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EMBRACING DIVERSITY: A FRAMEWORK FOR RESOLVING CONFLICT BETWEEN MIS AND MANUFACTURING

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ABSTRACT

"Turf wars" between corporate Management Information Systems (MIS) and corporate manufacturing threaten the success of computer integrated manufacturing (CIM). Cooperation between MIS and manufacturing is essential in the planning, design and implementation of cross-functional information systems, and it is information systems that are the biggest source of CIM failure. This paper takes the position that both MIS and manufacturing have been slow to recognize their contrasting corporate cultures and to deal with resolving the conflict between the two groups. In order to better understand the conflict between MIS and manufacturing, the authors identify the technical and organizational differences. From this, seven "points of conflict" are identified that are the focal point of the "turf wars." A framework for resolving the MIS/manufacturing conflict, based on prior research in organizational diversity, is presented. An empirical research agenda is proposed that will test the framework for applicability, completeness and accuracy. In conclusion, the authors recommend collaborative research between the MIS and manufacturing communities to study the technical and organizational issues related to CIM.

1. INTRODUCTION

The time has come for the corporate Management Information Systems (MIS) unit to bridge the cultural and technological gap that has traditionally separated it from corporate manufacturing. Longstanding differences in corporate culture have undermined efforts to implement computer integrated manufacturing (CIM). Improvements in manufacturing productivity, as a direct result of investment in information systems, have been slow and inconsistent. A recent survey of 1,300 manufacturing managers in the electronics industry indicated that only 25% of the firms had implemented CIM (Gupta 1993). The most commonly cited reason for the under-utilization of information systems in manufacturing environments was the "lack of coordination and cooperation" between MIS and manufacturing.

Two modern trends have signaled the beginning of the end to the chilly relations between MIS and manufacturing. First, MIS groups in manufacturing organizations have come to realize that the best opportunities for information systems (IS) to impact the "bottom-line" will be in manufacturing (Freedman 1993; Gupta 1993). Global economic competition has awakened management to the importance of manufacturing in improving product quality, reducing time-to-market, and in enhancing the marketing function. Second, for the first time many people in manufacturing have come to realize that information systems are vital to the success of their organization (Freedman 1993; Schlack 1992).

A 1993 survey of senior IS executives found that, for the fifth straight year, "instituting cross-functional information systems" is a top issue facing corporate MIS units (Champy 1993). Currently, information systems jump in and out of manufacturing business processes at discrete points. Information systems must become harmonious as they are in financial companies (Freedman 1993). The development of cross-functional information systems is necessary for CIM. However, the MIS manager charged with integrating the isolated "islands" of computing resources throughout the manufacturing firm is typically faced with significant obstacles. These obstacles are both technical and organizational in nature, but typically it is the organizational issues, not the technical issues, that present the greatest challenges to management (Meredith 1987). Sprague and McNurlin (1993, p. 6) state that:

> Clearly, an integrated approach to corporate information services has been needed. Unfortunately, during the thirty years in which information processing was segmented, the different sectors developed very strong traditions and insights that helped each serve its particular clientele. This history still raises serious problems for integration, because each sector tends to see integration as an extension of its traditions and insights to other "unenlightened" parts of the information processing infrastructure.

The authors of this paper take the position that both MIS and manufacturing have been slow to recognize their contrasting corporate cultures and to proactively deal with resolving the conflict between the two groups. The result has been "turf wars" between MIS and manufacturing that have resulted in the under-utilization of information systems in manufacturing environments (Gupta 1993). In order to better understand the conflict between MIS and manufacturing, the technical and organizational differences are identified. From this, seven "points of conflict" are identified that are the focal point of the "turf wars." A framework for resolving the MIS/manufacturing conflict, based on prior research in organizational diversity, is presented. In conclusion, the authors recommend collaborative research between the MIS and manufacturing communities to study the issues relating to CIM implementation and propose an empirical research agenda to test the completeness and accuracy of the framework.

2. VARYING PERSPECTIVES OF CIM

Zachman (1987) developed a framework for information systems architecture and pointed out that an architecture representation depends upon the user's point of view and functionality. In the case of CIM, conflict and difficulties between MIS and manufacturing emanate as a result of traditional differences in each of their "points of view." These differences are exacerbated by a CIM architecture that is typically hierarchical in nature. Jung (1990) describes such an architecture with five levels consisting of enterprise, system, production cell, workstation and equipment. Traditionally, manufacturing's point of view is bottom-up with a focus upon the execution and control of equipment, workstation and production cells. The MIS point of view tends to be top-down due to their traditional focus on the enterprise and system-level transaction processing systems. These views and related issues are depicted in Figure 1. Varying degrees of computer integration may exist, at the upper and/or lower levels.

2.1 Bottom-up CIM

Manufacturing has traditionally viewed CIM as a means to improve production operations by integrating systems and devices on the shop floor. Information systems are seen primarily as a tool for the factory manager to reduce work-in-progress inventory, to increase plant productivity, to improve product quality, and to increase capital equipment operating time. At the lowest level of computer support, computer-aided design (CAD) is often used as a standalone

HIERARCHICAL CIM ARCHITECTURE
VARYING PERSPECTIVES

5-LEVELS	ISSUES	
ENTERPRISE	MIS/DSS	TOP-DOWN
	TRANSACTION PROCESSING	PERSPECTIVE
SYSTEM	MRP-II	
	FMS	
PRODUCTION CELL	ROBOTICS	
	CAM - OPERATION CONTROL	
WORKSTATION	CAM - DATA COLLECTION	
	CAD	BOTTOM-UP
EQUIPMENT	NUMERICAL CONTROLLERS	PERSPECTIVE

Figure 1. Varying Perspectives of the Hierarchical CIM Architecture

application to improve the productivity of engineers in the (re)design of products and processes. Computer-aided manufacturing (CAM) involves the integration of a computer with equipment to support the automation of data collection and, if extended further, the automation of execution and control using numerical controllers. Further integration of different machinery and pieces of equipment (e.g., drill with tool handler) allows the development of the automated workstation.

Much of the research in CIM has focused on Flexible Manufacturing Systems (FMS). A flexible manufacturing system uses information technology to coordinate real-time routing of material, load balancing and production scheduling logic. Typically, automated guided vehicles, automated storage and retrieval systems and robotics are integrated to decrease time to change tools and fixtures, load and unload machines, and move materials to and from manufacturing cells (Doll and Vonderembse 1987). The National Bureau of Standards created an Automated Manufacturing Research Facility where an information system architecture for production control was developed (Jackson and Jones 1987; Jones and Barkmeyer 1990). Research at this facility has focused almost exclusively on information system issues related to production operations as opposed to issues related to integration with business management functions and engineering design functions. This is typical of a bottom-up view of CIM which falls short in providing middle and upper-level management with information, feedback and control mechanisms.

2.2 Top-Down CIM

The primary focus of MIS in the 1960s and 1970s was the integration of previously constructed applications fed by dedicated file management systems for the conventional administrative functions of an organization. For two decades, the primary focus was upon transaction data processing in a highly centralized processing environment spawning a top-down viewpoint of most MIS or data processing departments. Furthermore, the MIS department was often viewed as external to the organization, providing transaction processing services, which isolated information specialists from the realities of production and operations. Manufacturing automation and computerized control was rarely an MIS issue. The 1980s brought the first efforts to integrate systems across functional areas with an objective to improve decision support in a more distributed processing environment. Traditional MIS and data processing departments have typically responded to the development of such systems from a traditional isolated, centralized, top-down perspective resulting in limited success. Backlogs of work requests have typically been measured in years and are often obsolete once completed. Fossum and Ettlie (1990, p. 318) propose that corporate MIS are concerned with the proliferation of hardware and software and "understand these issues much better than the overall requirements of the manufacturing users...they tended to focus on solutions to their own problems rather than those of manufacturing users."

An example of a popular computerized production control system developed in the 1970s and marketed heavily in the 1980s is MRP-II. It theoretically integrates all of the material management processes and should interface with the organizational administrative systems to provide information to other functional subsystems, including executive information systems. MRP-II systems have had limited success as did their MRP predecessors (Duchessi, Schaninger and Hobbs 1989). There is indication that the degree of success depends upon three issues: top management commitment, the implementation process, and hardware and software selection (Duchessi, Schaninger and Hobbs 1989). The last two of these three issues are centrally tied to MIS activities and involvement. MRP-II systems offer tremendous opportunities for integration between functional areas but rarely address the lower-level processing strategies that production is now facing. The top-down view of CIM falls short by failing to provide sufficient IS support at lower levels where "information technology is a key ingredient in this emerging recipe for competitive advantage through manufacturing" (Doll and Vonderembse 1987, p. 205).

2.3 Converging Approaches of CIM

Allen and Boynton (1991, p. 435) report that "IS efforts generally automate the status quo, freezing the organization into patterns of behavior and operations that resolutely resist change." Top-down approaches to implementing information systems in manufacturing environments typically result in centralized systems that are inflexible and result in limited support at lower levels. Bottom-up approaches tend to result in much more decentralized islands of automation that provide a flexible environment for production control, but little strategic advantage to business systems for tactical and strategic planning.

Grant, Ngwenyama and Klein (1992) propose the nomenclature, computer integrated manufacturing information systems (CIMIS), to describe all information systems of the manufacturing-based organization, both man-machine and machine-machine systems. This includes all levels of the traditional information system hierarchy; transaction processing systems, MIS, and decision support systems as well as the production-oriented systems; CAD, CAM, MRP-II, and FMS. They propose that an organizational-level strategy for planning, design and implementation of the CIMIS is necessary for successful integration of the different systems. LAN protocols, such as the Manufacturing Automation Protocol (MAP), have been developed in order to interface the many proprietary computer system architectures found in a factory. While the acceptance of MAP as a single communication standard by the manufacturing community is still uncertain, because it complies with the Open Systems Interconnection (OSI) standard and is compatible with the Technical and Office Protocol (TOP), MAP is viewed by some as a total solution for corporate communication needs (Chang, Wysk and Wang 1991).

Doll and Vonderembse call for a partnership between executives in engineering, manufacturing, marketing, and MIS "who share a common vision of how CIM makes possible new approaches to designing business systems" (p. 206). Upper level management commitment is a prerequisite and must trickle down to all levels of the organization. The CIO must manage and direct with a cross-functional view and with sufficient depth in the area of production to promote the convergence of the top-down and bottom-up view-points of CIM. Only multiproduct flexible factories will compete at global levels and CIM technology offers that capability. Successful implementation of CIM, complete organizational integration, requires the IS community to search for methods that take advantage of the benefits offered by both top-down and bottom-up views of CIM while overcoming their limitations.

3. DIFFERENCES IN TECHNOLOGY BETWEEN MIS AND MANUFACTURING

The technologies used in MIS and those used in manufacturing have traditionally been distinct and separate. These technologies have played a significant role in shaping the different corporate cultures in MIS and manufacturing. In this section, we compare and contrast the differences between the hardware, software and system data traditionally found in MIS and manufacturing. Figure 2 provides an overview.

3.1 Hardware

Traditionally MIS has utilized mainframe computers for corporate transaction processing and MIS-level applications while manufacturing has traditionally used minicomputers for lower-level operational systems. For smaller DSS applications, MIS has more recently provided support for micro-based applications while manufacturing tends to favor more powerful workstations for applications such as CAD and CAE. When computers are used to integrate machine tools, minicomputers or workstations are the platforms of choice. The hardware gap is even wider for CIM and FMS applications that often require the use of numerical control machines, robotics, programmable logic controllers, machine tools and sensors on the factory floor. Others have recognized and reported the consistent differences in vendors of choice between MIS, which tends to favor systems by IBM, Unisys or Hewlett-Packard, and manufacturing, which tends to favor proprietary systems by DEC, Fisher Controls, Foxboro, Honeywell, Allen Bradley and Cincinnati Milacron (Piszczalski 1992; Laudon and Laudon 1991; Fossum and Ettlie 1990).

3.2 Software

MIS application software is typically developed using procedural, third generation programming languages. A well-defined, structured application environment is characteristic of a typical MIS application, and this allows for the effective use of computer-aided software engineering (CASE) tools. Even programming with fourth generation languages requires a structured design and development approach. Typical design tools include data flow diagrams, entity-relation diagrams and program flowcharts. Manufacturing software is typically used to control machine operations on the shopfloor. Because of this, specialized languages for programmable logic controllers (PLCs) and robotics controllers are used to synchronize and coordinate concurrent machine activities (Chang, Wysk and Wang 1991) (Bedworth, Henderson and Wolfe 1991). Unlike third generation procedural languages, PLC programming languages can specify machine functions, timing of machine operations, and machine movement in a three-dimensional coordinate system. Software development tools for the manufacturing environment typically include ladder diagrams (Chang, Wysk and Wang 1991), petri-nets (Bullers 1991), and state transition tables (Moodie et al. 1988). Rarely is time dependency an issue in data processing and MIS systems, but it is fundamental in production control processes. Designing more dynamic systems requires the systems analyst to use nontraditional modeling techniques.

3.3 Data

MIS and manufacturing systems traditionally have dealt with different types of data. MIS systems typically handle fewer types of data and have higher volumes per data type than in manufacturing systems. Manufacturing systems typically have highly dynamic data that is subject to greater changeability and timeliness than in MIS systems (Ronen

Categories that Define Corporate Culture	MIS	Manufacturing
Hardware	1. Mainframes 2. Minicomputers 3. Microcomputers	1. Minicomputers 2. Workstations
Software	1. Procedural Languages 2. CASE Tools	1. PLC Languages 2. Robotics Languages 3. Ladder Diagrams 4. Petri-Nets 5. State-Transition Tables
Data	1. Few Data Types 2. High Volume per Data Type 3. Less Changeability and Timeliness 4. Longer Lifespan	1. Many Data Types 2. Low Volume per Data Type 3. Great Changeability and Timeliness 4. Shorter Lifespan
Strategic Mission	1. Information Management 2. Support Service 3. Cost-Center 4. Top-Down	1. Production of Products 2. Profit-Center 3. Bottom-Up
Education	1. CS/CT/IS — Degree 2. Focus on Software 3. No Manufacturing	1. IE/IT/None — Degree 2. Focus on Machinery 3. Little Software Analysis and Design
Historical Background	1. Transaction Processing 2. Static Requirements 3. Single Function Applications	1. Scientific Management 2. Fluid Requirements 3. Adaptive Systems

Figure 2. Comparison of MIS and Manufacturing Corporate Culture

and Palley 1988). Samaddar and Rai (1992) state that CIM data is difficult to manage and store due their heterogenous characteristics, their dynamic nature, and their entity orientations. Badiru (1990) describes the importance of data requirements analysis in the successful implementation of CIM in a flexible manufacturing system.

4. DIFFERENCES IN CORPORATE CULTURE BETWEEN MIS AND MANUFACTURING

Corporate culture is defined as the system of values and beliefs that shape management style and human behavior in an organization. A better understanding of an organization's corporate culture can improve planning activities (Ernest 1985), can reduce tension in firms seeking to ethnically diversify (Goldstein and Leopold 1990), and can reduce the chance of Executive Information System (EIS) failure (Glover, Watson and Ranier 1992). Three major differences in the corporate cultures of manufacturing and MIS are identified: strategic mission, education and historical focus (see Figure 2).

4.1 Strategic Mission

The strategic mission of corporate MIS is to manage the information resources of the firm, while manufacturing's strategic mission is to produce product. MIS is typically viewed as a corporate support service whose responsibility is to support the different functional areas of the firm. MIS is often perceived as a cost center that drains resources away from the rest of the organization. Because MIS is charged with the implementation of cross-functional information systems, such as CIM, it typically sees IS applications from a top-down vantage. Manufacturing is viewed as a profit center for the firm. Because the products that manufacturing produces are a direct source of corporate revenue, the results of manufacturing are quite tangible. Hill (1989) makes the point that functional support for manufacturing, such as that from MIS, is typically weak. As a result, manufacturing generally has internal IS groups that are largely independent of corporate MIS.

4.2 Education

MIS personnel are typically educated in computer science, information systems or computer technology. Their education has focused on the analysis, design and maintenance of information systems. Manufacturing personnel usually have a background in industrial engineering, manufacturing technology or have no advanced off-job training. Their skills are in operating and maintaining production machinery and in improving manufacturing operations. In general, people in MIS have little educational background in manufacturing, and people in manufacturing have little educational background in information system analysis and design.

4.3 Historical Background

Both manufacturing and MIS have a history of being inwardly focused and technology fixated. In the 1960s and 1970s, MIS and manufacturing focused almost exclusively on new technology at the expense of solving problems associated with people and processes. Manufacturing's longstanding emphasis on the principles of scientific management played a large part in relegating manufacturing to a secondary concern of the organization (Hayes, Wheelwright and Clark 1988; Gibson 1990). The exclusive focus on improving operational efficiencies in the production process created an inward focus that effectively isolated manufacturing from the rest of the organization.

Corporate MIS has also tended to develop a distinct corporate culture. While the organizational cultural of MIS may not be as monolithic as manufacturing's, it has its roots in the development, implementation and operation of transaction processing systems (TPS). TPSs are characterized by highly formalized system procedures, application software with relatively static requirements, and single function applications. The result is a formal, disciplined culture characterized by the development and operation of mechanistic systems that serve a relatively homogenous group of end-users (Fossum and Ettlie 1990).

5. POINTS OF CONFLICT

The top-down, support-service culture of MIS often clashes dramatically with the bottom-up, efficiency oriented culture of manufacturing during CIM implementation. A review of case studies in CIM implementation reveals two areas of conflict in technology (software development and software maintenance) and four areas of organizational conflict (vendors, responsibility and ownership, existing policies, and measuring results).

5.1 Conflict in Technology

Software development is the number one technical challenge associated with the implementation of CIM systems (Meredith 1987; Ettlie and Getner 1989). The application of MIS-oriented software design tools and methodologies to manufacturing applications have generally resulted in poor performance in manufacturing systems. Problems with software not only arise because of the complexities associated with driving and controlling various elements of the factory, but also in interfacing manufacturing software with both engineering and business software. As noted by Jackson and Jones developing software that integrates "equipment from different vendors is far more difficult than ever anticipated" (p. 21). Software development practices found in a manufacturing environment are typically poor and lead to major problems in **software maintenance**. In the press for timely implementation, software "fixes" can be temporary, "bandaid" solutions, where the intention is that the job will be done right later, which rarely happens. Later modifications or upgrades in the software become traps for the unwary (Ettlie and Getner 1989).

5.2 Organizational Conflict

It would be virtually impossible to implement CIM without altering the organization. Zmud and Cox (1979) noted that, during the implementation of MRP systems, "the manufacturing environment is affected as information systems are formalized and as semi-independent functions are integrated, job descriptions are newly created and/or revised, power and authority relationships are altered, and performance becomes more visible." Conflict between manufacturing and MIS often centers around issues of **responsibility**. Often it is not clear who has the authority to make IS decisions or even who should participate in such decisions (Meredith 1987). The expertise of outside **vendors** is often sought for their experience in CIM implementation. However, failure to ensure system quality and acceptability for vendor supplied systems is a common source of CIM failure (Kunnathur and Sundararaghavan 1991). **Existing**

policies in manufacturing and MIS are potential sources of conflict. In particular, existing policies of motivation and reward tend to protect and insulate old systems and act as organizational barriers to CIM implementation. Finally, while MIS and manufacturing typically agree that traditional cost accounting methods do not adequately describe modern CIM systems, **measuring the results** is a nontrivial activity that often is a source of conflict (Meredith 1987; Jelink and Goldhar 1991).

6. DIVERSITY IN ORGANIZATIONS

This research maintains that lessons learned in the areas of cultural and organizational diversity can be applied to resolving the conflict resulting from opposing corporate cultures. Previous research in cultural and organizational diversity has focused primarily on the issues that deal with increasing the ethnic, age and gender diversity of the people within an organization. Griffen (1992) makes the point that it is important for management to understand that cultural diversity recognizes that differences do exist between cultures and that there is a fundamental need for different cultures to be understood. The literature on diversity in organizations confirms that conflict often results when opposing cultures clash within an organization. As a result, recent research has described how organizations can manage diversity by developing new policies and practices that will ultimately lead to a new organizational culture (Cox 1991). Understanding the clashing organizational cultures found in MIS and manufacturing can play a significant role in eliminating the barriers to successful CIM implementation.

7. FRAMEWORK FOR INTEGRATION

A framework for resolving the MIS/manufacturing conflict was developed based on the model for organizational diversity described by Cox (1991). Cox defines an ideal organization that has successfully embraced cultural diversity in terms of gender, race, ethnicity and nationality, and recommends that managers oversee the change processes that lead toward creating such an ideal organization. While Cox's model is based primarily on gender and ethnic diversity, we propose that lessons learned in research in cultural diversity can be applied to minimize the MIS/manufacturing conflict. Following are five characteristics of an organization that has successfully addressed the conflict between MIS and manufacturing:

(1) Full Structural Integration — the policies and practices of the firm allow full collaboration between MIS and manufacturing;

(2) Unimpeded Interpersonal Communication — an atmosphere that encourages both formal and informal communication between people exists;

(3) Absence of Prejudice — people and ideas should be valued and accepted based on their contribution to the project, not on their source;

(4) Low Levels of Conflict with Users and Vendors — an environment where conflict with internal and external sources is focused only on meaningful, work-related issues; and

(5) Pluralism — MIS and manufacturing actively work to understand each other's point of view.

Figure 3 provides a summary of the framework for resolving conflict between MIS and manufacturing.

7.1 Full Structural Integration

The full structural integration of MIS and manufacturing means that barriers to coordination and cooperation must be removed. The **joint development of a cross-functional business plan** must be undertaken at the beginning of the system development life-cycle (Meredith 1987; Ettlie and Gettner 1989; Zmud and Cox 1979). The business plan should lead to the development of a function model, an informational model, a network model, an organizational model, and an implementation plan (Aletan 1991). It has been recommended that MIS and manufacturing **share a budget, share performance standard responsibilities**, and **report to the same authority** (Piszczalski 1992). Ettlie and Getner found that user satisfaction with systems is higher when MIS and manufacturing share responsibility for the design of the system.

7.2 Unimpeded Interpersonal Communication

Management must be proactive in fostering an atmosphere that encourages both formal and informal communication between manufacturing and MIS. This is particularly important because MIS and manufacturing groups are often geographically separated. A **common planning methodology** and **common system development tools** are both necessary ingredients for successful intergroup communication (Fossum and Ettlie 1990). Exchanging **liaisons** is an effective way of establishing better intergroup communication (Piszczalski 1992). Finally, **prototypes** and/or **pilot programs** are effective ways of improving communication between manufacturing and MIS (Fossum and Ettlie 1990).

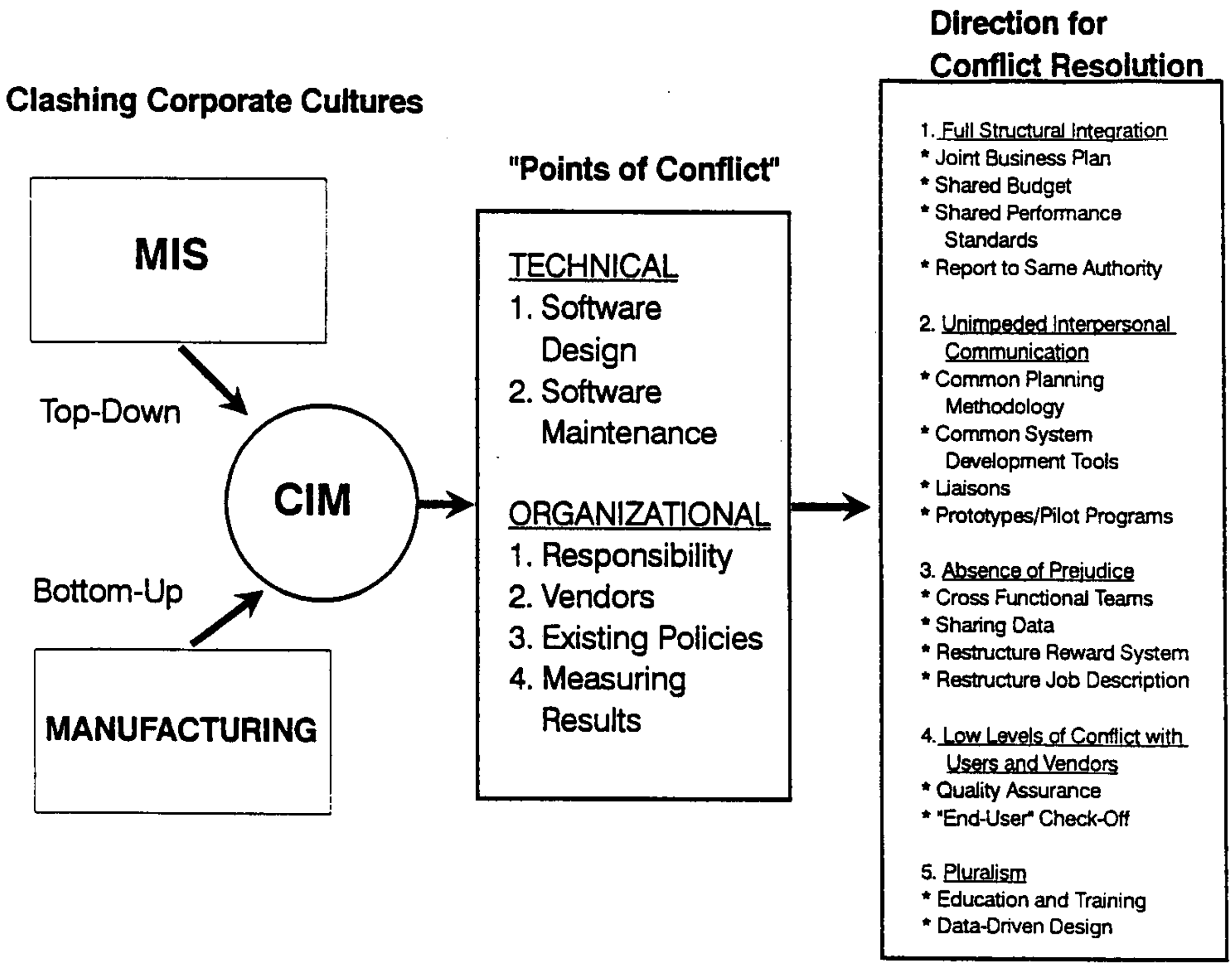

Figure 3. A Framework for Resolving Conflict Between MIS and Manufacturing

7.3 Absence of Prejudice

People and ideas should be valued and accepted whether they are from MIS or manufacturing. This means that prejudices based on preconceived notions should be eliminated. A key component to eliminating prejudice is the formation of **cross-functional teams**. Cross-functional teams should meet regularly to define roles and responsibilities, to determine a common planning methodology, and to decide upon common protocols and standards (Piszczalski 1992). Zmud and Cox show that members of a cross-functional team should assume different roles at different stages of the system development life-cycle. **Sharing data** is an important way to reduce suspicion and mistrust between groups. Peters (1987) states that "the widespread availability of data is the only basis for day-to-day problem solving." Finally, management must **restructure reward systems and job descriptions** to encourage cooperation, not competition, between manufacturing and

7.4 Low Levels of Conflict with Users and Vendors

MIS and manufacturing often run into problems with end-users and technology vendors during CIM implementation. Management must create an environment where conflict is focused only on meaningful, work-related issues. Formal methods for **quality assurance** are recommended to validate, verify and certify that the system performs properly and meets its requirements. It is recommended that an **end-user check-off** system be adopted where no system is accepted from the vendor until the end-users "check-off" that the system has indeed met its requirements and that it performs properly. Fossum and Ettlie state that end-users must participate in the formulation of CIM system specifications and the implementation of CIM components and subsystems. Yoshikawa (1987) points out that CIM designers should not necessarily seek the elimination of factory workers, but rather should focus on means for improving the interaction between machines, people and information systems.

7.5 Pluralism

MIS and manufacturing must actively work together to understand each other's point of view. **Education and training** in all forms should be a major effort in any CIM effort (Meredith 1987) (Fossum and Ettlie 1990). A formal plan for training and retraining personnel should be developed. It is important that people be trained in the organizational changes that CIM will introduce to the factory. Central to this education will be cross-functional training where MIS learns manufacturing concepts while manufacturing learns about methods for IS analysis and design. A **data-driven approach** to CIM design is an effective way to improve cross-functional understanding (Grant, Ngwenyama and Klein 1992). In a CIM system, there is a need for correlation and integration of data across the design, planning, implementation and operation phases (Badiru 1990; Samaddar and Rai 1992).

8. PROPOSED RESEARCH AGENDA

The evidence used to support the authors' contention of clashing corporate cultures between MIS and manufacturing has been based on previous field studies on CIM implementation and on observations made by professional CIM consultants. Little empirical research has been conducted on the conflict between MIS and manufacturing. Only Gupta has conducted empirical research that explores the conflict between MIS and manufacturing. However, no empirical research has been undertaken that verifies the cultural differences between MIS and manufacturing or that verifies the various sources of conflict between the two groups. As such, a four-part research agenda is proposed to (1) verify the cultural differences between manufacturing and MIS, (2) verify the "points of conflict" between MIS and manufacturing, (3) identify "best practices" for resolving "points of conflict" between MIS and manufacturing, and (4) verify the "Framework for Resolving Conflict between MIS and Manufacturing" as a viable model for conflict resolution.

The existence/non-existence of cultural differences between MIS and manufacturing would be determined by hypothesizing the existence of significant differences in hardware, software, data, strategic mission, and education and conducting a survey of MIS and manufacturing groups. The "points of conflict" between MIS and Manufacturing would be ascertained by performing a follow-up survey that hypothesized significant "conflict" between manufacturing and MIS, and the six technical and organizational factors listed in this paper as the most significant sources of conflict. Finally, a field study of successful and unsuccessful CIM implementations would be used to identify "best practices" for resolving the "points of conflict" between MIS and manufacturing and for verifying the "Framework for Resolving Conflict between MIS and Manufacturing."

9. CONCLUSION

The under-utilization of CIM systems is directly attributable to the technical and organizational issues associated with information system implementation. In addition, "turf wars" between MIS and manufacturing continue to threaten the success of CIM. In order to help the MIS manager appreciate manufacturing's vantage point, the authors have identified the differences in corporate culture between MIS and manufacturing. By identifying the "points of conflict" between MIS and manufacturing, the MIS manager can anticipate areas of potential conflict. Five dimensions of conflict resolution provide the MIS manager with guidance in reconciling the differences that threaten CIM.

Solving the complex technical and organizational problems associated with CIM will require cross-fertilization between research in MIS and manufacturing. Showalter (1992) states that both areas (MIS and manufacturing) appear to have established their own research agendas, neither of which gives priority to the "exploration of the interactions between operations management and information systems." Research in CIM design and implementation has primarily been in the domain of manufacturing. However, because the major issues in CIM are directly related to information systems, the time is right for the MIS community to consider CIM related research an important activity.

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