Reducing the Barriers to Interorganizational Electronic Data Interchange

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Introduction

Increasingly state and federal agencies in the United States in their regulatory roles use electronic data interchange as a means to interact with individuals and firms. Motor carriers are an industry group over which state and federal agencies have such oversight in addressing safety on the highway. Each truck used by motor carriers must be licensed to operate in the states through which it passes in transporting commodities, and the motor carriers have to also pay federal taxes based on their transport mileage. Thus each motor carrier deals with licensing agencies in each state in which it operates creating an enormous paper work burden.

Using Electronic Data Interchange (EDI) the motor carriers and the state licensing agencies could transmit, receive, process, and retrieve license data electronically which would change the way the states and the motor carriers currently do business. This paper examines the process for creating such an EDI system.

Barriers to successful EDI implementation are numerous. Licensing in each state is governed by a set of laws and regulations for that state. For example, many states require that the license with an original signature be displayed in the truck cab. These mandated barriers usually result from legislation, executive orders, or popular demand. Organizational issues reflect problems with how the state or carrier is structured to implement the EDI technology. These organizational issues can result from jurisdictional overlaps, unclear responsibilities, conflicting operating and administrative policies and priorities, and cultural differences. The socio/technical interface of the technology with its users (states and carriers) can pose an additional barrier to adoption of the EDI technology. If the EDI technology is to be used nationally, it must fit the work styles and needs of the states and carriers. An important component in developing an EDI technology is the success of the carriers and states in removing these barriers.

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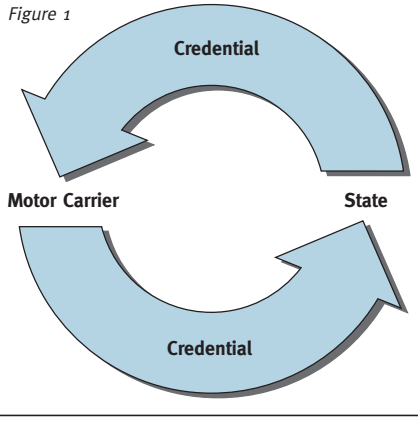
Figure 1



The Process of Developing an EDI Licensing System

A time based process approach (Monge, 1990) was used to assess the EDI systems development. The state and carrier partners were examined in terms of the work done to remove the EDI barriers. Also the partners' acceptance and use of EDI were examined in terms of their perceptual, behavioral, and procedural changes and in terms of EDI's impact on their effectiveness and efficiency.

Before EDI licensing is developed and implemented for the carriers and states, the mandated, organizational, and socio / technical barriers have to be addressed (Figure 1). Eliminating these barriers will require the reengineering of the licensing process in the states and carriers. The identification of these barriers and their resolution will necessitate intense state and motor carrier interaction. The effectiveness of the state / carrier collaboration process will determine the effectiveness of EDI licensing.

To manage these barriers, the partners must change the credentialing procedures within the states agencies and motor carriers. Thus barrier management is effectively change management. These state and carrier organizational units will be examined as open systems (Child, 1972; Hedberg, Nystrom; Starbuck, 1976; Pfeffer and Slancik, 1978, Daft and Weick, 1984) to assess their ability to respond to the collaboration effort to reduce the barriers to EDI implementation. These organizational changes may result in not only changes in work procedures but changes in the culture of these organizations (Staw, Sandelands, and Dutton, 1981; Bennett, 1991; Greenhalgh, 1983).

First the partners (states and motor carriers) determined the barriers to EDI implementation. This required the documentation of the work process flow in the issuance of licensing credentials. Each state agency produced work flow diagrams showing the credential cycle from carrier to state and back to the carrier. This process

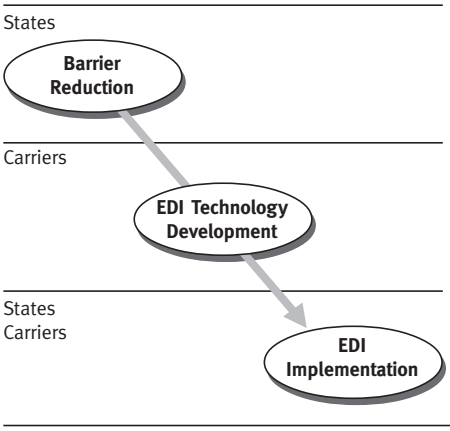
diagram and description identifies each information source and decision in the credential cycle.

After the state agencies completed their process maps, then the barriers to EDI licensing were identified through meetings with state agencies and motor carriers. Carriers identified to participate in these meetings included both the larger, more technologically advanced carriers as well as the smaller carriers. Using the states' process maps, the groups then identified the critical barriers to EDI licensing. The following categories of barriers were identified (Table 1).

Thus the identification of these barriers should have resulted in a plan for their elimination prior to EDI technology development (Figure 2). However in the rush to develop the EDI software these barriers were ignored.

EDI Licensing Software

Before removing the barriers, a software development firm was retained to develop for the states and carriers EDI software. Repeatedly the firm was told how the current licensing process worked and the technology constraints of each of the states. Rather than try to streamline the licensing process across the states, the software firm sought to satisfy the individual requests of each of the states. This resulted in the software running far over budget and never delivering the functionality needed.



Procedural Issues
Truck paperwork that must be on file with state; i.e. title, Internal Revenue Service forms and other License card that must be displayed in the truck
Mileage reports must be filed with the states and signed by the driver
Start-up and long-term cost of the EDI technology

Organizational Issues
Data confidentiality
Lack of support from the motor carrier industry because of uncertainty of benefits and associated costs.
Concern over the legality of the EDI technology
Fear by state agencies and carriers of losing authority and power
Tax quarterly reports that require original signatures
Coordination across all the states and carriers i.e. different licensing requires for each state
Lack of support from small carriers because of startup costs
Insufficient computer capabilities in the states and carriers
Equity - who pays and who benefits

Sociotechnical Issues
Difficulty for states/carriers in translating the EDI data to their computer based systems.
Lack of involvement of the states and carriers in the EDI technology development process.
Lack of initial and ongoing training and support for the state and carrier licensing agents.
Seamlessness of the carrier / state interface using EDI

Work Process Issues
EDI credential processing consistency with existing procedures
Credential processing uniformity across the states
Degree to which the credential process is improved
Change in credential processing cycle time
The degree to which the EDI technology is easy to use

Credential Worker Impact
Acceptance of the EDI technology by the motor carriers
Acceptance of EDI technology by states
Accessibility of EDI technology
Compatibility of EDI technology with existing work procedures

Market Potential
Hardware and software startup costs for EDI technology startup
Training costs for state and motor carrier credential workers
Costs to change work processes to be compatible with the new EDI technology
Perceived benefit of the EDI technology to state and motor carrier workers

Table 1 Barriers to EDI Technology Adoption

Assessment

An elaborate EDI assessment procedure was carried out to monitor barrier reduction, work process impact, and credential cyle time. The partners (carriers and states) provided their attitudes toward their current work processes before the EDI credential implementation. These pre-implementation attitudes were then compared to their attitudes after implementation of the EDI licensing credentials. Further the credential life cycle constituted application, fee payment, issuance, revenue distribution, modification, renewal, audit, sanctions, appeals, and roadside inspection for credentials. EDI licensing's goal was to enable motor carriers to request, pay for, and receive all the necessary credentials or permits electronically from the credentialing state. Thus the impact of EDI licensing was evaluated in terms of this credential cycle - starting with the carrier's request for a credential, the response by the necessary states, and the final receipt of the completed credential by the carrier. Baseline credential cycle times were obtained for the motor carriers and states and then compared to the credential cycle time after implementation of EDI licensing (Figure 3).

Survey results indicated that the states were very satisfied with the current licensing procedures while the carriers wanted improvement with less paper work for licensing and faster turn around (cycle time) for completing the licenses. The carriers expressed great anticipation for the EDI software. After the carriers and states were trained and the software implemented, the survey results indicate that there was much disappointment both by carriers and states with the EDI software

Why Did the EDI Approach Fail?

The software and networking requirements for this EDI licensing system were not its downfall. The EDI failure occurred because of the lack of procedural changes by the EDI partners. Rather than focusing on changes to work procedures and policies, this software development firm, tried to incorporate the states and carriers wishes.

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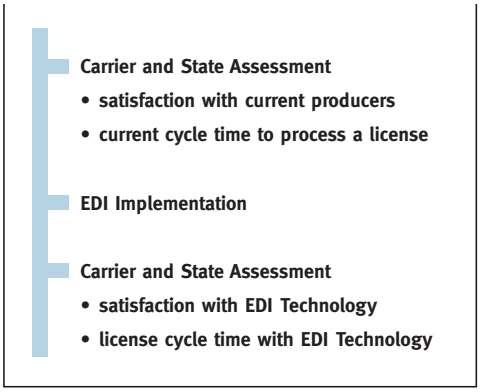

Figure 3 Assessment Producers

Of course each state and carrier wanted to minimize the degree to which they have to change their current operations.

For an EDI system to work in this context with differing state laws and procedures, a streamlined common approach to the licensing process was needed. This would have required intense interstate collaboration between policy makers to produce standard laws and procedures for licensing the motor carriers.

Elimination of the complex, legal and procedural barriers to EDI licensing required a multi assessment approach. A "Barrier Reduction Team" of key decision makers and workers from the states and carriers was needed. This team after the process maps were prepared should then have undertaken a competitive profiling in which licensing practices for these states / carriers are compared to those in other countries or industry types. The effort with this profiling would be to identify "best practices" by which to benchmark the current state / carrier procedures. This benchmark would then provide ideas for process improvement. Once the state and carrier partners agreed on these process improvements collectively they then should develop means by which to measure the achievement of these process improvements. Targets for things such as credential cycle time should be clearly established. A plan for how to institute the changes is needed. This plan should specifically address how to produce common laws and requirements across the states. Only then can the system designers begin the process of system development. If all the key people in the state and carrier partners are fully involved in this reengineering effort then these people will be open and accepting of the work changes that ensure from the EDI technology. Implementation of the actual system needs to be preceeded by intense training for the partners not only in terms of how to use the new EDI licensing system but prior to implementation in how to make the necessary changes to their work processes.

Thus this was an EDI effort where technology was seen as the solution but this greatly simplified a very complex issue. The real obstacle to EDI licensing implementation was the elimination of the barriers prior to technology development. As in too many cases the technology was viewed as the magic bullet whereas the real underlying problems to be addressed were ignored.