Corporate War-Rooms:

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The Closed World

- Cultural history of the SAGE air defense system and the SDI project

“The Closed World: Computers and the Politics of Discourse in Cold War America”
A “Semi-Automated Ground Environment”!

- SAGE itself was an anti-bomber air defense network in 1950s & 1960s
- Highly automated system
  - Collects data from huge network at central command posts
  - Decisions made very rapidly
- Enormously expensive
  - Most important single project in history of computing
My Topic:

- Construction of the computer as the centerpiece of a corporate system of command and control
- During 1960s, cold war military systems support this project by providing:
  - Technology demonstration
  - Rhetoric and cultural assumptions
- A visual demonstration...
Dr Strangelove
“The war-room atmosphere is growing up fast” (The Corporate Command Post, 1968)

“one by one, the same applications that are pioneered and proven in military use ultimately find their way into business” (1968)
“a more relaxed, leisurely management environment. The uneasiness will be replaced by a feeling of confidence in the completeness and timeliness of information and in the decisions based on that information....”
“A historical pattern in information systems has developed in which systems, applications and equipment used in advanced military... applications presage commercial developments. [this] permits business to obtain valuable insight into... concepts that will eventually become commercially feasible.... The command control center is an example, with its many parallels to the integrated management system”

John Diebold (prominent consultant), 1963
Management Information Systems

- "Totally Integrated Management Information System"
- From 1962 to 1970 – dominant idea for correct role of the computer in management
  - All information, instantly, all managers, whole firm
  - System include models, forecasts, projections
  - Used directly by top executives
  - Real-Time, On-Line
Striking but Circumstantial

- “Wow! But really, how did this happen?”
- To answer this
  - Rewind to late 1950s
  - Identify social groups within the corporation responsible for creation and propagation of these ideas
  - See how these huge, vague cultural themes play out in practice and ideology of particular groups
The “Systems Men”

- Systems and Procedures Association
  - Chartered 1947 (informally 1944)
  - Spread very rapidly in early 1950s
- Managerial Technicians
  - Corporate – many with accounting background (unlike Office Managers)
  - Staff role – advisory, not supervisory
  - Aspire to true managerial power
Who Were The Systems Men?

- World War II was genesis of movement
  - Administrative innovation for wartime production
  - Seek to apply rational, scientific, systems approach. Look up to RAND, McNamara, etc.
- Thrive with shift to multidivisional organization
- Self-consciously modern group
  - Mostly originating in accounting departments
  - Apply new and exciting “systems engineering” ideas of Cold War to sleepy world of corporate administration
  - Mostly parallel but separate to industrial engineering.
Great dreams...

- Management Generalist
  - Technocratic mandate from top executive
  - Audit departmental effectiveness
  - Reorganize departmental structure to unlock efficiency, “re-engineering and replanning the entire system”

(1958 presidential address)
... but limited respect

- Write manuals
- Improve clerical procedures
- Design forms
Management Engineers

- Find a niche, but a constraining one.
- Boundaries between engineering and management set in Progressive era.
  - Authority of engineers clearly limited to “technical” sphere
- Systems men claim management itself as their technical sphere
  - Attempted renegotiation draws on power of “systems” as universal expertise in Cold War culture
Enter The Computer
The Computer as Showpiece

“a computer installation can have tremendous public relations value for a company”

Management and Business Automation - 1960
Its work was quite mundane

- Payroll, accounting, invoicing
  - Taking over jobs from existing punched card machines
  - Slow evolution hardware of hardware, practice
- Intended to automate clerical work
  - Success means replacing clerks
  - Justified on basis of lower operating costs
- Guarded by...
The Machine Accountants

Not Really Accountants

Tabulating machine Technicians & Supervisors

Shift to Data Processing

Program as well as operate machines
Systems Men Look Down...

Is the analyst turning into an artisan making application of punched card and magnetic tape equipment?

Systems and Procedures Journal, 1960
Redefining the Computer

- Embrace the computer
  - But redefine it as managerial
- Centerpiece of a new kind of management system
  - Process **information**, not data
  - For **management decisions**, not payroll slips
  - Integrate **everything** ("total system")
Management in the Atomic Age

- Automation
- Operations Research
  - Mathematical modeling
- Statistical Analysis
- Organizational theory
  - Self-conscious examination of organizational form

AUTOMATION - the new technology

Rather than replacing human labor, automation will make it possible to render new, more comprehensive and more economical services.

By John Dickold

Automation control gives every evidence of becoming one of the most important factors influencing industrial development during the second half of the twentieth century. While the source of power may be affected by developments in the atomic energy field, it is automatic control that will in large part determine the manner in which power is used and consequently the form of our industrial plant.

The "second industrial revolution," as the application of automatic control has been called, lacks the unifying symbol that James Watt's steam engine provided for the first industrial revolution, where power-driven machinery replaced hand labor. No single machine, no one piece of equipment — not even the digital computer — adequately represents the nature of the industrial change being wrought by automatic control. That the many different forms in which this emerging technology shows itself have been the main objects of attention — with much resulting confusion.

It is of the greatest importance that American businessmen should not be the victims of this confusion; that instead they should cut through the varied and often apparently contradictory manifestations of this new development to the key concepts that make it what it is — and thus master the second industrial revolution as they did the first. Think of all the implications of such an achievement for the future of the United States economy!

Key Concepts

1. The common denominator underlying the widely different forms of the new technology is the concept of feedback control, or self-correction. It is the use of electronic controls employing feedback that gives rise to an entirely new technology: automation.
2. Electronic controls for automation can be used for special as well as general purposes — for performing a time study as well as for automating a complete plant.
3. Processes, machines, and products must be redesigned, often along completely new lines, to make most effective use of such controls; otherwise technical progress will be slow.
4. Although the potential uses for automation are tremendously varied, there are significant limiting factors of a non-technical nature — for instance, consumer desires.
5. The probable impact upon the economy has been greatly exaggerated. There will be no worker...
A “Managerial Revolution”

- “our thought process will be left in the horse-and-buggy state while our operations are being run in the age of nucleonics, electronics and jet propulsion”

Information in the 50s

- “Information Theory” – fashionable & novel during late 1940s, early 1950s

The authors of information theory

Norbert Wiener of M.I.T., ex-child prodigy and one of the world’s foremost mathematicians, was the first to grasp clearly that communication of information is a problem in statistics.

Claude Shannon of Bell Laboratories, a thirty-seven-year-old engineer and mathematician, published his brilliant work, A Mathematical Theory of Communication, in 1948.
Information

- Debut of “Information” in business culture
- *Fortune*, December 1953

The Information Theory

by Francisella

Great scientific theories, like great symphonies and great novels, are among man’s proudest—and rarest—creations. What sets the scientific theory apart from and, in a sense, above the other creations is that it may profoundly and rapidly alter man’s view of the world.

In this century man’s views, not to say his life, have already been deeply altered by such scientific theories as relativity theory and quantum theory. Within the last five years a new theory has appeared that seems to bear some of the same hallmarks of greatness. The new theory, still almost unknown to the general public, goes under either of two names: communication theory or information theory. Whether or not it will ultimately rank with the enduring great is a question now being resolved in a score of major laboratories here and abroad.

The central teachings of the theory are directed at electrical engineers. It gives them, for the first time, a comprehensive understanding of their trade. It tells them how to measure the commodity they are called upon to transmit—the commodity called “information”—and how to measure the efficiency of their machinery for transmitting it. Thus the theory applies directly to telegraph, telephone, radio, television, and radar systems; to electronic computers and to automatic controls for factories as well as for weapons.

It may be no exaggeration to say that man’s progress in peace and security in war, depends more on civilized applications of information theory than on physical demonstrations, either in bombs or in power plants, that Einstein’s famous equation works. As might be expected, military applications are coming first. For example: The recently disclosed “Distant Early Warning Line” of automatic radar stations, stretching from Alaska to Greenland, almost certainly incorporates more of the lessons of information theory than any other communication system yet devised. The warning line was designed by the two organizations that should know more about the theory than anyone else: Massachusetts Institute of Technology (working through its Lincoln Laboratory) and Bell Telephone Laboratories.

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Information circa 1955

- "Information" has scientific connotations
  - Used mostly for technical results
  - First begins to acquire modern meaning
- Tied to Cold War—"Information Explosion"
  - Phrase adopted by technical librarians
  - Seeking to rise above low status niche
- But also linked with computers
  - Technical origins of theory relate to storage, transmission of symbols down a wire.

First use of phrase “Information Technology” for computers.

Extremely influential

Business school professors and computers as new managerial elite

Harvard Business Review
November-December 1958

MANAGEMENT in the 1980’s

By Harold L. Lasswitz and Thomas L. Whisler

Over the last decade a new technology has begun to take hold in American business, one so new that its significance is still difficult to evaluate. While many aspects of this technology are uncertain, it seems clear that it will move into the managerial scene rapidly, with definite and far-reaching impact on managerial organization. In this article we would like to speculate about these effects, especially as they apply to medium-size and large business firms of the future.

The new technology does not yet have a single established name. We shall call it information technology. It is composed of several related parts. One includes techniques for processing large amounts of information rapidly, and it is epitomized by the high-speed computer. A second part centers around the application of statistical and mathematical methods to decision-making problems; it is represented by techniques like mathematical programming, and by methodologies like operations research. A third part is in the offing, though its applications have not yet emerged very clearly; it consists of the simulation of higher-order thinking through computer programs.

Information technology is likely to have its greatest impact on middle and top management. In many instances it will lead to opposite conclusions from those dictated by the currently popular philosophy of “participative” management. Broadly, our prognostications are along the following lines:

(1) Information technology should move the boundary between planning and performance upward. Just as planning was taken from the hourly worker and given to the industrial engineer, we now expect it to be taken from a number of middle managers and given to a new, largely autonomous specialist: “operations researchers,” perhaps, or “organizational analysts.” Jobs at today’s middle-management level will become highly structured. Most of the work will be programmed, i.e., covered by sets of operating rules governing the day-to-day decisions that are made.

(2) Correlatively, we predict that large industrial organizations will decentralize; that top managers will take on an ever larger proportion of the
Management Information Systems

- Coined in 1959 by American Management Association group
  - “The Continuing Seminar on Management Information Systems”
  - Elites of the “systems”, management consulting, industrial and computer vending communities
- Navy Report in 1959
  - Correct use of computers is to give the Navy a single information system.
Total Systems

- “Totally Integrated Management Information System”
  - All information, instantly, all managers, whole firm
  - System include models, forecasts, projections
  - Used directly by top executives
- “Total systems” comes from military projects
  - Systems Engineering in SAGE, Atlas
Information, not Data Processing

- Even successful data processing squanders potential of computer
- Don’t automate clerks, automate managers!
  - Bigger savings because bigger activity
  - High status, closer to power
  - Results can’t be measured because apply to whole company
The Information Pyramid

- “Information” turns control of low-level administration into a claim to strategic centrality in a new vision of management.
- The whole pyramid must be tackled together!
Follow the Military…

- “The validity of the real-time concept has been amply demonstrated in scientific and military applications” (Director of Systems Planning, Lockheed, 1961)

- “An adequate reporting system is just as essential to a business enterprise as an intelligence system is to an army of navy.” (A Central Intelligence Program for Management, 1956)
... demand the impossible!

- “They did not wait for new technology to develop... before they launched the program.” (Management Information Systems and the Computer, 1961)
- “A science fiction era of technology is being witnessed today. The public is informed by our daily newspapers of our latest conquests in space...” (Management in Management Information Systems, 1968)
From Elites To Masses

- From academic and business elites
- Transition very rapid to rank and file
  - By 1961, MIS and “Total Systems” are ubiquitous part of discourse
- Appeal to diverse technical and managerial communities
  - Becomes a unifying belief between disparate interest groups
  - Promises something for everyone
MIS Will Realize Potential of Computer...

ADP – THE STILL-SLEEPING GIANT

By John Eshelby

Automatic data processing (ADP) has certainly arrived. But somehow it has not produced changes of the order of magnitude that we who have pioneered in the field expected. Why is that? And what major changes in management still lie ahead as the revolution in information technology gathers momentum?

Speedy and Spotty

Let’s take a quick look at the record since ENIAC and Mark I made their appearance 18 years ago. In that brief period five distinct phases may be discerned:

(1) First, there was the cold reality of potential users in the early 1950’s. Typical of this period is the memorandum which quoted Mr. Pope’s “Not the first by whom the new is tried, nor yet the last to lay the old aside.” Everyone was from Missouri and had to be shown.

(2) Next came the status “keck” of 1956-1957 when corporate presidents decided they had to keep up with the Joneses. Four-color photos of walnut panelled, deep-carpeted, “showcase” installations graced corporate annual reports, and yet-to-be-realized savings by computers were what the presidents bragged about to one another out on the golf course.

(3) Then, with the onset of the 1957 recession, came disillusion as the initial installments failed to live up to expectations. Naysayer projections of big payoffs changed in a matter of months to an attitude reminiscent of Donmar Bourne’s character, Harry the Horse, his way to the track, “I hope I break even today——I need the money.”

(4) The fourth era was ushered in during the early 1960’s. It was characterized by a growing sophistication on the part of business regarding at least the obvious data-processing applications (as more programmers and other trained personnel became available). Of special importance, there was a growing appreciation by computer manufacturers of business data-processing problems, which affected computer design.

(5) Finally, today, we have routine acceptance of the electronic computer as an everyday tool of business. Almost 15,000 computer systems are now installed in this country alone. And, if even greater significance, more computers are now on order than have been built in the past 15 years.

Unrealized Potential

Of course, many of the 15,000 ADP systems in use are more than paying their way, and some are performing tasks that were not possible before. But even in the best applications we have not come close to realizing the computer’s true potential. Let me hazard some reasons why.

Determining factors differ from installation to installation. Sometimes... but mostly never... the equipment is at fault. In most cases the problem can be laid right on management’s doorstep:

- Inadequate planning, mostly panchinal rather than corporate-wide in scope.
- Not enough fresh thinking, and too much reliance on canned approaches.
- Selection of the wrong people to plan the installation — e.g., technical specialists who fail to acknowledge or even appreciate their limited understanding of business practices.
- Overemphasis on hardware and underemphasis on the design of comprehensive systems.

These are serious faults. But the basic problem lies deeper. It is far more subtle, yet in a
...while elevating systems men

The Real Problem to Find a Place for ADP in the Organization Structure

Automatic Data Processing 65

Whither The S & P Group?

By Albert Kanter

Systems and Procedures

New twist for an old game

location for the entire systems and procedures responsibility has become a problem. The

Harvard Business Review

1965
You Need a New Computer

- “third generation” hardware
  - Terminals
  - Random Access Storage (hard disk drive)
- Sold as MIS tools
Early MIS in Practice

- Many boasts through early and mid-60s of great systems under construction
  - “Phase I here already”
  - SAGE, SABRE as proof of principle
- Hardware, techniques hopelessly inadequate
  - Storage capacity
  - Processing power
  - Analyst time and skill
  - “MIS” more of a goal than a plan for many firms
- Word of disasters leaks out circa 1968
Backlash Begins: 1968

- Idea of “total system” loses credibility
- Controllers, accountants begin to fight back –
  - Claim “information” and control systems as what they did all along
The Fate of MIS

- MIS redefined by end of 60s
- "total" part downplayed
- But "management information" has huge enduring power
- Vision of huge, all encompassing computer system remains

[Management Information Systems]

Some dreams have turned to nightmares

Ridley Rhind
Mr. Rhind is an associate of McKinsey & Company, Inc. of San Francisco.

It is common knowledge that an executive is dependent on the quality of information he receives—both official and unofficial. Recently many systems men have urged the use of computers in creating management information systems (MIS). In this article, Ridley Rhind explores the value of such systems. He begins by citing some limitations of computer-based systems in providing information needed by managers for making decisions. Even though the author illustrates that on certain levels of management a computer-based information system can be of great value, he nevertheless contends that many claims for computers are unfounded. In addition, Rhind feels that despite great strides made in perfecting computer information systems, the responsibility for judgment still remains with management.

An executive’s dependence on information has long been recognized. Speaking of President Franklin D. Roosevelt as he approached his new office in the 1930s, Arthur Schlesinger has reported that “the first task of an executive, as he [F.D.R.] evidently saw it, was to guarantee himself an effective flow of information and ideas....”

Schlesinger goes on to discuss the very great efforts that President Roosevelt made to ensure that he received information—as often from unofficial as from official sources. Although it has not always been so explicitly recognized, the need for information in business is as great as it is in politics, and business executives now universally acknowledge that their sources are very imperfect. But it is only recently that it has become the height of fashion to look to computers to meet executives’ information needs.

Computer-Based MIS

Because the computer seems to promise an improvement in the availability and quality of information—which would meet a universal need—computer-based management information systems (MIS) are much discussed in management journals today, but many of the hopes now pinned to such systems seem to be derived from the acuteness of the need rather than the real likelihood of success.

The concept of a computer-based MIS

To Take a Longer Term View

- Systems and control have a long history in business culture
  - (“information” and “total systems” are the new ideas)

- Systems Men and their allies are attempting to
  - turn these intangible managerial things into concrete, technical things
  - that they control.
Struggling for Manageriality

How to turn technical expertise in administrative methods and machines into a claim to managerial authority?

- Challenge from 20s through 90s
- Sought through a redefinition of management itself
- Cold War environment provides a new powerful new set of tools
In this story

- Terms like "(total) system", "management", "information"
  - are claimed and redefined by many groups
  - Work like "Republicanism" or "Progress"
  - Highly charged categories, can’t take for granted or use for neutral analysis

- "Information" is a central ideology to emerge in Cold War era
  - Historians continue to naturalize it
Discourse as Cultural Resource

- The ideology and rhetoric of the Cold War spreads rapidly into business
  - BUT it does so as a tool to be used toward older objectives
- It explains the **means** adopted by the systems men
  - BUT to explain the **ends** they pursue we must probe the social history of management.
The Discourse Provides

- **Proof of principle**
  - SAGE invoked to show technical possibility
  - Military systems seen as state-of-art
  - Blue-sky is the way to go – demand the impossible

- **Rhetoric of modernity**
  - “Systems” are modern (again)
  - Automation is inherently good
  - Business requires instant information
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