Abstract

Current popular literature would have us
believe that all business practices are good
and that government practices are bad. But the
world of government is substantially different
than the private sector and works the way it
does for a reason. The appropriate business
principles should be applied and specific
strengths of the government system identified
and capitalized on. To get away from the
occasional, fragmented and simplified manage-
ment improvement and productivity solutions
as cure-alls that haven't seen results in the
past, a comprehensive multi-front program has
to be devised that gets at the systems that
are hampering morale and productivity of the
employees. Efforts at the U. S. Department of
Agriculture are centering on streamlining the
maze of systems that have built up over the
years plus identifying employees concerns and
developing targeted long and short-term
initiatives to make the necessary improvements.
Personnel and personnel-related activities are
the most noted topics for improvement and new
life and emphasis is being sparked into old
practices that need to change as we move into
a new era in handling the increasing expecta-
tions of our workforce.

Introduction

One of the best-read books by managers
today is "In Search of Excellence."* Its
popularity shouldn't be surprising. In the
current emphasis on "how-to" publications, the
principles offer simple answers to complex
workforce problems, treating "excellence"--
whatever it may mean-as the end product in a
simple equation.

Coincidentally, the general public consen-
sus insists that those very same business
practices and principles apply simply and
completely to the business of government--that
the wholesale application of those principles
will erase the ills seen in government such as
organizational layering, indecision, excessive
paperwork, and services and programs provided
at a snail's pace.

Much of the public does little to under-
stand the nature of government, relegating
their analysis to what's wrong with what they
see, an assumption of laziness and ineptitude,
and jumping to a "kick the bureaucrat" finale.

---

* Peters, Thomas J. and Waterman, Robert H., Jr.,
  In Search of Excellence: Lessons from
  America's Best Run Companies, New York,
  Harper & Row, 1982.

But government remains government--not
business--and built the way it is for a reason.
Simply put, it is diffused power that cannot be
arbitrarily exercised by a single individual
for personal gain. Virtually every function is
developed and managed by consensus, not by
command. The entrepreneurship, bottom line
accountability and market rise and fall that
dictate the landscape in the private sector
simply don't exist in government. The planned
diffusion works against efficiency and effec-
tiveness since so many hold the strings to
make even simple functions work.

Because government employees are entrusted
with public monies, how they operate is con-
stantly subject to public scrutiny, a world
apart from the private sector operation where
little else counts outside the ever-present
bottom line. Public employees work under much
greater constraints than the private sector in
how they carry out the public business. Their
worklife is a series of rules, regulations,
policies and procedures that dictate how things
will be done. A healthy dose of politics
completes the diffused power picture. Where a
public employee may have a logical recommenda-
tion in a benefit and cost analysis on any given
program, for instance, he or she will have little
real choice in the end.

Rather than a wholesale overlay of business
practices on the practice of government, we
should instead, select applicable portions of
those practices and tailor a program that fits
the obvious but generally disregarded strengths
and realities of the public sector.

Productivity, per se, is not held as a high
priority goal in the public sector. Our job is
not to see how many farm loans we can rack up or
how many people we can place on food stamp rolls.
We are a service and support organization to the
basic business of agriculture--there when
farmers and American agriculture need us. And
in large part, we provide many services that
would not be provided by the private sector
because they are not cost effective. We have
little control over what we administer. The
Congress designs our basic mandate to suit the
will of the people.

But although we have little control about
what we are involved in, we do have substantial
control over how we do it, keeping in mind the
constraints and checks and balances. Administra-
tion of our programs is where productivity
improvements can be made and where some of those
highly touted business practices can be exercised.

221

When we talk about increasing productivity and quality, we can refer to things or to people. We can look to increasing the number of payments processed or the number of issuances distributed. Or with productivity of people, we can refer, for instance, to the timely servicing of client families by our employees or the quality and usefulness of agricultural research projects produced by our agency employees.

The other choice we have is to look at productivity by mandate or by encouragement. Certainly we can simply mandate an increase in the number of inspections conducted or the number of payments processed to get the productivity quotient to increase. Or, more difficult over the long run, we can straighten out the systems that have come to overlap over the years to encourage a work flow that is more efficient and logical and where people respond more productively.

Things and mandates are obviously the simpler course. Needing to show quick results, many reform or improvement initiatives in the past have produced one-dimensional initiatives in the name of "fixing the system." Generally the mandate turned out to be but one more to the complexity of the system. Mandates and short-term reform efforts like these maintain long institutional lives after the initial push has gone away. (Have we seen substantive reform or paperwork reduction as a result of the Civil Service Reform Act or the Paperwork Reduction Act?)

Management Reform of the U. S. Department of Agriculture

Under the banner of this Administration's Reform '88 management improvement program to cut costs and improve administrative functions, Agriculture has taken up the gauntlet to "fix the system" through encouragement, example, and through people. Different from any past single-dimension effort, we have set out on a path to make substantive management improvements through a cohesive, continuing program with specific assigned leadership and through involvement of agency managers.

More than just a cost-cutting focus, Reform '88 has been taken at USDA as a platform of opportunity to make the gutsy innovative strides it takes to put some efficiency in the multitude of administrative services that serve the multi-faceted and highly decentralized Agriculture mission.

USDA could have taken the Office of Management and Budget (OMB) mandate to conduct the government business like that of private industry to cut costs and improve productivity through a mandated, top-down program to the Department staff offices and agencies.

Instead, we chose a bottoms-up method of involving the agencies in the planning and development of a comprehensive reform program, thereby gaining the agencies' commitment to a piece of the outcome. Our charge to them was quite simple—

"Where can your systems be improved? How can resources be made more effective?"

Querying the agencies for their reform ideas and appointing an ad hoc committee of key administration managers from the Department and the agency levels, a reform or management improvement plan was devised. The resulting plan included 10 Departmental reforms that were tailored to Agriculture and its specific needs but also encompass the OMB reform issues.

Task forces of agency-donated employees, in some cases numbering in the hundreds, were appointed to analyze the issues and map out a game plan for each reform.

The OMB mandate centers on reducing outlays spent on things plus getting the whole federal government to operate more the same way—consolidation of financial and accounting systems, reduction of communications costs and more controls to get at fraud, waste and abuse.

But taking the good intent one giant step farther at Agriculture, the effort included those consolidation and systems improvements that would straighten out the system through a common sense approach with a heavy people productivity orientation—get the system to work better so that people can work better. And we are also taking advantage of the opportunity to begin to set up some work environments that start to deal with employees' increasing expectations about job satisfaction, job enrichment and participative involvement in how their jobs are structured.

Management Improvement Accomplishments

The task force structure of Reform '88's first year has given way to the formation of the Office of Management Reform—the institutionalized focus of the management improvement effort. Since change and improvement is not a dynamic in the government system, it is up to this small but mobile group to nurture the individual agency and departmental efforts, negotiate consensus for change and share the results and accomplishments around to get others involved. Since it takes extraordinary effort to change major systems in the government, this type of specific and directed focus is necessary to even begin to move things.

In addition to the single, clear focus, the effort has been given a new attitude at the top of the organization. From the top down, clear and persistent "cheerleading" is forthcoming so that people at all levels of the organization feel there is an atmosphere of change, and support for their Herculean efforts to change whole systems. Through the leadership of Secretary John R. Block, USDA is willing to take the risk in making the changes. Stirring the pot upsets the status quo of people and ways of doing things and causes some disruption. But we feel the disruption is worth it. It provides the energy for new approaches and new methods. Lip service, minor initiatives and a stiff, formal chain-of-command approach aren't doing it.

It is a broad-brushed, quick hitting action oriented approach through task forces, and ad hoc groups and pilot projects. We're not studying the situation to death or dictating what a new system must look like. We're allowing our people to draw the picture themselves to get their commitment and make it work.

The 10 departmental reforms center around re-designing major administrative processing systems with better automated systems to meet people and program information and processing needs, review of delegations of authority, challenging administrative paperwork burdens, administrative consolidations, communications cost reductions, and better bookkeeping systems for external charges, and cash and debt management. "Reform 9" as it is called, is about people morale and productivity.

A comprehensive action plan has been devised around the most ambitious systems effort-- the information and administrative processing initiative. The intent is a major systems overhaul and will require considerable time and effort. Called "Cooperative Processing," the effort has a head start in the existence of a single consolidated processing center for the entire Department--the National Finance Center in New Orleans. Most other departments and agencies in government are fighting to get to where Agriculture is starting. We're working to make a good system better and meet our future information and processing needs to get away from the mounting paper burden. When accomplished over the next several years, it is likely to be a government-wide model for administrative processing and automated information needs.

Other initiatives have seen successes great and small in the department and in our agencies --some based on private sector business practices and some tailored to the government environment. A credit card and travelers check program has been instituted for cash management purposes, cutting down imprest funds. Cost containment programs have been instituted by several agencies to look harder for cost reductions and pay attention to what they're charged. Knowing they have to do a better job with less people, agencies are moving hard on automation to help them do more. A major administrative servicing unit consolidation in two agencies, handled well, has caused minimal disruption to the programs and people involved.

All these efforts are headed toward straightening out the way USDA does business--all those overlapping and duplicating and often illogical hoops that it takes for our employees to get their jobs done. We have forged a program-- tailored to our needs at USDA--to make our system more productive. And so we don't forget the public sector bottom line, we are effectively applying the public resources dedicated to the agriculture mission.

What About People Productivity?

Lots of bromides and instant answers are available through the latest off-the-shelf management manuals. They are written for and

aimed at the generally single-faceted private sector workforce where there is control over what work is undertaken and how they will undertake it, what organizational goals and priorities to pursue and they can lead the charge themselves. There, the bottom line is readily apparent, the method for getting there is no one's business and perks and pay can be the reward.

The assumption is made that the same principles will apply to the multi-function, widely dispersed, largest single workforce on the face of the earth where everything from salary to performance evaluation is a matter of public record. Not so.

Certain key characteristics mark the public sector employment that do not exist in the private sector environment. The government career workforce has a greater percentage of professional and technical workers than does the private sector as a whole, making direct productivity comparisons invalid. With the current efforts to review the contracting of more public work to the most effective producer plus potential changes in political appointees, there is an even greater need to keep a stable, high-quality workforce, particularly at the mid-manager range upward. Workforce reductions coupled with the need to preserve an experienced workforce, particularly at the mid-manager range upward. Workforce reductions coupled with the need to preserve an experienced workforce, plus the stable condition generated by the nature of public sector employment, we will have the current crop of employees for a number of years to come--for better or worse.** We are developing a comprehensive program that anticipates far-reaching productivity issues and begins to address the increasing expectations for job satisfaction and enrichment of the employee workforce in general.

Quality of Worklife Survey and
Sounding Board of Employees

Rather than assume certain workplace conditions, particularly when 90 percent of our 115,000 employee population is in field locations, we reached out to a sample of our employees to "talk" with them. Going to 11 USDA population centers, we drew a random sample of 100+ employees in each location--all grades, all agencies, all job classifications. We administered a 60-question survey and spent the rest of the day in work groups coming up with ideas and suggestions about what can be done to improve the most glaring problems we have to improving productivity and morale. The effort is the most innovative and comprehensive in the field government.

What they told us they feel is right and wrong in their perception is not surprising, since their concerns are universal in the workplace. What's different is the tools we have available to fix them.

Positive responses from the survey indicate that USDA employees consider their jobs worthwhile and an important part of getting the unit

---

** Washington, Charles W., "To The Morale Officer", The Bureaucrat, Summer 1984, Vol. 13, No. 2, p. 18.

223

work done, and know what's expected of them in their job. The negative side shows that the formal support systems—promotions, awards and suggestions—are not working well and as equitably as they are expected to, and that they are not involved in the planning and decision-making that affects them. Although they have an acceptable relationship with their supervisors for addressing the work at hand, they feel that the supervisor is not fully representing the organizational goals, missions, culture, or information to them and that their positive views, needs, and assessments are not being represented well to the larger organization.

A side issue revolves around automation. Our major field office agencies are in the process of automating their county and state offices nationwide. Employees, seeing computer capability in other sectors, know the productivity potential of the equipment for their jobs and, frankly, can't wait until systems are available to them. They also sense that computer literacy is going to change the face of the traditional federal workforce in how selections are made for jobs, and also the potential blurring of lines between the traditionally "professional" and "clerical" positions. No one has a clear view of what changes will have to be made. They only have a sense of coming substantive reorientation in the workplace.

A parallel effort brought 10 USDA field employees to Washington for a week to work with the USDA Reform '88 program implementors to act as an Employee Sounding Board on what the reform effort had accomplished to date and how the program could be improved. After identifying some 40 issues they felt needed to be addressed to improve how they could operate, the group focused their attention on five issues—lack of automation, lack of training, excessive paperwork and outdated regulations, delegations of authority, and disincentives to good supervision. Much of the material in the discussion and reports verifies the Reform '88 program and echos the findings in the Quality of Worklife Survey.

The Changing Workforce

Some of the results would indicate that we have done a fairly good job of developing the work relationships of the traditional hierarchical structure, i.e. "I know what to do on the job" and "I understand my performance standards." But that is not enough for today's and tomorrow's workforce.

Discussions behind those statements indicate that people want better organizational communications and involvement in the broad sense —they want to know the "whys" behind what they are doing, and to be involved in and have some control over what they do and how they do it. The old hierarchical authority structure is becoming a dinosaur as people look for job enrichment through developmental and broadening assignments, job and career mobility, career planning and a sense of team building. In short,

they are looking for the supervisor/manager in their lives to be the workplace facilitator who works with people rather than they working for him or her.

This emerging desire and increasing demand by the workforce coupled with the coming automation revolution will potentially turn personnel administration on its ear for years to come. If we can anticipate the issues now and begin to take some positive steps while we have the momentum for change, we can get in front of the curve to offset some of the major disruption that we can see in the future.

Productivity Action Plan

We have to begin to make the changes within the constraints and dictates of the federal system. We can't control the pay and benefits issue but we can put some new life and enthusiasm into the personnel systems architecture already on the books—suggestions and awards particularly. We intend to take a whole new look at training and career development of our workforce. This is likely to have impact on traditional position classification systems but we'll work up an action plan on a pilot basis to sort out the pros and cons.

Delegations of authority need to be sorted out to a lower level. We've started the process at the Department level, but our agencies need to follow through. Required justifications and authority levels need to be determined so we don't have to spend dollars to protect pennies.

We're putting new emphasis on organizational communications—new methods that cut down on paper but get the word back and forth through our Department. And also on communications— probably most importantly—we're taking a look at the lynchpins of our organization—the first-line supervisors—to see how we can encourage them to grow into a facilitators' role to get the most out of the people they work with. You can be sure this isn't a mandated program. We're working with and through our agencies to tailor programs that suit their particular needs.

Conclusion

In any comprehensive effort of this magnitude, the emphasis and leadership must clearly be from the top, but the real key to success and accomplishment must include ignition of the bottom-up process. Two-way communication is critical. And we must be ever mindful that we must fully utilize our most important resource —our high-quality, program-committed USDA employee.

224

-- NOTES --

-- NOTES --

226

Step Back into the Future:
The History of Multiple Management
J. W. Felton, McCormick & Co., Inc.,
Hunt Valley, MD

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in
Government and Industry

September 25-26, 1984/Washington, D.C.

227

228

STEP BACK INTO THE FUTURE: THE HISTORY OF MULTIPLE MANAGEMENT

John W. Felton
Vice President-Corporate Communications
McCormick & Company, Inc.
11350 McCormick Road
Hunt Valley, Maryland 21031

Abstract

An employee participation program called
"Multiple Management" is cited as one of the
reasons McCormick & Company, the international
spice firm, is included in the recent best seller,
THE 100 BEST COMPANIES TO WORK FOR IN AMERICA.
Multiple Management is a multifaceted program
which not only stimulates employees' innovative
ideas for new products and improved procedures
but also offers in-house training for future
leaders of the Company.

Unlike the popular quality circles, which
limit participation to employees in one specific
area of production, Multiple Management crosses
all corporate areas, levels and disciplines. It
is based on the premise that "the employee on
the job is often best able to say how that job
ought to be done."

McCormick says: "Few organizations realize
that making people feel they are an important
part of the enterprise is the key to enthusiastic
participation, to teamwork, to innovation and to
pride in products and in the workplace.

"Unlike many businesses, we're not as
interested in ideas about managing people as
we are in peoples' ideas about managing the
business."

229

STEP BACK INTO THE FUTURE: THE HISTORY OF MULTIPLE MANAGEMENT

John W. Felton
Vice President-Corporate Communications
McCormick & Company, Inc.
11350 McCormick Road
Hunt Valley, Maryland 21031

I suppose we could blame Tang or Xerox for this age which some future historian will call the "era of the quick fix."

With a flick of the wrist we have instant orange juice, instant coffee, and instant copies of almost anything.

With computers now calculating in nano seconds, is it any wonder that nearly everything in life appears to be running at faster and faster speeds? Like the queen in "Alice in Wonderland," we run faster and faster just to stay in place.

As we move from an industrial society to an informational society, this speedup affects us both at the workplace and at home. The stepped-up pace demands new efficiency and greater productivity. But where do we go to get it?

There are "How To" books on almost every subject. I'm sure most of you have read Ken Blanchard's book, "The One Minute Manager." It has been followed by "The One Minute Lover." That is carrying this business of speeding up too far! Even the best of ideas can be copied in a clumsy or unthinking way.

While some good ideas never did last very long, we used to have a little lead time before they were copied.

New ideas in management like new ideas in other areas may have the life span of the "Twist" or the "Hula Hoop." Just about the time we figure out how to do it, it's out of favor.

You know the buzz words--quality of work life, job enrichment, "I'm Okay--Your Okay," quality circles, productivity improvement, "Corporate Cultures," "In Search of Excellence." All these ideas and management theories keep zooming across our desks in a bewildering array. Which is right? Which best suits our work situation? How do we choose? What kind of "instant fix" do we need? Do we need one at all?

Let me suggest that we do need the perspective of looking back, from time to time, to pick up a reference point on where we've been in relation to where we're headed. For this reason, I suggest that we step back into the future.

To do this I'd like to share with you more than 50 years of experience in participative management which at McCormick we call Multiple Management.

So come back with me to 1932, a year those of us who can remember do not want to remember. It conjures up so many painful memories.

The year 1932 was the depth of the Great Depression; hundreds of banks closed, millions of Americans were unemployed, wages were down 60% since 1929, and the Dow Jones average had fallen from 380 to 41.

Many of you remember stories of desperate people selling apples on street corners and long soup lines!

In June 1932, a "Bonus Army" of 17,000 veterans camped out in Washington shouting for Congress to pay them bonus certificates.

Finally in July federal troops, under a General named Douglas McArthur, drove them out of the city.

In Baltimore, in the fall of 1932, McCormick & Company, which had been founded in 1889 as a seller of fruit syrups and tonics, was in the same predicament as most American industry. Sales were down, way down! And on November 4, 1932, Willoughby McCormick, the Company's founder and president, was in New York trying to raise cash to keep the business going. He had already made pay cuts and had just announced another. But on this business trip to New York, he died unexpectedly.

Back home in Baltimore, many people feared the worst for McCormick. Just a few years before, in 1921, McCormick had opened a new plant and headquarters on Light Street in downtown Baltimore. Now, however, the Company was scrambling just to survive.

The Company was in bad shape--losing money, an unexpected change in leadership, low morale, and even lower productivity!

The situation was painful in every respect. The existing way of doing things was not working. There was dissatisfaction with the status quo. Change had to be made if the organization was to survive.

The urgent necessity of these situations often gives birth to innovation. At General Motors it became a program called "the quality of work life." We read everyday of new efforts to gain employee involvement in solving the problems of these businesses. The unions are joining these efforts.

Necessity may be the mother of invention, but it was the pain that caused the recognition that something had to be done about the problem. If necessity is the mother of invention, perhaps pain is the father of change. It certainly was at McCormick back in 1932. And it probably is in most organizations. Pain and dissatisfaction provide the momentum to make change tolerable. During the Depression the pain of no job was about the worst pain people could think of.

230

There has been plenty of this same kind of pain in many of our basic industries recently and in many of our big unions.

Back at McCormick, Willoughby McCormick was succeeded by his nephew, Charles Perry McCormick, who had spent 15 years as a salesman and in the plant. "C. P." was then 36 years old.

In retrospect we can see that although Charles P. McCormick did not have the luxury of the kind of graduate education many people are receiving today, he did have instinctive good sense about organization, product development, distribution, marketing, and sales, and most of all good sense about human relationships.

Charlie knew from his 15 years of experience that worker productivity was low. For years he had heard stories about Willoughby's efforts to correct this problem.

Willoughby would make daily tours of the plant and offices. People knew this, and workers would knock on pipes or phone ahead to alert others to Willoughby's tour. Workers would get very busy when he was nearby. Charlie knew that properly motivated and led, great productivity gains were possible.

It is in human relations that he made his mark by shaping a system and creating a management attitude which continues to this day-- a system called Multiple Management.

The first thing "C. P." did when he took over was unheard of during the Depression. He reduced the work week from 56 to 45 hours. And instead of cutting pay, he raised wages by 10 percent!

His remedy for the pain of change was to offer employees participation--participation in decisions about their work, participation in the fruits of their labor if they improved production and profits.

"The only way the Company could survive under this schedule," he said, "was to boost production." So we made it plain that from now on "the workers would prosper if the Company prospered." He let people know that this change in the way things were done would be in their best interest if everyone worked at it. He knew that the people could raise productivity.

The next major step he took was part of this same philosophy. He introduced Multiple Management at McCormick. Multiple Management is similar to a Junior Board of Directors made up of younger executives who are asked to find better ways to operate the business.

Multiple Management is a system of managing and training, as well as philosophy of how you treat your fellow workers.

You may feel more comfortable with the term "Multiple Management" if I tell you it is a form of participative management.

Charlie McCormick didn't invent participative management. His innovation was in the concept of a board made up of junior executives--grouped into committees to try out new ideas, to carry out studies, and to make recommendations to top management.

Multiple Management evolved logically as the business world moved with the democratic trend toward greater participation. Charlie was able to foresee this trend and to harness it for the benefit of his employees. He also introduced a formal profit-sharing plan as an expression of this participative philosophy.

Multiple Management, which we often refer to as "MM," combines two things: the need for individual recognition with the dynamics of human relationships. It is practical and specifically addresses the employee's need to feel he or she is contributing to the success of the organization. Just being involved in carrying out the tasks of a company without ever having a voice in the development of its policies or procedures is not sufficient participation.

The result at McCormick was small teams of employees meeting regularly on a voluntary basis to identify, to analyze, and to solve work-related problems--real company problems regarding packaging, product development, productivity, cost reduction, distribution, sales, quality, and inventory control.

By 1933, just one year later, profits moved from the red into the black and have stayed there. Some two thousand board suggestions were accepted during the first five years.

Because Multiple Management provides a way to have a "say" in nearly all aspects of company activities, the barriers that sometimes exist between different levels of management are greatly reduced.

And when used effectively, Multiple Management is a counterforce to the deadening effect which autocratic rule and dogmatism can have at all levels of an organization. There is no real success for individuals or the organization without close cooperation.

Let's look at recent examples of the system at work.

* A committee determined the contribution a certain major product made toward absorbing overhead. Doing so required obtaining information about marginal costs. Highly sensitive data was made available to the committee. Trust is a key aspect of the Multiple Management system.

This trust occurs because committees frequently deal with company executives who themselves have participated on Multiple Management boards and believe in them.

3

231

* In another example, a committee found a savings of $45,000 by simply changing the type of containers used for shipping material in bulk.

* When increased interest rates made carrying large inventories extremely costly, a committee studied how the McCormick inventory management system operated and how it might be improved. It found that a better sales forcasting system could lower inventory. In the process, the committee also looked at the materials requisition plan--a computer model--to see if the assumptions made in the original system should be adjusted.

* Inflation had caused the Company's policy on moving employees from place-to-place to become outdated. A Multiple Management committee went to work on that problem. The result--a new corporate policy and procedure on transferring employees, which greatly eases much of the trauma associated with moving.

* Another project created a checklist and guidelines for smoothly integrating newly acquired companies into the corporation.

An outsider might get the impression that committee members are specialists in the subjects tackled. Not so, and nothing points up more clearly the value of Multiple Management as a training program. In fact, training is one of the three original aims of Multiple Management boards. Those aims are:

* To train and educate members by offering them the opportunity to work with employees from all parts of the business;

* To encourage the free exchange of ideas among all levels of management;

* To make recommendations on policies and projects that will contribute to the success of McCormick.

One recent board committee was composed of a research scientist, an auditor, a member of a human relations department, and a marketing specialist. Applying their skills with tenacity, they all learned from one another; and as a result, one of McCormick's plant operations was improved. But each participant also gained valuable professional insight about another part of the business. The success of their work reinforced confidence in Multiple Management as a vital part of the McCormick way.

The basic philosophy behind this way of doing things is to recognize that the employee on the job is often the best fitted to give advice about how best to do the job. This is the essence of Multiple Management and participative management as we see it today in quality of work life and quality circle programs.

A Multiple Management board is free to investigate any company activity except compensation and benefits.

Today, we have 15 Multiple Management boards representing each major unit of McCormick.

How does the MM system work?

Briefly, the mechanics are these:

Management appoints the first board. After that, members are voted on and off the board by members of the board itself. Continued membership depends on how each member is ranked on performance by all of the other members of the board. This peer ranking means that continuing on the board is based only on how the individual performs on the board itself.

We find success on the board is often an indicator of future leadership potential. Rankings are done every six months and are based upon individual creativity, judgment, achievement, and human relations.

The six members with the highest ratings are automatically members of the new board and elect the other members. Those voted off are eligible to return again after being off the board for six months.

Not only are board members highly competitive with one another, but we find each of the 15 boards competes with each other in suggesting new ideas.

Recommendations made by a Multiple Management board to top management must be approved by three-fourths of the members of that MM board.

After the board recommendations go to senior management, they must, in effect, be defended by the committee members who made them.

Over 80% of Multiple Management Board recommendations are accepted by senior management.

Board members are paid for their time and receive extra vacations. Boards vary in size from 7 to 20 members. Far more people want to be on one of the boards than there are openings.

The examples of typical committee projects I reviewed a few minutes ago are not intended to convey a picture of perfect togetherness or noiseless harmony. Instead, "MM" Boards often trigger the "harmonious clash of ideas."

In practice, ideas are presented by mature people who have to stand the test of evaluation and criticism. As I mentioned earlier, any committee whose recommendations are approved by vote of members of a Multiple Management board must defend its findings during a review by senior management. These encounters can be clinically severe as senior management seeks to determine if the recommendations are both sound and practical.

So, Multiple Management is not magic, and it certainly is no panacea. It's hard work! As one executive said: "We are not trying to sell ourselves as good guys. We're trying to get our employees more interested in the Company and get them to understand that their own best interest and the Company's best interest are the same."

232

We believe there are five basic needs that
must be met for employees. These needs are
fair pay, security, opportunity, recognition,
and participation. Understandably, we believe
participation is the most important.

And participation is the most important
element in the day-to-day working of Multiple
Management boards. It is the most important
element in the application on a day-to-day basis
of Multiple Management as a philosophy of
management, and participation is the most
important key to increasing productivity.

We hope this step back into the future,
as we looked at McCormick's 50 years of
experience with employee participation, can help
you answer some of your questions.

Successful businesses must learn to accept
change and to learn to work with their people,
their beliefs, their opinions, their attitudes,
their performance, and the services they provide
to customers.

If we have serious problems in any of these
areas, we should consider the need for change.
Would some form of employee participation help
solve the problem?

Multiple Management was McCormick's answer
50 years ago. It's not a fad. It's not a
hula hoop. It's not a quick fix. It worked for
us during the Depression. It works for us
today.

233

-- NOTES --

234

Paperless Office at Work
F. Giannantonio, Avon Products,
Inc., Rye, NY

NASA SYMPOSIUM ON PRODUCTIVITY AND QUALITY

Strategies for Improving Operations in Government and Industry

September 25-26, 1984/Washington, D.C.

236

Frank Giannantonio
Avon Products, Inc.

In today's world where technology is changing so rapidly, the implementation of office automation becomes a process rather than a project. As a company deciding to automate its office, the process would begin as a series of projects that would continue over time.

To give you a better perspective on an automated office, I would like to share with you our experience at Avon.

Avon is a multi-national company with computerized support in both its domestic and international locations. We had started the process of what we considered our "Office of the Future" in 1978. At that time we had established a group called "Office Systems" within the Information Services Department. It was primarily made up of staff that concentrated on word processing, the most widely used technolgy at that time.

At Avon we have large computers in many locations and had soon developed a large word processing base. Also, we are a multi-vendor computer shop. I highlight this fact because it played an important factor in our over-all strategies toward office automation.

The strategies that became significant to us, were:

- To develop end-user computing power. By that I mean, we wanted to give our user community the ability to control their minor computer requirements.

- The implementation of word processing.

- We wanted to capitalize on the use of personal computers.

- There should be only one work station per desk.

While supporting these strategies, the given objective was to increase productivity of Managers, Professionals and Secretaries while reducing costs.

Three key factors contributed to the evolving process I had mentioned above:

- Changing technology - the technology is changing so rapidly that we are truly into an information revolution.

- Application integration, that is, data processing, office automation and communications technologies have overlapped each other in the last few years.

- New business opportunities will contribute to the on-going process of automating the office.

Since 1978, we have followed the technological advancements of several vendors' hardware and software. We were convinced two years ago that an automated office with "paperless intentions" could begin to be achieved.

We had decided to evaluate several vendors, of which we selected one to do a pilot. The pilot was to be conducted over a 6-month period with the key objectives to measure effectiveness, justification and organizational implications.

In that same time we had established that our universal work station would be a personal computer.

We established criteria for both the work station and office system selection. Functionally, this system should be able to handle our word processing needs in that it should have the ability to create and edit text and also the ability to file and retrieve information. This system must be able to handle electronic mail, to create notes and memos, distribute it to one and many, and to maintain the ability to secure confidential information.

We wanted the system to support our management in terms of tickler or follow up files, automating/scheduling calendar capabilities and the ability for our management to do ad hoc reporting and personal computing on data both internally and on external data bases.

One of the key criteria that was established at that time was that the work station must have the ability to interface with all of our other systems. Since we are in a multi-vendor computer environment, this factor was a key ingredient to our decision to use a personal computer as our universal work station.

1

237

The profile of the pilot consisted of over 100 people, 90 of which were classified as Management/Professional and 20 Secretarial/Administrative. These people resided in five separate departments.

The results of the pilot were very positive. We had direct savings to support our investment and gain a return on this investment within one year.

We measured indirect savings on productivity gains of 23% for our Management/Professional staff and 53% for our Secretarial/Administrative staff.

We learned that:

- We were able to reduce staff at all levels tested.

- We observed a change in job content at all levels.

- Behavioral implications, working habits relating to the mail, telephone, scheduling and interpersonal communications, had changed.

The technique used to measure the above results was through a series of questionnaires and personal follow up with all participants in the pilot. The questionnaires were organized in such a way to measure the time that various activities took to do before the system was installed and subsequently afterward.

In summary, I would isolate the following challenges that you might encounter in achieving an automated office:

- Justification/measurement is an important step to take.

- Technology convergence. That is, data processing, office automation and communications will play a converging role in your implementation.

- Training is important and should be emphasized within each organization to support the move to a "Paperless Office."

- Since I believe that no one vendor has the answer, multi-vendor communications will be a challenging factor within the office.

- A universal work station is important as part of the over-all office automation strategies.

- Top Management support is needed at all times and is a key element for success.

- Lastly, attention to people issues must be an on-going task.

238

Union and Management Joining Forces

J. Sheinkman, Amalgamated
Clothing and Textile Workers Union,
New York, NY

239

240

Statement

of

JACK SHEINKMAN
Secretary-Treasurer
Amalgamated Clothing and Textile Workers Union

on

UNION AND MANAGEMENT JOINING FORCES

Abstract

During the first surge of industrialization, most unions found themselves in adversarial, often bitterly hostile, situations. In the 1930's, the National Labor Relations Act guaranteed the right of workers to unionize, but, even then, unions sometimes ran into great opposition. There were a few exceptions, such as the men's tailored clothing industry. On the whole, though, until fairly recently, mass production industries, such as auto and steel, have come to the bargaining table only when unions had the strength to get them there.

When the survival of whole industries was threatened by foreign competition and the collapse of markets in 1980-82, the necessity for cooperation became evident. On the other hand, under the Reagan Administration, anti-unionism has been sanctioned and encouraged. Yet, the future of our economy, the revitalization of our industries, and the restoration of our competitiveness in world markets require that every effort be made to increase labor-management cooperation.

One area in which work has been done is that of worker participation programs, which are intended to improve the quality of work life while enhancing the effectiveness of the company. Attitudes toward such programs have been mixed, and a recent study has found, in 1980, that 75 percent of such projects that had been operating at least five years were no longer functioning. Yet, I believe that worker participation programs can make a positive contribution if managements and unions approach the task in good faith.

Unions and managements must view each other as equal partners in planning and carrying out a program. All company policies that may affect the viability of the operation must be subjected to joint discussion. The company must share information on its plans for investment, procurement, product development, marketing, and the location of production.

Consultation cannot be limited to the shop floor but must be extended to all levels of the organization. Cooperation is not consistent with a superior-inferior relationship. Just as workers will need training to broaden their skills and re-orient them to problem-solving, supervisors will have to become "coordinators" rather than "monitors." The "culture" of the workplace must be changed from paternalism to genuine worker participation.

Management and union must make an explicit long-term commitment so that projects will not be abandoned when short-term goals have been reached. Participation by workers should be voluntary, and the financial incentives should be commensurate to the workers' contributions and efforts and should be sustained as long as the program is in operation. The program should not result in lay-offs, and this must be explicitly agreed to.

Finally, worker participation programs should not be used to undermine collective bargaining relationships but must take place within the framework of the contract between the parties. And, of course, I am opposed to the use of worker participation programs to thwart the legitimate desire of workers who want to be unionized.

These conclusions are based in part on contrasting experiences of the Amalgamated Clothing and Textile Workers Union, which I represent, with two major companies -- Xerox Corporation and Johnson & Johnson, which are described in the paper.

The idea behind worker participation programs is a good one. The hierarchical authority structures of American industry run counter to human values in the workplace. Changing the structure and content of work so that workers can participate in the decisions affecting their environment can contribute not only to productivity and the success of the company but also to the well-being of the workers.

*   *   *

In dealing with the question of union and management joining forces, I think we must first look briefly at where we have come from in labor-management relations before we can assess the possibilities of greater cooperation.

When our economy had its first surge of mass industrialization and the scene was dominated by robber barons, most unions found themselves in adversarial, often bitterly hostile, situations. They made little headway until the 1930's, when the New Deal's National Labor Relations Act guaranteed the right of workers to unionize, and, even then, unionization sometimes ran into great opposition.

There were a few exceptions. In the men's tailored clothing industry, which my union has represented for more than 70 years, the economic structure of the industry was so chaotic, and cut-throat competition was so destructive to the companies, that the union proved to be the stabilizing force. A basis for cooperative labor-management relations was established as far back as 1911. It was recognized that cooperation was

1

to the mutual benefit of both the workers and the employers.

On the whole, though, until fairly recently, mass production industries, such as auto and steel, have come to the bargaining table only when the unions have had the strength to get them there. What brought about a recent change in attitude on the part of management were the devastating effects of foreign competition and the collapse of the markets in 1980-82. When the survival of whole industries was threatened, the necessity of cooperation became evident.

On the other hand, the domestic political climate also has a bearing on the nature of labor-management relations. Under the Reagan Administration, anti-unionism has been sanctioned and encouraged. When the President himself became our number one strikebreaker, when the National Labor Relations Board flouted the intention of the very Act it was charged with carrying out, when the Supreme Court ruled that employers could cancel out their collective bargaining agreements by declaring bankruptcy, anti-union employers had the blessings of the highest authorities. They stiffened their resistance in negotiations and demanded concessions, whether warranted or not, and intensified their efforts to prevent unionization.

Yet, the future of our economy, the revitalization of our industries, and the restoration of our competitiveness in world markets require that every effort be made to increase cooperation between unions and management.

One area in which interesting work has been going on deals with worker participation programs. The concept of these programs is to improve the quality of work life while enhancing the effectiveness of the company. They are undertaken in the belief that workers who have a say in how their jobs are performed and participate in solving problems in the workplace will increase their productivity as well as their job satisfaction.

These are constructive and laudable objectives, but there has been considerable skepticism among union leaders and others about QWL programs. And the track record in plants which have instituted such projects is not all that good. Professor Paul S. Goodman, of Carnegie-Mellon University, found, in 1980, that 75 percent of the projects that had been operating at least five years were no longer functioning.

Goodman's analysis of the reasons for the failure of these programs is instructive. Dependence on a single sponsor within the company, whose tenure might not last or whose interest might shift, was one reason. Beyond that, Goodman found that commitment at all levels of both the company and the union was a crucial factor and that a lack of commitment on any level of either management or labor could be fatal. When workers did not see their increased output through QWL projects reflected in their paychecks or found that inital financial incentives were not maintained, projects failed. Another problem was conflict between QWL and non-QWL operations, since offering benefits to one group and not others can be divisive. Goodman also learned that QWL plans foundered when the company's attention became dominated by other problems; he felt that the company's commitment in bad times as well as good times was important. Finally, QWL projects did not succeed in companies where the essential concept of worker participation programs -- that workers should have "more control, more responsibility, and more autonomy over their workplace" -- ran counter to the basic attitudes of management in the company -- top-down hierarchy, authoritarianism, competitiveness, and mistrust.

While these findings indicate some of the pitfalls in efforts to initiate effective worker participation programs, they do not lead me to a negative conclusion. On the contrary, it seems to me that these programs do address real needs. Surely, the old-fashioned hierarchical authority structures prevailing in many industries militate against the attainment of human values in the workplace. Not only do they demean the people who have to work under the close control of harsh overseers; they are counter-productive. Both efficiency and quality suffer as a result of the excessive simplification of tasks imposed by the technologies that force the worker to become an appendage to the machine.

Work should be structured so that it challenges the worker to exercise his or her abilities in ways that are not only productive but satisfying. Providing workers with an opportunity to develop diverse skills enhances their motivation and contributes to improved morale. Giving them a voice in the control of their immediate work environment should lead to greater teamwork and high productivity.

These are worthwhile goals. They can be achieved if management and unions approach the task in good faith. The trust and openness required for success cannot be turned on and off like a faucet. They can only be earned by the consistent actions of both parties that convince all concerned that there is a genuine basis for going forward.

Unions and managements must view each other more as equal partners in planning a worker participation program and in carrying it out. Consultation between the parties cannot be limited to the shop floor. All company policies that may affect the viability of the operation must be subjected to joint discussion. Information must be shared on company plans for investment, procurement, product development, marketing, and the location of production.

Moreover, the equal footing of each party must be extended to all levels of the organization. Cooperation and teamwork are not consistent with a superior-inferior relationship. Just as workers will have to receive training to broaden their skills and re-orient them toward problem-solving, supervisors will require a redefinition of their jobs and training appropriate to changing them from "monitors" to "coordinators." Only by a broad change in the "culture" of the workplace from paternalism to genuine worker participation can a viable program emerge.

The length of time for which the parties are committed to maintain a QWL program is an important consideration. Many projects have failed because the initial interest was not sustained after short-term goals were achieved. The parties must anticipate the probability that obstacles may arise after a year or two of experimentation. These are

242

more likely to be overcome if management and union made an explicit long-term commitment.

A mechanism for overseeing the worker participation program is essential. Responsibility for initiating new projects, reviewing progress, and implementing the findings and recommendations of working groups should be lodged in a steering committee representative of the management and the union. Any consultants engaged to advise the committee on program development should be acceptable to the union as well as management.

Most workers would welcome the opportunity to take part in a QWL program. However, their cooperation cannot be commanded, nor should anyone be coerced into participating. Therefore, it should be made clear at the outset that participation is genuinely voluntary.

QWL programs should not be used to undermine the collective bargaining relationship. The rights and benefits established by the contract should not be jeopardized. Any proposed changes that may affect contractual provisions should be made the subject of appropriate discussions in collective bargaining between the parties in accordance with the contract.

It has been said that QWL programs are designed to help people "work smarter, not harder." This must be recognized as the hallmark of an effective program. People should not be expected to come up with ideas which result in their having to work harder or faster. Nor should the implementation of suggestions result in layoffs. There should be an explicit agreement to this effect.

Participatory practices will require individual employees to take greater responsibility for their work operations. It is only fitting that with greater responsibility should go commensurate financial rewards. A mechanism for sharing the benefits among all employees who contribute should be agreed upon in advance, and financial incentives should be sustained as long as the program is in operation.

I believe that companies and unions which approach the planning of work innovation in light of the above prerequisites have a good chance of developing viable programs. Only a few of the companies with which my union deals have exhibited enough interest to embark on such an endeavor. I will discuss two of our experiences, with results on both sides of the ledger.

One company, Xerox Corporation, has been working with us on a project since 1980, and I would assess the program as quite successful. Virtually all of the prerequisites outlined above have been fulfilled. Operating under a joint committee with responsibility for planning and carrying out the program, we set up QWL teams consisting of six to eight workers from the same work area in each of four plants comprising the company's major manufacturing complex. Each team undergoes an inital 40-hour training program which emphasizes problem-solving skills and team-building. The focus of the team's weekly meetings has been on solving problems related to existing jobs.

We anticipate that some 80 percent of the work force will be involved by the end of next year, and that the focus of the teams' activities will be extended to a broad array of issues related to work organization, job design and work layout, and work group management.

A notable achievement of this program has been to provide a mechanism for dealing effectively with a controversial issue which arose in 1981. A full-time labor-management "study-action team," composed of hourly employees and engineers, found ways to save an operation by reducing operating costs by over $3.2 million after the company proposed that it be discontinued. Some 180 people are now employed who would otherwise have been laid off. The team recommended ways to manufacture competitively component parts for Xerox machines by changing workflow patterns, instituting better inventory control, and purchasing new equipment. These recommendations were adopted, and the parties reached an agreement in 1983 to set up joint study-action teams to investigate all situations in which the company proposes to subcontract work that it believes is not currently being done at a competitive level.

The success of our joint effort at Xerox could not have been achieved in the absence of broad consultation at the highest levels. The willingness of management to share information on plans for investment and marketing, as well as its receptivity to union input on these matters, provided the assurance needed to convince participants at the shop floor level that cooperation was worthwhile.

I want to stress also that none of this could have been accomplished if we did not have a sound labor-management relationship at Xerox, based on many years of collective bargaining on the basic issues. Worker participation projects should be supplemental to the collective bargaining agreement and should operate within its framework. Where companies have attempted to utilize QWL programs to circumvent the union contract or to undermine a union, such programs defeat their primary purpose.

Another company with which ACTWU has worked in developing QWL programs is Johnson & Johnson. We have been engaged in joint committee activity for several years with respect to wage incentives and job safety. In 1982, we embarked on a joint problem-solving program at the company's Ethicon plant in Somerville, New Jersey. Under the direction of a plant-wide joint steering committee and departmental advisory committees, several problem-solving teams have been trained to deal with such shop level problems as quality, layout and location of equipment, experimental areas, and products to be produced in the plant. An indication of the successful handling of a difficult problem was the recent agreement by the company to absorb excess workers for a two-year period, during which attrition would be allowed to reduce the labor component.

Ironically, at the same time that our local union was cooperating with management in developing QWL teams at the New Jersey plant, the management at a sister-plant in Albuquerque, New Mexico was utilizing QWL team techniques as an

243

anti-union tool to frustrate the efforts of the workers to organize a union. The following excerpts from testimony of a Ph.D. candidate at the University of New Mexico, who made a study of the QWL program at the Albuquerque plant, are instructive:

"Jaramillo (the plant social psychologist and personnel administrator) made it clear to me that the team system at Ethicon is being used as a 'union-busting' tool.... For this purpose, facilitators (supervisors) are expected to remain in control of their teams while employees are made to feel that the system is 'open' to their suggestions and decisions. According to Jaramillo, teams are used a part of a strategy to 'isolate' pro-union employees from their fellow team members...he or she can be fired for not having 'team support'... or for a poor 'attitude' or other factors ostensibly unrelated to union support...

"At Ethicon the team system has been transformed into a tool of employee manipulation... The team becames a conflict group rather than a production group...management has put in doubt the future of teams if the union gets into the plant... Establishing a non-union plant is apparently management's primary goal...

"One production team was eliminated because expression of pro-union sentiment became too frequent for the facilitator (supervisor) to control...

"A system of worker consultations with team facilitators was originally intended to address legitimate production or other performance problems. However, with each employee now identified in management's ratings by union leaning, 'consultations' are used as a symbolic threat to pro-union people."*

As a result of the company's anti-union campaign, of which the QWL program was a key part, the union lost an NLRB election at this plant. The NLRB subsequently charged the company with unfair labor practices, including the discharge of four employees for union activities. The company conceded its guilt by entering into a consent agreement with the NLRB which included the restitution of back-pay to the four illegally-discharged employees.

This example of the abuse of a worker participation program by management is not an isolated event. It is an indication of the depth of anti-union animus that pervades the thinking of management in the United States. A 1978 Conference Board survey of 668 of the largest private-sector unionized firms indicated that "the majority of firms with less than 40 percent of their employees organized assign top priority to avoid further union organizing.

The strategy of enlisting techniques developed in the personnel and organizational behavior fields had become the predominant method of avoiding unionization among firms which can absorb the costs of this more sophisticated approach."

It is ironic that many advocates of worker participation stress its usefulness as a means of substituting cooperation for the adversarial attitudes which are said to poison union-management relations. The union, as the moving party in collective bargaining, is generally regarded as the source of these adversarial attitudes. Yet it is the prevailing management practice in the United States to attempt to avoid collective bargaining. I suggest that where excessively adversarial attitudes make cooperative union-management relations impossible, it is more likely to be due to anti-union hostility than to anti-management bias on the part of unions.

In conclusion, the idea behind worker participation programs is a good one. The hierarchical authority structures in American industry militate against human values in the workplace. Changing the structure of work so that workers can participate in the decisions affecting their work and its environment can contribute not only to productivity but also to the mental health of the workers and the well-being of the company.

Converting this idea into reality is a challenging task. It is subject to abuse by managements which may be more concerned with short-term profits or anti-unionism than with improving the work environment. Workers and unions have good reasons to be suspicious. They have the responsibility of making sure that management initiatives reflect a genuine willingness to work cooperatively to achieve mutually-accepted goals.

If management recognizes the union as an equal partner in planning and carrying out a worker participation program, it has a reasonable chance of serving the interests of the workers as well as the firm. I can therefore contribute to the democratization of the workplace.

For such a program to succeed, the parties must be willing to extend their joint activities beyond the shop floor. Workers are entitled to assurance that the gains achieved in one operation will not be lost as a result of management actions on another level. Meaningful worker participation must include broad consultation and information-sharing on all subjects that may affect the future of the workplace. If management is open to meeting these basic criteria, quality of work life programs will have a role to play in the future of American labor relations.

___

* Testimony of Guillermo J. Grenier before the Citizens' Monitoring Committee, Albuquerque, New Mexico, April 12, 1983.

244

-- NOTES --

245

-- NOTES --