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Lifting the Fog of Corporate Information Management

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ABSTRACT

Corporate Information Management (CIM) is a very complex, multi-faceted program which is being implemented in the Department of Defense. It is so broad and all encompassing, that it appears more as a vision than a program. The intent is to operate DOD like a business enterprise, by streamlining how we do business and then implementing state-of-the-art information technology. CIM will impact every facet of DOD, from administrative support to the "warfighter" in combat.

This paper takes a broad look at CIM from a layman's perspective, and provides a simplified explanation of the program.

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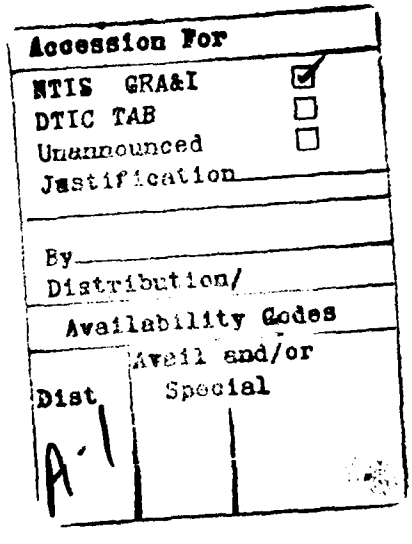

MANAGING INFORMATION TECHNOLOGY

"DOD recognizes that information must be managed, just as capital, material, and people must be managed, to improve effectiveness and efficiency of operations."[1] This excerpt from Assistant Secretary of Defense (C3I) Duane Andrews's speech before the House Appropriations Committee embodies the impetus behind Corporate Information Management in the Department of Defense.

Drawing upon industry achievements, DOD acknowledged the streamlining of business processes through improved use of information technology. Thus, Corporate Information Management (CIM) was chosen as the methodology for DOD to improve its own operations. CIM is not -- as some would suggest -- a system for managing computer technology to save money. Rather, it is a system for analyzing business processes and for strategically employing information technology to improve them.

The purpose of this paper is to take a generic look at Corporate Information Management in the Department of Defense from the point of view of the information system implementor "in the trenches". I will examine the integral parts from a layman's perspective, so as to simplify CIM's procedures and remove some of the mystery surrounding it. I want to provide a basic understanding of CIM by exploring its background,

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[1]Andrews, Hon. Duane P., Statement before the House Appropriations Committee, Defense Subcommittee, April 24, 1991.

discussing the doctrine and methodologies, and then highlighting what I perceive to be the key issues.

GROWING UP IN THE INFORMATION TRENCHES

As one who came up through the information trenches in the Army, I am particularly eager to understand corporate information management. As the lines between communications and automation became less and less clear, the Army -- like the other services -- began to concentrate on information. Anything that stored, manipulated, or transmitted information fell under an information manager. By centralizing control of information, the services expected to achieve synergistic benefits of efficiency and cost effectiveness. I was one of those information managers.

I became Director of Information Management (DOIM) at a large Army installation in July of 1990 -- about the time CIM in DOD was being introduced. Over the next two years I heard the term CIM used more and more. It was always mentioned in conjunction with a new Defense Management Review Decision (DMRD). Therefore, it was associated with the reduction of people, the loss of automation dollars in the budget, or restrictions on the type of communications and automation equipment that could be purchased. Of course, all of these made my mission more difficult, so negative feelings ran high.

WHY WRITE ABOUT CIM?

All attempts to learn about CIM led to more confusion, as policy and doctrine were

still being developed. Discussions with people working in CIM, revealed they only understood their little portion of the program. But one thing was apparent, this new program had control over all automation dollars, and it was busy hiring people in Washington D.C. to run it. Further, I might mention these feelings were shared by many of my peers in information management.

So from the "trenches" perspective it appeared:

* No one in Washington understood information management where "the rubber meets the road"
* "CIM" was a new phrase for old ideas coined by some guy named Strassmann
* CIM was another boondoggle to build more bureaucracy in Washington at the expense of scarce automation dollars
* CIM was a "smoke and mirror" show with no substance and that's why it could not be explained
* CIM would pass away with the next set of political appointees like so many programs before it.

After two years and the continual maturing of the CIM program, things are slightly more coherent.

Now that I am assigned in Washington amongst the bureaucracies, I feel it imperative

to explore this topic in some simplified manner for others who must operate in the trenches. Although much has been written about CIM, it is a difficult program to understand. Especially since the doctrine is still evolving.

A ROADMAP FOR THE PAPER

Before proceeding, I would like to provide a kind of roadmap for the paper, and my approach to exploring the complex topic of corporate information management. First I want to set the stage for the introduction of CIM into DOD -- the why and how. Next the paper will discuss the actual mechanics of the process -- improving business processes and fixing our information technology. The physical mechanics of CIM are then tied back in to how CIM will actually support the combat commander. Finally, I conclude with my personal observations regarding the CIM initiative.

HOW WE GOT TO CIM

AUTOMATION EXPLOSION

The automation track record in DOD has paralleled that of the private sector. The seventies saw expensive, stove-pipe, mainframe systems which required a focus on software and hardware maintenance. Programming and operations were left to the "techies" in the data centers. Tremendous amounts of output were provided as batch printouts, but little of it was used. There was very little standardization and/or compatibility.

The late seventies and into the eighties saw the growth of personal computers and networking. The automation budgets were growing exponentially. As everyone rushed to automate in hopes of achieving efficiency in production and service, incompatible systems proliferated. The systems were often not cost-effective, as functional users did not fully comprehend the advantages information technology could offer to their mission-critical processes. Consequently, in the majority of cases managers were automating old, inefficient business practices.

INFORMATION MANAGEMENT IS THE KEY TO COMPETITIVENESS

In the private sector, corporations noted this tremendous increase in the automation budget line. They realized the key was information management -- but not in accordance with the old paradigm. Previously the computer types had been responsible for automation

and information, but now industry realized information was another tangible asset to be controlled by functional management

Global competition and economic stagnation forced industry to develop a different approach to efficiency -- they needed to streamline and cut costs, while maintaining productivity and quality. One place to attack was information and the growing automation costs.

Thus, we have the introduction of corporate information management. It seemed to evolve from information resource management, total quality management, and other management practices. CIM is a way of analyzing the business processes, cutting non-value added functions, and using information technology to improve the processes through data sharing, standardization, and re-engineering.

"It is time to stop paving the cow paths. Instead of embedding outdated processes in silicon and software, we should obliterate them and start over. We should re-engineer our businesses: use the power of modern information technology to radically redesign our business processes in order to achieve dramatic improvements in their performance."[2]

DEFENSE MANAGEMENT REVIEW DECISIONS REQUIRE CIM

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[2]Hammer, Michael, "Reengineering Work: Don't Automate, Obliterate", Harvard Business Review, July-August 1990, p. 104.

In July 1989, the Secretary of Defense submitted the Defense Management Report (DMR) to The President of The United States. This report described those steps the Pentagon was initiating to improve capabilities, while achieving mandated budget reductions. These changes were expected to save $71 billion by 1997 through improved efficiency and productivity. Of this, $35 billion would be achieved through CIM.[3]

With his General Motors background, Deputy Secretary of Defense Donald Atwood is credited with the DMR initiative, and bringing corporate information management to the Department of Defense.

"CIM is a reflection of the organizational innovations by the Deputy Secretary, Mr. Atwood, who conceived the Defense Management Review Decisions, the DMRD's, as the vehicle for applying the Goldwater-Nichols Act to support the infrastructure of DOD.

"Very early in the planning for DMRD's Mr. Atwood identified the common thread that will facilitate all the DMRD's. The common glue for making the defense infrastructure feasible comes from a coherent approach to information management...and exploitation of information technologies."[4]

DOD BUDGET DECREMENTS ARE REAL

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[3]Strassmann, Paul, "The Policies, Processes, and Technologies of DOD Corporation Information Management", speech given at the Executive Breakfast Series, Falls Church, Virginia, September 22, 1992.

[4]Ibid.

The current budgetary target for DOD is a reduction of $410 billion between 1990 and 1997. Of that amount, $339 billion will come from personnel reductions and changes in force structure. The $71 billion, as previously stated, will come from the DMRD's. Of that amount, half is attributable to CIM, with $6.9 billion being cost reductions in automated systems. The rest must come from efficiency gains, including improvements in business processes, organizational structure, and information flow. These improvements are to be achieved through application of CIM principles.[5]

EXECUTIVE LEVEL GROUP (ELG) PROVIDES PLAN FOR CIM IN DOD

In early 1990, Mr. Atwood put together a nine person team of DOD representatives and outside consultants to develop a plan for implementation of his information strategy. Their task was to take a look at the information situation in the department and develop a strategy for applying CIM. In September 1990 the team reported out. They provided a model for DOD corporate information management, an analysis of the current situation, and a vision for where it must go.

The following quote is an excerpt from the preface of the ELG report:

"Most U.S. Government agencies and corporations viewed information management as the automation of existing business methods in order to reduce costs. With this narrow view, little effort was made to improve the methods themselves. Results were disappointing: new technology applied to old methods did not produce the benefits expected.

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[5]Ibid.

"Forward-looking organizations took a path which put primary emphasis on continuously improved business methods. Computing and communication technology played a subordinate role, and only now is being applied to the superior business methods that have evolved."[6]

DOD IMPLEMENTS CIM

Corporate Information Management was formally implemented in January of 1991. In March of 1991, Mr. Paul Strassmann was appointed as Director of Defense Information under the Assistant Secretary of Defense (C3I). His task was to implement CIM in The Department of Defense.

Mr. Strassmann was not a newcomer to handling information management. He had come up through corporations such as Kraft and Xerox managing information systems. He was also one of the members of the Executive Level Group which developed the CIM model.

"CIM" and "Strassmann" are almost synonymous these days -- as he promoted CIM with the zeal of an evangelist. His mission was to put DOD on a business basis where efficiency, quality, productivity, and cost effectiveness were the emphasis. He stated it in this manner: "In these days of budget cuts we must facilitate productivity gains through the

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[6]Report, "A Plan for Corporate Information Management for the Defense Department", by the Executive Level Group for Defense Corporate Information Management, September 11, 1990, p. i.

restructuring of work. The only way to do that is to organize DOD as if it were a business enterprise."[7]

As a political appointee, Mr. Strassmann left his post as the Director of Defense Information at the end of the Bush Administration.

[7]Corbin, Lisa, "DOD INC.", Government Executive, June 1992, p. 36.

THE MECHANICS OF THE CIM PROCESS

MULTI-FACETED

The difficulty in understanding Corporate Information Management is due in part to the scope and complexity of the program. It is not a simple technique applied to one process or facet of the military structure. CIM is rooted in every system and process in DOD -- short of embedded computers in weapons systems. The key to beginning a study of CIM is to realize it encompasses four interrelated areas, with information as the common thread:

* functional processes
* technical control/management
* strategic (peacetime) support systems
* operational (war fighting) functions

This means CIM is much more than communications and automation management. It is not information management or information resource management (IRM), as many want to believe. It is a methodology for improving the way(s) we conduct business. CIM provides the procedures and tools to analyze and re-engineer business processes; such as paying military and civilian personnel, managing health care, or stocking depots. It then further improves the processes through the proper application of a standardized information technology, if required.

Originally thought to apply only to the strategic (fixed) support systems -- CIM recognizes the true objective is to support the combat commander. There is no longer a demarcation point where fixed information systems stop and tactical ones begin. Stated differently, there is no difference in the data between support and command structures. "The core of the [CIM] doctrine is that all information strategies must be derived directly from war requirements."[8]

THE PILLARS

The next step in simplifying CIM is to grasp what I consider to be the pillars of Corporate Information Management in DOD:

* War fighting is our business and all processes must contribute to that mission
* The functional manager is responsible for the cost effective application of information management
* Centralized management and control of hardware and software will move DOD to totally open, interoperable communication and automation systems

WAR EMPHASIZES THE NEED

Desert Storm reassured us that warfare is on a fast track to being information

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[8]Endoso, Joyce, "Strassmann Pledges DOD Toughness on IRM Budgets", Government Computer News, February 3, 1992, p. 59.

intensive. From the mobilization of supplies and personnel in CONUS to the delivery of rounds in the desert -- heavy information flow was mandatory. However, just as the war proved the case for advanced technology, it highlighted how poorly equipped we are to deliver vital information in a meaningful manner to the commanders.

We have stovepipe computer systems that push volumes of information to the commander, based on what some system designer thought the commander needed -- much less what he wanted. Consider, for example, the requisitioning of repair parts: Once a combat commander placed a requisition through his supply channels, he was only concerned with when the item would be delivered. What the various systems provided him were reams of computer print outs, which listed all valid requisitions in the system, but no answer to his question. The same type of thing occurred in tracking replacement personnel, analyzing intelligence data, etc.

CIM will focus us on providing what the commander needs. The plan is to interlink networks to common data bases so the commander in the field can make discreet inquiries -- receiving only the information he determines he needs. This will be achieved through common software and hardware.

Whether supporting the action officer or the commander, CIM is driven by the functional manager. It strives for cost effectiveness and efficiency by empowering the functional managers to determine their requirements for automation and information, then

holds them responsible for success.

THE CIM MODEL

The Executive Level Group (ELG) provided DOD with the model for executing the CIM program. Refer to Figure 1. This model encapsulates the application of CIM to the various functional processes. "CIM allows managers to look at how and how well they do their business, to derive benefits from changing business processes, and then to use information technology as a platform to gain efficiencies."[9]

The following excerpts explaining the model are taken from the ELG report to the Assistant Secretary of Defense:

* Policy - Policies are the guiding principles and operating fundamentals that determine the direction the organization shall take.

* Business Methods - Business methods are the formal ways in which business is conducted. It is essential that business methods be continuously re-examined and redefined in order to effect improved operations.

* Measures of performance - Measures of business and mission performance must be defined. They provide the framework for evaluating effectiveness and efficiency of an organization's business methods and resulting operations.

* Data Models - ...Data models represent the data necessary to execute the

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[9]Meier, Nancy J., "Corporate Information Management: Improving The Way DOD Does Business", Executive Research Project for the Industrial College of the Armed Forces, 1992, p. 9.

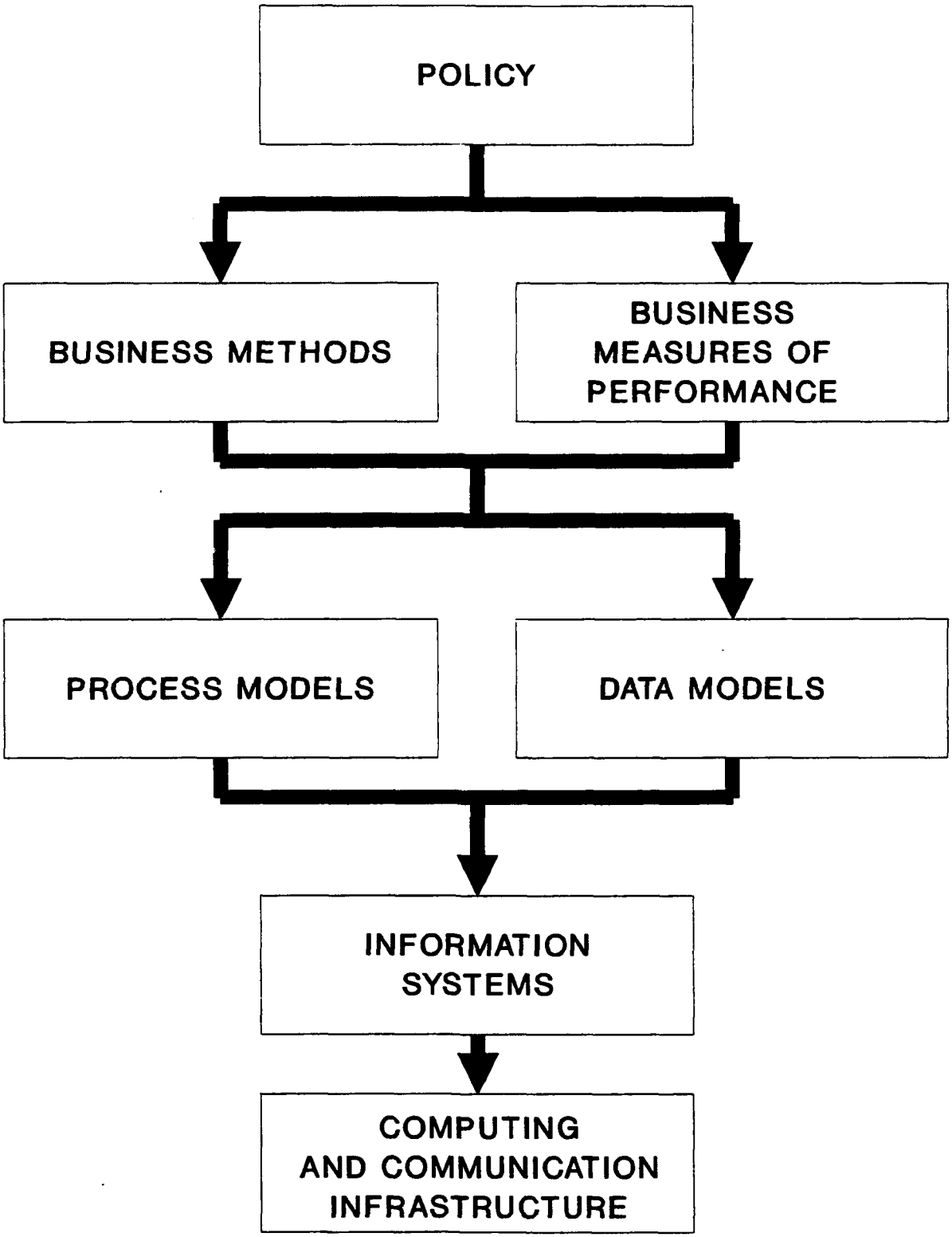

FIGURE 1. CIM MODEL

business method. Data models formally define the terms (data [elements]) used in a business method.

* Information Systems - Business methods and performance measures are implemented through information systems.

* Infrastructure - Information systems support operational transaction processing...and provide information needed to support management decisions. Information systems are computer based. They stand upon a computing and communications infrastructure.[10]

So what does the model tell us? Simply, CIM directs us to evaluate our business processes in compliance with established policies and guidance. The evaluation is accomplished through modeling the process, identifying the data flow, and establishing metrics. Once this is completed, we decide what to change, correct, delete or streamline in the process to make it more efficient. Only then do we determine the information system and associated infrastructure to enhance this optimized process.

THE BUSINESS SIDE OF CIM

The Main Focus is on Business Process Improvement

Process improvement is a chapter right out of Total Quality Management (TQM). More specifically, it sounds as if Dr. Deming himself were teaching it. Dr. Deming, one of

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[10]Report, "A Plan for Corporate Information Management For the Defense Department", by the Executive Level Group for Defense Corporate Information Management, September 11, 1990, page not numbered.

the TQM pioneers, preached that you should continually study the process and improve it. You must chart/model the process to identify the duplication, bottlenecks, and inefficiencies.[11]

Business Process Improvement Program (BPIP), Business Re-Engineering Support Program (BRSP), Business Re-engineering, Functional Process Improvement, or process improvement -- they all mean virtually the same thing. Decide what function you want to perform. Then decide how you ought to perform it given modern technology -- not how you used to do it with obsolete technology.

"At the heart...is the notion of discontinuous thinking -- of recognizing and breaking away from the outdated rules and fundamental assumptions that underlie operations. Unless we change these rules, we are merely rearranging the deck chairs of the Titanic. We cannot achieve break throughs in performance by cutting fat or automating existing processes. Rather, we must challenge old assumptions and shed the old rules that made the business underperform in the first place."[12]

When CIM was first implemented, process improvements were applied to eight functional areas: civilian payroll, civilian personnel, contract payment, distribution centers,

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[11]Hunt, V.D., Quality in America: How to Implement a Competitive Quality Program, Homewood, Illinois: Technology Research Corporation, 1992, pp. 57 - 61.

[12]Hammer, Michael, "Reengineering Work: Don't Automate Obliterate", Harvard Business Review, July-August 1990, p. 107.

financial operations, government furnished property, material management, and medical support.[13] Now it is being considered for over 100 processes with many more candidates in the wings. This is happening at the macro level (DOD), but the significance is that it can be applied to any process at any level. As more managers and executives are educated, CIM is being utilized more. Consultants specializing in process improvement have sprung up in the commercial sector overnight. Regardless of how the analysis is conducted, or by whom, CIM provides the methodology and tools.

The procedures are not simple when accomplished in strict compliance with CIM guidance. Computerized models must be developed, data models must be designed, and a functional economic analysis must be completed. The new DOD manual, Functional Process Improvement (DOD 8020.1-M [draft]) details the methodology.

Computerized Modeling of Processes

The first step in process improvement is to develop a model of the process. DOD has adopted the computerized IDEF modeling technique to layout business processes for analysis. "IDEF modeling techniques were derived from the Integrated Computer Aided Manufacturing program (ICAM) sponsored by the US Air Force. The acronym IDEF was formed from the term ICAM definition languages. The widely used techniques were

[13]GAO Report #B-241969, "Defense ADP, Corporate Information Management Initiative Faces Significant Challenges", April 22, 1991, p. 3

designed to capture the processes and structure of information in an organization."[14]

IDEF techniques let us develop a model of the process, graphically portraying inputs, outputs, control mechanisms, and any internal or external influences on the process. From the top level, each step is broken into subsequent models of the lower level processes. This procedure is repeated until every activity is identified.

"The IDEF activity modeling technique is a rigorous but single technique that facilitates communication about how an organization performs its repetitive business processes. It can be easily understood by a variety of individuals to document complex processes within a specified scope. These same individuals can review and validate these models without much difficulty because the technique uses a structured approach that follows the deductive thought process."[15]

Once the model is validated as representative of the process, one then looks at the data flow. Data modeling is a portrayal of the data that must, or does, flow between the various activities in the model. From this the functional manager can now look at an "as-is" representation of his business process. These computer models can then be run as simulations, testing various alternatives for process improvement. Once the process is

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[14]Corporate Information Management Process Improvement Methodology for DOD Functional Managers, D. Appleton Company, Inc., February 1992, p. A-13.

[15]Ibid, p. 3-5

maximized, only then does one search for ways to apply information technology.

Functional Economic Analysis

How does a functional manager know if he is improving a process, or when it is maximized? There must be a way to take measurements. CIM uses Activity Based Costing (ABC) to do economic analysis. "ABC has been selected as a key CIM component because it is an excellent source of information for various process improvement techniques. People understand activities and people understand costs based on activities. ABC organizes traditional information into a form that makes sense to the nonaccounting-oriented manager...This ability to place costs based on activities and their outputs provides a clear metric for improvement, whether for determining improvement priorities in the long term or for measuring near term success. ABC enables functional managers to characterize the value of, or need for, each activity...using ABC, the DOD will determine the non-value added content within the businesses and wring out the waste before automating (or reautomating) activities."[16]

ABC works in conjunction with the IDEF models to put a cost on every activity. This provides a baseline for the "as-is" process. From these models and associated costs the process can be modified and evaluated. The cost data provides the input for a functional economic analysis (FEA) of the business process. The FEA in CIM is a methodology for analyzing and evaluating alternative investments and changes in the process. Once the

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[16]Ibid, p. 1-7.

analysis is complete, the FEA data is used to build a case to justify (or support) the changes.

Under CIM we often hear people saying we must make the "Business Case" before a new system or process will be approved and/or funded. In DOD a business case is a functional economic analysis, which provides a structured proposal for a business process improvement. The proposal includes an analysis of the process, problems, proposed solutions, benefit/cost analysis and investment risk analysis.[17]

The Bottom Line on Process Improvement

Process improvement is the heart of the CIM program -- not improving information technology. It is a complicated process that requires skilled, trained personnel -- either government or contractor -- to execute. It is a methodology which will eventually be applied to all processes and functions, and which has the potential of large payoffs. Process improvement breaks the old paradigm of automating old, inefficient practices, by looking for totally new or improved ways to do business. Once the objective process is determined, one applies information technology, if applicable, to further leverage the improvements.

To me, business process improvement is not a new philosophy or new approach to management. However, it is a new methodology with more efficient tools to do what managers have always done -- flow charting processes, unit or activity costing, life-cycle costing, modeling alternatives, etc. The big change is utilizing this new methodology to do

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[17]Ibid, p. A-7.

the analysis, then to prove the case.

Whatever changes are implemented in the business processes, CIM doctrine acknowledges we must make them gradually. This allows us to migrate from where we are, to where we want to be, without major disruptions in the business functions. CIM recognizes the difficulty and costs in changing how we do business, and that it may take years to migrate some processes.

THE TECHNICAL SIDE OF CIM

We Must Fix Our Information Architecture

Just as old business methods must change, so must the ways DOD manages its communications and automation, or information technology. That is, we must stop proliferating incompatible, inefficient, proprietary systems and methods.

The current situation was recently described as follows: "Poor management of data, LAN'S, and software development created the disarray that is the Defense Department's current ADP infrastructure...more then any other factor, the current jumbled structure thwarts efforts to control information technology within Defense...individual fiefdoms, intent on serving their own needs and maintaining close relationships with particular contractors, created the incompatible, unsupportable operations and high maintenance costs that now

haunt DOD..."[18]

Centralized Control

One of the reasons we did not achieve the desired synergistic benefits of centralized information management in the services, was that we centralized at too low a level. Under CIM, control of automation has been centralized at the highest DOD level under the Director of Defense Information (DDI). And most importantly, this office has the power of enforcement through its control of the DOD automation budgets.

From this level the DDI can guide automation for the entire DOD. CIM's goal is a standardized, interoperable, open systems architecture -- utilizing common data elements and reusable software. Its a plug-in/plug-out concept, where all data is entered one time into DOD corporate databases. All users can access these databases from their own terminals anywhere in the system.

DISA is the Central Information Manager for DOD

The Defense Information Systems Agency (DISA) is responsible for control and management of these technical improvements in information architecture.[19] This is the IRM principle that "techies" manage technical systems -- not business operations. DISA will plan

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[18]Endoso, Joyce, "Strassmann: 'Fiefdoms' Thwart IT Control", Government Computer News, Dec 7, 1992, p. 3.

[19]Defense Management Report Decision No. 918, signed by Deputy Secretary of Defense Atwood on September 15, 1992.

and implement the systems that will migrate DOD toward an objective type architecture.

The new term applied to this DISA mission is "Defense Information Infrastructure" (DII). So whether we discuss information architecture, information technology, or DII; its basically the same from a layman's perspective. This task comprises six major areas:

* Centrally managing the acquisition of hardware, software, and contractor support services
* Consolidation of software central design activities and information processing centers
* Controlling information standards
* Consolidating functionally similar systems
* Managing and implementing security
* Beginning an education program for an Information Technology career field. [20]

Decentralized Execution

The centralization under DISA has been interpreted by many to mean all information processes from need, to procurement, to implementation, to operation and maintenance will be owned and controlled by DISA. However, this is not the case. CIM recognizes centralization can only provide the framework and tools for the user -- the user must have the flexibility to decide what fits his needs and how best to employ those resources.

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[20]Short, LTG Alonzo E. Jr., "Building the Defense Information Infrastructure", Defense Information Systems Agency briefing to CINCLANT, October 7, 1992.

Our constitutional framework of layered institutions has been used as a model to build the successive layers of responsibility and authority in information management. "The way you manage information flows is rapidly becoming the way you assign authority for decisions. The essence of the new DOD directive on defense information management is contained in the principles of the separation of the roles of information providers from those of information customers."[21] Each level will take its authority from guidance provided by the higher one. Essentially CIM has established five basic levels:

* Enterprise Level
* Mission Level
* Function Level
* Application Level
* Personal Level [22]

The first four levels appear to be the bureaucracy of centralized management. DOD is the enterprise level where policy, doctrine, standards, reference models, data management, tools, shared computing and telecommunications will be provided. The mission level will apply the standards and resources to the mission areas of intelligence, command and control, and support. The function level is the further integration into the various functions of the three mission areas, for example, payroll and personnel management in the support mission.

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[21]Strassmann, Paul, "The Policies, Processes, and Technologies of DOD Corporation Information Management," speech given at the Executive Breakfast Series, Falls Church, Virginia, September 22, 1992.

[22]Ibid.

The applications level is the development and maintenance of standard applications in accordance with the centralized control.[23] The demarcation point for responsibilities between DISA and the services and agencies in this hierarchy is not clear. However, it appears the services' and agencies' roles will be integrated at the mission, function, and application levels.

The fifth level -- personal -- is totally decentralized execution. The user (customer) will develop his own customized applications, personal tools, info windows, private files, inquiry languages, etc., that allow him to do his job.[24] CIM's standardization and centralization works because the user must utilize approved data, software, applications, tools, databases, architecture, etc., provided by the system. The flexibility the user actually has is picking and choosing only the tools and data from the standard DOD information set that fit his needs.

Hardware -- Incompatibility and Redundancy Dictate Open Systems

Incompatible automation and communication systems in DOD are recognized as the major weakness in our information architecture. It carries a support tail that is increasing exponentially, as we continue to maintain redundant, stovepipe systems. CIM's solution is to migrate DOD to an open systems environment. This open systems environment will not

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[23]Strassmann, Paul, "Linking Defense Strategies to Information Technology - The CIM Case", address at the Automated Planning System Integration Symposium, May 12, 1992.

[24]Ibid.

mandate a single proprietary hardware solution, but will issue standards that all hardware must meet. These open systems standards are presently being required for new government acquisitions.

Under CIM's objective system, all data would be entered once in DOD and stored in corporate databases. Individuals would have only one work station and could access any of the desired databases. It would be a plug in/plug out architecture where the user could enter from anywhere in the system. Hardware would be commercial, off-the-shelf, upgradeable, and treated as a commodity or item of supply.

The user would decide which information he wants/needs and then pull it from the system -- instead of the system pushing unnecessary data to him. This means the user inquiries would not be answered by reams of printouts on a scheduled basis from a standard automated system. Instead, he would make a specific query and receive a unique response from a standardized data base. The system connectivity would be seamless and transparent for the civilian user at an installation, or a combat soldier in battle. Users would be able to access all corporate databases from these systems which could be easily and quickly reconfigured to meet changing mission requirements.

Lisa Corbin writing for Government Executive summarized the CIM principles for this information technology in the following manner:

- *"Use standard, off-the-shelf hardware and software;

*Lengthen technology life by continuously upgrading;

*Distribute hardware and software from re-use warehouses;

*Forbid more than one work station for individual use;

*Standardize display interface styles;

*Commit to vendor-independent, interoperable systems;

*Pursue distributed client-server architecture;

*Provide scalable computing capacity using microprocessors;

*Specify equipment that's easy to test, use, and simulate;

*Require flexible, secure, and damage resistant systems."[25]

This is a monumental task whose feasibility, much less possibility for success, is easily debatable. The importance is it puts us on a migration path toward solving our incompatible information infrastructure. The key to the hardware fix is that DOD recognizes we cannot define or specify the objective architecture, just as we will never reach it. The state of the art is changing so fast that the fashionable things today -- POSIX, GOSSIP, ADA -- will be obsolete tomorrow. However, the CIM changes will allow us to build on what we already have in place and continue to migrate; rather than continually buying all new items

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[25]Corbin, Lisa, "DOD INC.", Government Executive, June 1992, p. 38.

when the state of the art advances.[26]

Software -- Changing from an "Art" to an "Industry" Through Reuse

Whether accomplished through contract or in house, when a need for software was identified, someone would be commissioned to develop it. These skilled programmers would normally start from scratch writing new code -- a process which was time-consuming and expensive. The new paradigm under CIM is to make all code reusable.

No longer will programmers skillfully craft a new creation. They will manufacture, or produce, software from controlled, standardized code which is readily available; either commercially or within DOD. "The skill and artistry in the future will come not from the making of components, but from how we put them together."[27]

The plan is to establish central software component repositories for DOD under DISA control. The components will be tested and validated, then subjected to a formal domain analysis as a way to index or to categorize them. "To make the reuse of software code manageable, the industry tries to categorize the usable code into groups and subgroups, which are called domains. By analyzing code for possible reuse, DOD officials want to give users some idea of how and where specific components, or groups of components, can be

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[26]Strassmann, Paul, "Linking Defense Strategies To Information Technology - The CIM Case", address at The Automated Planning System Integration Symposium, May 12, 1992.

[27]Ibid.

used. By assigning the code to domains, DOD gives programmers and users that information."[28] Once the code is made available, programmers can electronically come on-line to draw from these repositories.

In an address to the National Defense University, Mr. Strassmann listed the following as some of the principles to achieve software reuse:

*"Reuse is an integral part of software engineering

*Domain analysis and domain models are the focus

*Will buy or license reusable components from industry

*Will certify and maintain reusable components

*Zero defects are the objective for reusable components

*Integrate reuse into systems life-cycle by means of I-CASE

*Managed by software reuse operations unit of DISA

*Provide near-term services training, acquisition, recovery"[29]

Paraphrasing from a recent Government Executive article, software reuse is critical to achieve cost savings. Currently DOD expenditures for software are about $15 billion dollars, and are expected to triple to almost $45 billion over the next two decades. DOD

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[28]Endoso, Joyce, "Business Issues Impede Software Reuse", Government Computer News, November 9, 1992, p. 70.

[29]Strassmann, Paul, "Information Systems and Strategic Decision-making for The Deployment of Information Technologies in DoD", briefing to the National Defense University, September 23, 1992, slide 57.

plans to hold the costs constant over this time frame. A significant portion of the cost avoidance will be through reuse of expensive software. The goal is to give DOD computer programs a 20-30 year life.[30]

Standardized Data

The seriousness and magnitude of standardized data is summarized as follows: "A vigorous data standardization effort is one of the keys to assuring that DOD's systems interoperability objectives will be met. Without data standardization there is no CIM. It is the basis on which all of the CIM systems must be constructed...we had 38,000 data elements that had been submitted for consistency-checking to the DOD corporate data repository...For instance, in one situation, we've discovered that there were 150 aliases for a data definition."[31]

DISA's Center for Information Management is charged with the task of data standardization. In August 1992 the center opened the Defense Data Repository System. The task is to collect (identify) data elements then attempt to standardize them, so as to provide common data elements for DOD.

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[30]Corbin, Lisa, "DOD INC.", Government Executive, June 1992, p. 38.

[31]Strassmann, Paul, "The Policies, Processes, and Technologies of DOD Corporation Information Management", speech at the Executive Breakfast Series, Falls Church, Virginia, September 22, 1992.

Summarizing the Technical Aspects of CIM

DOD's information architecture is a conglomeration and proliferation of large, expensive, decentralized, incompatible communications and automation architecture; which costs billions of dollars annually to pay for the redundancies and inefficiencies. CIM has undertaken a monumental task to migrate this architecture into a totally integrated, responsive infrastructure. This will be accomplished through centralized management, standardized protocols, interoperable software, and common data elements. The Defense Information Systems Agency has been charged to execute this task for DOD. The focus is to build a system that will support the warfighters, as information becomes a greater and greater force multiplier.

SUPPORTING THE COMBAT COMMANDER

Everything that CIM does contributes to supporting the soldier on the battlefield, to allow him to accomplish his mission. CIM views information as any other tool of warfare. But it has an important attribute: it can become a significant force multiplier. Whether you are discussing command, control and intelligence (C2I); command, control, communications, and intelligence (C3I); or command, control, communications, computers, and intelligence (C4I); it's all synonymous in terms of the information architecture commanders will need on the next battlefield. The discussion on re-engineering of business practices and a standardized, interoperable information infrastructure is directly applicable to the battlefield environment.

JCS SPECIFIES ITS INFORMATION NEEDS

The Chairman of the Joint Chiefs of Staff was asked to specify the kind of information infrastructure DOD would need in the twenty-first century. His response was issued in October of 1991 in the "Command, Control, Functional Analysis and Consolidation Review Panel Report" (C2 FACRP).

"The C2 FACRP stated that the needs for information technology will be driven by the requirements of small, mobile, rapidly deployed, and locally managed joint forces. These small forces must have the same information management capabilities as are currently

available to large higher echelon commands. The C2 FACRP also established the principle that the local commander must have easy access, from the same display device, not only to military, positioning, and intelligence information, but also have access to all relevant data such as manpower, logistics, medical, and transportation support...an information network that is seamless, secure, interoperable, global..."[32] Once again, this is the user pulling only that information he needs, rather than the system pushing everything it has. The needs expressed in the C2 FACRP dovetail perfectly with the goals of CIM.

SEAMLESS ARCHITECTURE

CIM will do away with the distinction between fixed (strategic) and tactical information systems. The open systems environment will facilitate this. The combat commander will not know whether his query is answered from a corporate database in CONUS, such as status of a supply requisition, or from a corporate database in the theater, such as the latest intelligence update. His terminal will be plugged into this totally integrated network and how the information is obtained will be transparent.

This applies laterally as well as vertically. The individual need no longer access unique stovepipe networks. All networks will operate from the same databases. This is especially important, since joint and combined operations appear to be the norm for future engagements. Once again, the key to this type system is interoperable hardware and

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[32]Office of the Assistant Secretary of Defense (C3I), "Status of the Department of Defense Corporate Information Management (CIM) Initiative, October 1992, pp. 42-43.

software with common data elements.

GLOBAL ACCESS REQUIRES MODULARITY

CIM will make the DOD information infrastructure global in its reach. This will be accomplished through major interface points in projected theaters of operations and through wideband communications links, as necessary. This allows the combat commander to have access to necessary information anywhere in the world.

The concept is further simplified by the modularity of the integrated open systems environment (OSE). That is, the system can be further expanded or modified with common hardware configurations which meet the OSE standards. In this plug in/plug out configuration the hardware and software building-block concept increases the flexibility and agility of the warfighters.

"STANDARD INFO WINDOW"

One way CIM will leverage our information infrastructure is through standardizing the information a user has on his display. This concept is called the standard info window. It will be achieved through standardization and centralized management.

From day one when a soldier starts his training, he will learn a standard display which will not change as he moves from location to location; or the software migrates from generation to generation. "The training cost is not in the applications software, but in what

the soldier sees. The cost of this training goes up if we have a confusing interface that changes from application to application."[33]

"SHADOW WARRIORS"

One of the most interesting concepts in supporting the combat commander is that of shadow warriors. This is an extension of the person himself, which is developed throughout one's career. It is customized software that functions as what I would call off-line memory. Mr. Strassmann explained it in this manner: "A true 'personal' computer is not a piece of hardware. It is software that recognizes your individual habits and tries to compensate for your information-handling limitations. It is your shadow. It can become an extension of your thinking process...I call the portability of thinking patterns into the battlefield the 'shadow warrior'. A warrior should be able to call on thousands of 'shadows'...In the confusion of the battlefield,...These 'shadows' can assist in coping with situations to which successful response patterns already exist."[34]

THE BOTTOM LINE ON SUPPORTING THE COMBAT COMMANDER

I see nothing unique in CIM's support to the combat commander versus it's support to the strategic or business side of DOD. And that, I believe, is the significance of CIM. It is so embedded in every aspect of DOD information infrastructure, that it's application to

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[33]Strassmann, Paul, "Linking Defense Strategies To Information Technology - The CIM Case", address at the Automated Planning System Integration Symposium, May 12, 1992.

[34]Ibid.

tactical or strategic, or to mission or support is transparent. Business process improvement can be applied to tactical intelligence gathering or to close air support as easily as it can to financial management. Standardized, integrated, interoperable information systems are as important in war as in peace. The shadow warrior concept can be used by civilian action officers as beneficially as by the combat commander. The bottom line is that the CIM concept directly supports the combat commander.

PERSONAL OBSERVATIONS REGARDING THE CIM INITIATIVE

THE WRONG FOCUS

In spite of CIM doctrine and guidance -- DOD appears to be focused on the technical issues instead of the business process. DOD is concentrating on CIM as cost savings in automation and communications; such as centralization, open systems architecture, standardization, etc. CIM is so much broader, and the DOD should be pushing the functional managers to use it in streamlining functional operations (business processes) -- this is where the real cost savings will come from. Even when you listen to CIM briefings, discussions on process improvement quickly digress into how improved information technology will be the major benefit.

I suspect there are several reasons for this focus. First, correcting the technical problems is something physical that an action agency can get it's hands on; as compared with getting managers to question how they do business. Second, the mission of a technical solution has been assigned to a DOD agency (DISA), who is moving out with the task. I cannot find an agency charged with putting all DOD business functions through the CIM model. Third, the name itself -- corporate *INFORMATION* management -- implies this is something to do with computers and therefore is a techie problem, not an issue for operational managers.

Lastly, I believe the CIM program is pushing so hard to prove it's worth that it is attacking only the near term pay off, which is reduction in information operation and maintenance costs. Even this effort is misdirected, since by CIM's own admission only $6.9 billion of the projected $35 billion in savings through 1997 will come from the cost reduction in automated systems.

CIM IS NOT UNDERSTOOD BY THE IMPLEMENTORS

The corporate information management program is so broad and so technical, that it is not understood by those below OSD who must execute it. Much of this is attributed to a lack of publicity in simple understandable terms. This publicity should be aimed at the non-technical functional manager. Currently one's sources of information are news articles and the DOD manuals on CIM -- both technical and fragmented.

I would recommend a simple, short, non-technical, easy to read pamphlet which outlines the various aspects of CIM. This could be followed with a quarterly newsletter to the field, written in the same style. Non-technical managers are not going to wade through the CIM status reports currently provided to Congress. At a minimum, an electronic bulletin board that addresses CIM questions and issues should be considered.

Very few will have the opportunity to attend the "school house" at the Information Resources Management College to learn about CIM. It's time to think about integrating it in all levels of advanced DOD military and civilian education programs for mid to senior level

managers.

THE CIM MODEL WORKS BEST AT DOD LEVEL

Application of the CIM model for business process improvement is complicated and requires skilled personnel to execute. The common functional manager at most levels cannot apply the computer modeling techniques to his process without outside help. Therefore, I believe the applicability is at DOD or service level where the proper skills can be obtained. One only needs to study the new DOD 8020.1 (draft) manual, Functional Process Improvement, to have an appreciation for the complexity of the process. For this reason, I believe the "business case" will only be made for major procurements at service levels.

POLITICS MAY NOT ALLOW CIM TO REACH FRUITION

CIM is as much a vision as a program. That is, it is a continuous and iterative process who's major cost savings do not begin to accumulate until five, ten, or twenty years out. In this current time of budget overruns and cost cutting, a micro-managing Congress is looking for immediate return on programs. For them, long range planning extends as far as the next election.

CIM is such a huge undertaking that it may have been premature to project major savings in the next 4 to 5 years. The projected savings are based on process improvements and technical consolidation and integration. DOD is a complex organization which I do not believe can migrate that fast.

Lastly, as the old adage goes, "you must spend money to make money". The existing communications and automation infrastructure is an old patchwork arrangement of incompatible equipment and software. Much of this cannot be interfaced in the near term as a first step to migrating toward an open-systems environment. It must be replaced with hardware that meets the open-systems standards. I'm talking about the infrastructure at the installation, which is what allows the action officer or warfighter to reach the DOD networks. At my last installation, for example, the projected cost for such a fix was $12-$20 million. That is not easy money to obtain when GAO is counting every CIM penny to verify the $6.9 billion savings for Congress.

WHO'S CHANGING THE PROCUREMENT LAWS?

One of the things that has exacerbated the proliferation of incompatible hardware and software over the past few decades has been our government procurement laws. Under the Defense Acquisition Regulation (DAR) and continued under the Federal Acquisition Regulation (FAR) is the premise that DOD could not demand specific makes and models in hardware and software. Further, simple things like declaring a standard software package for use at an installation were prohibited because this gave the incumbent unfair advantage. Another problem was buying outdated technology, because the procurement cycle was so long.

Now CIM wants to do two things -- dictate software and hardware standards that all purchases must meet, and speed up the procurement process so we can purchase "just in

time" information equipment. The first appears to be achievable as industry is moving toward open systems. However, I see no progress on the second. Procurement procedures are not changing and there has been no streamlining of the major acquisition review procedures.

THE FOLKS IN THE INFORMATION TRENCHES ARE BEING SACRIFICED

DOD does not seem to realize that it's the information managers facing the warfighters everyday, who are critical to CIM's success. Although DOD is busy selling CIM to the "war managers" -- that is the Secretaries and Chiefs of the Services -- the warfighters are the one, two, and three star unit commanders at the installations. For this reason, the on-the-ground information manager must sell CIM to the guy who is supposed to benefit. As discussed earlier, the problem is these information managers have not been briefed or trained themselves.

This issue is exemplified when an information manager must explain to an Army Corps Commander, or an Air Force Wing Commander, that he cannot expand his current network because it does not meet CIM standards -- even if he has the money. Or that his automation dollars have been reduced because of information processing consolidation (the projected savings have already been decremented even though they have not yet been realized). Commanders want results, not excuses about some new DOD bureaucratic program. As such, I believe CIM has forgotten to sell itself to the very people it's designed to support -- the actual "warfighters"!

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