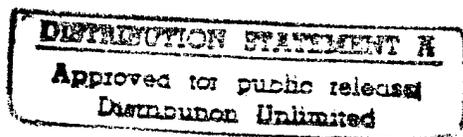

Logistics Management Institute

Improving EDI Data Quality

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Preface

Electronic data interchange (EDI) enables the Military Traffic Management Command (MTMC) to exchange information with a host of dissimilar information processing environments. MTMC's EDI efforts have increased significantly over the past five years and are anticipated to grow at an even faster pace in the future. The CONUS Freight Management (CFM) system, Worldwide Household Goods Information System for Transportation (WHIST), and Automated Carrier Interface (ACI) system are exchanging data with at least 100 trading partners, with hundreds more planned.

Among the lessons learned to date, the importance of maintaining a high level of data quality and system integrity stands out. The need for engineering better data quality during systems development and ensuring that high quality data are used throughout EDI programs have been well known throughout the Department of Defense (DoD). Beyond acknowledging that need, MTMC's past experiences with EDI programs indicate the subject of data quality requires more attention than it has been receiving.

This briefing report identifies and categorizes recent EDI data quality problems, presents industry's approaches to resolving data problems, and recommends measures MTMC should take to improve EDI data quality as it continues to develop EDI applications.

Agenda

- ◆ Identify and categorize recent problems with the quality of EDI data
- ◆ Report survey results of DoD and industry business practices related to data quality
- ◆ Recommend preventative measures and reactive procedures for improvement

In this briefing report, we focus on recent data quality problems and their causes. We also report on the results of a survey of electronic data interchange (EDI) data quality issues within various Department of Defense

(DoD) organizations and then industry trading partners. Based on the results of that survey, we recommend several preventive measures and reactive procedures for improving the management of data quality.

EDI Data Quality Problems

- ◆ Human error
 - ▶ Inadvertent data entries
- ◆ Noncompliance
 - ▶ Rules and procedures known, but not followed
- ◆ Unregulated requirement
 - ▶ Procedures do not exist
 - ▶ Responsibilities are not fixed

The Military Traffic Management Command's (MTMC's) data quality problems with the CONUS Freight Management (CFM) system, Worldwide Household Goods Information System for Transportation (WHIST), and Automated Carrier Interface (ACI) system fall into five categories. Those problems are defined on this and the next chart.

Human error problems occur when a reasonable effort has been made to reengineer a process and develop automated system tools that minimize the potential for error, but they still occur. As an example, making a data entry error while typing a Government Bill of Lading Office Code (GBLOC), such that the newly entered GBLOC incorrectly matches one in an edit reference table, is a human error.

Noncompliance problems occur when the user or analyst building an interface knows

the rules and procedures but elects not to comply with them. An example of this error is the decision by some shippers not to submit an Advance Transportation Control and Movement Document (ATCMD) to MTMC as prescribed by DoD 4500.32-R, *Military Standard Transportation and Movement Procedures*.

Unregulated requirement problems occur when systems analysts do not research the business process thoroughly enough to determine if a requirement is supported by a published regulation and if the responsibility for satisfying the requirement are unambiguous in the regulation. An example of this type of problem is the recent realization that installation transportation offices do not intend to enter accessorial charges on personal property government bills of lading (GBLs) for shipments they receive because they had never been required to do so and were not staffed to perform the work.

EDI Data Quality Problems (continued)

- ◆ Inadequate LCM
 - ▶ Nonexistent programs
 - ▶ Weak or ineffective programs
 - ▶ Programs not enforced
 - ▶ LCM practices not applied to smaller programs
- ◆ Inadequate open systems communication
 - ▶ Interface coordination not formal/ineffective
 - ▶ Global standards nonexistent/not applied
 - ▶ Global systems analysis not applied

The most predominant cause of data quality problems stems from a lack of discipline in MTMC's *life-cycle management* (LCM) of automated systems. Furthermore, LCM practices are not required when project investment is small. LCM practices should be required whenever EDI is used regardless of the size of the project. An example of this type of problem is the absence of documented operational test and evaluation requirements. In another example, data elements needed for an interface with WHIST were optional for the data base providing the information but were mandatory for the system receiving the information.

The last category of problems is common among organizations that move from

stovepipe systems to systems that embody data sharing and open systems architectures. These problems are usually exposed when an organization moves into an EDI environment. It is a problem we have labeled as "*inadequate open systems communication*." An example of this type of problem is the absence of well-coordinated standard reference files prior to implementing a data exchange, such as between the CFM system and DoD shipper systems supplying shipment data. Accredited Standards Committee X12 EDI standards do not dictate standard reference files and application edits, so data elements such as city names, commodity codes, and standard point location codes may appear in many different formats.

Organizations Surveyed

- ◆ DoD Information Resource Management College
- ◆ DoD Center for Data Quality
- ◆ PRC Data Quality Engineering Department
- ◆ Peat Marwick Data Warehousing Engineering Department
- ◆ Institute of Internal Auditors Research Foundation
- ◆ 3M Company
- ◆ Proctor & Gamble Company

In an attempt to understand how other organizations have resolved their data quality problems, we surveyed several different organizations. We used personal interviews, telephone calls, and reports and other literature from those organizations to obtain that understanding. Some of these organizations are heavily involved in EDI and data quality engineering, some have encountered many of

the same problems that face MTMC today, while others, such as the Defense Information Systems Agency (DISA), are working on global standards for DoD. We found no “silver bullet solutions,” but did uncover a few ideas that may help MTMC to improve its data quality.

Survey Results

- ◆ Data quality engineering tools
 - ▶ U.S. Marine Corps
 - ▶ PRC Data Quality Engineering (DQE)
 - ▶ QDB™ Solutions
 - ▶ DB STAR
 - ▶ WIZSOFT
- ◆ Industry lessons learned
 - ▶ Paper conversions to EDI
 - Will be prone to error
 - Requires business process reengineering
 - ▶ EDI transaction monitoring
 - Requires full-time human resources
 - Audit analytical tools

In the technology arena, a number of promising data quality engineering tools are available in the marketplace. DoD, and presumably MTMC, has access to some tools without having to buy them. Marine Corps recently had PRC and SRA build a "Data Quality Engineering" tool that is used to analyze data bases of interfacing systems and indicate potential data quality problems. This tool requires some programming experience to operate and a little practice before it can be used effectively. A more robust capability can be obtained on a trial basis from the DoD Center for Data Quality. It includes a sophisticated tool (QDB Solutions) and trained analysts that will conduct the analysis and assist with the corrective actions. In addition

to QDB solutions, other tools such as DB STAR and WIZSOFT offer similar capabilities at competitive prices.¹ These auditing tools can also be used to check data bases for quality problems before and after implementing a new interface.

Discussions with commercial enterprises that are using EDI, such as 3M and Proctor & Gamble, revealed one common theme: the conversions of paper to EDI requires a significant effort to ensure good data quality and will almost always require a business process redesign before implementation. Additionally, EDI requires substantial resources to monitor daily data exchanges and to resolve problems with trading partners.

¹Joe Celco and Jackie McDonald, "Don't Warehouse Dirty Data," *Datamation*, 15 October 1995.

Preventive Measures Guide

- ◆ Enforce sound LCM practices
- ◆ Develop formal interface controls
- ◆ Implement configuration management
- ◆ Identify regulatory changes needed during concept development
- ◆ Include internal controls and utilities to fix corrupted data in system design requirements
- ◆ Develop standard reference files and standard edits among all trading partners
- ◆ Establish standing Executive Steering Groups
- ◆ Develop centralized data quality management review process

The most important preventive measure is to follow sound LCM practices. Those practices, however, should be approached from a global perspective. Most information management organizations realize LCM procedures are not glamorous, easy, inexpensive, or quick to perform, but almost all realize that problems are postponed if corners are cut in this area. Two aspects of LCM require special attention. Business processes should be redesigned prior to EDI development and data quality design requirements should be met as an integral part of the design phase.

The second preventive measure is to formalize all interfaces with memorandums of understanding (MOUs), interservice support agreements (ISAs), or interface control documents (ICDs). Do not assume anything when

working through the analysis of a planned interface. Document every agreement and qualified stipulation made during the process. When developing and implementing the interface, document all steps that have been taken to ensure data quality.

Implement formal configuration management for software and hardware configurations and for the entire systems development and change process. The configuration of formal documentation should include ICDs that must be in place before the software is designed and coded. To enhance trading partner communications, configuration management boards (CMBs) should have members from all trading partners; MTMC should also seek membership on boards of systems that it interfaces with.

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Identify regulatory changes up front. Given the lead-time needed for most regulatory changes, they should be identified early in the development process so they are ready when the system is implemented. It is a good practice to simultaneously incorporate interim regulatory agreements into MOUs or ISAs in the event the regulatory process falls behind system development.

Each internal control should be listed as part of the requirements specifications, just as functional and technical specifications are included. Unfortunately, internal controls are often an afterthought, not a development requirement. Numerous incidences suggest that poor internal control programs often lead to fraud and information security problems. Additionally, even though most system developers strive to minimize data quality errors, data errors will periodically contaminate a data base. To offset those errors, utilities should be included in the system

configuration for correcting data bases, reconstituting data operations, and recovering data.

Develop standard reference files and edits that all trading partners can apply. Without those files and edits, data quality problems are guaranteed to occur and eventually contaminate a data base. Even if there are only two trading partners, insist on using global, or at least DoD-wide, standard reference files. Data sharing often starts with two parties and expands. Trading partner agreements should include a commitment by each party to edit both outbound and inbound transactions.

During system design or development of interfaces, establish a problem resolution body for problems that the configuration control board or affected parties cannot resolve. The use of Executive Steering Groups (ESGs) will often reduce or eliminate crisis and special interest communications, as well as preclude the "quick fix" plans that could have been avoided by an established procedure for elevating problems to a level where they can best be resolved.

These preventative measures require centralized management oversight to be effective. A MTMC quality review program should be established for each major EDI program to ensure that preventative measures for data quality problems are considered during the development process.

Reactive Measures Guide

- ◆ Identify problem
- ◆ Organize problem resolution team
- ◆ Implement interim procedures and data correction, if required
- ◆ Use configuration management procedures to implement solution
- ◆ Initiate MOUs, ISAs, ICDs, or regulatory changes as needed
- ◆ Reexamine LCM process
- ◆ If not resolved, refer to CMB, TSRC, or ESG

Reactive measures are the procedures that should be followed to resolve data quality problems if preventive measures fail. The first step is to isolate and identify the problems.

In most cases, a team will be needed to develop the solutions. The team should include personnel with the expertise, both functional and technical, to analyze the problems, as well as to understand their impact on the external trading partners. All potentially affected trading partners should be notified of the data problems. The team may also find a need to implement interim procedures and oversee data correction efforts while more long-term solutions are being developed.

Hardware, software, and procedural changes should be managed in accordance with formal configuration management procedures. Without those procedures, the risk of implementing undocumented software,

hardware configurations, and users manual changes is greatly increased.

In many cases, new MOUs, ISAs, or ICDs will need to be created to correct the problems. When regulatory changes must be made, these types of agreements could be used to implement interim measures before the actual changes are published.

A reexamination of current LCM practices should be made to determine if the data quality problems could have been prevented by better LCM practices and controls.

When the team cannot agree on the corrective action or schedule for resolving the problems, problem resolution efforts must be elevated. They should first be referred to the CMB and then, if necessary, to MTMC's Transportation Systems Review Council (TSRC). If the problems still are not resolved, they should be referred to the ESG as a matter of final recourse.

Reactive Measures Guide

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As in the case of preventative measures, resolving data quality problems also requires central management oversight. Since EDI often crosses organizational boundaries, resolution requires more resources than available through a single program management office.

Recommendations

- ◆ Strengthen LCM practices
- ◆ Emphasize business process redesign
- ◆ Implement global coordination practices
- ◆ Develop standard reference files and edits
- ◆ Explore and test technical data quality management tools and professional services
- ◆ Employ sufficient human resources for EDI data quality monitoring
- ◆ Obtain leadership commitment and manage data quality centrally

In summary, MTMC can improve EDI data quality by implementing the key recommendations shown on this chart. MTMC should review current LCM practices and strengthen those practices that contribute to better quality control assurance. Prudent LCM practices should be used for all EDI development projects regardless of the established regulatory investment costs. When converting a data exchange to EDI, emphasize business process redesign instead of simply automating current practices. Thoroughly coordinate new interfaces and changes to MTMC's automated systems among all trading partners. This coordination should include development and implementation of standard reference files and edits. Test the utility provided by automated data quality tools currently available to MTMC and its trading partners for little or no cost. Employ sufficient human resources to

monitor EDI trading partner transaction exchanges, edit rejects, and audit data, especially during the start-up phase of an EDI project. Finally, managing information assets requires policy development and compliance monitoring. Many organizations accomplish this task by establishing a standards and quality assurance (QA) staff element. In most cases, MTMC has delegated QA responsibilities to individual program management offices. As such, there is no single organization charged with the overall responsibility for QA and related policy guidance. Since data quality is integral to the product MTMC delivers to its customers, it is recommended that MTMC formally establish a structure to establish guidance, monitor compliance, and direct corrective action on data quality matters related to EDI.

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