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Guide to Best Practice

Robert Schware and Paul Kimberley
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(List continues on the inside back cover)
Information Technology and National Trade Facilitation

Guide to Best Practice

Robert Schware
Paul Kimberley

The World Bank
Washington, D.C.
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>v</td>
</tr>
<tr>
<td>Abstract</td>
<td>vii</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>ix</td>
</tr>
<tr>
<td>Abbreviations and Acronyms</td>
<td>xi</td>
</tr>
<tr>
<td>1 LEGAL AND REGULATORY REQUIREMENTS</td>
<td>1</td>
</tr>
<tr>
<td>The Legality of EDI</td>
<td>1</td>
</tr>
<tr>
<td>Agreements</td>
<td>1</td>
</tr>
<tr>
<td>International Law</td>
<td>2</td>
</tr>
<tr>
<td>Contracts</td>
<td>2</td>
</tr>
<tr>
<td>Evidence</td>
<td>3</td>
</tr>
<tr>
<td>Data Disclosure</td>
<td>3</td>
</tr>
<tr>
<td>Legislation</td>
<td>4</td>
</tr>
<tr>
<td>Conclusion</td>
<td>4</td>
</tr>
<tr>
<td>2 SKILLS AND TECHNOLOGY INFRASTRUCTURE</td>
<td>5</td>
</tr>
<tr>
<td>Technology and Skills Inventory</td>
<td>5</td>
</tr>
<tr>
<td>Key Technology and Support Elements</td>
<td>5</td>
</tr>
<tr>
<td>Best Practice</td>
<td>6</td>
</tr>
<tr>
<td>Barriers to Use and Participation</td>
<td>7</td>
</tr>
<tr>
<td>3 LOCAL BUSINESS CONSIDERATIONS</td>
<td>9</td>
</tr>
<tr>
<td>Government and Local Business Practices</td>
<td>9</td>
</tr>
<tr>
<td>Culture and Religion</td>
<td>10</td>
</tr>
<tr>
<td>External Influences</td>
<td>10</td>
</tr>
<tr>
<td>4 INVESTMENT COSTS AND BENEFITS</td>
<td>11</td>
</tr>
<tr>
<td>Costs and Benefits</td>
<td>11</td>
</tr>
<tr>
<td>Cost and Revenue Categories</td>
<td>13</td>
</tr>
<tr>
<td>Three Typical Models</td>
<td>14</td>
</tr>
<tr>
<td>From Different Perspectives</td>
<td>16</td>
</tr>
<tr>
<td>Summary</td>
<td>18</td>
</tr>
<tr>
<td>Conclusion</td>
<td>19</td>
</tr>
<tr>
<td>5 TECHNOLOGY AND COST OPTIONS</td>
<td>20</td>
</tr>
<tr>
<td>EDI's Brick Wall</td>
<td>20</td>
</tr>
<tr>
<td>Number of EDI users and Message Volumes in Australia</td>
<td>20</td>
</tr>
<tr>
<td>Costs of Installing EDI</td>
<td>22</td>
</tr>
<tr>
<td>The Advocacy and Implementation Model</td>
<td>23</td>
</tr>
<tr>
<td>Cost Summary for a 20-Partner Grouping</td>
<td>25</td>
</tr>
<tr>
<td>Advocacy and Implementation: the Last Word</td>
<td>26</td>
</tr>
<tr>
<td>A Partner's Internal EDI Costs</td>
<td>26</td>
</tr>
<tr>
<td>The Dilemma</td>
<td>26</td>
</tr>
<tr>
<td>Alternatives to EDI</td>
<td>27</td>
</tr>
<tr>
<td>Intermediaries</td>
<td>27</td>
</tr>
<tr>
<td>Low Tech Infrastructure</td>
<td>28</td>
</tr>
<tr>
<td>Broader Technology Initiatives</td>
<td>28</td>
</tr>
<tr>
<td>The Hypothesis</td>
<td>28</td>
</tr>
<tr>
<td>The Model</td>
<td>29</td>
</tr>
<tr>
<td>Not So Low Tech EDI</td>
<td>32</td>
</tr>
<tr>
<td>Voice Processing: Telephone Technology</td>
<td>33</td>
</tr>
<tr>
<td>Scanning and Image Technologies</td>
<td>33</td>
</tr>
<tr>
<td>Other Technologies</td>
<td>35</td>
</tr>
<tr>
<td>Conclusion</td>
<td>36</td>
</tr>
<tr>
<td>ANNEX 1: THE CASE STUDIES</td>
<td>37</td>
</tr>
<tr>
<td>Methodology</td>
<td>37</td>
</tr>
<tr>
<td>Argentina</td>
<td>37</td>
</tr>
<tr>
<td>Current Status</td>
<td>39</td>
</tr>
<tr>
<td>Discussion</td>
<td>40</td>
</tr>
<tr>
<td>Australia</td>
<td>40</td>
</tr>
<tr>
<td>Trade Facilitation</td>
<td>41</td>
</tr>
<tr>
<td>Tradegate</td>
<td>41</td>
</tr>
<tr>
<td>The Organization</td>
<td>41</td>
</tr>
<tr>
<td>The User Community</td>
<td>42</td>
</tr>
<tr>
<td>Role of Government</td>
<td>42</td>
</tr>
<tr>
<td>VAN Interconnect</td>
<td>43</td>
</tr>
<tr>
<td>Vendors</td>
<td>43</td>
</tr>
<tr>
<td>Industry Associations</td>
<td>44</td>
</tr>
<tr>
<td>Assessing Tradegate</td>
<td>44</td>
</tr>
<tr>
<td>Lessons from the Australian Experience</td>
<td>44</td>
</tr>
<tr>
<td>Brazil</td>
<td>45</td>
</tr>
<tr>
<td>Current Status</td>
<td>46</td>
</tr>
<tr>
<td>Discussion</td>
<td>47</td>
</tr>
<tr>
<td>Chile</td>
<td>47</td>
</tr>
<tr>
<td>Current Status</td>
<td>48</td>
</tr>
<tr>
<td>Discussion</td>
<td>49</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>49</td>
</tr>
<tr>
<td>Tradelink</td>
<td>50</td>
</tr>
<tr>
<td>Summary</td>
<td>51</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>Hungary</td>
<td>52</td>
</tr>
<tr>
<td>Trade Facilitation</td>
<td>53</td>
</tr>
<tr>
<td>Current Status</td>
<td>53</td>
</tr>
<tr>
<td>Discussion</td>
<td>54</td>
</tr>
<tr>
<td>Malaysia</td>
<td>55</td>
</tr>
<tr>
<td>Current Status</td>
<td>55</td>
</tr>
<tr>
<td>Experience</td>
<td>56</td>
</tr>
<tr>
<td>Discussion</td>
<td>56</td>
</tr>
<tr>
<td>Mexico</td>
<td>57</td>
</tr>
<tr>
<td>Current Status</td>
<td>58</td>
</tr>
<tr>
<td>Discussion</td>
<td>58</td>
</tr>
<tr>
<td>New Zealand</td>
<td>59</td>
</tr>
<tr>
<td>Singapore</td>
<td>59</td>
</tr>
<tr>
<td>Current Status</td>
<td>60</td>
</tr>
<tr>
<td>The SNS Business Case</td>
<td>61</td>
</tr>
<tr>
<td>SNS Running Costs</td>
<td>61</td>
</tr>
<tr>
<td>Business and Cultural Factors</td>
<td>62</td>
</tr>
<tr>
<td>Taiwan (China)</td>
<td>63</td>
</tr>
<tr>
<td>Current Status</td>
<td>63</td>
</tr>
<tr>
<td>Summary</td>
<td>64</td>
</tr>
</tbody>
</table>

ANNEX 2: IMPLEMENTATION CONSIDERATIONS AND TIME FRAMES 65

| Technology Project Plan                      | 65 | Whose Standard: Yours or Mine?       | 83 |
| Trade Facilitation: EDI Project Plan        | 65 | Message Standards                    | 84 |
| Information Gathering                        | 65 | The Components of EDIFACT            | 86 |
| Reverse Engineering                          | 67 | UN-EDIFACT Syntax                    | 88 |
| Reengineering                                | 67 | Data Elements                         | 88 |
| Implementation                               | 68 | Data Element Values and Code Lists   | 90 |
| Technology Issues                            | 70 | Composite Data Elements              | 90 |
| Time Frames                                  | 70 | Segments                              | 91 |
|                                            |    | Qualifiers                            | 92 |

ANNEX 3: A SAMPLE TECHNICAL PROPOSAL 72

| Definitions                                  | 72 | Messages                              | 93 |
| Requirements                                 | 73 | The Organization                      | 94 |
| Functions                                    | 74 | Developing a Message                  | 96 |
| Gateway Services                             | 74 | UN-EDIFACT Deliverables               | 98 |

ANNEX 5: UN-EDIFACT 82

| ANNEX 6: GLOSSARY AND ABBREVIATIONS 99 |    |                                      |    |

iv Information Technology and National Trade Facilitation: Guide to Best Practice
Foreword

Information technology is demolishing territorial boundaries today, and bringing nations together in a single global community—but a community more fiercely competitive than ever before.

Change is the order of the day. Trade, banking, and telecommunications are being deregulated. Transport is getting faster, flexible, and available. Reengineered business systems are taking advantage of quick-response and just-in-time strategies; and cargoes, containers, and goods are being tracked around the globe by a variety of automatic identification devices. Electronic data interchange and electronic commerce are replacing the slower, more tedious paper trail. Countries now compete in global markets regardless of time zones, national boundaries, and distance, as products and processes are redesigned to adjust to the new business environment.

The increasing pressures from the global market are forcing everyone to adopt these new trade practices and standards. Customs, treasuries, and lawmakers are having to reinvent themselves to adapt to the concept of electronic commerce. Nations are adjusting to new methods of finance and tax gathering, opening up their telecommunications systems to private interests, and learning to take full advantage of harmonized procedures, standards, and practices for trade documentation. None of this is easy, but for many countries of the world, it is a matter of survival.

The present report, *Information Technology and National Trade Facilitation: Making the Most of Global Trade*, attempts to make the process of change smoother. It examines costs, benefits, and best practices in applying information technology to trade facilitation. It provides definitions and introduces basic concepts and issues in the substitution of electronics for paper, in the effort to achieve cost-effective international trade.

The companion volume, *Information Technology and National Trade Facilitation: Guide to Best Practice*, is a practical aid for governments to understand the tasks, costs, and time involved in setting up and implementing national trade facilitation initiatives. Together the reports offer essential information for decision makers promoting better trade practices in concert with international standards, common practice, and most important, specific national goals.

JEAN-FRANCOIS RISCHARD
Vice President
Finance and Private Sector Development
The World Bank
November 10, 1995
ABSTRACT

Designed for use by managers and technical staff involved in the implementation life cycle of an electronic commerce project, this volume begins with a section on legal and regulatory requirements, covering the legality of EDI and electronic commerce and the various agreements which deal with international trade. A second major section considers the skills and technology infrastructure necessary to participate in IT assisted best practice trade facilitation projects.

Local business issues are considered next, including government and local business practices, culture and external influences. A discussion of investment costs and benefits at national, industry, and end user levels is followed by a section on technological and service alternatives for smaller, less technologically advanced organizations.

Four Annexes contain a series of national case studies; implementation considerations and time frames in order to illustrate a typical project plan; a typical technical proposal covering vendor and end user requirements; and sample terms of reference for a project review, based on an actual World Bank project-in-progress. A fifth Annex discusses in some detail the need for and the design and application of EDI standards as used in trade facilitation applications.

The volume concludes with a glossary of terms and abbreviations used within both reports and in the implementation of best practice, IT-based facilitation applications.
ACKNOWLEDGMENTS

Many organizations have been generous in donating their time and sharing their experiences with the authors of this report. In an introductory volume of the report, Information Technology and National Trade Facilitation: Making the Most of Global Trade, there is a list of all cooperating agencies, organizations, and individuals who contributed information and experiences. They include many international agencies, international industry bodies, government departments, technical and trade associations, vendors, and a wide variety of systems users from banks, corporations and governments. In addition, we received the help of many hardware and software vendors, network services vendors, telecommunications companies and authorities, and private individuals. Valuable contributions have been made by professional staff from within the Bank, particularly Hans Peters and Françoise Clottes. We would like to thank Shampa Banerjee for a fine job of editing.

It is impossible to research global experiences without the help of the pioneers. We gratefully acknowledge this help.
ABBREVIATIONS AND ACRONYMS

ACS  Automated Commercial System
APEC  Asia Pacific Economic Cooperation
ASYCUDA  Automated System for Customs Data
BT  British Telecom
CAS  Community Access Service, Hong Kong
CIM  Computer-Integrated Manufacturing
CNAB  National Council for Banking Automation, Brazil
EAN  European Article Numbering
EANCOM  European Article Numbering Communication
ECE  Economic Commission for Europe
EDI  Electronic Data Interchange
EDIFACT  EDI for Administration Commerce and Transport
EFT  Electronic Funds Transfer
EFTA  European Free Trade Area
EFTPOS  Electronic Funds Transfer at Point of Sale
ERS  Evaluated Receipt Settlement
EU  European Union
FACET  Future Automated Commercial Environment Team
FDP  Finance and Private Sector Development
GATT  General Agreement on Tariffs and Trade
GDP  Gross Domestic Product
IBM  International Business Machines
ICC  International Chamber of Commerce
ID  Identity
III  Institute of Information Industry, Taiwan (China)
ISO  International Standards Organization
IT  Information Technology
JIT  Just in Time (inventory control)
LOCODE  United Nations Location Code
MBK  Hungarian Bank for Foreign Trade
MOF  Ministry of Finance, Taiwan (China)
MSTQ  Metrology, Standards, Testing, and Quality
MTCW  Ministry of Transport, Communication, and Water Management, Hungary
NAFTA  North American Free Trade Agreement
NCB  National Computer Board, Singapore
OECD  Organization for Economic Cooperation and Development
OFTP  Open File Transfer Protocol
PAXLST  (UN-EDIFACT) Passenger List
PSA  Port of Singapore Authority
QR  Quick Response
RFID  Radio Frequency Identity
SITPRO  The Simpler Trade Procedures Board
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>SME</td>
<td>Small and Medium Enterprise</td>
</tr>
<tr>
<td>SNS</td>
<td>Singapore Network Services</td>
</tr>
<tr>
<td>SPEDI</td>
<td>Shared Project for EDI, Hong Kong</td>
</tr>
<tr>
<td>TDB</td>
<td>Trade Development Board, Singapore</td>
</tr>
<tr>
<td>TP</td>
<td>(UNCTAD) Trade Point</td>
</tr>
<tr>
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<td>United Nations</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on International Trade and Development</td>
</tr>
<tr>
<td>UN-EDIFACT</td>
<td>United Nations EDI for Administration Commerce and Transport</td>
</tr>
<tr>
<td>U.S.</td>
<td>United States</td>
</tr>
<tr>
<td>U.K.</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>VAB</td>
<td>Value Added Banking</td>
</tr>
<tr>
<td>VAN</td>
<td>Value Added Network</td>
</tr>
<tr>
<td>VANS</td>
<td>Value Added Network Service</td>
</tr>
<tr>
<td>WCO</td>
<td>World Customs Organization</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organization</td>
</tr>
<tr>
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</tr>
</tbody>
</table>
1
Legal and Regulatory Requirements

Over the last 20 years, an intensive debate has surrounded the legal issues in the substitution of electronics for paper. There are many good books and a plethora of papers on the subject. The development of national models for trading partner agreements, efforts of international agencies such as the United Nations Conference on Trade and Development (UNCTAD) and the World Trade Organization (WTO) in redefining international trade and maritime laws, and the emerging national trend toward redefining evidence acts and the rules of evidence under electronic commerce, make this a very dynamic topic. In addition, technological trends of cryptography, security and signature devices both help and confuse the issues further.

This section is intended as a basic introduction to some of these legal issues. Anyone requiring advice should seek guidance from a professional.

THE LEGALITY OF EDI

Any discussion concerning the legality of EDI raises the question of how EDI systems may accomplish the traditional legal purposes of paper communication. These are typically concerned with authentication and permanent storage of information; communication of trade terms and conditions; and compliance with laws that require certain legal information to be “written” and “signed.”

On closer examination other issues arise, such as:

• Should the law be amended for its application to EDI?

There is a third group of issues which also requires discussion: privacy, confidentiality, negligence and protection of intellectual property.

It is now generally acknowledged that legal considerations do not present any major impediments to EDI implementation, but organizations do need to recognize when it is prudent to seek advice. There are now well-tested models that would help to develop EDI guidelines and agreements practically and realistically.

Wherever statutes require documents to be written or signed to be legally effective, these were originally enacted to preclude oral communication, not to exclude electronic communication, which could hardly have been foreseen up to 20 years ago. The flexibility of commercial law will generally ensure that the writing and signing requirements will not be a major inhibitor for EDI.

Agreements such as trading partner agreements, designed to cover the transition from paper to electronic trading between organizations may be informal or formal. At both national and international levels there is a trend toward greater use of trading partner agreements, dealing specifically with commercial and technical issues.

Many national EDI associations now have appropriate national trading partner model contracts for use by their members.

AGREEMENTS

Many of the national models were based on the early efforts of the International Chamber of Commerce (ICC). As long ago as 1987, ICC developed a set of voluntary guidelines for international transactions: the Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission (UN-CID). The rules were useful as general
principles, but they have been substantially reworked for national models. They sought to define an acceptable level of professional behavior and to secure a common approach and identified some of the problem areas as risks in transmission; acknowledgments; return receipts; security; data logging; and storage.

The objectives for many model agreements and for much of supporting control system design include:

- system reliability and security;
- ensuring that network(s) have the necessary level of checks and controls;
- maintaining a detailed audit trail consisting of a mixture of acknowledgments, track-and-trace numbers, audit logs and network reports;
- systematically matching and reconciling audit trail information with messages;
- investigating inconsistencies and record reconciliations;
- keeping an original log of data sent and received;
- regularly auditing the system for weaknesses in reliability and control.

The UN-CID recommendations for formulating a trading partner agreement emphasized the following concerns:

- There is always a risk that something may go wrong. Who should carry that risk? Should each party carry its own or would it be possible to link risk to insurance or to a network operator?
- If damage is caused by a party failing to observe the rules, what should be the consequences? This is partly a question of limitation of liability. It also has a bearing on the situation of third parties.
- Should the rules on risk and liability be covered by rules on insurance?
- Should there be rules on timing, that is, the duration within which the receivers should process the data, and so on?
- Should there be rules on secrecy or other rules regarding the substance of the data exchanged?
- Should there be rules on a professional nature such as the rules applicable to the banking and securities industries?
- Should there be rules on encryption or other security measures?
- Should there be rules on signature?

Rules on applicable law and for dispute resolution have since been added by other authorities.

INTERNATIONAL LAW

At the national level, service providers and others are subject to normal legal liability principles but the international situation is complicated by the question of the choice of law.

Three connecting factors have been used by various legal systems to determine which law should obtain in an international tort: the law of the forum in which the case is brought; the lex loci delicti (the law of the place where the wrong occurred); and the so-called "proper law" or a variation on this concept (which is defined differently, for instance, in English and American law.)

In the current legal situation a claim for damages could be differently decided simply because of the different connecting factors in the forum selected. The court itself may decide which legal system should apply.

CONTRACTS

EDI is changing the way that businesses negotiate and agree contracts. Technology is also changing some of the potential for conflict. These changes raise issues of control, ownership and liability.

It is important to determine exactly when a contract or agreement has been made. Regulations may be applied in some jurisdictions which distinguish between instantaneous communications and delayed communications.

EDI technologies permit multiple, simultaneous transmissions and receipts. Any number of offers to tender may be made around the world and the offerer may demand responsive bids in diminishing time periods.

EDI standards bodies generally disclaim responsibility for deciding if or when the interchange of data forms a contract. In the United States the EDI Association's Programming Guide states: "The legality of EDI data as binding
contracts is left to the marketplace and negotiation between individual buyers and sellers, shippers and carriers, payers and payees."

The Bolero program currently under way in Europe is a rare example of technologists, lawyers and legislators working together to help adapt existing law to the new technologies of EDI. Bolero has been awarded a grant of ECU1.83 million (US$2.6 million) by the Economic Commission for Europe (ECE) to test electronic alternatives to maritime documents such as the bill of lading and the sea way bill.

Bolero is based on the United Nations EDI for Administration, Commerce and Transport (UN-EDIFACT) IFTM (Transport) messages and central registries for bills of lading and individual subscribers to the system. Many banks today only require confirmation that their counterpart has electronic access to the bill of lading; the sea way bill is now recommended for use in every case except where there may be a need for a document of title. Bolero is aiming to solve that particular problem.

EVIDENCE

Paper documents are traditionally accepted as undisputed evidence. Paper is long lasting and normally allows changes or additions to be clearly visible. Electronic messages, being intangible, are fundamentally different.

Paper and electronic networks are merely media that carry information. As such, it is possible to give electronic networks characteristics which may make them equal or superior to paper, not only as carriers of information, but also as evidence. However, a legal technicality—the best evidence rule—may also question the admissibility of an EDI record. The best evidence rule generally requires that the original of a writing is presented as evidence. At the same time, computer output is acceptable as court evidence when supported by technical witnesses. There are precedents to the admissibility of such evidence, for example, the Watergate and the Iran Contra trials.

To enhance the credibility of EDI records the following external techniques can be applied:

- Value Added Networks (VANs) can keep records of messages. For instance, the SWIFT system for international fund transfers keeps an inventory of data. Networks can archive audit trail or message content data for legal and auditing purposes, subject to user acceptance, disclosure procedures and privacy legislation.
- Each user can keep a data log of message content, electronic signatures and audit and control information (the UN-CID rules require use of a data log).
- An audit trail can be maintained as evidence of what happened to the data between receipt and final archiving.
- Cryptography can be used to inhibit data fabrication.

An important debate at the national level concerns evidence law. The role of documentary evidence in commercial disputes, in trade practices litigation, and in revenue proceedings (for example, income tax, sales tax and customs and excise matters) is currently crucial. Legislative changes are necessary in order to overcome this hurdle.

DATA DISCLOSURE

Considerations of data disclosure under the existing laws involve data content and contractual obligations for confidentiality. The data may lead to legal issues when they contain erroneous information, defamatory or slanderous content, confidential material or contractual liability disclaimers by providers.

Many EDI users impose contractual obligations to keep all private trade data confidential, although such confidentiality clauses rarely apply to data moving in all directions. At the same time, providers maintaining data records of EDI activity in different jurisdictions may be subject to different national laws regarding disclosure.

There may be other considerations, such as:

- international confidentiality principles;
- transborder data flows;
- technology transfer restrictions;
- allocation of loss;
• intellectual property.

LEGISLATION

Although there is nothing yet that can be described as a body of EDI law, legislation on EDI matters may fall within these categories:

• The need to facilitate the admission of electronic communications as evidence in court.
• The need to formulate rules about how people can communicate electronically with governments, including requirements to maintain electronic records, an area increasingly important to revenue authorities such as taxation and customs authorities.
• The need to prohibit unauthorized access to computers and unlawful interference with electronic data.
• The need to protect the public from damage which may arise from electronic communications such as in the areas of privacy, consumer protection and information confidentiality.
• The need to protect intellectual property such as computer software and design.
• The need to meet international obligations, such as the OECD privacy rules which cover transborder data flows.

CONCLUSION

If correctly planned and implemented, EDI can answer all fundamental legal objections which may be raised. However, it is indisputable that much of the law needs revision to be consistent with EDI, even if in most cases EDI can be safely used before the laws are changed.
This chapter categorizes the skills and technology infrastructure required in establishing EDI for trade facilitation. As it may be even more useful to know why certain skills are needed and how they will be employed, this section has been organized in three parts: the introductory skills and technology resource catalogue; a description of best practices in EDI and trade facilitation applications; and a discussion of factors which could inhibit implementation.

TECHNOLOGY AND SKILLS INVENTORY

A major trade facilitation EDI project can be carried out at the strictly technical level by a small team of people; perhaps as few as two or as many as five specialists. They will need to be supported by end user staff and a range of other professionals, but in purely technological terms a small team is adequate.

The team should have skills and experience in EDI and trade facilitation implementations, knowledge of the theory and practical application of EDI standards, especially UN-EDIFACT trade and transport messages and of a range of application software. The team would also need experience in interfacing or integrating EDI with application systems. Professional skills required are project management, education and teaching experience (at least as practitioner, if not end user), and management and senior client liaison skills and experience.

In order to do their job properly, members of this team would need access to adequate and appropriate computer processing facilities, complete with EDI host software and network connection capabilities (see Annex 2, 3 and 5 of this report).

The host EDI server may already be available from a local VAN or through the local operations of an international VAN. Or it may be necessary to install a purpose built system. Naturally, if this were the case, further skills and specialist personnel would be necessary.

The most important technological infrastructure requirement, apart from the EDI host, is a modern telecommunications network. Most end user connections will be adequately served by dial up connections; probably less than 5 percent of connections will require leased lines. Connections will need to be made fairly quickly and technical expertise be readily available if the implementation is not to suffer from externally induced delays. At the national level the telecommunications authority will need to offer a wide range of international connections and circuits to all of the commercial world’s trade hubs.

Thereafter implementation depends upon external factors: local application systems, knowledge of local systems, willing and competent pilot trading partners and an appropriate business and administrative climate to encourage participation.

KEY TECHNOLOGY AND SUPPORT ELEMENTS

For EDI and trade facilitation to work to the required levels of effectiveness there is a set of technological preconditions:

- an adequate telecommunications network;
- wide acceptance and use of IT in the public and private sectors;
- a pool of IT people with the right skill sets, trained to appropriate levels;
- hardware, software and communications vendor infrastructure;
- educators and trainers;
- access to practical skills and experience in business processing reengineering.
technology, and EDI;

- willing and able end users in both the public and private sectors at national, industry and enterprise levels;
- supportive external agencies, such as EDI associations, article numbering associations (UCC-EAN), trade facilitation bodies, Chambers of Commerce, standards bodies, and industry bodies;
- supporting international agencies, such as EDI associations, UN-EDIFACT, UNCTAD, International Chambers of Commerce, World Customs Organization, World Trade Centers, trade facilitation bodies, international aid and lending agencies, and major national and international VANs offering EDI and electronic commerce services;
- banks and financial institutions offering electronic funds clearance facilities with financial EDI capabilities and corporate electronic banking services.

BEST PRACTICE

The term “best practice” is subject to considerable abuse, but in the context of EDI-based trade facilitation it may be considered to be the implementation of the goals of trade facilitation. Such implementation involves simplifying processes, removing excessive and obsolete controls, shortening and easing lines of communication, and using coding systems and EDI for rapid, accurate transfer of data between computers. This implies alignment with trading partners’ systems and adoption of world standards for best practice.

Any plan to implement best practice conditions presupposes a knowledge of EDI, trade facilitation goals, the appropriate technological infrastructures, willing participants, and a nationally agreed program. Key steps in the implementation of the process follow.

Feasibility study. Documentation of information flows and identification of key players for the early stages of implementation.

Project plan. This includes broad awareness, concept marketing, and an education program.

Documentation of existing systems. Documenting the systems as they are currently being used, not as they were originally designed. The two conditions are often significantly different.

Review knowledge of what is possible. This involves an awareness of, and education in, all of the technologies previously discussed. It also involves knowledge of case studies, understanding of trading partners’ business processes, and awareness of what is required for an international alignment of systems, both in technology and business practice.

Reengineering. Having documented existing systems, and evaluated how they work, it is now possible to redesign and reengineer current systems, based on a knowledge of what is possible.

Standard messages. Having reengineered the information flow, it is now necessary to examine the newly-defined data to be transferred between computers. This data then needs to be compared with existing approved standard messages.

Message design. Message design and approval can be a time consuming process, and should be avoided if possible. If new messages are deemed necessary and the design process therefore unavoidable, they must be based on guidelines discussed in detail in the EDIFACT message syntax and design guidelines.

Pilot operations. An initial EDI group of trading partners is then set up and extended to a small number of competent trading partners. This involves installing translation software, integrating that software with existing application software, connecting to a VAN’s EDI service, and then exchanging test messages. As the pilot develops, it is possible for partners to begin to trade electronically and to gradually remove the paper systems it was designed to supplant.

Ramp up. This is the term given to extending the new electronic methods to the widest range of participants. The techniques used to enlarge the user community and to encourage participation may vary from mandating compliance at one extreme to a range of financial and business inducements at the other. Only full participation will yield the desired results.

Progress review. The management and the project review of each pilot and major initiative will involve public and private
sector organizations, as well as many of
the major trading partners. The purpose of
reviews, apart from commercial and
operational necessity, is to confirm that the
original design parameters are being met,
and to improve them where possible.

Legislation. To the extent that legislation
needs to be changed, attention should be
paid to the Customs Act, the Evidence Act,
and any other legislation that concerns the
validity of electronic commerce, taxation,
and banking regulations.

When presented in this fashion the task
may seem overwhelming, but a properly
constructed plan will create a staged
approach, phased and balanced for local
conditions, with as much expert help as
necessary. The plan should take into
account non-automated small- and me-
dium-sized enterprises through a local
variation of no tech-low tech EDI initia-
tives. Enterprises and industries from
nations of all sizes have already embarked
on such a plan. The fundamental prerequi-
site is determination.

BARRIERS TO USE AND
PARTICIPATION

On one hand, EDI has been seen as a tool
for the larger enterprise, the wealthy
industry, or for government departments.
The well-funded, well-resourced, technolo-
gically literate organizations are always
among the pioneers, and tend to dominate
the standards-setting process. These are
the people who can afford the right soft-
ware and the right VAN service.

On the other hand, the unautomated
and hence technologically disenfranchized
small companies fall even further behind
the wealthy organizations as the adoption
of technology widens the gap between the
smallest and the larger organizations.

Funding, however, is not the only
barrier to the use of EDI. Even in wealthy
countries there can be equally effective
barriers, such as competing infrastruc-
tures, lack of leadership, and inappropriate
message standards.

This section briefly looks at the most
common limiting factors, to sound a note
of caution about the methods that may be
adopted and implemented at the national
level.

Funding. Clearly the most common
reason why EDI is imperfectly imple-
mented or adopted at all is lack of ade-
quate funding. This manifests itself at the
national and the enterprise level alike. At
the national level an inadequate telecommu-
nications infrastructure, lack of a
sufficient base of IT equipment, or the
absence of a body of skilled and experi-
enced people, would clearly make it
difficult to achieve a critical mass of users.

There are some appropriate aids, such
as no tech-low tech initiatives, but an
effective telecommunications infrastruc-
ture and an EDI VAN are the minimum
prerequisites for EDI, for which govern-
ment funding should be available.

At the enterprise level there are a range
of aids and inducements. “EDI In” and
“EDI Out” service bureaus, fax input-
output services, voice input-output ser-
dices, and inducements from govern-
ment and industry bodies can help. Loans for
equipment and training to be repaid from
savings, the rental of hardware and soft-
ware by VANS, fixed monthly billing and a
range of shared operation options, all work
under the right circumstances.

Finally, banks and financial institu-
tions may choose not to cooperate in clearing
house functions for electronic funds
transfer, trade payments, and electronic
trade documentation. Whether this is the
result of cynicism, of perceived technologi-
cal superiority, or the desire for market
advantage over domestic competition, it
happens all too frequently, to the detri-
ment of national interests. The banks and
financial institutions must become part of
the best practice movement; they must be
persuaded to adopt EDI and financial EDI
from the outset.

Vision and leadership. An EDI initiative is
rarely successful when driven from the
bottom up. Success requires a strategic
plan and a shared vision of the outcome
and benefits. Without this form of leader-
ship from the highest levels or from a
strong, unified commercial interest, the
result is a fragmented effort with conse-
quently wasteful use of scarce resources.
This breeds only partial commitment and
gradual disinterest. It may be necessary to
mandate certain national processes in
order to achieve the necessary critical mass

Skills and Technology Infrastructure 7
vital to the overall success of the initiative.

Knowledge. Until a sufficient number of people concerned with trade facilitation issues know what is possible, it is very difficult to make progress. Unless a campaign of awareness and education is undertaken at the right level and for the right duration, the pioneering implementers and users will have an uphill task. An awareness and education program is possibly the most important key to success, and conversely, the lack of such a program is the most likely to cause failure, delay, or compromises.

Too much competition. Lack of leadership or unfocused initiatives can breed unnecessary competition among vendors, each seeking competitive advantage over the other. An absence of leadership can also encourage an environment of noncooperation among vendors, nonstandard approaches and, consequently, higher costs and noncompliant systems. The choice and adoption of industry, national, and international standards, and their application in a uniform fashion, so as to be aligned with overseas trading partners, are particularly important. An uncoordinated vendor infrastructure leads to confusion and lack of cohesion.
Local Business Considerations

Even if all of the technological preconditions for success are present in a business community, there are always other factors which have to be considered in overall project planning. A good telecommunications and computer infrastructure, complete with adequate skills and knowledge base cannot, on its own, guarantee success. It needs the willing support and active cooperation of the public sector, most particularly of major government sponsors in the early stages of the project. It also requires a similar attitude from the local business community and any multinationals who may be present. If we add to these needs those of adapting the traditional local way of doing business and the practices that have evolved over the centuries to the newly evolving methods of international trade then we can assess the initial chances for success.

As a benchmark, take the case of several Asian countries who have built on a less than optimum technology base in order to implement a national plan. Their achievements have come through governments who have been able to marshal support from all sectors of the local business communities in committing themselves to international best practice for the national good. This concept of the national good has helped them to overcome sectoral opposition to the alignment of local practices with international systems.

On the other hand, take the example of several advanced western style economies who, for all of their investment in technology, have failed to set a national agenda through a national shared vision, have left the leadership to the private sector, and as a consequence have secured unsatisfactory national returns on investment and effort. This has happened because of the resulting fragmented efforts, duplicated resources and redundant competition.

Major nontechnical factors to be taken into account, therefore, are government and local business practices, language, cultural and religious practices, and external influences such as multinationals.

GOVERNMENT AND LOCAL BUSINESS PRACTICES

In any area selected as a potential location for a technology-based initiative, the local government ideally needs clearly articulated national business objectives, and capable and honest public servants to delegate their implementation to. To be carried out successfully, these objectives must be free of political and ideological biases, and be seen to be fair to everyone.

Traditional Confucian practices, post colonial nepotism and influence from traditional power sources may not be helpful. Many of the case studies for this project yielded instances of these types of environments stifling the necessary spirit of enterprise for technology-based initiatives.

So the judgment is whether the government is actually able to distance local practices and pockets of perceived self-interest from a project whose dimensions are defined and measured by technological competence, and success in the international arena.

It must be remembered that the project will require a great deal of help from organizations who have already had long years of experience with the government concerned. The cynicism that this type of relationship often engenders is hard to shake off, as some Latin American countries demonstrate.

It is also possible that, in some countries, the government may have to be the conduit for funding, but may not be the right organization for the management role, nor for the leadership tasks so vital to the success of the project.
CULTURE AND RELIGION

These are factors with a diminishing impact on trade issues but cannot be ignored with impunity. Business practices are often very closely related to cultural issues.

Japanese and Korean business practices date back hundreds, perhaps thousands of years. They were designed to protect local industries and craftsmen, to lock out competition, and monopolize suppliers. In an electronic world, these concepts are diametrically opposed to the concept of open standards and cooperation between competitors on technological and standards issues for the larger good of the global industry.

Other cultures tend to emphasize the small family unit business to the detriment of national organizations. There are some of these tendencies at work in Hong Kong and China, for example. Family, clan, tribal and cultural allegiances often transcend open business relationships in developing economies, thereby making open business networks more difficult to establish than they need be.

EDI standards and documentation have so far been developed in the official UN languages. In order to participate in the EDIFACT movement, countries either have to have a nationwide fluency in a European language or they have to convert the standards and documentation to local languages. In some instances, especially in ideographic languages, they first have to agree to a common language for standard codes for information interchange (like the American Standard Code for Information Interchange, or ASCII). Korea, China and Taiwan have all completed this work.

English is not the primary spoken language in most countries, but it is the primary written language for international trade. This often creates problems. Even when an organization has someone with sufficient fluency in English to fill in official forms, that person usually has other work to do, or may not be able to fill in the forms accurately. EDI and simplified automated trade facilitation can help a great deal, but it still requires genuine knowledge of the appropriate language.

Variations in government style, in local business culture, in religious impacts on work practices, religious holidays and the local working week, language and the availability of romance language speakers, all have an effect on the successful implementation of a major trade facilitation initiative based on technology.

EXTERNAL INFLUENCES

Post-colonial governments tend to have very strong or antithetic relationships with the governments of ex-colonizers. Such relationships can sometimes distort objective judgments, quite often on technological issues. It would be dangerous to assume that a previous colonial administration would be in a better position than others to understand local conditions, and that its solutions to specific problems would therefore be more appropriate than solutions from elsewhere. There are some classic examples of EDI systems being exported to countries least suited for them merely because such an assumption was made in the planning stages.

The influence of multinationals would normally appear to transcend many of these local variations and special circumstances, operating as they are in international conditions. But in practice, the successful multinational has absorbed many of these local factors, while appearing to be impervious to them from an outsider’s perspective. The experiences of multinationals, and the lessons they have learned are extremely important to this type of technological initiative. They have had to find their way around most of the problems facing a trade facilitation initiative and are generally the keenest to see it succeed.
Investment Costs and Benefits

The simplifying and speeding up of trade information flows offer significant national benefits. At one level they ensure that efficient approvals and information flow can be processed with a smaller number of steps, fewer people, and in less time—offering savings to government departments and commercial users alike. But the downstream results of these efficiencies are even more important.

For example, the use of accelerated, simplified systems and EDI to preclear imports and exports means that goods can be loaded and unloaded in the most efficient manner, problems can be anticipated and solved before they become problems, facilities can be properly scheduled and maximum use made of the road, rail, ports and harbor infrastructure and installations.

To take a simple example: if a ship can be processed in half a day or less rather than the day or more it may currently take, then the infrastructure capacity is effectively doubled: twice the cargo, twice the number of ships, twice the number of containers. The result is increased harbor duties, increased excise, increased revenue from income tax, and the company profits without increased investment in infrastructure.

Singapore claims that properly applied trade facilitation is already saving the country in excess of 1 percent of its gross domestic product (GDP) each year. Returns on the investment in the national trade facilitation initiative, Singapore Network Services (SNS), came during year two of operation. Taiwan (China) and Korea have similar stories to tell.

Hence the big picture shows more efficient trade, higher government revenue and the ability to defer government investment in major infrastructure projects by optimizing use of existing installations.

The benefits of these efficiencies translate to wider attractions for the trading partners. Efficiency improvements in vessel turnaround have attracted new entrepôt and distribution business to Singapore. Advanced electronic commerce and EDI facilities enabled Australia to increase their lead in tourism revenue growth. The ability to electronically communicate with their northern hemisphere trading partners has resulted in a four week extension of their supply season each year for a New Zealand produce industry.

At the enterprise level, the adoption of quick response (QR) and just in time (JIT) strategies, particularly those supported by EDI, are enabling textile and apparel manufacturers all across Asia and Latin America to dynamically satisfy variable customer demand and thereby gain significantly larger proportions of their business. Auto manufacturing operations all over the world are reporting savings of US$200 per assembled vehicle through JIT and EDI practices. Major multinational retailers are obtaining a greater variety of fresh produce from all corners of the globe while simultaneously achieving dramatic savings through the use of QR strategies. In some cases supermarkets have increased profits threefold over the last ten years, while their inventory float has been reduced from three to four months of supply to less than one week.

Best practice trade facilitation and EDI based industry initiatives have not only produced economic advantages, they have turned into a marketing tool for their advanced users. New business is being attracted to EDI-compliant enterprises at the expense of those which are not.

So the ultimate question might be not “What does EDI do for me,” but “What will the lack of EDI do to me?”

COSTS AND BENEFITS

There is no magic formula which can
guarantee a safe return on investment in EDI and best practice. The most successful case histories are from countries which were able to conceptualize solutions to their fundamental trade processing problems and then committed themselves to the approach, with the conviction that substantial benefits would follow. Much of the investment made for implementing best practice and EDI is indirect in nature, but must nevertheless be taken into account: for example, the commitment of the time of key people to the project. They represent real costs, but they may possibly be absorbed within normal budgets.

Investments also depend upon the scope and the size of any project. To totally reengineer a nation’s trade process from a base of clerical and bureaucratic systems, involves commitments of a significantly higher order than an individual enterprise adopting best practice in an environment where there is a good technology infrastructure and EDI is a common practice.

Two extremes illustrate the differences in more detail: the macro view (a national perspective) and the micro view (an enterprise-level perspective). Take the example of a nation or territory where there is no existing national program and few, if any, EDI users. Assume also that the country is operating the traditional paper and lengthy approval customs export-import system. Further, there is no natural candidate for a national organization charged with providing the technology, commercial leadership and project management. There are several categories of cost needed to build the infrastructure and awareness from the ground up, assuming that there is an adequate basic IT infrastructure (telecommunications, computer usage and skills pool).

The first is discovery, which includes executive time and travel, and external advice, such as some external agency involvement in the debate on objectives and options, potential scale and sources of funding.

Next is awareness, or the creation of a national promotional campaign, education courses and conferences and the use of the media, spread over a long period.

Direct costs will include the costs of the campaign, media costs, conference costs, cost of educational materials and external advice and assistance. Private industry and far-sighted vendors may be willing to contribute funds for this early part of the project and make it possible to initiate an ambitious program.

It should be noted that to be truly effective the awareness campaign needs to be focused first on national advantage and then on individual key industry benefits, finally concentrating on the individual and small to medium enterprises. The activities should embrace all government departments, all commercial enterprises and all quasi governmental authorities and organizations. Ultimately the campaign should become institutionalized through the education sector.

The evolution from the launch of the program to its adoption by the education system may take about five years. The public sector will almost certainly have to bear the brunt of these establishment costs if the job is to be done properly, especially in the market start-up and consolidation phases. A nascent technology vendor-VAN industry would be unable to fund such an extensive program in advance of revenue although it should be able to make an increasing contribution as the market expands. This phase of the project is vital for a successful national implementation therefore sources of funding must be established at the outset.

The third cost category is the technology provider. It may be necessary, at one extreme, to establish a new organization and to install new equipment and software in order to provide the necessary technological facilities and level of service required for a national approach. To prepare for this possibility, and in order to make realistic commercial decisions, this exercise will involve feasibility studies, cost benefit assessments and business planning activities. Thereafter the organization will require investment and support until the enterprise breaks even, or achieves a level of business performance at which it may attract private sector funding or may even be completely privatized.

There are two categories of investment, with many options depending on local conditions. The first involves the planning and feasibility activities. Much of this
work may need to be carried out by external consulting bodies or experienced international agencies. They need to be supported by local executives and government officers, for credibility, for technology transfer and for continuation of commitment.

Plans need to take into account all direct costs of technology, staff and other resources. Service pricing can be a contentious issue. It may be tactically necessary to offer inducements and attractive pricing plans for early users; but once the service is established it is important to levy fair and reasonable pricing tariffs. In any case, the attention of competing vendors and overseas trading partners will ensure that hidden subsidies cannot be provided for long.

The second cost category—cost of the technology service, or the local VAN, if it is to be provided locally—may be defrayed in a number of ways. It may be possible to subcontract the entire task to a third party and avoid direct investment in technology in exchange for contractual exclusivity for a number of years. It may also be possible to minimize investment by entering into a joint venture with a new or existing venture for the right contractual arrangements. Or it may be tactically necessary to invest in a brand new organization and technology.

The major costs are people costs, much of them invested by end users and government departments off-budget. But they are real costs nevertheless.

Finally, there are the costs of implementation. Increasingly, as the project matures and the local VAN grows in experience, the technical people, and the technology, are provided by the local authorized organization—the local VAN. VAN revenue comes from software sales, education and training, consultancy, and network traffic, perhaps from supporting electronic commerce services as well as EDI.

Network traffic increases with volumes of transactions and the variety of applications. But since the tariff for these services must be both attractive and competitive, and since it is based on the most efficient contemporary computing and telecommunication technologies it requires a sizable number of users and level of activity to generate a break even income. Virtually every case study illustrates a cash flow break even of between 48 and 72 months (four to six years) on this type of operation. So the challenge is to bring forward that break even point or to support activities until returns can be made.

This final point is crucial, and explains why commercial vendors are not breaking down doors to fund the start-up operations of electronic commerce initiatives in developing countries. The funding of the infrastructure and market development costs are outside the normal span of commercial viability for existing technology suppliers. Their business is to provide access to the specific technologies necessary for electronic commerce but as the case studies illustrate, technology alone is a relatively small cost component when compared to overall costs.

The range of case studies also illustrates that there are no simple rules to determine costs, benefits and break-even points. But there is an enormous amount of evidence concerning the number, sequence and scale of activities. Local business practice, policies and business accounting methods need to be applied to individual cases. What follows is a guide, a set of tools for decision making, for measuring progress, and to help set financial criteria for judging success.

COST AND REVENUE CATEGORIES

There are four main cost categories:

- Research and business planning. These activities may be expensed or budgeted.
• Investment in IT equipment, software, personnel and telecommunications services necessary for a national EDI service. There is a fixed minimum entry level price plus a variable cost, dependent upon activity and usage.

• Implementation activities, composed of the minimum activity necessary for establishing EDI technology, messages and reengineering infrastructure, and a variable component set by activity and take-up volumes.

• A variety of indirect and associated activities such as management, working party and committee work, legal, audit and security tasks and direction on ownership and funding activities associated with the national initiative.

The revenue may come from two sources:

• end user payments for EDI products and services;
• privatization, and equity participation in the national technology initiative, or from charges for contracted access to government information.

The scale is dependent upon levels of activity and the overall potential of the initiative. Three different models are given below for general guidance.

THREE TYPICAL MODELS

The three different take-up models proposed in this section illustrate variations in scale, activity, and cash flows. The first, Model A, is based on a relatively small scale initiative in an Indian Ocean, Caribbean or Pacific island community. It assumes about 20,000 enterprises in total, of which 5 to 10 percent are involved in the transport and distribution aspects of the import-export trade. The remaining enterprises are concerned with the normal activities of primary industries, retail and wholesale, transport and distribution, service, and government sectors. The first five to seven years of the business plan would be aimed at capturing all participants in international trade and the most important domestic enterprises.

All models use global average prices for EDI software packages (US$500 to US$3,000 per copy); assumes consultancy and implementation charges of up to US$2,500 for a small user; and network, communications and service costs in the range of US$50 to US$250 per month. The variables are implementation and integration complexity, application types, types and numbers of messages and transaction volumes. These figures do not separately identify the more expensive IT implementations for a major reengineered process, nor do they identify any no tech-low tech EDI charges for nonautomated users. For the sake of simplicity, these have been bundled in with overall user’s costs and revenue figures.

Models B and C vary only in the size of the economic communities that they serve, that is, their potential user base. To some extent, the size of the economy influences the speed and rate of take-up, if only because of the scale of the end user’s own resources.

Model B assumes 100,000 enterprises, Model C 250,000 enterprises. The three models encompass population of up to 25 million people.

It must be remembered that the costs quoted are those directly attributable to a modest yet highly focused reengineering effort of EDI-based trade facilitation. Extra product development, extra services, a more ambitious roll out program and failure to meet what are proven to be achievable user number targets, can easily result in multiples of the costs illustrated.

The models assume 10 areas of business costs covering the first five years of a national EDI initiative: discovery, awareness, feasibility, strategic business planning, technology acquisition and implementation, project planning, technical implementation, operations, review. Thereafter the business should be concentrating on consolidation and the application of market-driven pricing to recover initial investments, if they have not already been recovered by this time. The list does not include end user technology, which is taken to be outside the national initiative business planning. A contingency plan can assume that one user in three will buy new equipment, at an estimated 1995 price of US$3,000 for hardware.
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Model B End User Revenues

<table>
<thead>
<tr>
<th>Number of Users</th>
<th>25</th>
<th>200</th>
<th>500</th>
<th>1000</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue (US$ 000)</td>
<td>250</td>
<td>1000</td>
<td>2000</td>
<td>3500</td>
<td>7000</td>
</tr>
<tr>
<td>Cumulative</td>
<td>250</td>
<td>1250</td>
<td>3250</td>
<td>6750</td>
<td>13750</td>
</tr>
</tbody>
</table>

Model C Costs

<table>
<thead>
<tr>
<th>Type</th>
<th>Costs (US$000 per year)</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Discovery</td>
<td>500</td>
<td>250</td>
</tr>
<tr>
<td>Awareness</td>
<td>250</td>
<td>1000</td>
</tr>
<tr>
<td>Feasibility</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Strategic business planning</td>
<td>100</td>
<td>250</td>
</tr>
<tr>
<td>Technology acquisition and implementation</td>
<td>2500</td>
<td>1000</td>
</tr>
<tr>
<td>Project planning</td>
<td>100</td>
<td>250</td>
</tr>
<tr>
<td>Implementation planning</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Technical implementation</td>
<td>500</td>
<td>750</td>
</tr>
<tr>
<td>Operations</td>
<td>250</td>
<td>750</td>
</tr>
<tr>
<td>Review</td>
<td>100</td>
<td>250</td>
</tr>
<tr>
<td>TOTALS</td>
<td>5050</td>
<td>5250</td>
</tr>
<tr>
<td>Cumulative</td>
<td>5050</td>
<td>10300</td>
</tr>
</tbody>
</table>

Model C End User Revenues

<table>
<thead>
<tr>
<th>Number of Users</th>
<th>50</th>
<th>350</th>
<th>1000</th>
<th>2000</th>
<th>5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue (US$ 000)</td>
<td>500</td>
<td>2000</td>
<td>4000</td>
<td>8000</td>
<td>20000</td>
</tr>
<tr>
<td>Cumulative</td>
<td>500</td>
<td>2500</td>
<td>6500</td>
<td>14500</td>
<td>34500</td>
</tr>
</tbody>
</table>

All models illustrate a break-even point after a period of 48 to 54 months of operations, which is consistent with virtually every nonsubsidized initiative. The critical dependencies are obviously take-up rates and end user revenues. Both are dependent upon service, hence on initial investment. All are dependent upon the awareness campaign working.

The ratio of technology costs to total costs is around 15 to 20 percent. The proportion of costs attributable to end user and private sector efforts, as opposed to direct investment by the public sector, are around 30 percent of the total.

FROM DIFFERENT PERSPECTIVES

From a wider perspective, electronic commerce is directly analogous to the telecommunications and broadcasting industries: the payback may be longer than for many other commercial enterprises but the revenue stream is also correspondingly longer, and ultimately more profitable.

Specific costs are a function of scale. Direct costs are a fairly small proportion of the total. It is unlikely that all technology and external advice costs exceed 10 percent of the overall total of a national trade facilitation EDI initiative. The balance of costs is concerned with people, from the technology provider and end user organizations, in both public and private sectors.
The national benefits need to be assessed in the same way as costs. They will involve direct benefits of efficiencies, of cost reductions, in better use of resources and in deferral of capital expenditure. Growth in trade needs to be considered, as does the value of the new skills and industries fostered by the new technologies and new techniques introduced to support the trade facilitation initiative. One percent of GDP, or even a fraction of that may be incentive enough to justify the investment.

At the micro level of the individual enterprise, the costs and potential benefits are much more tangible, and more immediate. Figure 1 represents the normal situation, in which companies use computers to create paper forms, then place them in envelopes and post them to their suppliers or customers. It provides the end-to-end example of buying and selling, or the purchase order to receipt and payment process, now often referred to as “the supply chain,” especially when it includes all of a company’s suppliers.

Even in this simplified presentation, there are 10 steps in the complete end-to-end process, each one open to errors and duplication. Data entry into computers for internal systems is done on several different occasions (It is a well recorded claim that 70 percent of computer output becomes someone else’s computer input). All this is inevitably time consuming. Figure 4.1 demonstrates how goods are delivered within a couple of days, while the complete information processing task and payment takes several weeks. One major supermarket admitted that, prior to EDI, its seven-day accounts were taking 27 days to process, with each supplier invoice costing them an average of US$30 to process.

In information systems time causes a phenomenon called “float.” It is an inbuilt allowance by the system for investment in time, resources and inventory necessary for the system to replenish stock. Float is often measured in “days of stock.” A key objective in any business system which has to control stock is to reduce float. At one time float could be measured in weeks or months. Now, when an EDI-facilitated business practice has been properly implemented, float can be measured in days, and in the future perhaps in hours.

Of course, EDI is not the only reason: bar coding systems, electronics funds transfer at point of sale (EFTPOS), and modern computer replenishment systems, all play their part. But EDI is the key facilitating technology; it is the reason why accurate information can be rapidly transferred between computer systems, which in turn provides precise information on float, thus making QR and JIT systems practical.

Figure 4.2 illustrates the impact of EDI
and financial EDI on the “order to receipt and payment cycle” described earlier in Figure 1. It shows that the computer-generated order goes straight into the suppliers’ computer in a matter of minutes or hours. That information is processed by their order entry system and goods supplied thereafter.

The same is true of payment. No paper is used by the EDI facilitated system and therefore no data entry, no mistakes and reworking, no paper storage and retrieval and no picking paper up and putting paper down, that is, processing, need take place. The time taken to process paper in the system is often called “the information float.” By reducing the information float it is possible to reduce inventory float and thereby make the whole process faster, simpler and cheaper.

SUMMARY

The costs of installing EDI by individual enterprises obviously vary with company size and project complexity. For example, the organization might have a mainframe computer handling high volumes of complex transactions. It might be necessary to totally reengineer a function and to dedicate a team to the task. In addition to staffing the project team they would need a translation software package which, for a mainframe computer could cost in the region of US$25,000. They would also have to connect to a VAN, rent an electronic mailbox, and initiate a program for education and training.

Staff time and expense to interface the translation software package, and then to reengineer systems would, of course, be internal to the individual company. Clearly the costs would be significant, but compatible with a normal mainframe project. Cases of this size and complexity, although representing a high proportion of transactions exchanged within a given community, are nevertheless the exception rather than the rule. Well over 90 percent of all EDI users around the world use a personal computer for the purpose.

The annual repetitive costs of using the network for EDI are directly proportional to volume in the vast majority of cases. But this is quite inexpensive when compared to any other alternative. At a typical tariff of US$0.30 per 1000 characters sent and received, this represents a fraction of today’s postage rates.

At the level of the smaller enterprise, staff involvement may be measured in hours, and one-off costs from a few hundred dollars to US$5,000. Repetitive costs are typically less than US$100 per month for an average small user.

The benefits may take some time to
accrue, in line with the number of trading partners who have adopted EDI practices. But in some cases, for example, as in the case of a customs broker making export declarations, the benefits begin to flow from the first day.

Generic benefits include direct cost savings, increased productivity, improved trading partner relationships, greater marketing opportunities and reduced inventory levels. Faster response times often lead to increased sales volume but in a greater number of smaller batches. EDI is the only reliable way to cope with this trend. New business opportunities, particularly from overseas trading partners, can develop simply because of EDI compliance.

CONCLUSION

There are around 100,000 users of EDI operating to national and international standards in 1995. The number of users increases at a rate of around 25 percent compound each year; and the volume of transactions and new applications at significantly higher rates. By no means all of these users have experienced the suggested benefits, but many have and more expect to do so.

The same is true for national initiatives. In one form or another, over 50 countries are now actively using EDI. Traders in virtually all these countries are using EDI for trade clearances and trade facilitation purposes. In addition there are many more times the number of users using EDI for industry and efficiency purposes.

The cost-benefit case depends largely upon local conditions and the local starting point. But the more advanced trading partners, at national and enterprise level, are beginning to demand EDI compliance as a condition of doing business or conducting trade in the future. Already some organizations will only accept new suppliers if they can demonstrate an EDI capability. There are cases of companies, particularly traditional, small, older firms, who have gone out of business because of inability, or unwillingness to comply or disbelief in the need to comply. This has been particularly true of some middlemen occupations.

Ultimately there is an even harder fact to consider. There is no longer any choice about compliance; the market has made the decision for everyone. The remaining choices involve timing, to a diminishing extent, and the level of participation. It may be possible to adopt a cosmetic approach, or minimum level compliance. But that represents considerable pain for a limited, and transient, gain. Market conditions will, in time, demand maximum participation and the adoption of best practice for survival. At the moment there are still opportunities for competitive advantage.
EDI is often seen solely as a tool for large firms and government. They improve their efficiency while their smaller trading partners are forced to absorb the costs of installing EDI. Of course the issue is much more complex than that, but the fact is that EDI can be costly for small enterprises.

This section looks at the real costs involved in installing EDI and at how these costs may be reduced so that even the smallest of trading partners can justify EDI. To the technical purist, the techniques involved in this low-cost EDI approach may not fit the definition of electronic data interchange. But they can meet the same objectives, and at less cost.

**EDI’S BRICK WALL**

Of the estimated 100,000 EDI users in the world by end 1995, about 50 percent will be in North America, and the majority of the remainder in northern Europe, with sizable minorities in Japan, Singapore, Australia, and New Zealand. Also, there are indications that within three years the most rapid growth will be in the Asia-Pacific region.

EDI users go through a number of phases, but none of those phases have so far included exponential growth in numbers of connections to trading partners. Even today the average EDI user is part of a community of less than 10 users. After all these years of experience, why is it so? What are the real inhibitors and barriers to the rapid growth and success of EDI?

Obvious inhibitors include the lack of adequate infrastructure, unsuitable software or standards, cultural and language impediments, monopolized telecommunications regimes, lack of skilled personnel, and so on. But all these are rapidly being overcome. Even in the advanced western countries where these inhibitors no longer exist, the growth of EDI is still relatively slow when compared to many early predictions. The reasons for this are rarely those we hear at seminars, such as legal, audit, security and network interconnection issues. These may be reasons to defer serious consideration of EDI in the first place, but they are not reasons to stall growth of existing users.

The real reason is the effort involved in installing EDI and integrating EDI into business systems. This is the brick wall facing all EDI implementers.

To take a practical example: Woolworths Supermarkets in Australia has over 10,000 trading partners, the majority within Australia. About 80 percent of those trading partners supply goods which are eventually sold within the supermarkets, the remainder being goods and services for internal consumption (among them building maintenance, electricity, cleaning).

It will take Woolworths three to five years to achieve full EDI capability. The company has to change internal disciplines and processes. For example, it will no longer be dealing with vendors’ invoices but rather with a new message, the SNM or Ship Note Manifest. It has to redesign information flows, rebalance staff levels against redesigned work practices, and redesign computer systems and databases to handle EDI input and output.

Woolworths’ major trading partners, relatively few in number, are often multinationals with large MIS departments. They will go through the same processes as Woolworths, but to a different time scale and often for different motives. Hence their priorities are often out of synch with Woolworths’. A larger number of Woolworths’ trading partners are mid-sized companies, which use much less sophisticated forms of automation, from minicomputers and PCs to service bureaus. Once again they have their own priorities, which do not
always match Woolworths’. Because they are not Woolworths’ most important partners, Woolworths is not yet placing pressure on them to implement EDI, so this category of trading partner has a little breathing space.

By far the largest category of Woolworths’ trading partners are small to very small firms, many of them one-or two-person businesses, often without as much as a PC or any other form of automation except for a phone and a fax machine. Woolworths is placing no pressure on these trading partners yet, but every trading partner knows that ultimately it must do EDI with Woolworths if it wishes to protect its business with the supermarket chain.

**Table 5.1: Estimated Business Message Volumes (1992)**

<table>
<thead>
<tr>
<th>Countries</th>
<th>Letters/Head in millions</th>
<th>Population in millions</th>
<th>Total Letters in billions</th>
<th>Business Mail in millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>211.70</td>
<td>17.00</td>
<td>3.60</td>
<td>720.00</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>715.20</td>
<td>250.00</td>
<td>179.00</td>
<td>35,800.00</td>
</tr>
<tr>
<td>U.K.</td>
<td>260.40</td>
<td>58.00</td>
<td>15.10</td>
<td>3,020.00</td>
</tr>
<tr>
<td>Singapore</td>
<td>119.60</td>
<td>3.00</td>
<td>0.36</td>
<td>72.00</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>95.80</td>
<td>6.00</td>
<td>0.51</td>
<td>102.00</td>
</tr>
</tbody>
</table>

Of course, this is not just true of Woolworths; it is the same for all major companies or hubs in EDI jargon. Australia has around 500 hubs; their trading partners (and their partners) total about 800,000 to 1,000,000.

Many of these EDI hubs now realize their predicament. They chose EDI for the familiar range of benefits, not the least of which is cost reduction. Yet most of them are incurring not lower but higher costs through EDI because they are now running hybrid systems: paper for the majority of trading partners and EDI for a small but growing number of EDI partners.

Clearly every hub would like to flick a magic switch and turn all trading partners over to EDI overnight. But to convert them all could take them well into the 21st century, maybe 30 years or so.

Experienced EDI implementers now realize there is no short cut to full EDI; it must be done thoroughly and patiently, and it will take some time. However, it should be possible to overcome the hybrid system scenario by a variety of techniques, techniques that can reduce costs for all parties until such time as EDI is fully implemented across the whole community.

**NUMBERS OF EDI USERS AND EDI MESSAGE VOLUMES IN AUSTRALIA**

The following Australian figures may be useful as a model for what happens elsewhere.

In 1992 Australia had about 3,500 users of EDI, only 20 percent of whom were actively using EDI as a business tool for general business benefits. The remainder were using EDI because their major trading partners demanded it (the auto industry,
potential Australian users and 0.15 percent of potential message traffic (see Figure 5.1).

There are two other factors to bear in mind. First, as we use EDI to remove people from the administration of trading processes we will develop more and more specialized EDI messages to replace informal telephone messages. Second, postal volume alone (that is, business activity) is growing at 3 percent to 5 percent per year worldwide. These two factors could within 10 years result in doubling the volumes quoted earlier.

COSTS OF INSTALLING EDI

There are two distinct phases to acquiring EDI knowledge and experience: the pilot phase and the rollout or ramp up phase. The pilot phase involves the education and training needed to set up a generally one-on-one trading partner relationship. The effort for the pilot phase is not routine, because it only happens once for each EDI user. The costs are distributed over the following areas:

- Awareness: reading, researching, seminars, visits.
- Education: management, project management, technical.
- Hardware: at entry level, PC and modem.
- Systems consultancy: installing the translation software, mapping and testing.

- Applications: as necessary, amending applications to produce, say, a flat file output.
- VAN costs: registration, monthly minimums, volume costs, and special services.
- Software costs: translation package and maintenance.

These one-time costs, if totally attributed to the pilot, fall between US$6,000 and US$9,000 per user. Mid-range and mainframe costs can go as high as US$100,000 with averages in the US$25,000–35,000 range. It must be emphasized, however, that these are one-time costs, and for entry into EDI for the first user.

The ramp up or rollout phase involves rolling out EDI to a wider community of

![Figure 5.1: Message Volume and EDI Potential, Australia 1992]

![Figure 5.2: Ramp Up Phase]
potential users. What follows is a model for EDI advocacy and implementation that will help to explain this phase of involvement.

THE ADVOCACY AND IMPLEMENTATION MODEL

This model, based on an actual case study, is designed for the EDI manager at a hub that has completed the pilot phase and is now ready to add new users to its EDI community. It is a 20-partner ramp-up effort, but makes no reference to who actually carries out the work. Instead, the emphasis is on the scale of the effort.

The ramp up phase can be divided into six stages (see Figure 5.2):

- Marketing and awareness
- Advocacy, the selling cycle
- Implementation
- System development
- First stage, pilot operation for new users
- Trading partner maintenance and administration

Marketing and awareness—the discovery phase. This stage involves bringing EDI and its benefits to the attention of selected trading partners, including some “reserve” or fall-back partners. A rule of thumb says that one out of two trading partners selected actually conforms to the program. Hence, for a planned community of 20 it is necessary to initially involve up to 50 potential partners.

Recruitment methods will involve personal contact, mailings, seminars, and so on. To keep costs to a minimum, it is desirable to avoid individual face-to-face meetings until this stage of the campaign has had a discernible effect, such as the conclusion of an introductory seminar.

The mailing effort should take 14 working days (three targeted people or addresses per potential partner—say, 75 people), typically involving about a week’s work to establish names, titles, addresses, fax and phone numbers, then set up the mailing list, and actually complete the mailing.

Two people should work for 10 days to prepare for two seminars, with two additional days spent on the rehearsal and delivery of each seminar. This includes the development of relevant handout material. It is reasonable to assume that this phase would require a total of 38 working (people) days and additional miscellaneous expenses of about US$3,000 to cover stationery, audio-visual production, hotels and travel.

Advocacy, the selling cycle. Once prospective partners have attended a seminar and read the handouts, they are already on their way to discovering EDI. If they are sufficiently interested, they will want to talk to the EDI advocate at the seminar or soon after. This is the first occasion when prospective electronic trading partners will meet face to face in the context of an EDI relationship. The questions will be along the lines of “What do I do next?”

The post-seminar discussion will allow the initiating agency to ascertain levels of interest and collect data to help determine what priorities (in terms of effort and timing) should be allocated to each trading partner, and whether a trading partner is desirable as an EDI partner.

The next step is a more formal data gathering process, which can be accelerated by sending out a survey. Bearing in mind the level of detail needed to progress at this stage (time, travel, and expense permitting), it is usually better to gather data during more than one face-to-face meeting. This also assists the informal education process for the prospective EDI partner.

A typical survey would include organization details, contacts (position, contact phone, fax, and so on), data processing systems (hardware, operating systems, communication devices), EDI capability, translation package or network used, document types, EDI standards, their levels and message sets, sample forms, volumes, traffic analysis, and information flow diagrams. At this stage it is also helpful to have some demonstrations and quotations from one or more VANs.

All this can take eight meetings, or four days per trading partner for one person, and travel and other expenses. For 20 trading partners, the total effort would be around 80 working days, with miscellaneous expenses of US$5,000.

Implementation. At this stage the process becomes a little more predictable. It involves people with specific technical skills,
such as business analysts and programmers. Assuming, for the sake of simplicity, that the trading partner already has appropriate hardware and has opted for a front-end PC approach, the options are a stand-alone PC, a front-end PC sending and receiving flat files to and from another computer (or another program on the PC), or a mainframe or mid-range computer. The implementation steps include:

- software product training in a classroom environment;
- software installation and testing;
- document and standards mapping;
- network-mailbox testing;
- application training in a normal trading environment;
- pilot commencement;
- trading partner or network or vendor certification.

Typically this would take a day in a classroom, with up to eight other trainees, plus up to two days for a support technician on customer premises. For 20 trading partners, assuming two trainees per partner, this would mean six courses. Although these activities would most likely be organized and run by VANs, the EDI advocate would have to spend some time at each course.

With total classroom training of eight days (this step also requires two days of implementation effort per trading partner), total implementation time would be 40 days.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Days of effort</th>
<th>Associated expenses($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocate Technical/ Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Marketing awareness/ Discovery</td>
<td>38</td>
<td>3,000</td>
</tr>
<tr>
<td>2 Advocacy/ Selling cycle</td>
<td>80</td>
<td>5,000</td>
</tr>
<tr>
<td>3 Implementation</td>
<td>8</td>
<td>40</td>
</tr>
<tr>
<td>4 Systems development*</td>
<td>-</td>
<td>60</td>
</tr>
<tr>
<td>5 Pilot operation</td>
<td>-</td>
<td>70</td>
</tr>
<tr>
<td>6 Maintenance/ Administration</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>TOTAL</td>
<td>126</td>
<td>190</td>
</tr>
</tbody>
</table>

* A self-funding exercise

Table 5.2: Case Study, a 20 Partner Group

System development. Effort at this stage varies with the trading partner. If, for example, a flat file has to be mapped between an application and the EDI translation process, that would take a few days of systems development time. Let's assume it would be a self-funding operation and the work would be specific to an individual trading partner's needs. It will still be necessary to allow about three days per partner. System development for 20 partners at three days each adds up to 60 days for one person (funded), for an estimated cost of US$3,000 per installation.

Pilot operations. In this period the trading partner becomes self-reliant and sufficiently competent to add new documents and install new versions of software without any external help. Since trading partners will be joining the network at roughly two- to three-week intervals, a consistent telephone support service needs to be available. Assuming each pilot calls the service once a week and takes one hour for the call and problem resolution, the support effort would require for an average number of 10 partners, 50 weeks times one hour per partner, and a total of 70 days for one support person.

Trading partner maintenance and administration. Other tasks are involved here in addition to technical support, advocacy and education: for example, establishing a user group, communications, a newsletter, perhaps a message development group; conversion to new document types; and introductions between trading partners.
Even for a 20-partner trading group, this can take four weeks for one person in a year, plus printing, mailing, travel, and accommodation expenses. Total time, therefore, would be 20 days for one person, with total expenses coming to US$2,000 for miscellaneous expenses.

Table 5.2 illustrates the six stages of implementation for a 20-partner unit when undertaken independent of vendors’ efforts, while the proportions of effort involved in advocacy and implementation are represented in Figure 5.3.

Assuming a fully burdened professional person (that is, overhead plus salary, expenses, and so on) for both advocacy and technical support costs US$100,000 per year (200 days per year), the people costs for a 20-partner effort can be estimated for 316 days as US$158,000, plus expenses of US$10,000, that is, a total of US$168,000. This calculation ignores the resources and costs for customer-specific work, such as systems development. It may be reasonable to assume a full cost recovery or revenue-neutral approach for systems development.

Accordingly, the people costs associated with developing the relationships with trading partners to the point where they can actually use an EDI system can reasonably be estimated at between US$6,000 and US$9,000 per trading partner, or an average of US$8,400. These costs are in addition to hardware, software, network, and vendor training costs. Vendor costs, not considered in this section, may be categorized as the cost of technology. The only costs described here are those of developing EDI trading partner relationships.

Table 5.3: Cost Summary for a 20-Partner Grouping

<table>
<thead>
<tr>
<th>Stage</th>
<th>Labor (days)</th>
<th>Expense (US$)</th>
<th>Total (US$)</th>
<th>Average (partner US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discovery</td>
<td>38</td>
<td>3,000</td>
<td>22,000</td>
<td>1,100</td>
</tr>
<tr>
<td>Advocacy</td>
<td>80</td>
<td>5,000</td>
<td>45,000</td>
<td>2,250</td>
</tr>
<tr>
<td>Implementation</td>
<td>48</td>
<td>-</td>
<td>24,000</td>
<td>1,200</td>
</tr>
<tr>
<td>Systems Development</td>
<td>60</td>
<td>-</td>
<td>30,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Pilot Operations</td>
<td>70</td>
<td>-</td>
<td>35,000</td>
<td>1,750</td>
</tr>
<tr>
<td>Maintenance</td>
<td>20</td>
<td>2,000</td>
<td>12,000</td>
<td>600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>316</strong></td>
<td><strong>10,000</strong></td>
<td><strong>168,000</strong></td>
<td><strong>9,900</strong></td>
</tr>
</tbody>
</table>
essential move if communities are to grow. Meanwhile, it is evident from the figures above that two people dedicated full-time to the project can cope with a 20-partner implementation within a year. Certain activities, such as seminars, will need more people, such as those with experience from the first phase of the founding EDI partner group. In practice, one person can deal with only five or six attendees at any seminar; hence a seminar with 50 people attending would need an extra five or six volunteers, which adds to its costs.

Similarly, two people can handle 20 partners if the work comes in a steady flow. But the work never does come in a steady flow. Holidays, sickness, training, and peak loads, all have to be accommodated, as does a succession plan. Therefore, it may take up to three people, virtually full-time, to service this effort. This would raise actual costs to the range of US$12,000 to US$14,000 per new trading partner.

The costs identified here are real costs which up until recently have been partly subsidized by or paid for entirely by vendors. Increasingly, however, the end user will have to meet these costs, or they must be absorbed by a major hub.

Two further points need to be emphasized here. First, the costs described are concentrated on the costs of marketing to and implementing with individual trading partners. But the reality is that to sell and implement EDI you often need to talk to a trading partner’s EDI committee—a group of people. Each trading partner is likely to send several people to meetings, training session and the like. This adds to the costs.

Second, although all the steps described for the large-scale ramp up model are indispensable, they can be streamlined to some extent. Some of the information that must be imparted to trading partners can be delivered at seminars, so that multiple people hear the message at once. Further, each of the first 20 or 30 trading partners could be given responsibility for advocating and implementing EDI with 5 to 10 new partners every year. Over a period of three years this could increase the size of the EDI community to 1,000 participants, keeping down the cost to the hub.

A PARTNER’S INTERNAL EDI COSTS

The costs of rolling out a large community are not just borne by the group or vendor who has undertaken the advocacy and implementation task. For every person involved from the external advocacy and implementation group, there could well be an equal number involved internally.

These internal people will come from the various EDI-affected departments (purchasing, accounting, and so on), and may well include an organization’s complete EDI committee. In addition to these staff and their associated costs, whether regarded as sunk costs or not, there are technology-related costs, such as hardware, software, and network costs.

A recent survey of EDI implementation in the Australian auto industry produced some surprising results. After a five-year implementation, electronic messages now represent 92 percent of the total value of purchases by the industry. The average cost of implementing EDI was US$12,000 per installation (range US$1,100-125,000); this includes hardware, software, integration, staff costs, and expense.

Annual operational costs, including EDI service provider costs, network costs, and associated staff costs average US$4,500 per annum (range US$225-22,500). Although these are Australian costs, and much of the costs in the early days could have been avoided if it were not for the pioneering nature of this particular EDI community, they illustrate a typical EDI community’s internal costs.

THE DILEMMA

For a typical medium-sized EDI community (or a ramp-up increment of a larger EDI community) the approximate costs, taking the large-to-medium in the ranges, are shown in Table 5.4.

These are high figures for small- to mid-sized businesses, high enough to be barriers to entry for those businesses. Similarly VANs do not have the resources, or the will, to continue subsidising the advocacy and implementation tasks. At this rate the necessary critical mass of users may never be reached. As it is, in many cases, EDI has added to business costs.
Table 5.4: Internal and External Costs for EDI Ramp Up

<table>
<thead>
<tr>
<th>Cost type</th>
<th>One Time (US$)</th>
<th>Per Annum (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External</td>
<td>5,200</td>
<td></td>
</tr>
<tr>
<td>Internal</td>
<td>9,000</td>
<td>3,375</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14,200</td>
<td>3,375</td>
</tr>
</tbody>
</table>

It is good to remember at this point that there are other methods to reach the same goals as EDI. These methods involve conventional technology (like fax), existing processes, and the existing business infrastructure. They can be cheap, easy to install, and capable of being integrated into a full EDI scheme, as time, resources, and cost permit.

So far it has been shown that there are substantial external and internal costs associated with advocating and implementing EDI. As VANs and vendors will pay less and less of these costs in the future, it is necessary to find innovative ways for meeting or reducing these costs.

ALTERNATIVES TO EDI

Given the expense of implementing traditional EDI today, users have ample incentive to seek alternatives. These alternatives must fulfill a variety of objectives, depending on the perspective of the user.

The hub or large EDI user wishes to avoid having to support both electronic and paper output and input. In other words, it wants (for appropriate applications) to treat all output as EDI output and to receive all input, whatever its sources, as EDI input.

The medium or small user who already has some EDI-computer capability wishes to have a number of different means of receiving and sending data, so as to satisfy each of its different trading partners. This user wants to progressively install EDI while reducing costs.

The least sophisticated user wants to use existing installed technology to access EDI-capable trading partners, without the expense and effort needed to implement a full EDI system. The same user wants the technology to be usable by existing staff at minimum effort.

VANs want to increase data traffic without incurring substantial extra support costs.

The local business community (specifically in the Asia Pacific region) would like to ensure that EDI and its alternatives embrace local business practices, culture and languages. It would like to avoid any forced adoption of new practices.

The general business community, on the other hand, would want to achieve mass installation of electronic communications, using the existing infrastructure of technology and services.

With these various objectives as a starting point, it is possible to explore how the existing infrastructure of technology and services might be used to achieve the objectives of EDI today.

INTERMEDIARIES

The existing EDI infrastructure consists of mainframe, mid-range and personal computers, VANs and network services, translation software vendors and the various education, training and consultancy organizations. This infrastructure is currently used by no more than 5 percent (and probably a lot less) of potential users.

For alternatives to EDI, we must look elsewhere. The goal is to find any existing procedure or technology that will accomplish the objectives of EDI, but with less cost than the existing EDI infrastructure. The types of business service providers that even the smallest traders are accustomed to dealing with on a regular basis include the postal service and couriers; banks, accountants and attorneys; courts and service bureaus; the local telephone company and other public utilities such as electricity, gas and water; government departments; customers and suppliers; and so on.

Some of these service providers could perform an intermediary EDI service. They could serve as walk-in service bureaus and collection or distribution points for hard copy input and output, or even be one of the resources for “low tech-no tech” EDI.
LOW-TECH INFRASTRUCTURE

A low tech-no tech EDI service must cope with small to very small volumes of input and output. This requires batch processing techniques rather than real-time or interactive processes.

Intermediaries are just part of the existing infrastructure that could support low-tech, no-tech EDI. Another part would be the "noncomputer technology" that is likely to exist today on the premises of small businesses. Many small businesses, even in Asia, already have personal computers, but several of them refuse to use computers for EDI, using the machines for specific jobs and nothing else. For EDI, the technology should be relatively current, electronically-based business machinery, connected to some form of communications network, such as the telephone, telex, fax, and point-of-sale (POS) device (EPOS, ECR, EFTPOS). As time goes by, the list would also include the cellular phone and other cellular data devices, such as portable faxes.

BROADER TECHNOLOGY INITIATIVES

There are more sophisticated machines and technology available, which would assist intermediaries to provide an EDI service between both noncomputerized trading partners and hub EDI users. Among them would be

- Store-and-forward fax services, fax on demand, toll-free fax services and optical character recognition (OCR) faxes.
- Telex technology, such as soft, or programmable, telex machines and telex-to-fax services.
- Voice processing services, such as digital voice-in, data-out services.
- Point-of-sale technology, such as scanners, electronic cash registers, EFTPOS and intelligent (programmable) POS devices.
- OCR devices (scanners) and magnetically encoded character recognition equipment.
- Imaging technology, such as digital photography for document storage, archiving and editing.
- Intelligent character recognition (ICR), which scans input and translates it into ASCII-formatted EDI data.
- Wireless data technology, including radio frequency (RF) and cellular data technology, using cellular voice or cellular data networks.
- Wireless personal computer technology.
- Customer input terminal, a specially engineered equipment, specifically built for a single purpose. For example, it may be a hand-held device with a screen, keyboard and fax-data modem, capable of inputting, receiving and translating one or two document types.

THE HYPOTHESIS

There are some basic premises for the low tech-no tech model.

No matter what the partners' circumstances, provided they have one of the suitable basic devices (phone, fax, telex, and so on) installed, they can be connected to the world of EDI.

The very large hubs, on the other hand, will be able to utilize their existing VAN infrastructure to send and receive data. In ideal circumstances, they need not connect electronically to any other service vendor.

A not too price-sensitive intermediary infrastructure in combination with the VAN infrastructure can facilitate low tech-no tech EDI. For example, if a small enterprise only sends one invoice a week, then US$5 to US$10 EDI charge for that invoice would not be considered too expensive.

This is not a hypothetical situation. Several Asian territories are trying to make EDI possible for nonautomated traders. Singapore has already made some progress. Singapore Network Services (SNS) and Singapore Customs helped to establish several EDI data entry-output bureaus for their import-export approval and quota control EDI system. Additionally, Singapore Post now offers an EDI fax service for such messages as export approvals and acknowledgments. Hong Kong, Taiwan (China), Malaysia and Korea will now follow suit within the next two or three years.

THE MODEL

Two functions are needed to complete the EDI loop. These are EDI-out and EDI-in.
EDI-out is where a hub can deliver messages (via an EDI service) to any trading partner. The messages start in the format and medium of the hub's choice. EDI-in is where any partner can deliver EDI-formatted messages to a hub's mailbox, using any appropriate technology or intermediary for that purpose. For both EDI-out and EDI-in, the conversion of data between the hub and the trading partner is transparent to the parties at either end of the transaction.

The EDI-out process is shown in Figure 5.4. The idea of EDI-out is that any EDI hub can treat all of its trading partners as if they were EDI capable. With cooperation from the VAN, this is not difficult. The VAN may have to do a little development and may have to charge a little extra. However, the VAN has incentive to cooperate because the EDI-out service will increase data traffic through the VAN. In addition, the hub should be interested in paying a little more because the service will help the hub eliminate systems that support both EDI and paper.

All messages for any trading partner are translated by the hub's data processing system from the application format into EDI format and then delivered to the VAN. Because none of the messages are printed, the hub's trading partner enabling tables can be simplified.

The messages are transmitted as an aggregate file to the VAN. Messages with valid electronic trading partner addresses are delivered to the appropriate mail boxes. Those without valid trading partner addresses, but with a default address, are delivered to a dead letter mail box (DLMB). The DLMB can be accessed by the VAN itself or by any of the intermediaries previously identified.

For example, a VAN may access this DLMB, interpret the file of messages to a standard print format and then fax them to their destination. This would mean that a fax number would need to be picked up from the profile tables and inserted into the message. The VAN might bill the fax recipients for processing and fax charges.

Alternatively, a toll-free number could be used for a fax-on-demand service. Trading partners could dial into the service to receive their messages, and the costs would be billed to the hub.

If an intermediary, such as a postal authority were to access a DLMB, it would retrieve the file, sort it into print or fax.
groups and levels of service (for example, expedited or regular delivery). The intermediary would then format the messages appropriately and deliver them directly to the recipient trading partner.

This technology is not EDI to the technical purist, and some may worry that this approach may delay the full acceptance of EDI. Nevertheless, the EDI-out scenario is a step forward; it avoids the artificial EDI situation where partners buy hardware and software just to print out EDI messages. (A large proportion of EDI users do just that, which can hardly encourage others.)

Also, most of the economic benefits of this scenario appear to go to the hub. However, it does allow the smaller trading partners to be part of an EDI network without great cost and effort. More importantly, it allows the smallest traders to participate in QR and JIT communities and avoid the risk of losing business because they cannot support EDI.

The EDI-out process may introduce new players into the electronic trading vendor infrastructure, such as postal authorities wishing to protect their revenue and messenger-courier companies wishing to create new sources of revenue from an existing client base. The technology excludes no one; therefore, competition will keep prices in line.

Several VANs already have vanilla fax-out services, but for registered users only. Several postal authorities are trying out or investigating EDI post services. At least one international courier company plans to introduce such a service. In addition to Singapore Post, Australia Post has offered an EDI post service since 1992. Australia Post also offers an EDI data entry service for personal income tax returns.

The U.K. Royal Mail has had an EDI post service since 1991. By October 1994, volumes were increasing by 50 percent every month. In Hong Kong, DHL, the courier company, unsuccessfully bid for an input bureau service for Hong Kong's national EDI service, Tradelink.

The format of data delivered to small trading partners need not be limited just to print or fax. Telex is a reasonable option. Estimates of the installed worldwide telex base range from 200,000 to 1 million. In
places such as India, China and the African countries, the telex population is actually increasing. In addition, there are many telex-to-fax services, in virtually every country where there is a fax store-and-forward service.

Another option might be to deliver data to trading partners by voice, particularly if there is a local voice processing service. This might be a little esoteric, but it may be useful in industries like grocery, where orders are often phoned out by the buying department.

The EDI-in process is described in Figure 5.5. Useful though it may be, EDI-out only addresses half the problem. Hubs are still left with the data capture-data entry half of the problem. This is where we can go back to the 1960–1970s for an idea. The service bureau, for plain data entry or for a full input-output service, is returning, but with some 1990s twists.

In densely populated areas, like many Asian cities, the concept of a walk-in EDI bureau has taken hold. At one time, Singapore had 16 walk-in bureaus. This number has now been reduced somewhat by market forces.

The idea is simple. The input document is taken into a bureau that supports the entry of a number of standard document types in a single formatted layout. The document is keyed or otherwise converted into an EDI input document. The sender pays on the spot (or on account for larger traders) and receives a statement complete with details for tracking and tracing (for which bar codes are useful, pre-printed onto data entry documents).

This is the basic EDI input-output service; there are many existing examples of such bureaus, including accountants for tax returns, customs agents for import-export documents, “implants” (data entry department for hubs) that offer a service to their trading partners, and post offices for public utility bills, tax returns.

For example, all tax agents in Australia and New Zealand, and all Australian post offices offer an EDI-in tax return service. In return for submitting personal tax returns electronically, the Tax Office guarantees refunds (if permissible) within 14 days. Refunds are sent by EFT direct to the taxpayer’s bank account.

Customs agents in Australia and New Zealand offer an EDI input-output bureau for nonautomated customs agents in their neighborhood. Chamber of Commerce branches in Hong Kong are likely to offer this type of service for the national Tradelink Restrained Textiles Export License (RTEL) EDI service.

An example of an implant involves Sears U.K., who offers an EDI post service in cooperation with the Royal Mail. Sears U.K. is the country’s largest retailer with mail orders, apparel and footwear retailing and footwear manufacturing as their principal businesses.

The physical delivery of a document to a bureau so that the data from it may be keyed into a system is labor intensive and slow. An alternative to this approach is to fax documents to service bureaus so that the documents may be keyed. An enterprising organization is considering offering a toll free fax number, so that the documents may be collected and keyed at a single national center, thereby avoiding the overhead of city center facilities.

Deeper problems concern VAN end user identities (IDs). If a bureau acts on behalf of many trading partners, it may use a single VAN ID for all partners. This raises audit trail, security and ultimately legal issues. These are not roadblocks; they are merely points to be aware of. The trading partner agreement would still be in force between the hub and each of its trading partners. The service bureau and the VAN would have agreements with its users similar to current post office or courier agreements.

Bureaus performing this work are virtually an instant fix for the countless thousands of small users who are hesitant to adopt EDI. As the number of hubs expands, and their trading partner base swells, the business case for a walk-in fax-in bureau becomes stronger. The service is significantly less price sensitive than a VAN service, since the bureau provides an end-to-end high-value added service.

This simple bureau approach (shown in Figure 5.6) is almost immediately applicable to current EDI initiatives. Since this approach will bring to the industry a new group of intermediaries, such as post offices and couriers, EDI will be given a new stimulus. Furthermore, because VANs

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Technology and Cost Options 31
will be receiving low cost and regular revenue from new traffic, they are likely to invest more in marketing the EDI ramp up process. However, the idea has its drawbacks. The bureaus will only be able to service certain market segments and common document types. They will also only be able to handle a limited volume of activity. There will probably be natural thresholds to variety and volume that may place a limit on EDI growth. Take, for example, document type variety, infrastructure costs, data capture costs, or sheer volume and turn-around restrictions. Some very large organizations have already anticipated this potential problem and are applying technology to solve it.

NOT SO LOW TECH EDI

There are two situations that may fall outside the scope of the basic service of manual data entry using a personal computer. The first involves the casual EDI user; perhaps an individual who has to make a solitary EDI transaction. This individual may wish to import or export something personal, file an annual tax return, or pay a public utility bill, and does not wish to stand in line at a government office or a service bureau.

The other situation is where a national authority has mandated EDI for certain processes (such as export declarations) for a community that is largely not computerized. For example Hong Kong’s 120,000 traders, the majority of them not computerized, may soon be told to declare their import-export transactions by EDI. By 1999, these 120,000 traders will be processing 75 million documents each year. With errors, resubmissions, and so on, this will come to over 100 million documents a year, each containing an average of 750 characters, perhaps 35 percent of them in Chinese! The government may guarantee that these transactions will be turned around (acted upon) within 48 to 72 hours. Because of volume, archiving and retrieval issues, as well as turn around guarantees, the basic service bureau concept will not be adequate for all EDI input and output needs.

Two other technologies might overcome

![Figure 5.6: A Model EDI Service Bureau](image)

* Imaging/Scanning/ICR
* Fax In
* Walk In
* EPOS
* Voice Processing
* OCR
* MICR
* Mark Sense

* Audit Trail
* Help Desk
* Log
* Billing

Intermediaries

End Users

EDI Users

VAN

RF

CDN

Other VANs and IVANs
these particular problems—telephone technology for the casual user situation and imaging technology for the high-volume, high-speed situation.

VOICE PROCESSING: TELEPHONE TECHNOLOGY

This is a rapidly developing technology in its own right. There are six basic voice processing technologies or services:

- **Voice messaging** is voice input that is digitized and stored for later use. Voice messages can give the casual EDI user questions or prompts that tell when and how to enter data through a telephone keypad.
- **Voice response** is voice output generated by computer. This is for public use, often for generalized messages (for example, timetable information).
- **Interactive voice response** allows a caller to retrieve specific information in response to prompts and the caller’s use of a keypad on a telephone. This is often used for database access and for retrieval of specific information, such as stock quotes.
- **Transactional voice response** allows callers to go one step further, facilitating the input and output of information. This has limited EDI applications but could be used for message amendments, alterations and cancellations.
- **Text-to-speech** is the process of converting ASCII text into synthesized voice. For example, in the grocery industry, a purchase order could start as text but be delivered to a supplier as voice in a voice mailbox.
- **Voice recognition techniques** convert voice into digitized computer records. This technology is of general interest for EDI input purposes. Imagine the productivity gains if a customer could place an order by speaking into a computer, which transforms that order into an EDI purchase order. Table 5.5 gives units used in voice recognition-generation systems.

Work is proceeding with all of these voice processing technologies. Some of these will undoubtedly find their way into EDI applications, especially for casual users and for very simple messages.

SCANNING AND IMAGE TECHNOLOGIES

The main technologies under this heading are scanning, which is a form of digital photography, and OCR. There are various nuances to the OCR approach, starting with Magnetic Ink Character Recognition (MICR), which is traditionally used for reading data at the bottom of a bank check. Typefaces and fonts specifically developed for OCR have also been widely used for

<table>
<thead>
<tr>
<th>Table 5.5: Units Used in Voice Recognition/Generation Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
</tr>
<tr>
<td>Phoneme</td>
</tr>
<tr>
<td>Aallophone</td>
</tr>
<tr>
<td>Diphone</td>
</tr>
<tr>
<td>Syllable</td>
</tr>
<tr>
<td>Demisyllable</td>
</tr>
<tr>
<td>Morpheme</td>
</tr>
<tr>
<td>Word</td>
</tr>
<tr>
<td>Word, all forms</td>
</tr>
</tbody>
</table>
such applications as subscription data and charge card accounting. Other symbologies for OCR include standard and special bar codes for document type recognition, sequential numbering and product and shipment data (the track-and-trace application).

A much earlier form of scanning used mark-sense or mark-space techniques, whereby preprinted forms, containing specially shaped fields, were completed (or left blank) using specific writing tools, such as a magnetic lead pencil. The scanner then recognized the completed fields in order to identify a pattern.

Generic scanning applications include EPOS devices, Fax-OCR technology, and bar code scanning-type technologies.

EPOS devices and hand-held scanners are all used for bar code reading.

The fax-OCR technology enables a fax machine to read and interpret incoming textual or bar code data. Both formats are now in use for applications such as database updating and newsletter input. The OCR technology reads the fax image, converts it to ASCII and manipulates the ASCII characters. It is natural to expect that these ASCII characters might be manipulated into EDI format. Yet, so far the reliability of character recognition methods is not adequate to support an automated fax-in, EDI-out capability.

It should be remembered that fax-OCR is not an extension of text-to-fax, which works in the opposite direction.

Bar Code scanning-type technologies are those that scan OCR fonts, MICR characters and simple shapes (such as check marks and crosses) in predictable locations on a form. This category also includes "mark-sense" techniques.

Imaging offers the most potential of the applications discussed here. In the classic sense, imaging involves placing a document on a flat bed scanner and photographing it so that a perfect image is captured, stored and archived in a way that allows the image to be retrieved rapidly. Off-line storage is achieved by optical discs. Imaging and scanning requirements are shown in Tables 5.6, 5.7, and 5.8.

An operator may manually translate an image into EDI by viewing a large screen that is divided into two parts. The left hand or upper portion of the screen displays the original scanned image. The other portion of the screen is organized to display a data entry screen so that the operator can read the source data from the scanned image and then complete the data entry screen with the aid of a keyboard and screen-based template.

This process may be no more efficient than data entry from the original paper document. However, it eliminates the need to store paper. It also allows documents to be retrieved and edited quickly. It further provides an audit trail and document tracking and tracing advantages.

If the scanned image can be read by the Intelligent Character Recognition (ICR) logic and be automatically converted to EDI, then real efficiencies can be achieved. Figure 5.7 shows how artificial intelligence is used in the process.

A number of major banking applications for ICR are already in use. ICR is a natural for EDI if recognition levels can be made sufficiently high and if the computer processing load can be made cost effective. Rules processing and artificial intelligence approaches are now being used to improve confidence in the ICR-to-EDI process. Work is being done on this technology by at least three hardware vendors and numerous software companies. Table 5.9 illustrates the statistical probability of encountering

<table>
<thead>
<tr>
<th>Dots/Inch</th>
<th>Quality</th>
<th>Pixels for A4 page</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>TV; not legible</td>
<td>425x550</td>
</tr>
<tr>
<td>100</td>
<td>Just legible</td>
<td>850x1140</td>
</tr>
<tr>
<td>200</td>
<td>Lacks crispness</td>
<td>1700x4400</td>
</tr>
<tr>
<td>400</td>
<td>Printed page</td>
<td>3400x4400</td>
</tr>
</tbody>
</table>

Table 5.7: Picture Resolution

<table>
<thead>
<tr>
<th>Example</th>
<th>Resolution (dots per inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photograph</td>
<td>3000</td>
</tr>
<tr>
<td>Print of photo</td>
<td>1500</td>
</tr>
<tr>
<td>Polaroid</td>
<td>1300</td>
</tr>
<tr>
<td>Hi-Res Scanner</td>
<td>800</td>
</tr>
<tr>
<td>Human Eye</td>
<td>700</td>
</tr>
<tr>
<td>Television</td>
<td>50</td>
</tr>
</tbody>
</table>
particular words in free text. Similar tables will need to be constructed for terms used in individual EDI applications if ICR is to become useful.

A practical ICR application for converting data to EDI format must be able to recognize an acceptably large proportion of input data while also supporting manual correction of errors. The first commercially priced and technically satisfactory ICR-to-EDI applications are expected as early as 1996.

OTHER TECHNOLOGIES

There are other technologies likely to affect EDI over the next few years. These include wireless, or RF and cellular data technology, and customer input terminals or CIT technology.

Wireless technology offers the ability to transmit data independent of traditional terrestrial networks, enterprise networks and local area networks (LANs). The two major technologies involved are RF and cellular data networks (CDN). RF is typically used for command and dispatch applications, such as police, fire, ambulance, taxi and warehousing. Operational instructions are displayed on screens installed in mobile equipment (taxis and ambulances).

Table 5.9: Statistical Probability of Encountering Words in Text

<table>
<thead>
<tr>
<th>Word</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>the</td>
<td>.0700</td>
</tr>
<tr>
<td>of</td>
<td>.0364</td>
</tr>
<tr>
<td>and</td>
<td>.0289</td>
</tr>
<tr>
<td>to</td>
<td>.0261</td>
</tr>
<tr>
<td>a</td>
<td>.0232</td>
</tr>
<tr>
<td>in</td>
<td>.0213</td>
</tr>
<tr>
<td>that</td>
<td>.0106</td>
</tr>
<tr>
<td>is</td>
<td>.0101</td>
</tr>
<tr>
<td>was</td>
<td>.0098</td>
</tr>
<tr>
<td>he</td>
<td>.0095</td>
</tr>
<tr>
<td>for</td>
<td>.0095</td>
</tr>
<tr>
<td>it</td>
<td>.0088</td>
</tr>
<tr>
<td>with</td>
<td>.0073</td>
</tr>
<tr>
<td>as</td>
<td>.0073</td>
</tr>
<tr>
<td>his</td>
<td>.0070</td>
</tr>
<tr>
<td>on</td>
<td>.0067</td>
</tr>
<tr>
<td>be</td>
<td>.0064</td>
</tr>
<tr>
<td>at</td>
<td>.0054</td>
</tr>
<tr>
<td>by</td>
<td>.0053</td>
</tr>
<tr>
<td>I</td>
<td>.0052</td>
</tr>
<tr>
<td>this</td>
<td>.0051</td>
</tr>
<tr>
<td>had</td>
<td>.0051</td>
</tr>
<tr>
<td>not</td>
<td>.0046</td>
</tr>
<tr>
<td>are</td>
<td>.0046</td>
</tr>
<tr>
<td>but</td>
<td>.0044</td>
</tr>
<tr>
<td>from</td>
<td>.0044</td>
</tr>
</tbody>
</table>

Inference is an artificial intelligence technique of constructing meaningful output from partial data. As an example try to read this sentence with only vowels and then with only consonants.

A-a e-a-e, o-ea i-e e-e i- o- o-e a-e e-i o- o-o-a-

-s -n x mpl try t-r-d th-s sn-t nc w-th
nly v-w-ls nd th-n w-th nly c-n s-n-nts.

Figure 5.7: An Inference Example
Application software that generates RF output is now being delivered with EDI functionality. RF-facilitated warehouse, distribution center and transportation EDI applications are expected in the near future.

Some trials on ship-to-shore RF applications have been carried out for transmission of manifests, requests for dockside services and requests for preclearance by customs authorities.

CDNs have greater potential. Any network supporting cellular telephones can support cellular data devices, such as personal computers, fax or portable EFTPOS equipment. Therefore, remote applications, data bases and EDI services can be liberated from terrestrial networks, thereby enabling a range of new mobile EDI applications (such as field sales and field engineering).

CITs are now widely used for capturing consignment details for applications such as couriers and the gaming industry. Combined with a future lightweight wireless modem technology, these terminals can extend the functionality of fixed-function, low cost, mobile EDI terminals.

CONCLUSION

There can be no substitute for a fully integrated EDI-capable trading community, which must remain the clear objective of EDI users. However, most communities will take a long time to fulfill this objective, and it will not be a cheap solution to begin with, since the implementation and awareness tasks are generally people-dependent, rather than technology-dependent. In fact, there may be greater resistance as EDI gets into the second and third tiers of trading partners within a community.

In the meantime, the EDI-out and EDI-in approaches can make a significant contribution toward the long-term objectives. It should be remembered that the techniques described here are neither hypothetical nor academic. All examples of the technologies discussed are currently in productive use for EDI or other applications.
Field visits were undertaken in the following countries:

Argentina
Australia
Brazil
Chile
Hong Kong
Hungary
Malaysia
Mexico
New Zealand
Singapore
Taiwan (China)

METHODOLOGY

The study used a standard questionnaire as a starting point, and purely for guidance. There was already a great deal of published material available on the organizations we planned to visit, much of it produced by the organizations themselves. The questionnaire, therefore, was designed to help frame more specific queries which would get past the cosmetics of the organizations’ marketing departments presentations and elicit information of real value to the project.

For example we were interested in the true costs and benefits of the initiative, not just those which have been made available for public consumption. We sought opinions on the respective roles of the public and the private sector in setting up and running a national EDI-trade facilitation initiative. We held meetings with both private and public sector organizations and listened to views on the role of trade management and trade facilitation in the total trade process, the end-to-end supply chain. Care was taken to get independent, or at least opposing, and hopefully, balancing views on each of these national initiatives.

ARGENTINA

From a technological perspective, Argentina is like an emerging European country, analogous to and closely linked with Spain, but with a time delay of three to five years. This delay helps create a buffer which in turn presents a genuine opportunity to get electronic commerce right if the correct action plan is put in place.

EDI started in Argentina predictably among managers with US experience showing an interest in the late 1980s, particularly in the oil and gas, apparel manufacturing and retail sectors. A few local initiatives started in 1991 in these industries. At the same time, IBM began to offer their IIN services in response to customer requests, initially by long line access to their Tampa service. More recently they have installed an access node or switch based on an IBM Austria EDI service. Known locally as the BC service, it still has technical incompatibilities with the older IIN which currently makes it an impractical option for Argentinean users.

So far, with only about 50 EDI users, there are no good examples of EDI benefits or reengineered processes. Nevertheless the infrastructure is growing.

IBM are still in a reactive mode. They do
GENERAL QUESTIONNAIRE

Contacts
Names, titles, telephone, fax, mail, electronic mail addresses.
Business cards.
Any other contacts?

Introduction: background
Organization, key people.
Overall project description.
Objectives.

History of the project
Preparation and planning: Who? How? What?
Why? How much? How long?
Sponsors? Why?
Players and contacts.
Motives; justifications.
Key decisions; influencers.
Stages of the project. Why?
Vendors.
Costs.
Projected (and actual benefits) for public sector and private sector.
Samples: Business Plans, relevant documentation, legislation, technical material.

Current status
Sponsors, reporting lines.
Organization.
Specific key players; duties.
User communities; types.
Numbers of users; break down by user type and application/industry.
Service types (trade facilitation, general EDI, electronic mail, information services, network access services, hardware, software, implementation, consultancy, training and education, and so on).
Pricing, contracts.
Revenue per employee, per user.

Preparation
Academic, intellectual leadership: Who?
Awareness, education. Who delivers, who pays?
Reengineering efforts?

Further plans: milestones

Planned benefits and costs
Original plan; performance criteria, indicators.

Status against plan.
Reviews: How? When? By Whom?
Correction process.

Lessons of experience
Local issues, such as politics, vested interests, religion, culture, business practices, language, standards, legal infrastructures.
Regional issues.
International issues.
Other inhibitors.
Facilitators.

How would you do it differently today?

Technology issues
Hardware.
Software.
Applications software.
Communications.
Integration.
Development.
Standards.
Codes.
Vendors.
VANS.
Interconnection, interworking, standards.
Infrastructure, available skill levels.

Message development
Which? Why?
Which standards.
Implementation guidelines.
Codes involved.
Compliance checking? Why? Why not?

Roll out plans
Fully integrated EDI.
Interfaced EDI.
Bureau(s).
Low tech-no tech EDI.
P.C., LAN, mid range, mainframe: numbers, proportions.
Post office.
Technical innovations.

Competition
Impact.
Specializations.
Resellers of VANS.
Software resellers.
Implementers, consultants.

Review and summary
not yet offer consultancy and implementation services, but rely upon third parties, the principal among whom is EDI SA. EDI SA have already installed the Supply Technology STX PC translation software, Promenos software for AS 400, and Atlas software for Unix. These have been implemented in the apparel and textile supply chain based somewhat loosely on the U.S. Kmart-Levis model. They all employ ANSI X.12 for purchasing in a pilot project.

More recently, a tender for an industry EDI service was invited by CODIGO, the Argentinean EAN authority. Although principally chartered with promoting EAN bar code implementation, CODIGO also promote EDI to their members. One of their principal member groups, the supermarket industry, is well along the path to full bar code implementation, but probably has a further five years to go before it achieves 100 percent EAN compliance. In the meantime, CODIGO is trying to establish the infrastructure for EDI.

CODIGO received a number of tenders for their EDI service. In the event, the project was given to a combination of Telecom Argentina and Telefonica, the state telecommunications duopoly. The service is based on the current Spanish national system, running on a Tandem platform, using GSI end user EANCOM translators and OFTP file transfer software. This is a local Spanish implementation of a retail industry closed user group. It provides no facilities for other EDI standards, no access methods, no software products or interconnects with any other network. GSI is a French system, based on French procedures, and has a limited appeal to companies who demand an open approach to EDI.

The CODIGO system, called STARTEL, has several high profile potentially committed users among their own executive board members. However, based on international precedents, it will need to open up the system considerably if the third party software and integration infrastructure are to help ramp up usage.

**CURRENT STATUS**

There are now four VANS represented in Argentina: IBM, STARTEL, GEIS, who offer a local INS system implementation, and most recently AT&T, with an international transport pilot.

The GEIS service is a custom built data entry, electronic mail service for auto manufacturers and suppliers. The AT&T pilot is intended to implement bay planning (EDIFACT BAPPLIE) with a local container terminal and one or two conference line shipping companies.

The STARTEL system has the first Internet access rights; all four VANS offer electronic mail.

The situation is complex to say the least. Of the four VANS, two (IBM and AT&T) do not offer local access. There are three sets of standards in use, or about to be in use: ANSI X.12, UN-EDIFACT, and EANCOM. There are at least six translators in use, and probably less than 100 users in total.

The consultancy, implementation, and integration industry is in its infancy. There is no EDI association, bar coding is partially complete but probably needs another five years for full adoption. Customs have not yet made a commitment to EDI. However, there is a powerful local shipping and customs agent’s lobby which takes a fiercely defensive position on local practices which are comparable to Mediterranean practices of the 1950s and 1960s and some contemporary Asian practices.

There have been two national EDI conferences operated by an international conference organizer, where expenses came to over US$1200 a delegate!

Finally there are no existing interconnect arrangements between the VANS; and there is no published national vision or strategy on electronic commerce, either from the private or the public sector.

All major initiatives, such as, oil and gas, automotive manufacturing, apparel manufacturing, supermarket retailing and international transport, have expansion objectives. CODIGO is reportedly planning for 500 users within two years.

While the basic technology infrastructure is being put in place, albeit with serious technical deficiencies when compared to a mature electronic commerce marketplace, the proven prerequisites for success at a national level, particularly in trade facilitation, have not yet emerged.

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Annex 1: The Case Studies 39
There is a possible exception. The two separate banking clearance networks are holding talks about amalgamation and thereafter offering a national electronic clearance system. Possibly financial EDI will lead the way for business messaging, but this is a speculative proposition at the moment.

**DISCUSSION**

There are national cultural imperatives which are inescapable. For example, the cultural role models of Spain and Southern Europe and traditional business practices in trade processing and clearance procedures. There is also a regulated telecommunications duopoly with the relatively uncompetitive and expensive service which this situation breeds, when compared to the fully deregulated, fully privatized model.

There is nothing fundamentally wrong with electronic commerce in Argentina but a nationally-funded government-directed initiative would provide all the leadership and impetus that this market needs. But for that to happen, the Argentinean government must be made aware of the potential of electronic commerce to the nation.

Culture, vested interests and inappropriate role models currently make this unlikely without a powerful external initiative.

Finally, even if the government were to take the lead, it is doubtful, given the past history, if the private sector would follow any lead which the government advocated. There is little mutual trust between the two, not even some form of equilibrium where common roles are identified and understood. Emerging trade groupings will help, as will association with larger trading blocs; but the time that will take will probably damage, not enhance trade competitiveness through electronic commerce.

EDI originated in Australia in 1985, when the auto manufacturing industry set up a committee to investigate the application of EDI to the auto assembly industry. The retail industry followed a year later, under the auspices of the Australian Product Number Association (APNA). With the development of interest in EDI, VANS began to offer their services.

VANS currently offering services include Telstra, the major deregulated telecommunications carrier; GEIS; NEIS, a local VAN, currently on offer for sale; AT&T EasyLink, set up through the acquisition of a local VAN Paxus, who in turn bought a government network service, CSIRONet; BT Australasia who are not offering EDI in Australia; IBM, who offer a service but not actively; SITA, who offer the specialist airline cargo EDI services; and SWIFT with its national operation in Australia. AAP-Reuters entered, and left the market during the period 1990 to 1993.

There is a good infrastructure of software houses, technical developers and consultants. The VANS themselves have largely abdicated implementation and technical support to third parties and resellers: EDI processing margins do not permit much bundled support.

Several larger users and government departments operate gateways; not necessarily for economic reasons, but to enable interconnection between networks. This is sometimes called user-based routing.

The main EDI user communities in Australia are:

- Import-export, customs brokers, transport and customs.
- The retail industry.
- The automobile assembly industry.
- State and federal government supply management.
- Electronic tax lodgment.
- Healthcare and education.
- Heavy engineering.
- Various smaller initiatives, including TV advertising, hardware sales, primary industry, pharmaceuticals, packaging, retail fund management.
- A limited range of electronic banking initiatives.
By the end of 1994 there were probably around 10,000 EDI users in Australia, switching over 50 million messages a year.

**Trade Facilitation**

Australia is a major trading nation, crucially dependent upon exports, principally of primary products. Higher value-added products like machines, IT products and aircraft, are imported in return.

In 1991-1992 total international trade, of A$107 billion (US$80 billion) was made up of:

**Imports**

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<tr>
<th></th>
<th>Air</th>
<th>Sea</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Tons (Malaysia)</td>
<td>0.17</td>
<td>34.4</td>
<td>34.6</td>
</tr>
<tr>
<td>Tons (% total)</td>
<td>0.5</td>
<td>99.5</td>
<td>100</td>
</tr>
<tr>
<td>Value (A$ bn)</td>
<td>14.5</td>
<td>36.6</td>
<td>51.1</td>
</tr>
<tr>
<td>% of total value</td>
<td>28.3</td>
<td>71.6</td>
<td>100</td>
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</table>

**Exports**

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<thead>
<tr>
<th></th>
<th>Air</th>
<th>Sea</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tons (Malaysia)</td>
<td>0.198</td>
<td>317</td>
<td>317</td>
</tr>
<tr>
<td>Tons (% total)</td>
<td>0.01</td>
<td>99.9</td>
<td>100</td>
</tr>
<tr>
<td>Value (A$ bn)</td>
<td>11.5</td>
<td>44.5</td>
<td>55</td>
</tr>
<tr>
<td>% of total value</td>
<td>20.5</td>
<td>79.5</td>
<td>100</td>
</tr>
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</table>

In 1991, 85 percent of freight was containerized, and 1,790,000 containers were processed throughout the year.

Of the 2.7 million cargo consignments processed each year, 1.5 million (55 percent) are carried as air freight. Air freight represents 0.6 percent by weight and 48.8 percent by value of cargo consignments.

The consignment transaction processing cost in these transactions may be 12 percent per consignment more expensive than sea cargo and 15 times more expensive per unit measure of weight. Emerging business practices will even further exaggerate and accelerate these trends.

**TradeGate**

In December 1988, after an in-depth analysis of the information sharing and data interchange capabilities of Australia's trade and transport sectors, the National Communications Working Party (NCWP), set up by the federal government's Industry Committee of the Inter-State Commission, recommended to the government that an independent nonprofit-making organization be created and funded by industry to facilitate efficiency improvements in the trading and transport chain. The government endorsed the recommendations, and Tradegate Australia Limited was incorporated in August 1989 as a not-for-profit public company, limited by guarantee. One of the principal recommendations was that Tradegate should oversee and manage the creation of a national communications network for EDI and related services within the trade and transportation community.

Tradegate Australia was funded by various organizations, including the Australian Customs Service, Qantas Airlines, the Association of Australian Port and Marine Authorities, the Australian Chamber of Shipping, the Australian National Maritime Association, the Customs Brokers Council of Australia, the Australian Road Transport Federation, the Australian Forwarders EDI Association, the Railways of Australia, and Austrade, which represented the exporters.

A$1.1 million (US$0.82 million) in long-term loan funds was initially committed by these organizations representing over 2000 individual participants in the trading chain. Today Tradegate also services the information needs of the container terminals and depots, importers and exporters, banks and insurance companies as they relate to international trade.

**The Organization**

Tradegate Australia has a Board of Directors representing the founding organizations. A chairman is selected from the directors. A chief executive officer is responsible to the Board for the day-to-day activities of the company, supported by a small team of marketing, consultancy, and administration staff. A major activity is the management of the various contracts with technology suppliers and value-added service providers. In this sense Tradegate acts as a cooperative. This complements Tradegate's primary role as a facilitation body.

Tradegate's corporate mission is to improve the efficiency and speed of moving goods through the trading chain by widespread introduction of a comprehensive
range of Electronic Commerce Services.

This means facilitating the introduction of EDI and related services that will over time eliminate the bulk of the estimated 110 million paper documents that support Australia's trading process each year.

THE USER COMMUNITY

By mid 1994, Tradegate services were in use by over 600 member organizations covering some 2200 user sites. Message volumes exceeded 15 million annually, representing some 8 percent of the target volume. The types of user organizations involved span the trade and transportation community. Message volumes are forecast to grow at around 30 percent annually during the 1990s.

The vision for Tradegate is distributed through a series of subsidiary objectives:

- To facilitate community cooperation through a process of cross sector working groups.
- To build a working technical infrastructure through the VAN contractor, currently AT&T EasyLink Services.
- To create a critical mass of users through the Customs Electronic Initiatives program.
- To assist users of the Customs Electronic Initiatives program to become EDI enabled.
- To encourage the supply of additional value-added services and end user software by third party suppliers.
- To actively support the international UN/EDIFACT process.
- To promote a high market profile for Tradegate.
- To develop communication links to the international trade community.
- To provide assistance and education in electronic commerce techniques.
- To work closely with the federal government's micro-economic reform process as it relates to the reform of Australia's transport environment.

Finally, end users and community members, through numerous surveys and discussion groups, set some priorities, the topmost among them being EDI projects for maritime and air imports and exports. At a second level were bulletin board projects on vessel arrival data, shipping schedules and general port and terminal data. Customs related projects covering Australian Customs Service publications and system upgrade formed the third priority.

By the end of 1994, EDI based services were in operation for preclearance of imports by air and sea, and for export entries and manifests. Although imports were being processed by a dedicated interactive network service covering over 600 user sites across Australia, commercial EDI took care of bookings, shipping and forwarding, and invoices. Over 600 members used a global e-mail service including a fax sender facility. Over 200 regular users accessed Tradegate and customs information through bulletin boards.

ROLE OF GOVERNMENT

The government believes its role in trade facilitation is to provide opportunities for the private sector. Most initiatives, therefore, begin at the departmental or state level. But departmental objectives are rarely the same as the government's, being more susceptible to budgets, internal politics, personalities and lack of decision making.

Hence, the first customs initiative, EXIT, was introduced to capture export statistics and to reduce the data entry load on customs' internal IT departments, and not specifically to enhance trade efficiency or to assist traders.

The government has provided some leadership, but this has come through departmental initiatives and projects which quite often have a political orientation. In the last decade, the government has been of a socialist complexion, with an organized labor power base. Consequently, it has been constrained from articulating the benefits of a reengineered commercial environment based on electronic commerce. Electronic commerce on the waterfront, for instance, is predicated upon fundamental reform of work processes. Progress has been slower than many would have hoped.

At the state government level, EDI projects have generally been aimed at state purchasing and, in the case of New South Wales, a direct entry form of financial EDI via a state-owned bank.
The federal government now has numerous initiatives operating, the most successful being the Electronic Lodgment Service (ELS) for tax returns and payment. The ELS is a classic example of a system designed to offload costs from a department, which claimed it had saved 300 data entry operators as a consequence of implementing EDI. However, there are also benefits for end users: refunds are provided electronically, within 14 days of lodgment.

The idea of leaving the private sector to build the infrastructure and to develop the electronic commerce technology is a seductive one for the government. It can easily be rationalized where there is a good existing technology infrastructure, where English is the natural language, and where there is adequate access to capital. In Australia’s case this has led to a numerically successful outcome. There are at least five VANS and around 10,000 EDI users. The VANS have evolved into industry-specialized networks, as Australian EDI initiatives are generally driven by industry organizations.

The other side of the coin is that, after seven years of electronic commerce experience, there is as yet no national agenda for electronic commerce, there is still only limited senior executive awareness and little comprehension of its importance at senior government official level. The government has never tried to set the agenda nor to encourage debate. These tasks have fallen to the private sector, by default.

Partially because of leadership issues but mainly because of competitive and marketing reasons, the major banks still do not offer financial EDI services, nor do they operate a national corporate funds clearing house system.

In summary, it is evident that although EDI has so far succeeded at the industry level, it has had to be grafted on to a government and banking infrastructure which has yet to adopt the principles of electronic commerce and reengineered processes for national competitive advantage.

VAN INTERCONNECT

Interconnection between the major VANS, such as AT&T, BT, IBM and GEIS, already exists in North America and Europe. Until quite recently there were cost and legislative inhibitors for local users to make use of these overseas interconnections. There are signs that this is changing; in the meantime, local interconnects are very limited, in both availability and functionality. So far, only industries with significant purchasing power to enforce compliance have persuaded VANS to offer even rudimentary interconnects.

The local VAN, Telstra, offers an X.400 interconnect and UN-EDIFACT compliance checking facilities. AT&T interconnects with Telstra for the Customs EXIT 1 service. Telstra and GEIS interconnect for the retail industry, at the X.12 compliance checking level.

Trials are taking place between other networks, for both major standards, as well as on financial EDI between separate banks, but no practical outcomes have resulted for the last three years.

VENDORS

Very few of the VANS would claim to be making a profit from EDI at the moment. Competition keeps the margins down and the level of service demands keeps the costs up. Among the VANS, GEIS have specialized in the retail industry and some international transport projects. AT&T have concentrated on customs related trade facilitation projects, solely through their contract as the Tradegate VAN. IBM and BT are not, so far, active in any serious way; while NEIS, a local VAN, specializes in supply management applications for the New South Wales state government. Telstra services the automotive industry and smaller groups in many specialized initiatives.

Much of the role of implementation, end user support, and roll out and project management is now being handled by the industries themselves and by third parties, such as software houses and consultancies. Many of the government’s departmental initiatives have been predicated on the notion that the VANS fund all marketing and development efforts, and then pay a proportion of traffic revenue to the government department involved, which has had the effect of reducing levels of service and
diluting overall support in those projects.

**INDUSTRY ASSOCIATIONS**

Australia has had an EDI association since the late 1980s. Known as EDICA (EDI Council of Australia), it has always struggled to maintain a paying membership adequate to fund its activities. In 1994, EDICA merged with Electronic Messaging Association (EMA) in order to form Electronic Commerce Australia (ECA). EDICA only had partial success in its mission of raising awareness and setting the national agenda. Lack of funding soon made it a member service organization, dependent on volunteers for message setting and supporting activities. It also offered commercial services which actually competed with its vendor members. Its main fund-raising activity is the annual EDI conference.

Most observers agree that the role of an EDI association is to raise awareness and help set the level of expectation for EDI. This means that its activities fall into two areas: servicing existing users through standards activities and potential users through information, contacts and awareness activities.

Funding initiatives made this only partially possible and led to widespread member dissatisfaction, with a resultant fragmentation of effort and resources. As a consequence, the EDI association no longer exists as a separate entity. Its secretariat duties are now performed by ECA; UN-EDIFACT responsibilities are now mandated to the national standards authority, Standards Australia (SAA). Even under the SAA regime, standards activity continues as a voluntary operation, although the government did help fund a recent UN-EDIFACT JRT meeting in Sydney.

**ASSESSING TRADEGATE**

Tradegate commenced with A$1.1 million (US$0.82) capital, and with three people. This level of staffing continued for three years, after which a tariff on revenues from the VAN began to justify extra staff and consultants.

In one Tradegate consultancy study, developed in an attempt to attract government funding, it was claimed that end user costs were between 8 and 10 times the costs borne by Tradegate for their share of the EDI implementation effort. This is one of the first references to the indirect costs of implementing EDI. These costs include setting message formats, based on UN-EDIFACT, message guideline development, systems reengineering, and software testing. But they do not include systems development, integration, internal training, opportunity costs, and technology costs.

Tradegate are pleased with their progress, but believe they do better with active government promotion. For example they have tried to get the government to publish a national benefits statement on EDI, but with no success.

Their main operational difficulties have been in selling. Chief Executive Officers of their target clients generally delegate EDI matters to technical specialists. Where the Chief Executive Officer remains involved, there is nothing to guarantee that he or she will retain the shared vision and continue to believe in the original objectives.

Because Tradegate is essentially a cooperative of end user representative organizations at board level and committee of technical experts at the operations level, there is a significant gap between the levels. This gap can only be filled by business managers with a grasp of market factors and corporate survival strategies.

**LESSONS FROM THE AUSTRALIAN EXPERIENCE**

The Australian experience offered many lessons in the implementation of EDI for trade facilitation. For example, it is evident that the government should by now have developed a national vision and developed a national promotion campaign to publicize the benefits of electronic commerce, and a national education program in coordination with it.

The benefits of international (UN-EDIFACT) standards should have been promoted much earlier. This would have encouraged much wider participation in the EDIFACT process.

There is serious concern locally that the existence of a local Australia-New Zealand EDIFACT Board (ANZEB) excludes local participants from the dynamics and wider benefits of membership in the Asian
EDIFACT Board (ASEB). Currently the membership of ANZEB is limited to government officials and EDICA (ECA) executives. End users have no direct voice, apart from the rapporteur. Because of funding restrictions, the rapporteur is perforce a distinguished but retired public servant.

It is also a matter for concern that EDI for trade facilitation has not been mandated after a period of grace, say three to five years. It is still optional.

In all this, EDICA should have had a more active and dynamic role to play. It should have set expectations, focused on best practice and message development, acted as a focal point for information exchange. Instead, very little reengineering is actually being done; and at the same time, it has not been easy to get government bureaucrats to adopt external ideas and to surrender some of their power over their fiefdom.

A major problem is emerging with message guidelines which were developed by industries in isolation from their overseas trading partners, including some who have not yet committed to EDI and do not fully understand the issues. This is fine for a trade cluster with known participants and where the industry leaders set the agenda. But where this effort is happening in parallel, message sets and guidelines are bound to be unsynchronized. This is increasingly true for trade facilitation across international trading groups. For example, exports from Mexico, even under the UN-EDIFACT message standard, need different guidelines for NAFTA, EU, APEC, and other specific regions.

There is some move towards an international registry of message guidelines, which must be given strong powers if it is to overcome these emerging problems of incompatibilities between international and intertrade cluster message sets.

BRAZIL

A volatile and confused economic history has its parallels in the use of electronic commerce in Brazil. Led by the banking sector for many years, most of the necessary technologies have become commonplace. A deregulated VAN market has also helped create the basic infrastructure. But lack of central direction and cooperation between the public and the private sector has led to a multiplicity of initiatives, many of which are in technological conflict.

The astonishing difference between EDI in Brazil and in virtually every other country is that EDI started in the banking sector. Many years of inflation and uncertainty about future costs forced the banks to cooperate very early on such things as formats for data transfer between themselves, usually by file transfer. Beginning in the 1970s, the CNAB (National Council for Banking Automation) specified standard message and file layouts to reconcile intra- and interbank holdings at a new reconciled daily value. Because of the rapidly diminishing face value of bank notes, automation was employed as early as possible for collections and settlements. Similarly automation has been consistently used to operate on predictable costs and minimum staffing levels and to mitigate the impact of rampant inflation as far as possible.

Some banks operate their own networks and offer full accounts payable, accounts receivable, and cash management electronic services, usually through a direct entry (dedicated terminal) and using proprietary standards. The central bank requires entry into the international settlement and clearing system and SWIFT access by a similar (proprietary) direct entry system. There is no interconnect between central banking and the other proprietary banking and interbank network systems.

An interbank network was developed in the 1980s through a cooperative arrangement of around 70 banks (of the total 240 banks in Brazil).

There are very large numbers of electronic banking service users. These are not EDI nor financial EDI systems; they are private format, dedicated terminal, direct entry systems. Nevertheless, they operate as paperless systems and provide a vital
service for corporates in a country with a volatile currency.

A new interbank switch, known as Interchange, owned by Unibanco, Citibank and Banco Real is currently handling 10 million banking transactions each month, something like 40 percent of the national total. Interchange is now converting to UN-EDIFACT message sets for users, although it will switch between banks in private formats. There is still no interconnect for the central bank and SWIFT transactions from the bank's own networks.

Currently, at least 650 industrial groups, representing possibly as many as 15,000 end users, are using existing proprietary banking formats. Around 15 percent of these have indicated a willingness to migrate to Financial EDI and then into business systems EDI using EDIFACT.

There are a number of peak industry bodies and national initiatives which are taking the lead in electronic commerce. SIMPRO Brazil is the trade simplification authority, based on the U.K. SITPRO model. Its mission is now to promote UN-EDIFACT as the national standard as well as to promote its use for international trade data flow purposes. The Chairman of SITPRO, is the PanAmerican EDIFACT Board (PAEB) rapporteur.

EAN Brazil are also promoting the use of EDIFACT (EANCOM) for general commerce, particularly in the manufacturing, distribution, warehousing and retail industries.

The banking association is still currently supporting both private standards and EDIFACT for corporate and banking clearance purposes. The central bank does not yet appear to have a position on EDIFACT but may be forced into a position as SWIFT migrates to EDIFACT support.

The auto manufacturing industry have a private format version of file transfer data exchange, while customs appear to have no position on EDI, nor on EDIFACT at the moment.

**Current Status**

Telecommunications is only deregulated for VANs services, but voice is still regulated. The national carrier, Embratel, which launched an EDI service in 1995, also offers electronic mail and is soon to offer the nation's first commercial Internet access.

Other VANs include:

- Proceda, a Brazilian-Argentinean corporate joint venture. Proceda now resells the GEIS service.
- GSI was established in 1990. It is now the IBM reseller.
- Interchange is the banking VAN, operating an OTC (Telstra Australia) X.400 service.

The combined revenue of the VANs over the last three years was:

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<th>(US$ million)</th>
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<td>8.3</td>
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Usage, in 1994, was broken down to 48 percent in banking, 6 percent in transport, 20 percent in general commerce, 6 percent in the auto industry, and 20 percent in others such as insurance and credit cards. It must be remembered, however, that standards-based EDI is probably less than 10 percent of these figures.

There are two regional government initiatives, both for ICMS (a local value-added tax). They are proprietary systems using EDI principles, and are a regional, not a federal tax initiative.

In 1995, the Brazilian federal government asked SIMPRO for a submission on EDI for customs usage. Initial discussions are still in progress.

Unibanco, a major Brazilian bank, in concert with its partners in Interchange, began to offer value-added banking (VAB) services based on EDIFACT standard messages in the same year. Interchange will retrieve and deliver messages to all VANs, other banking or private networks, or even direct to clients' own networks. They provide an optional remittance advice (EDIFACT REMADV), which may alternately be delivered by a VAN or point to point by corporates.

EAN Brazil are now attempting to develop national EDIFACT message guidelines, integrating Brazilian codes into EANCOM and EDIFACT messages. The first two messages to be completed are
PAYMLT (multiple payments) and its Response message.

In 1994, SINDIPESA, the Brazilian manufacturers association, recommended a national standard for the auto manufacturing industry. It contains 17 message types and is based on ODETTE, the European proprietary EDI system for auto manufacturing. ODETTE is in fact a message set and a file transfer protocol (OFTP). The Brazilian banks have rejected this proposition, but discussions continue.

EAN Brazil have been developing commercial EANCOM message sets since 1993. They have helped around 60 commercial companies into EDI, using 8 to 10 EAN messages. There are now several EAN initiatives including hardware-wholesale, the supermarket industry (which is now nearly 100 percent product bar coded), pharmaceuticals and transport. Their target is to have 350 users by end 1996. A user is defined by EAN Brazil as a large company, or hub; but they also hope to attract 10 to 20 percent of medium-sized companies into these projects.

A service bureau, Siscomex, specializes in trade documentation. It is talking to customs on the possibility of including EDI modules in their service for traders. Mercosul will probably require EDI interchange between members quite soon.

Currently there are no tertiary education courses on EDI or electronic commerce. EAN run regular courses for their own members, specifically on EDI implementation and technology. There is also no law covering EDI. The few EDI translators at all supported, are EDI Edge (by Interchange), Supply Technology STX, St Paul Software, Unisys' Eadiplus, SSA, Sterling Software, and EDI*TIE. The level of support, however, is generally fairly primitive except where a VAN or EAN supports them.

DISCUSSION

Despite fragmented leadership, peak industry bodies and nongovernment agencies appear to be playing a useful role. The absence of any government initiative, particularly to legalize electronic commerce is a concern, as are the different views on standards, but informed debate should resolve these issues.

A national shared vision articulated by the government is locally considered only partially useful. A joint initiative with agencies such as SIMPRO and EANCOM carries more support in the business community. Government-only guidance would be unwelcome although the issue of mandating EDI for customs clearance has some support, since a similar mandate for ISO 9000 proved to be effective.

In summary, inflation led to an information explosion which in turn led Brazilian banks to an electronic regime much earlier than in many other countries. The advent of VANs over the last three years has given rise to concerns about banking disintermediation, resulting in a greater fillip to banking or financial EDI. Private sector agencies and peak industry bodies are now taking up the challenge for business systems EDI. Although there are only 100 to 200 true EDI users in Brazil at the moment, there are few technological inhibitors to growth.

CHILE

Chile has progressed well with EDI in a short time; however, the legacies of a Spanish style colonial administration have left their mark and present a few barriers to successful implementation. Even so, it is believed that Chile will get it right first in the region. Their main challenge is to develop skilled and experienced resources and to find a role model for guidance. As a Pacific country, Chile may well look to Asia rather than Europe or North America for this guidance.

EDI arrived in Chile fairly recently from two directions: transplanted from the United States by Chileans working for U.S.
companies, and through the Chilean EAN. Article numbering is administered through the National Chamber of Commerce (NCC) which is one of a small number of powerful peak representative bodies in the country. The NCC has the support and the ear of government. Together with the Bankers Association and SOSOFA (Manufacturers Association), the NCC persuaded the government to help fund the establishment of EDI*Chile in 1993.

EDI*Chile has taken on a national, cross industry EDI promotion and implementation role. Its mandate is to create awareness, agree on message sets and implement EDI. It has no direct interest in any VAN. EDI*Chile charges membership fees, for which it provides information, a forum for users, and implements messages using EDIFACT and EANCOM syntax and message sets. It is also creating a set of Chilean message implementation guidelines in Spanish. In practice, these are more or less a direct translation of the EAN guidelines, but with the integration of local Chilean code sets.

In 1994, EDI*Chile had 15 members; in 1995 they have 125 members. They plan to have 3000 members by 1999. Membership fees vary with the size of the organization. Presently EDI*Chile have a staff of three: a general manager and two product managers (that is, applications specialists).

There are five VANS in Chile: GEIS, who run a service called Transaction; EDI*Bank with a financial EDI service and interbank clearing house; AT&T for mainly email; IBM Advantis; and EDI Trade, a new Customs initiative, which is preparing for a pilot.

EDI*Bank is a bankers' consortium, representing companies processing 90 percent of all Chilean bank transactions. It is made up of seven banks and 87 percent representation from the private sector.

**CURRENT STATUS**

EDI*Chile have two government projects. The first is AFP, for the government's pension plan deductions and administration. The second is ISABRE, for health insurance and administration. Both are in their pilot phases with few, if any, actual users.

The customs pilot is based on UN-EDIFACT CUSDEC. It is planned to have three or four pilot users by the end of 1995.

The supermarket industry is currently using ORDERS (EDIFACT Purchase Orders) and Responses between supermarkets and suppliers. They have about 30 trading partners in preparation, but only a small number are actually using EDI at the moment. Bar coding in this industry is not yet the universal practice but is well on the way.

The banks are testing EDIFACT PAYORD (Payment Orders) at the technical level between themselves at the moment, using internal banking formats for inter-bank communications and clearance. The EDIFACT standards are for use by end users, not yet by the banks themselves.

In total, there are probably no more than 50 pilot users in all industries, possibly only five or 10 dependent EDI users at the moment. But the pressure is obviously building up.

Translation packages being offered at the moment include EDI*TIE (a Dutch package) from EDI*Chile; DNS EDI*EDGE from EDI*Bank; EDI*TIE and EXPEDIT from IBM; and St Paul Software from GEIS. Several local packages are said to be under development.

EDI*Chile intend to broaden their base to include all six peak industry bodies. EDI*Trade is planned for a full customs declaration service. Financial EDI is planned at the national level using a locally implemented Digital-based clearing house.

The government also intend to implement scanning systems to support the health and pensions EDI processing initiatives, to reduce the potential paper mountains which will result from current systems.

There are no specific electronic commerce laws in place yet but EDI*Chile believe that legislative change will begin in 1996. In the meantime, the national taxation authority have introduced a change in tax legislation to enable submission of electronic invoices for reconciliation of Eva (a local VAT), but only for companies above a certain size. Eva currently requires a signed, watermarked, original invoice for all purchases, to be lodged monthly by all corporations.
This presents serious administrative overheads for smaller companies. If EDI is to penetrate all levels of enterprise, a technical solution must be found to solve this problem.

**DISCUSSION**

Although there are only a small number of EDI users presently, the infrastructure appears to be developing much more along Asian than Latin American lines. The government has taken a position with EDI*Chile and agreed to use EDI. The NCC and EAN authorities and the banks are also participating. While there may be some grandstanding on UN-EDIFACT at the moment, trade with the United States is likely to draw in ANSI X.12 users.

EDI*Chile is acting as the EDI association as well as an implementer at the moment. Lack of resources, expertise and the conflicts presented by being a representative body and a consultant and implementer at the same time will inevitably force role changes.

On the trade processing front it is far too early to make a judgment, although everyone agrees that customs have been too slow to take an initiative. The nationally owned port will present some logistics barriers until it adopts EDI. There is severe concern about its capacity at the moment. Membership of APEC, NAFTA and association with the Latin American trade grouping Mercosul, and possibly the EU, will soon test systems to the limit.

There is no electronic commerce law, and no local VAN interconnect at the moment. VAN experience and their natural marketing ambitions are currently preventing interconnections. However, since Chile has a fully deregulated telecommunications regime, it is expected that interconnects based in the United States will soon be used and that the VANs will absorb international connections in exchange for traffic and revenue growth.

Chile has proven it can solve infrastructure and public sector problems. The country now needs time to develop skills and build on experience.

The major concerns revolve around the ability of the Eva tax system to adapt to EDI; a government endorsed national vision statement for electronic commerce; and the ability of the port authority to adopt contemporary electronic commerce and IT systems to help meet capacity constraints. At the same time, the ability of smaller companies to adopt the technology, and the resulting potential for wholesale disintermediation, may test government resolve.

**HONG KONG**

Like Singapore, Hong Kong has a small land mass and a relatively small population: 6 million in Hong Kong as against 2.7 million in Singapore. Both are major land and sea ports; both depend upon trade, particularly reexports in the case of Hong Kong. Both countries initiated a project to implement EDI in the early 1980s: Hong Kong in 1983; Singapore a little later. What has happened since that time is symptomatic of the difference between the two regions.

The most obvious difference lies in government philosophy. Singapore is interventionist and paternalistic in nature, hence offers strong leadership and direction. This has led to the great success of Singapore's Tradenet EDI services. On the other hand, Hong Kong has a laissez faire philosophy, taking the approach that anything that is ultimately good for trade and industry should be paid for and operated by private commercial interests. Since the most important relevant interests are represented by a small number of large trading and commercial companies, some of whom are in competition with each other (competition in Hong Kong is much fiercer than in Europe or North America), any...
collection of strictly commercial interests tends to delay action. This has not been helped by the "1997 syndrome," when the colony is scheduled to rejoin China.

An additional brake on progress is caused by the practical concern that any trade facilitation EDI must have the active support of customs. However, Hong Kong customs is much less important to its economy than to most countries. Hong Kong is virtually a free port; very little is collected in the way of duties. The main role of customs is to police borders, to oversee trade quotas and try to contain the drug trade. As a consequence, customs trade processing IT systems, with the exception of quota management, are very limited in scope.

Hong Kong's commercial procrastination and lack of central leadership have combined to allow Singapore to take the lead in EDI and to gain significant commercial advantage. Which is not to say that Hong Kong is backward in establishing the infrastructure. It has deregulated the VANS market and has an excellent telecommunications system. For example, there are 17 suppliers of paging services, three mobile radio operators, three telepoint (CT2) personal communication systems, two operators of trunked radio systems for voice and data and over 30 licensees of value-added services for such services as electronic mail, voice mail and store-and-forward fax services.

The small number of EDI users in Hong Kong are in the retail industry, shipping lines, freight forwarders, some airlines and a few U.S. based multinationals. Textiles and apparel manufacturers and importers and exporters are also developing electronic connections to the major U.S. and European clients. Even so, with all of this activity, in the absence of commercial unanimity and government leadership there are probably no more than 500 or so EDI users in Hong Kong at the moment.

Other factors are having a negative impact, compounded by the 1997 deadline. The most obvious among them is the very real damage being done to the economy by the brain drain. During the period 1989 to 1993, an estimated 40 percent of the top IT professionals either left Hong Kong, or obtained a British passport, which would allow them to leave in the near future.

TRADELINK

In 1983, the Hong Kong government helped sponsor the creation of a special council to improve trade through trade facilitation. This council was made up of representatives of the government, and of major trading companies and financial institutions. The council proposed the creation of an EDI system—a database of consignments—to facilitate trade. The proposed system was called Hotline. Promising as Hotline looked, the council did not have the means or the charter to pay for the system. The council then took the project to the Hong Kong government, suggesting that the government build the system. The government's reply was that such a system would benefit mainly businesses, and was therefore unfit for official funding. A survey of trading companies undertaken by the council provided another argument for government sponsorship, noting that most trade business people said they would feel uneasy if competitively sensitive trade data were stored by an organization other than the government. Again, the government argued that it was not in the business of providing information processing services that could well be done by other VAN suppliers.

The government's reticence in taking the lead on Hotline resulted in a hiatus in EDI for trade in Hong Kong. Still, the belief that EDI was needed for trade persisted and several companies that had participated in the council started their own forum, Tradelink, to support a consultancy study investigating the commercial viability of a trade-related EDI system.

The resulting report indicated that such a system would probably not be profitable from a strictly business point of view, and further obscured what roles should be played by the government and the private sector in creating such a capability in Hong Kong.

In March 1990, the government announced that it was setting up a shared initiative with Tradelink to take the project closer to a working system. The shared initiative was called SPEDI (Shared Project for EDI). The first recommendations were
published in 1991, eight years after Hotline was created.

Projects of special interest to SPEDI and the Tradelink partners are:

- a gateway to government systems, for example, customs and quota systems;
- VANS and IVANS interconnection, and common access;
- EDIFACT message development;
- Chinese language standards development (30 to 50 percent of documents are in Chinese; an even higher proportion contains at least some Chinese);
- Economic methods of EDI use and access for the 80 percent of Hong Kong firms which have less than 10 employees (Community Access Service, or CAS);
- A service bureau or paper-based trade facilitation service for these small companies.

Around July 1993, Tradelink announced they had concluded negotiations with IBM to provide the Tradelink EDI service, which comprised CETS (Community Electronic Trading System), end user software repertoire; and CAS, a concept, based upon bureaus and no tech-low tech EDI services, involving phone, fax, telex and hardcopy.

The service was due to go live by early 1995, leaving very little time to prepare for possible changes that might take place in 1997. However, catastrophically, during 1994, IBM and Tradelink abandoned their negotiations, each side blaming the other for either rewriting the specifications or not adhering to original agreements. By early 1995, Tradelink had placed an order for an INS (GEIS) EDI software package to run on a Hewlett Packard Unix platform. The original specifications had been downgraded to match a revised budget. Tradelink, which at one stage had 23 employees engaged on system design and message development, are now having to rethink their implementation, marketing and support roles, which were originally to be contracted out to IBM. CAS for nonautomated users appears to have been placed on hold. There is no public announcement on the government's participation in the project.

The launch date for Tradelink's initial service is now March 1996. Meanwhile, the transport and distribution industry have set up an alternative, Cargonaut. The retail industry also launched their own service in May 1995. Both of these important user bases are now lost to Tradelink, which will pose both technical and marketing problems to them downstream.

Summary

Surprising as it may seem, the idea of an EDI service designed for a national trading community, was born in the small island country of Hong Kong in the early 1980s, with the Hotline project.

The project, now called Tradelink, was designed to eliminate paper from the export process and to speed up approvals and the quota surveillance operations. It promises considerable economies for the government and the private sector alike.

Today Tradelink is a private company with an equity partnership of 11 major Hong Kong enterprises. It has government backing to run a community EDI service, with equity of between 30 and 48 percent being taken up by the government. The arrangement is that Tradelink will get an exclusive EDI gateway to the government for a period of seven years. The gateway will provide two-way EDI access to trade, customs and statistics departments. In return, Tradelink have to provide electronic input and output facilities for up to 120,000 Hong Kong trading companies.

And this presents the real challenge. Most experts agree that after something like 10 years of true EDI experience, the total number of EDI users worldwide is currently around 80,000 to 100,000. So to fulfill its mandate, Tradelink has to revolutionize the way in which EDI is implemented, and in so doing pay special attention to the needs of small traders and to the Chinese language issues.

There are still doubts about the government's intention to make EDI mandatory, but without some form of compulsion it is doubtful if Tradelink will come anywhere near that total of 100,000 plus users in seven years.

The importance of Tradelink's success for Hong Kong's commercial well being, and in particular for the export-oriented industries of textiles, electronics and
banking, cannot be overestimated. Tradelink EDI is a critical infrastructure project, but it will be breaking new ground. No one, anywhere in the world, has had experience in developing such a large EDI community from scratch. There is only a small amount of EDI experience in Hong Kong. Delays have enabled other private sector competitors to erode Tradelink's potential customer base, its authority, and ultimately its participation in the full trade facilitation process.

Procrastination, lack of commitment, of leadership and, crucially, of a shared vision embracing both the public and the private sectors (compounded by the imminent changes in 1997) have made the future of Tradelink uncertain. What would have been an opportunity for a quantum leap in trade competitiveness and regional advantage has been turned into an exercise which will need considerable good fortune just to catch up with their regional neighbors.

The earlier centrally planned and controlled economic structure had created a contrived communication system, which, when removed, left an information vacuum. There is still widespread ignorance of EDI as a potential business facilitator within the Hungarian trade and industry communities. Interindustry relations and trading arrangements still reflect past practices of hoarding inventories and production to stock. As a result, inventory turnover rates and order processing cycles remain excessive by international comparison. Interestingly, however, computer-aided design and computer-aided manufacturing have a tradition in several branches of the Hungarian industry. But these systems were confined to individual plants in the local economy and did not serve as a medium for interindustry communication, let alone as an instrument for interacting with consumer markets at home or abroad. Still, the existence of computer-integrated manufacturing (CIM) points to the fact that there were substantial R&D capabilities in Hungary, and all related hardware and software had been locally designed and manufactured.

The challenge for the Hungarian government and the local business community was to encourage the reluctant industrial, agricultural and service sectors to adopt informatics concepts and to integrate EDI-based management into their production, marketing and sales processes. The urgency of this was heightened by the fact that foreign competitors had started to aggressively penetrate Hungary's domestic market. The lifting of import quotas and growing liberalization of regulations had created a situation where foreign parties could expand their networks into the local economy. These foreign traders and service providers were put into advantageous positions because they employed advanced informatic systems, which the Hungarian business community could not match. Hence many local producers and traders found themselves increasingly marginalized.

With the help of foreign aid institutions, the government started to launch several initiatives aimed at introducing effective EDI-based management information systems for trade, industry and the agriculture sector. Notable among the aid providers were the Economic Commission for Europe (ECE) and the World Bank. Both organizations engaged in market analyses and the derived design for informatics systems. The ECE, through its PHARE program, focused on the agriculture sector. The World Bank concentrated on developing competitive markets for consumer goods while maintaining emphasis on agro-industrial products. Meanwhile, the Hungarian government, through its ministry of Transport, Communications, and Water Management (MTCW), took steps to tie into ongoing research in the application of EDI concepts in the service sector, especially
transport. MTCW became active participants in the ECE's Research and Technological Development Program in the Field of Communication Technologies (RACE) and within the framework of the European Cooperation in the Field of Scientific and Technical Research (COST) program.

**TRADE FACILITATION**

During the 1970s, the Hungarian government had established a specialized body, HUNGPRO, which was mandated to arrange for trade facilitation. The organization and goals were modeled after the British Simpler Trade Procedures Board (SITPRO), a leader in such initiatives. SITPRO is an independent executive body established in 1970 by the British government and sponsored by its Department of Trade and Industry, although its members are drawn from a variety of trade and industry organizations. SITPRO's terms of reference are to guide, stimulate, and assist the rationalization of international trade procedures and the documentation and information flows associated with them and, where appropriate and in consultation with the department, to undertake consultancy work in the trade facilitation field in the United Kingdom and other countries.

Unfortunately, HUNGPRO, while interesting in concept and intent, did not evolve into anything even remotely resembling SITPRO. Its successor organization, HUNPRO, which the government set up during the 1980s, remained ineffective and failed to create consensus among government institutions and between these and the national trade and industry community about required actions.

HUNPRO established links with the ECE. ECE's working party 4 (WP.4) had spearheaded efforts to establish the internationally compatible system of EDIFACT, which has gradually become the international system for trade and services related electronic data exchange, despite the earlier existence of competing systems, like the North American ANSI X.12. HUNPRO became a member of the Eastern European EDIFACT Board. But beyond expressing interest in the EDIFACT system, HUNPRO did little to propagate EDIFACT principles and measures within the Hungarian business community, mainly because of rivalries among government ministries. The former Ministry of International Economic Relations, a remnant of previous socialist government structures, proved incapable of taking the lead.

**CURRENT STATUS**

A new HUNPRO was established in 1993. The former Ministries of International Economic Relations and Industry, not always on friendly terms, were amalgamated into the Ministry of Industry and Trade (MIT). Leadership was streamlined and objectives more clearly defined, as were the institutional responsibilities. The new HUNPRO includes three levels of EDI activity. At the first level, an interministerial committee decides upon the work plan, coordinates its execution, ensures appropriate financing, and represents Hungary in international forums. A second executive level includes the secretariat and other auxiliary groups responsible for the execution of the work plan and providing assistance to other groups within HUNPRO. The third level comprises so-called EDI forums or EDI clubs in different sectors of the economy.

The transport EDI forum is the most active. As one of the first initiatives, MTCW arranged for seminars through which participants had opportunities to learn the basics of EDI, meet Hungarian software developers and discuss how to take part in transport pilot projects. Several such pilot projects have started in the field of freight forwarding, trucking, inland waterways transport, and railway management.

An experiment in financial EDI was launched by the Hungarian bank for Foreign Trade (MBK) with two users. This bimodal solution enables those having in-house EDI systems (through a banking EDI interface) to connect to MBK, but the bank also provides stand-alone software for non-EDI users to send structured flat files to MBK. The national headquarters of customs are planning to introduce an EDI module in their new computer system. In early 1995 a project was launched to create the environment for this under the name EDIFOCUS (Electronic Data Interchange for Customs),

Annex 1: The Case Studies 53
primarily with bona fide partners entitled to delayed customs payment. The project built on two EDIFACT messages—CUSDEC and CUSRES. The data content of the Hungarian versions of ECE's Single Administrative Document (SAD) is taken as the basis for the subsets. But the acceptance of the new Customs Law, presently under preparation, is required for the application of EDI.

EDI and EDIFACT standardization in Hungary are the responsibility of the Office of Standardization. Apart from the naturalization of EDI and EDIFACT related standards set by the International Standards Organization (ISO), the office has taken the first steps based upon German examples, towards presenting specific EDIFACT messages as Hungarian standards. The ambiguity of EDIFACT code lists created difficulties for initial EDI implementation. Consequently, HUNPRO devoted part of its resources to preparing a Hungarian version of the UN Trade Data Elements Directory (UNITDED). More than a simple translation, this includes a thorough analysis of code definitions and related issues by experts from different sectors.

The new HUNPRO holds much promise of success, although many hurdles remain to be overcome. Infrastructural issues appear to ease, as HUNPRO reports data exchange can now be realized in many areas through telephone lines, through dial-up modems at a quality approaching European standards. The packet switched data network allows direct connections in packet mode (X.25) and asynchronous (X.28) terminal equipment from most regions of the country through a radial trunk network and the connected local networks.

International connections are possible to 27 countries. The digital leased line data network extends transmission possibilities by high quality services, while satellite data telecommunication networks offer special solutions.

According to evaluations by HUNPRO's transport forum, the data transmission infrastructure does not impede future development of EDI applications. While these observations may hold true in several respects, there remains continuing need to entice potential users to participate. HUNPRO is aware of this need and has special plans aimed at dissemination and training.

**Discussion**

During a workshop organized by a World Bank mission in 1995, participants representing Hungarian trade, industry, and service communities identified the following conditions for a well-functioning national EDI system:

- reliable, competitive, cost-effective telecommunications networks where users can choose from a range of solutions;
- secure electronic environment where business users can communicate without risk to confidentiality and integrity of proprietary business information;
- strong and binding intellectual property rights for manufacturers and service providers;
- protection of personal data targeted to address legitimate concerns while ensuring that EDI achieves the benefits arising from free flow of information;
- simple, unambiguous, timely telecommunications and information technology standards set at a truly global level;
- stable legislative environment attracting international investment capital to the telecommunications and information technology sectors; and
- environment where business takes the lead, and government activities on legislative, regulatory, and institutional fronts are discussed with users, manufacturers and service providers.
MALAYSIA

Malaysia’s industrialization program aims to transform the country into a developed nation by the year 2020. In 1983, manufactured exports totaled 30 percent of total Malaysian exports; 10 years later the figure was 74 percent; and by the year 2000 it is expected that this figure will exceed 80 percent of the total. In part this achievement results from a national strategy which saw the establishment of an Export Promotion Council (EPC) in the mid 1980s.

The role of the EPC was to transform Malaysia’s external trade. The EPC defined three initiatives as part of its overall strategy: institutional development in trade promotion; export promotion and marketing; and trade facilitation and export support.

In 1986 EPC oversaw the establishment of the National Trade Facilitation Committee (NTFC), whose mission was to help simplify the paperwork involved in international trade. NTFC adopted the Aligned Documentation System (ADS) as the Malaysian model. ADS is a paper-overlay system designed by SITPRO (Simplified International Trade Procedures Board), a one-time U.K. Department of Trade and Industry initiative.

The ADS system had been widely adopted during the 1970s and the early 1980s. It was credited with being one of the major influencers of EDIFACT standards and its predecessors. Indeed the first EDIFACT secretariat was housed at SITPRO; and SITPRO’s Chief Executive, Ray Walker, is now Chairman of the UN-EDIFACT board.

The ADS system never took off in Malaysia, because by the time it was introduced EDI had started its remorseless international assault on paper systems. The promoters of ADS, who had by this time formed a company, EDI (Malaysia) Sdn. Bhd., became promoters of EDI. In time, they were able to recruit major investors, including Tabung Haji, the Malaysian Muslim Pilgrims Fund, Time Engineering, a major electronics and telecommunications company and the Malaysian chapter of the International Chamber of Commerce (National Chamber of Commerce, or NCC).

By this time, around 1991, the investors had influenced the appropriate government departments to grant EDI (Malaysia) a 15-year exclusive license to access trade-related government information, particularly customs information. However, the agreement remained confidential until such time as the sponsors of EDI (Malaysia) had their investors and funding in place.

Naturally, when the announcement was made, under the auspices of the EDI Implementation and Coordination Committee in 1993, it caused a certain amount of conflict in the marketplace, not least from VANS who had already been offering EDI services for some time.

By August 1993, the formal launch of EDI (Malaysia) had taken place, with backing from various government departments. They have now installed an INS EDI server and switch system. The INS system is a cut-down version of the public system operated by INS in the United Kingdom, which supported over 5,000 U.K. EDI users at that time.

EDI (Malaysia) also offer the INS translation software products.

CURRENT STATUS

The EDI (Malaysia) service is called Dagang*Net (Trade*Net in Bumiputra). By December 1994, they had around 100 employees and 100 customers, including 30 customs brokers and agents, sending 500 declarations a day to Malaysian Customs.

Start up capital was RM54 million (US$20 million), fully paid up. They estimate the split of their costs is 20 to 25 percent technology, the remainder being spent on awareness, education and promotion.

They have now started to resell the GEIS service and a range of other software products; they have also introduced an electronic mail and bulletin board service. It is likely that they will soon announce access to information services.

Dagang*Net have pilot EDI communities in the Port Klang community, involving customs import and export declarations, which will, in turn, involve the port authority, customs, exporters, importers, forwarding agents, shipping agents, hauliers, container handlers, and banks. They are also involved in textile quota and license

Annex 1: The Case Studies 55
administration applications with the Ministry of International Trade and Industry (MITI). A further initiative concerns the use of the UN-EDIFACT SANCRT, or Sanitation Certificate, for veterinary and health approvals for the import and export of livestock, particularly *halal* certificates.

Further pilots are taking place with the port of Johor. Other ports and airport EDI applications are planned as are financial EDI and a range of nongovernment EDI services. They are certifying a number of local systems integrators to help with enabling and selling.

GEIS reseller arrangements mean that they can begin to offer international gateways. They also plan to offer SITA connectivity services for the airline community.

**Experience**

In some areas, the experience of EDI (Malaysia) illustrates how not to go about establishing a national trade facilitation initiative. It was established under the sponsorship of a small number of government departments in a climate guaranteed to induce hostility and noncooperation from competitors (and the competitors' clients). Private sector funding subsidizes all awareness, education and training, which implies that EDI (Malaysia) will, in time, only be able to address potentially profitable or short term revenue clients, thereby ignoring many who can have more impact on the national objectives of trade facilitation.

While educating their potential client base they are simultaneously having to educate the government in order to persuade them to take the necessary steps to ensure the success of EDI. By now the government has enacted legislation to change the Evidence Act, has changed the Customs Act and has amended the Penal Code to bring them into line with the requirements of EDI. The Companies Act has also been amended to allow the storage of electronic documents for audit and presentation purposes. In time, these changes may be integrated into an all encompassing EDI legislation not unlike what has taken place in South Korea.

In the meantime, EDI (Malaysia) have to spend valuable time and resources in supporting this vital infrastructure which is not of commercial value, forcing them into selling other products and services, and pushing them into other, more competitive markets in an effort to generate revenue for this start-up phase.

EDI (Malaysia) currently do much of the standards setting for Malaysia, and provide people who sit on the various committees set up for national EDI implementation. The cost of this privileged access could well prove insupportable; the start-up technology costs were around US$ 2.5 million; annual staff and running costs are in the order of US$ 15 million. It could well take five to seven years before annual revenues reach that level.

Customs have still not adopted EDI techniques; they are not yet technically capable of doing so. The best they can do is to receive a flat file and print it out on their premises. EDI (Malaysia) staff then take the printout and walk it through the fast track approval process. This is partly because of the computer vendor's agent who supplies customs' systems. The EDI initiative threatened his source of revenue to such an extent that he lobbied internally within customs to try and ensure a minimum compliance and to delay full EDI implementation.

Even though the EDI (Malaysia) system has reduced approval times by as much as 70 percent, this is still not good enough when compared to the general experience of reductions from 10 days to 10 to 15 minutes.

At the moment there is no automated Malaysian inter-bank clearing system so that traders will need to open special accounts for direct entry duty payments. Except for faster payment clearance, this is not a benefit at all. Also, it only benefits traders who are not regular customs clients; regulars normally obtain clearance on check presentation. Bank Negara, the Malaysian central bank, holds a watching brief on the need for a national automated clearing house service.

**Discussion**

The private sector has very little power or influence in shaping the direction of a
national initiative unless it has sufficient resources to force compliance. Also, it must have a vision which successfully combines national good with its own ambitions. EDI (Malaysia) seems to have neither the resources, nor the vision. The danger it poses to a national initiative is that as a private partner it may become tempted to adjust pricing to a noncompetitive or predatory level for its own survival, thereby endangering the larger national good. At the same time, local business practices and the existing interaction between the public and the private sector have not prepared anyone for the sophisticated and synergistic relationship required for this initiative.

To make matters worse, at first analysis it looks as though EDI (Malaysia) has been underfunded by at least US$ 50 million if it is to perform its true function; and even that figure is based on the assumption that government departments and other institutions make their own contributions by way of staff and resources.

Probably the most important missing ingredient in Malaysia was awareness of the potential of EDI. Neither the government, nor EDI (Malaysia) seemed to be fully aware of what they were getting into.

Finally, although it has not yet emerged as an issue, the widespread substitution of Bumiputra for English is now being reversed due to a reluctant political acceptance of the predominance of English in international trade. A generation of Malaysians may be handicapped as a result, a problem which may creep through to influence EDI acceptance in Malaysia.

MEXICO

From the perspective of electronic commerce, Mexico is the Southern equivalent of Canada, their partners in NAFTA. The overwhelming technological and commercial influence is the U.S; 60 percent of all Mexican exports go to the United States. Mexican practice is much closer to the U.S. and ANSI standards than the global EDIFACT movement.

EDI has been in active use in Mexico for several years, and has been dedicated almost entirely to North American hubs in industry-specific implementations, such as retail and textile manufacturing. EDI in Mexico, like bar coding in Mexico, is a hybrid. The Mexican EAN organization, AMECOP, promotes UPC, the United States version of EAN numbering. UPC has the same code structure as EAN, but the first two digits which represent country codes are absent. This means that the United States is implied in a UPC code; and Mexico is treated as a virtual U.S. state by UPC.

AMECOP also promotes ANSI X.12 as the national Mexican standard. It would have been difficult for them to choose any other course, bearing in mind the overwhelming presence of their North American trading partners, and of course the advent of NAFTA.

In addition to ANSI X.12, AMECOP promotes and supports derivatives and subsets of ANSI X.12, such as UCS (Universal Communication System) and VICS (Voluntary Industry Communications System) for the retail supply chain.

VANS presently offering their service in Mexico include IBM Advantis, Sterling, GEIS, AT&T, and MCI/BT. A wide range of translation software products are supported by these VANS and increasingly by third parties.

The main user groups include the health sector for pharmaceuticals and hospital supplies; the auto manufacturing industry and its supply infrastructure; textile manufacturing, apparel manufacturers and department stores; and grocery and supermarket industries.

Telecommunications are deregulated in Mexico hence there is a truly competitive VAN infrastructure.
AMECOP is the de facto EDI association. It employs EDI consultants and issues guidelines and general communications on the subject. The EAN chief executive chairs a national EDI committee, which also includes representatives from a wide spectrum of industries such as pharmaceuticals, oil and gas, manufacturing, textiles, department stores, and now the government. Presently there is no active work taking place on EDIFACT message standards for trade facilitation.

Other representatives on the national EDI committee include peak industry bodies from the auto manufacturing industry and the NCC. EAN itself now has 9,500 members eight years after its establishment in Mexico.

CURRENT STATUS

There are 700 EDI users in various industries, particularly in the pharmaceuticals and health sector, oil and gas, the retail supply chain and general manufacturing.

There is no specific law for electronic commerce and no regulations regarding the tax status of electronic invoices. Discussions are just about to commence with the government and the EAN-National EDI Committee on these topics and that of national trade facilitation.

There are hereditary cultural problems regarding relationships between the public and the private sectors. For example, the government still insists that the private sector must prove the legality of any new initiative, including EDI, of which the government appears to have become aware only recently.

It was repeatedly stated that whenever the government senses a departure from traditional business practices, it attempts to gain control and regulate that new practice, which causes pioneering users of new techniques and technologies to become secretive and to distance themselves from disclosures to the government. EDI and electronic commerce appear to be a classic case of hiding a new development in full view of the government.

However, the EAN-National EDI Committee are at the moment involving the government and may even conclude a partnership with them. The banks are beginning to make noises about financial EDI but, being nationalized institutions, are unlikely to take a very aggressive position.

Meanwhile the government is grappling with an economy in crisis. Many government departments are in a state of flux, with significant personnel changes and the loss of a body of knowledge acquired over many years.

DISCUSSION

At this stage electronic commerce in Mexico may be regarded as an extension of North American practice and technology. Even so, there are issues to be faced, apart from a rapprochement between the public and the private sectors in order to articulate a national agenda or vision statement. In addition, the government has to come to terms with the potential disintermediation of an extensive small to medium enterprise sector, comprising at least 600,000 enterprises. Not only does government have to identify and absorb the potential of electronic commerce, it has then to derive a strategy to ensure the participation of these smaller organizations or to prepare for their ultimate disintermediation.

The conflict between the public and the private sectors cannot be underestimated. It is unlikely that under the present circumstances a planned or even publicly-supported growth of electronic commerce will take place. It is likely that private market forces will prevail and with it the growth of conflicting standards and competing VANs.
NEW ZEALAND

In the 1970s, New Zealand Customs developed their own automated clearance system based on paper input from traders. At the time the system was regarded as a world leader in functionality. During the late 1980s an automated, paperless import clearance system was added. Originally called ICCS, it later embraced UN-EDIFACT syntax and emerged as an EDI based system called CEDI*FIT (Customs EDI for Import Transactions).

In March 1995, this system, which had fallen into some disuse and had foundered through lack of development was upgraded to full UN-EDIFACT current message status (CUSDEC). Previously, every EDI entry had to be converted to paper for local customs office and other government agency action. The aim is now to operate a completely paperless system.

In May 1995, out of a total of around 260 customs brokers, 184 were using EDI for import clearances. The majority are expected to migrate to CUSDEC.

Export EDI clearances will not follow for at least two, and possibly four years. Much of the supporting transport and trader infrastructure has still to take up EDI with any enthusiasm.

The New Zealand government has adopted an even more hands off approach than Australia, although in the early days of the customs EDI project senior customs management were enthusiastic advocates.

Numerous government departments now espouse EDI for trade facilitation but offer no leadership. The local EDI association (EDIANZ) operate solely on a voluntary basis; their hands are tied due to funding limitations.

The method customs use to offer EDI services is to totally subcontract all processing, implementation, training and ramp up facilities to the VAN. For the first three years GEIS was the contractor, before a retendering at the end of the contract period. The contract was then awarded to AT&T, through their local reseller, Netway.

Customs pay a monthly fee to the VAN as do all end users. End users pay market rates for all other products and services. They also pay an EDI clearance fee to customs.

The benefits to end users are generally confined to faster clearances. Integration with other government departments and most traders has not yet been achieved. Lack of leadership, high costs of implementation, and lack of an adequate EDI technology infrastructure, have all contributed to this situation. The economics of the small New Zealand market place have not encouraged the necessary infrastructure to develop.

SINGAPORE

Singapore Network Services (SNS) are an extremely well-documented company. They have attracted two Harvard studies. They evolved from a National Computer Board (NCB) research project which began with five people in December 1986. The initial preparation stage lasted 18 months. The primary objective for the project was to boost Singapore's competitive status in the world market. Trade was selected as the target for EDI, a natural choice, bearing in mind Singapore's entrepôt activity and ambitions. By March 1988, NCB had chosen to offer the service on an IBM 3090-MVS using the "Tampa Engine", which is basically the software which IBM use to run their International Information Network (IIN). This service, including EDI, is now offered by a joint venture between IBM and Sears, and is known as Advantis.

The Tradenet service was inaugurated on January 1, 1988, with a pilot group of 50 companies, including traders, customs agents and the Trade Development Board (TDB), which handles much of the statistical and licensing work traditionally performed by customs in other countries. SNS
was incorporated to manage and operate the Tradenet service.

The basic purpose of Tradenet is to enable a trader to make an electronic declaration of imports and exports direct from his own computer, typically but not exclusively a PC. The declaration is transmitted, using EDI techniques, to the TDB, who issue the appropriate approvals within 15 minutes, after routing details to various other government departments, depending on the goods. As many as 20 controlling agencies may be involved. On receipt of the EDI delivered approval the trader prints it off and signs it to obtain release of the cargo.

End user software was developed by SNS and is offered through a cadre of approved Singaporean software houses. Software not developed by SNS requires certification by SNS, which costs S$10,000 or around US$6,000.

End user benefits include 20 to 30 percent productivity improvements and cost reductions by as much as 50 percent. Traders no longer have to make personal trips to obtain approvals; repeat trips to resolve errors or disputes now hardly ever occur, which has enabled them to reduce their labor force.

Storage of goods awaiting clearance is no longer necessary. Goods may now go straight to the consignee from the cargo vessel. This is a particularly important benefit to Singapore, where space is at an absolute premium. The flow of goods has been expedited even further by the Port of Singapore Authority’s (PSA) own port, container and real time vessel management system. It is claimed that ships can now be turned around in less than 10 hours which offers a considerable improvement in utilization of port and harbor facilities. EDI preclearance has added to these extra efficiencies to help make the PSA possibly the most efficient port in the world. These “trade center management” efficiencies have been valued by the Singapore government as being worth in excess of S$1 billion annually, or around US$700 million. In 1994 this was worth more than 1 percent of Singapore’s GDP and around 0.4 percent of total external trade.

SNS helped noncomputer users by setting up a number of service centers, or EDI service bureaus. At one stage there were 10 of these bureaus but their numbers are decreasing as more traders install their own computers. SNS now have 12,000 users but probably only 50 percent are EDI users (of whom less than 3,000 are traders), the remainder are users of electronic mail, information services and bulletin boards as well as a range of new services designed for healthcare, legal systems, electronics, manufacturing, retail and distribution, and so on.

Current Status

SNS claim to have broken even in year three (1991-92) of operation. They now have an IBM 9000 installed, three RS-6000 and four Digital Vax machines. They employ 200 people; the average burdened salary for a Singaporean IT professional is in the order of S$250,00 per annum. Of their 12,000 users, 70 percent of revenue is derived from the higher value-added services of EDI. They are now installing several exported versions of their service in such countries as China, India, Mauritius, Canada, Silicon Valley-USA, Vietnam, Malaysia and the Philippines. Many of these installations are actually joint ventures with government departments, such as Mauritius Network Services or with commercial enterprises such as Ayala in the Philippines.

Singapore opted for EDIFACT standards well before any EDIFACT messages had been approved. They developed their own proprietary messages, based on EDIFACT syntax. They have yet to convert to United Nations Standard Messages (UNSM) such as CUSDEC. Singaporean users are not involved in standards development; Tradenet does it all for them.

By now SNS may be handling as many as 10,000 declarations a day, each of around 700 characters, charged at S$0.50 (US$0.35) per thousand characters, plus S$6.00 (US$4.50) per declaration.

SNS have embarked on a very aggressive international marketing campaign with particular emphasis on joint ventures. Their home market is already reaching maturity, especially for the higher revenue earning services, so they
need new services and to add value to existing services. In addition to multimedia services for home and education purposes, real time EDI is likely to be high on the agenda. For all their success, the Tradenet service is still only a batch-oriented store-and-forward service. In fairness, all of the other generic EDI services in the world are also batch oriented, although not all are store-and-forward; some are X.400 based.

If SNS decide to introduce a real time EDI service—and they have already demonstrated a prototype—they will once again be pushing the standards and performance envelope. Real time EDI will need real time standards which is a significantly greater challenge to end user and server systems than batch operations. It will probably also need to be Unix and X.400 based to conform with the direction that SNS are promoting to their overseas system purchasers. Such a set of changes will require renewed commitment to technical pioneering, especially since their competitors in Taiwan (China) and Korea are already part way down this path.

SNS are now promoting access to Tradenet through communication nodes in Malaysia, and through connections facilitated by exported systems to countries such as Mauritius. Experience suggests that such international traffic peaks at 10 percent of transactions and 15 to 17.5 percent of revenue, a useful addition to domestic revenue if support costs can be contained.

THE SNS BUSINESS CASE

SNS have demonstrated great success in the application of EDI to trade facilitation. In particular, they are illustrating where national benefits lie for newer entrants. But how truly replicable is the SNS experience? What are the levels of costs and benefits that might be expected from an endeavor such as SNS in isolation from the special Singapore factors which command the cooperation of everyone and ensure that only success is publicized?

In 1988, when SNS was just being planned, a government spokesman was reported as saying that a financial payback for the Tradenet service would “take many years”. In 1991, the CEO of Tradenet stated that technology investment in Tradenet was only around S$3 million and that they broke even in their third year of operation. In 1993, Tradenet management were quoted as saying “We have been profitable since our second year of operation. Revenues grew from (about) S$4 million in 1989 to more than S$20 million, with profits of S$3.2 million in 1992. We have no debt; our paid up capital was financed from funds provided by our owning boards.”

Another published source mentioned that the investment in technology, including hardware, software, IBM consultancy assistance and development came to US$20 million. Around 250,000 lines of COBOL was developed for the initial installation.

Even if technology was assessed at 30 percent of the total investment, this would raise the project cost to around US$75 million or S$100 million. Perhaps, like TradeVan, the efforts of the other participating bodies such as NCB, PSA and government departments have not been counted. In fact, they do not even appear to have been acknowledged.

There is no doubt that technology investment can be a much smaller component today. Companies like SNS, INS, GEIS and Tandem now have a range of products that eliminates much of the need for pioneering effort. But each country has its own unique characteristics. It is hardly likely that any product can be installed as a “plug in and go” system. The capital cost must be assessed realistically and efforts to customize systems for local adoption must be properly counted.

The proportion of expenditure between technology and awareness, promotion and education has still not been seriously challenged, be it 30:70 or 20:80. The overall scale of costs for the complete task also seems to be confirmed as being within the range US$50 million to US$100 million.

SNS RUNNING COSTS

At the end of December 1994, SNS employed 200 people. The average burdened salary per head for the caliber of staff needed for SNS at the time averaged S$250,000 per annum. A total cost of around S$50 million is indicated by these costs. The 1994 industry norms suggest a turnover per head of around US$250,000, or S$350,000,
inferring a budgeted turnover for SNS of S$70 million with present headcount, at normal commercial standards.

The majority of network revenue would probably be earned by Tradenet, which is indicated to total S$6.40 per declaration, 10,000 declarations a day giving a revenue in the region of S$15 million a year. Normal EDI applications and less well-paying messaging applications are likely to earn no more than S$1,000 to S$2,000 for each customer each year, a range of S$9 million to S$18 million for a probable network sales total of around S$40 million per annum. Consultancy and software sales, bolstered by export sales may stretch the total to S$50 million (US$38 million). However, when compared to other VANs in the field and market pricing levels, the SNS business plan model would appear to work only in a noncompetitive or highly protected business environment, or with subsidies.

To take one item: before Tradenet, exporters and importers paid TDB S$6 per declaration; now they pay that S$6 to SNS. A revenue gift, or subsidy, of such proportions is an extremely generous act, but it is hardly likely to be duplicated elsewhere.

Now that SNS are operating with a Malaysian partner, the effect of SNS pricing strategies on the nascent, local competition is becoming evident. It has been claimed that the prices which SNS charge Malaysian businesses amount to unfair competition and dumping. The truth of the matter is that SNS prices are lower than what a local commercial start up can maintain.

At one time it was widely rumored that the Singaporean government was going to make EDI mandatory for trade declarations. Legislation did not prove to be necessary; a combination of enlightened self-interest and statements from TDB that paper declarations would not be accepted after a certain date ensured over 95 percent compliance. Paper is still handled by the service centers on behalf of smaller, nonautomated traders; it is still used for declaring personal effects, for vessel provisioning and numerous other specialized imports and exports.

**Business and Cultural Factors**

There is little doubt that in Singapore, businesses are much more complaisant than their counterparts elsewhere; the economic health of the republic, and by inference its traders, is of paramount concern. As a consequence, if a government announcement promotes a new efficiency initiative, it will be taken up without opposition, and quickly. Singaporeans traditionally expect, and rightly so, that their government has thought through any commercial implications, and that the new initiative will be of benefit to all.

While this is fine for Singapore, who long ago shared their national vision with every citizen, it is less likely to work elsewhere. Most countries have not articulated a set of national goals and persuaded their businesses and citizens to sign off on them. The type of uncritical acceptance of government initiatives which is the norm in Singapore is most unusual elsewhere.

The technology and business skills infrastructure, and the general level of education in Singapore are all more conducive to the success of a technology initiative. At the same time, the regulated nature of State enterprises does not encourage much in the way of funding for competition, nor for competition with government enterprises as part of the business mindset.

On balance, the SNS experience is invaluable, but for a series of local special factors it is unlikely to be repeatable elsewhere. This is matter for concern, because there are evidently many government agencies around the world who believe that they can repeat the Singapore experience by buying their hardware and software. This approach may make start up cheaper, but only for that proportion of the task that is technology dependent. And even the cheaper technology will only work properly if all of the preparation work has been completed.
TAIWAN (CHINA)

TradeVan was initiated in 1989 following a period of research by the Institute of Information Industry (III). Start up capital was provided by the Ministry of Finance (MOF) and set at NT$2.1 billion (US$85 million). The objective for the initiative was to speed up international trade and improve the use of airport and harbor facilities. More formally stated, TradeVan's mission was to improve the international competitiveness of Taiwan (China).

During the initial III study, it was recorded that there were 5 million sea and air declarations recorded in 1988, submitted as part of a paper and clerical based clearance system. The clearance system involved 222 data entry operators and four divisional staff officers. The system demanded 32 different clearance documents; 4,000 customs brokers dealt directly with customs on a regular basis. Typically it took two days to clear a declaration, because of the bureaucratic process, multiple queues, dense city traffic and the use and management of key staff, messengers and couriers. Naturally, this process had developed its own inevitable cycle and resultant methods of working with, and around the system, for importers and exporters. It resulted in extra labor costs, idle time, unnecessary cargo delays, and hence the need for extra and expensive storage space, which in turn made physical customs inspections more complex and time consuming. In its turn this led to the need for extra customs staff, all of which caused added costs, delays and inefficiencies.

TradeVan installed a BT-Tandem trade facilitation EDI system, the software for which was developed around a core of Tandem reseller messaging products. Much of the translation and enabling software was developed from scratch with significant local language capabilities. TradeVan also initiated the development of a large range of UN-EDIFACT based messages, starting off with 24 customs related messages based on six UN-EDIFACT standard messages, such as CUSDEC, CUSRES, CUSCAR, and so on.

Legislation affecting customs clearance was amended by the government. Specific legislations include: amendment of customs law, promulgation of automated cargo clearance regulations, and promulgation of TradeVan's service agreement.

Implementation included a review of customs processes, significant redesign, substitution of vital data with UN-EDIFACT messages and redesigned approval processes. Presently TradeVan offers a national packet switched network, central or application level translation, mailbox services, various databases, audit trails, and a bulletin board. There are additional services in operation, such as message design, strategy and planning, software design, training and software certification for EDI.

**CURRENT STATUS**

By December 1994, TradeVan had around 800 users, including 300 customs brokers. Over 98 percent of export declarations and over 80 percent of import declarations, by volume, were being made by EDI.

The number of different types of customs documents has been reduced from 32 to two: a CUSDEC now takes about 15 minutes for approval to be granted for shipment release. The number of brokers has been reduced from 4,000 to 1,300. Customs staff have been reduced by 119 data entry staff and 41 customs officers. However, paper is still required for audit purposes but that now happens after the event, once goods have been released and after duty has been paid.

Ten local software houses have been certified as software vendors to the TradeVan user community. A typical software package from TradeVan or one of the certified vendors can cost between US$400 and US$2,000, depending on the amount of integration and implementation effort involved. These prices appear to be less than half the corresponding products and services in Europe and North America.

TradeVan has over 100 staff and receives significant help from III and various ministries. Of the NT$2.1 billion capital allocated by the MOF, approximately NT$1.5 billion had been spent by December 1994 (US$60 million). TradeVan estimates that only 10 to 20 percent of this amount was spent on technology; the majority was used in re-engineering, awareness, promotion and
education. These figures do not include investment from other sources such as III, other government ministries and the private sector. Once taken into account, these investments in training and promotion sessions and a wide range of meetings concerned with implementation, liaison and consultation, would significantly increase the figure of NT$1.5 billion.

The government and the banking industry have also sponsored a financial EDI initiative for the payment of customs duties, and at a later stage for full EFT and Remittance Advice processing. A sea cargo clearance initiative went live in November 1994. Other initiatives in the retail industry are being planned.

In line with the promised deregulation and ultimate privatization of the telecommunications sector, it is proposed to privatize TradeVan in the near future. In November 1994, it was officially reported that the TradeVan project had already saved the territory over NT$4.3 billion. While details were not provided, it is understood that the figure was adduced from faster turnaround of vessels, improved use of storage facilities, reduced delays, leading to better use of staff, less lost time and a reduced impact on traffic density. The report also drew attention to the “green” aspects of the TradeVan initiative: less paper used and reduced fuel emissions. A “green bonus”.

**SUMMARY**

By any standard this is an impressive achievement, however, there are other aspects to take note of in this program. Firstly, it seems that the reengineering effort was not subscribed to by all government departments. Paper is still required for audit purposes. The development of 24 new UN-EDIFACT documents suggests that some existing internal processes were simply automated, not reengineered.

Secondly, because the whole process was underwritten by MOF, it might be that much of the planning and implementation was not subject to normal commercial management control. Although it is difficult to contest the savings quoted without detailed investigation, it is possible that other interpretations could be made of the data. Perhaps significantly, no data on TradeVan revenue nor tariffs were provided.

The key asset of TradeVan, and any other national EDI initiative, is the ownership of exclusive access to customs systems and data. Might this not be achieved more equitably by the creation of a customs gateway, for example? Once again, the issue of the “shared vision”, especially with the private sector, and with a more active involvement of the private sector in the planning and implementation, needs to be addressed.

At the technical level, TradeVan does not yet have an international telecommunications license, nor does it have any interconnect agreement with other VANS or IVANS. Apart from its certified partners, it appears to operate as a monopoly service—an anachronism in the context of EDI.

TradeVan has also not provided any information on preparatory work that was required to persuade the government, nor on their sponsors other than MOF. Such information will be vital in recording the process and in modeling similar efforts elsewhere.
Annex 2
Implementation Considerations and Time Frames

This section describes major activities involved in implementing EDI in a reengineered trade process. It is not intended to be a guide to best practice, although it contains many of the recommended elements.

The orientation of this annex is primarily technical. It assumes that there are no serious barriers to success, that a serious attempt is being undertaken, that resources are not an issue, and that the cooperation of all parties is forthcoming. Hence, unlike in real life, no compromises are catered for.

The starting point for this review is the project plan. The preparation work to reach this point could well have taken 12 to 18 months, although this time should gradually reduce as the overall level of experience increases globally.

In fact there are two types of project plan: the first may be applied to the implementation of the technology chosen, on the assumption that a new EDI host is to be installed for the purposes of a national EDI initiative. The second may be applied to the end user implementation plan for EDI and the reengineered trade information process.

TECHNOLOGY PROJECT PLAN

The system will comprise:

- conventional mid-range computer hardware;
- a form of Unix or similar mid-range operating systems;
- communication switch hardware and software, possibly to X.400 specifications;
- EDI VAN software, providing EDI functionality, mailbox, archiving, logging, billing and administration functionality;
- back office software for certain specific application development or application interfacing;
- end user translation software at mainframe, mid-range and PC level.

There are no special requirements of IT professionals involved in these tasks, although appropriate education and training in product functionality, EDI functionality and standards, and end user application to standards mapping will be needed.

A lead time of six to 12 months would be the typical time to plan and install this type of system. A small team, comprising a manager, project leader, analyst and possibly two programmers would form the nucleus of the installation project, although much of this work could be subcontracted. Annex 3, A Sample Technical Proposal, gives more details on the technology.

TRADE FACILITATION:
EDI PROJECT PLAN

The project plan in Annex 2 Figure 1 involves integrating best practice and EDI processes into end user systems.

The decision on precisely which system to reengineer will have been taken at the executive level. A typical example would involve export declarations, with the objective of replacing paper, simplifying processes and speeding up approvals.

INFORMATION GATHERING

The first step is to understand the end-to-end process, the participants’ roles, and
1. DISCOVERY
2. NATIONAL PLAN
3. AWARENESS
4. EDUCATION AND TRAINING
5. PROJECT PLANNING
6. TECHNICAL TRAINING
7. INSTALL TECHNOLOGY
8. END USER AND IMPLEMENTATION
9. AUDIT/REVIEW
10. ROLL OUT

Annex 2 Figure 1: Trade Facilitation EDI Life Cycle
the way their systems work. It should be borne in mind that, although the initial implementation will only affect a few people, say customs and a couple of government departments, a small number of brokers and perhaps a major exporter, the system is being designed for the whole industry. Step one, therefore, is to ensure that the new system is capable of being assimilated by the broadest community of users. This is an essential difference between designing in-house systems, designing products, and adapting systems for interorganizational use. The last is based, at least to some extent, on compromise; the first two can work to a pre-agreed design specification.

REVERSE ENGINEERING

After a suitable period of consultation and study it will be possible to identify each step in the process to a fair level of detail. It is necessary to document all exceptions and processes, to record the time each step takes, and the resources needed to carry it out. This must be done for the complete end-to-end process, including the broker’s feeder systems, customs processing and approval systems, brokers handling of approvals and what happens thereafter to ensure that the goods are exported.

Each process variant for product or commodity code, each variant for different documents or computer system and its interaction with the others, must be documented for later analysis.

It is most important to walk current users through the documented system to ensure that they agree the system works as described, not as earlier designers have said it should work.

This process of stripping a system down to its bare essentials to examine precisely how it works is becoming known as reverse engineering. Reverse engineering of a major system is the natural precursor to reengineering that system.

REENGINEERING

When broad agreement has been reached on the information flow and processes employed by the present system, it is time to test the system’s capacity to assimilate change. Systems reengineering is a widely known and discussed set of techniques. The basic principles are:

- Removal of all duplicated, overlapping and redundant operations and processes from the system.
- Replacement of every item of information which can be substituted by a code or set of codes instead of the full description.

For example: ISO Country Codes, such as US instead of the United States, or BAL for Baltimore. Similar codes exist for currency, weights and units of measure for a range of industries, for packaging and containers, and so on. Naturally, since computers will be doing much of the reading and processing of information in this reengineered system, the main purpose behind code substitution is to have easier and faster computer processing.

- Implementing the World Customs Organization (WCO) recommendations on harmonized systems. In this system, codes are used for commodity types, product types, and various other categories of imports and exports. As customs processes around the world adopt these codes, the job of processing clearances becomes easier to automate.

- Implementing an automated computer approval process and an automated excise-tariff allocation and payment system. This will ensure the vast majority of clearances can be authorized in a matter of minutes, and paid for before the goods are actually physically ready to move, thereby assisting capacity planning and scheduling of scarce facilities and capital plant and equipment. This in turn leads to further downstream benefits.

- Automating the approvals and information interchange between government departments and other agencies involved in the import-export process. These might include taxation and excise departments, immigration, agriculture and fisheries, security and drug control organizations, quota and tariff management agencies, trade development, and so on.

It is acknowledged that this ideal
system will involve an enormous amount of nontechnology effort, including negotiations, compromises and probably a staggered implementation plan spread over two to three years, or even longer in some cases. These compromises depend almost entirely on local circumstances.

The responsibility to achieve these social and administrative objectives are largely outside the direct terms of reference of the technologist. The broader membership of the task force will have to concern itself with these issues. They will need to use their knowledge of local conditions and their authority to protect the technologists from being drawn into nontechnical issues.

The reengineering process, if properly staged and negotiated, needs to be capable of being explained to all concerned participants in both the public and private sectors, and in turn to other agencies, to overseas trading partners and to their governments.

- Designing the system so as to maximize the use of electronic commerce. This is intended to ensure that all information to be transferred between the computers involved in the declaration, processing and approvals system is transferred electronically in approved UN-EDIFACT standard formats. It is important to make use of UNSMs (United Nations Standard Messages) where possible, to avoid lengthy development times. The use of UNSMs also ensures that standard software translation packages can be used without changes.

A further important point concerns economic use of networks and minimizing end users’ network charges. Each electronic message should contain the absolute minimum information needed to convey the precise meaning of the message. For example, do not send postal addresses or product descriptions where account codes and product codes will serve the same purpose.

It is bad practice to send free text information within an EDI message. The translator will not recognize the free text; it will be ignored or cause a system interrupt. Free text also makes the message longer, which costs more. Electronic mail is the right medium for free text; it can be read by both sender and receiver. Electronic mail is also considerably cheaper than EDI. It needs much less functionality.

Access to databases for codes and transport availability, for tariffs, regulations, schedules, and so on should be catered for in the reengineered system design. Information services on products, business opportunities and bulletin board services for local variable information, and fast breaking commercial and transport news should also be included in their design. Ultimately multimedia diagrams and graphics of ports and harbors, container parks, bay plans and navigational aids, for example, will be available over the Internet and various other commercial networks.

Bar coding and automatic identity capture have not been traditionally within the ambit of trade facilitation information technology systems design, but the information handling needs of goods handling will soon be an integral part of trade facilitation systems, and will need to be incorporated into systems design at some stage.

IMPLEMENTATION

Once the overall systems reengineering and redesign is completed, there remains the specific question of how the new systems, particularly the electronic exchange of information, are to be integrated with other systems in the end-to-end process. Many of these systems will remain unchanged so that integration issues take on particular importance for participants.

Such major changes could be made in either a “big bang” fashion or in a series of smaller evolutionary stages. Once again, the decision rests largely on local circumstances. In either case, the new systems will require an EDI module.

- Systems interconnection issues. The more likely case is that EDI functionality needs to be added to existing systems, from a customs broker to a customs and government agency gateway system.

There is a range of options available
for retrofitting EDI translation facilities to existing custom-built software and application packages. The principal choices are to interface to application systems, or to integrate EDI facilities into application systems.

• EDI pilot implementation. The most technically elegant approach is to integrate EDI functionality into the application in such a way that EDI output is a standard option, just like output to a printer or to fax. Similarly, EDI input can be regarded as a direct data entry option by the system. In the next generation of application software packages, EDI will become a standard option, as it already is for some major application packages.

EDI functionality is already being planned for the major PC-LAN products, such as Microsoft Office, Novell products and Lotus Notes. However, for the next year or two, EDI implementers will probably need to interface EDI translation capability to the application.

The simplest method is to generate an outgoing message from the application system, say the export declaration, and then to transmit a flat file to an intermediate storage or processing location. This may go to a directory, a specific file or even a front end PC. The flat file may be an individual transaction or a full file of transactions; the principle is the same.

There is an intermediate process between the flat file and full EDI compliant input or output. Commonly called translation (or interpretation when data is incoming), it involves reformatting each field in the file in order to map it to the chosen EDIFACT message.

A flat file definition needs to be issued to all developers and system operators in the trade processing chain. This definition, agreed with the translation software support organization or developers, essentially automates the mapping process for standards application.

It is typically possible to map an outgoing message to a translator in around two hours for current translation packages.

The EDI translation process can then take place. It will involve a series of envelopes being wrapped around fields of data, messages, files of messages, and the complete transmission. These envelopes are the initial instructions to the interpreting function of the translator, on the sequence of unpacking and interpretation, which must be done in order to format incoming data in exactly the manner needed for automatic data entry into the target system.

The envelopes also carry within them control data, such as addresses, standards type and level, message types, EDIFACT identifiers and security instructions. Time and date information and network identification data are inserted by the network.

• Systems test. Once the translation software is installed, and after appropriate training courses for technologists and end users, the next step is to connect to the chosen network and to send and retrieve test messages.

The software facilities to connect to an EDI network are normally built into the translation package (a communications script). It may be as simple as clicking on a screen icon. More typically, in production, the network is accessed automatically, at preset times of the day (in the unattended mode).

Systems testing normally starts independent of trading partners so that the technology can first be tested, point to point. Each system needs to be tested in this way. Similarly, all systems changes need to include this test prior to issuing to production.

After network testing, it is necessary to perform an end to end send-and-retrieve test, when the trading partners’ computers each perform a sequence of events.

To begin with, an application generates a flat file, which is then converted to the UN-EDIFACT format. The translated file is transmitted to the trading partner’s own mailbox (for example, the broker’s). Next the translated file is moved to the target mailbox (for example, the customs) by the VAN’s EDI server. The customs retrieve the file from their own mailbox, and it is interpreted, that is the reverse of translation takes place. The interpreted data is then
automatically read by the customs’ application system. The approval process is completed, and an export certification or approval issued by the application system. Finally, the complete end to end process is then inverted, from the customs’ to the broker’s application system.

This total information flow typically takes place in a few minutes, with data flowing from computer to computer with no intervention except where it is designed into the system.

- Audit: Professional staff still need to audit the transaction log at an early stage. Some European taxation authorities have formed specialist teams to help companies properly complete this task.

Legal and security issues also need to be completed in harmony with the complete pilot process; nevertheless, it has to be acknowledged that the professions normally have trouble in meeting technologists’ time scales, and in keeping up with their innovations.

Legal, audit and security issues are not normally considered to be on the critical path for implementation, especially for the early, pilot users.

TECHNOLOGY ISSUES

One further point remains to be made in the context of implementation: this is about network interconnection.

In a national initiative, the national EDI server will normally facilitate all overseas and network connections in such a way that a local end user can address any trading partner, or any VAN, anywhere in the world. For the price of a local call the host will make the interconnect.

In some cases, the networks interconnect between themselves, thereby performing the same interconnection functions as a national service.

In both cases, the trading partner only needs to subscribe to a single network in order to communicate with all of his trading partners, no matter what network the trading partners may actually be connected to. There are technical considerations regarding the audit trail, and also pricing considerations in this approach but the interconnect function works.

A third possibility is that an end user adopts a user-based routing approach. This means that all communication scripts for all networks to be accessed have to be loaded into the translation software package.

Trading partner tables, or address books, contain details of the particular network which each trading partner uses, in addition to information on message types supported by the exchange, and standards and standards levels in use for each message type. These address books then select the appropriate network and automatically make the network connections for each batch of trading partners.

All three methods of interconnection are in common use. Selection will depend upon local conditions.

Variants of each approach will also apply to other electronic network services, such as the Internet and e-mail.

TIME FRAMES

Much of the time involved in a major reengineering initiative is taken up with nontechnology issues. These might include negotiations, overall project planning, and legal, audit and security concerns. The critical path for technology issues in isolation from the wider plan still depends upon the members of the working party being able to handle the nontechnology issues within the agreed time frame wherever possible.

A fairly small technology team should be able to handle the nucleus of the best practice EDI implementation, supported of course by teams from the organizations involved, initially from the pilot group. An ideal number of trading partners comprises a group of around six organizations and a working party of perhaps three technologists and three nontechnologists, who are there to handle organizational and procedural, legal, audit and security issues. These are in addition to the representatives from individual trading partners, who should be kept to a minimum at the technical implementation stage.

The main stages of the plan are given below. The time frames quoted are within the range of experience to date. They may have to be expanded or condensed depending on the skill and experience levels of the trading partners and the technologists.
Many of these activities will overlap in such a way that the overall time will actually be less than the sum of its parts.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Project Plan</td>
<td>6-12 months</td>
</tr>
<tr>
<td>Technology Plan</td>
<td>6-12 months</td>
</tr>
<tr>
<td>End user EDI Implementation Plan</td>
<td>3 months</td>
</tr>
<tr>
<td>Reverse Engineering</td>
<td>3-6 months</td>
</tr>
<tr>
<td>Reengineering</td>
<td>3-6 months</td>
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<tr>
<td>Systems Design</td>
<td>1-3 months</td>
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<tr>
<td>Implementation</td>
<td>6-9 months</td>
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<tr>
<td>Pilot/Test</td>
<td>1 month</td>
</tr>
<tr>
<td>Audit</td>
<td>1-3 months</td>
</tr>
</tbody>
</table>

Target overall elapsed time from forming the working party to completing a successful first stage pilot is in the range 12 to 18 months.
Annex 3
A Sample Technical Proposal

The system which acts as the intermediary between a group of users (trading partners) and all of the other networks, or VANS, is generally known as an EDI server, a VAN or an EDI switch. It performs the role of mailbox manager, central communications switch and the interface between all external networks necessary for a specific local EDI and electronic commerce system. The system now generally operates on a standards-compliant, fault-tolerant hardware platform, and package-based, specific electronic commerce functionality software.

A typical technical proposal would include:

- a hardware platform, most probably Unix based;
- EDI mailbox software based on X.400, or with a planned migration path to X.400 capabilities;
- multiple communications options (switch software);
- custom-built “back office” software for special local requirements;
- end user translation and EDI management software; and
- a detailed implementation plan for the central site and the initial users.

The same functionality is required whether the installation is for a large corporate, a large government department or even a moderate sized national service. These are increasingly being described as “gateways.”

DEFINITIONS

At this stage it is important to know what function a gateway, particularly an EDI gateway, performs that cannot be done efficiently in other ways.

A large EDI initiative, especially one with significant international trade requirements, needs to be able to talk to all major VANs, because that is where the

Annex 3 Figure 1: How Networks Inhibit Electronic Commerce

72 Information Technology and National Trade Facilitation: Guide to Best Practice
connections are made to international trading partners.

The usual argument is that EDI VANS are unable to provide the necessary interconnect, or interworking between each other's networks. While this is now only partially true, there is still some validity in the argument. But does it really need a gateway to solve the problem? (See Annex 3 Figures 1 and 2.)

At the local level, VANS find it uneconomic to provide an interconnection. However, a local interconnection may be no cheaper in the long run because VANS, in general, charge for their network, even if no value is added. Of course, in some countries, VANS have been forced to provide local interconnects, just to get business; but they rarely volunteer to do so. Also, even if some VANS do not have local interconnect agreements, they may have them overseas. For example AT&T, GEIS, BT, IBM and a few others have interconnect agreements in the United Kingdom and in the United States. Telecom companies interconnect at the traffic level too; SWIFT and SITA have a range of interconnect agreements. But this facility cannot be relied upon for any new gateway implementation.

The second part of that argument goes that increasing VAN traffic and multiple mail boxes cause costs to escalate, and that integrating an organization's internal network into a gateway means that the organization needs only one mailbox on each appropriate VAN. Once again the argument has validity, but it does not generally reduce traffic costs, only mailbox costs.

So a gateway has a significant role to play in providing a local EDI service, a local access to the major international networks, and interconnect services, both for technical efficiency and cost savings.

REQUIREMENTS

If we therefore take the broadest of current requirements, a gateway must

- have an internetwork switch;
- have a range of communications options;
- display EDI functionality, including (corporate) central translation, validation and compliance checking, trading partner enabling tables (as a central or end user option), and security facilities;
- possess application integration capability;
- include application development functions;
- be based on the open systems interface (OSI) standards (for example, X.400, X.500, and Unix), embrace all major EDI

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Annex 3 Figure 2: Gateways or Interworking

Annex 3: A Sample Technical Proposal 73
message standards (for example, ANSI X12 and UN-EDIFACT) and their major derivatives (VICS, EANCOM, and so on);  
- have a range of administration functions, such as logs, audit trail, billing, reports, and so on;  
- support other media and other data services than just EDI, such as file transfer, mail, fax, voice, value added mail, fax and voice, and increasingly scanning and imaging applications, perhaps even audio and video conferencing.

FUNCTIONS

An EDI gateway, therefore, must be able to handle access to any network or direct links with trading partners. Normally, asynchronous access over a PSTN from a PC is the simplest means of satisfying this requirement, even if the PC has to act as the front end to the host processor. Providing the host processor has an operating system with PC support, the front end communications switch would merely send and receive flat files from the host. Most EDI users, probably over 90 percent, are satisfied with this approach. The front end may also need to access the packet switched network (X.25), or satisfy a range of proprietary protocols. Very high volumes can justify dedicated digital services, but that level of functionality is only genuinely needed by a small number of installations. However, issues of reliability and security may override such economic issues.

The switch function can also vary in sophistication. Externally, the switch will log on to each VAN in turn, retrieve mailbox contents and then deliver a translated file. Note that ANSI X12 and UN-EDIFACT message standards also have the ability to contain internal network addresses. This function is not exclusive to an application system, host or front end system.

The processing functionality of the gateway could include trading partner tables, which contain details of electronic (VAN) addresses, fax and phone numbers, EDI document types, physical document types, message standards and standard levels, and security information. The user may also wish to maintain history files on some of these fields. For example, exactly when a standard level was changed, in case there are messages to or from the same partner at different levels which are still in the system, or if there is need to change VANS connections at any time. However, this level of functionality is ideally contained in the end user’s own system.

The gateway would also need to be able to validate a trading partner number prior to each transmission. In some countries, where EDIPOST is used for true EDI, the gateway can assign a “dead letter” mailbox number to an otherwise invalid combination for onward transmission of hard copy and fax.

If the gateway is being used as a central translator, it would need to apply a separate logic stream to confirm that the translation (or interpretation) of a particular message set from a particular standards is called for. In addition, it would need to support all supersets and subsets of standards (message sets) used, or likely to be used, by trading partners.

At the enhanced functionality level, the gateway may act as a platform for other communications services, such as X.400 store-and-forward products, any mail, fax, and enhanced fax, digitized voice services, and X.500 services. The session protocol for future EDI data transfer is likely to be X.400, while X.500 may become the standard vehicle for trading partner tables.

Some gateways have applications for specific functions. For example, user billing, log, audit trail tracking and tracing software, statistics, and so on. In one case this included “opening” X.400 envelopes, matching and merging data, and then reenveloping.

GATEWAY SERVICES

In general VANS are withdrawing from providing EDI end user services. Increasingly, either directly or through a third party, the gateway provider provides support for the education function right through to implementation, maintenance and the help desk. Where a particular VAN has a turnkey arrangement with the gateway organization, it will almost certainly support only its own products and services. However, there are several good products which are VAN independent, including
many of the better education courses, and ramp up or roll out programs which are offered by third parties.

The necessary level of end user support is not likely to be available from VANS for all end users, hence whoever takes on the gateway approach also takes on the end user support tasks.

EDI GATEWAY AND SERVICE FUNCTIONALITY

Looking at the complete life cycle of an EDI project, and bearing in mind the need to be self-sufficient, fully supported EDI end users who are independent of VANs and their products, desirable functionality at the preinstallation stage would include services such as cost benefit studies, EDI capability and preparedness exercises, and EDI audits; education, training and updating services; functionality studies on EDI software products (to validate the product for internal and external network use); and other appropriate support services for existing and future EDI trading partners.

At the installation stage the requirements would be to set up users, provide integration services and create, and maintain documentation (this may involve removing function from a host processor, followed by repair, remodelling and maybe systems reengineering); to establish business partners and trading relationship tables; to allocate and manage passwords; and to set up appropriate security procedures: allocate keys, and manage key rotation.

At the production stage it will be necessary to set up and manage a help desk, make arrangements for "out of hours" working (the overseas EDI partners could well be as much as 18 hours out of time synch); provide remote diagnostics and appropriate support; provide ongoing EDI audit and QA services, monitor usage and statistics, logs, audit trail, billing services, monitor security, password use, EDI translation standards support, levels support, integrated EDI application support and maintenance, and trading partner table maintenance.

Ongoing services will include development and maintenance of application interfaces: "hooks" for integrating EDI with applications; and management of priority EDI streams and priority allocation, while facilitating interactive EDI processing where possible.

User connectivity would include PSTN, LAN (IEEE 802.3), LAN variants, X.25, SNA and variants, X.400 and X.435, FTPs, proprietary protocols, input from protocol converters, and VAN connections.

The EDI gateway will ultimately need to connect to other communities, including enterprises, industries, government systems, VANS and IVANS. Such VAN and community connectivity efforts would include custom built VAN pipes, X.400 domains, mail and fax services, network session protocols, intercorporate (intraindustry) switches, a national or international switch for specific, non-VAN connections, and an inter-VAN switch.

VENDORS

There are four main groups of vendors who can offer the major components of a corporate EDI gateway: hardware vendors, software vendors, telcos or VANS, and consultancies. This does not necessarily include all of the communications options.

Where an enterprise is considering a gateway there is usually no alternative to the RFI-RFP route. This may not achieve the best results since many of the more experienced vendors either have no direct local representation or their centres of expertise
DATA SWITCHES
Data switches first appeared in the late 1950s in support of what we now call Local Area Networks, by means of an in-host controller. Modems and multiplexers were followed by dedicated communication controllers, supporting Wide Area Networks (teleprocessing). Intelligent controllers, capable of handling more than one protocol and large networks, comprised of subcontrollers, reached the market by the early 1980s. These have been followed by front end network controller hierarchies, access nodes, bridges, routers, and so on.

Very intelligent versions of these devices now totally insulate host processors and data base machines from the networks.

And soon, the public network may be able to perform that function in a data-centrex, intelligent VPN controller.

are based overseas. A do-it-yourself approach, on the other hand, is slow, prone to failure, and expensive (see Annex 3 Figure 3). Under those circumstances, it is always best to defer until the right product is available.

OTHER MEDIA
Evidently, the change from conventional data application to EDI is taking far too long to implement between enterprises. To reap the benefits of computer to computer communications we must become more flexible in our choice of the medium.

Hence, in addition to EDI, we need:

- EDI to fax: fax to EDI
- EDI to hard copy: hard copy to EDI (print)
- EDI to Telex: Telex to EDI (including use of Telex to fax services)
- EDI to digital voice: digital voice to EDI
- EDI to image: image to EDI

It is inappropriate to detail the actual technologies here, but they are feasible. For example, there are six voice technologies which are suitable in some measure. ICR (Intelligent Character Recognition) is also being used for the purpose. X.400 offers some facilities in this area. In addition to EDI and file transfer applications, it will soon support technical document interchange, voice mail interchange (X.440) and image document interchange.

X.400 and X.500 philosophies are likely to become the keystones for integrated platforms for the exchange of all electronic business information.

Although it is difficult to recommend

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Annex 3 Figure 3: The Gateway Service
specific choices in a rapidly evolving market, it is possible to provide an insight into a fully specified gateway of the future and a migration path from where systems currently stand. The range is enormous: from PC to fault-tolerant mainframe; from EDI-specific, to an EDI gateway service, to a full electronic services platform. There is no single definitive solution, as indicated by the variety of vendors in this very new marketplace.

A MODEL FOR A GATEWAY-ROLLOUT SERVICE

The (Hong Kong) Tradelink CAS and other Asian requirements (see Annex 1), and various national EDIPOST experiences, have now made it possible to define what a mixed technology input-output gateway service will look like. It will include all support and production services identified earlier, plus a full X.400-X.500 gateway, with comprehensive access and interconnections, plus end user facilities for input by:

- business systems;
- walk in EDI bureau;
- telex;
- fax;
- voice;
- EPOS;
- OCR-MICR;
- intelligent fax;
- intelligent character recognition;
- custom-built EDI terminal;
- radio frequency device;
- cellular data network;
- as well as output by conventional EDI, hard copy and any other input option.

SUMMARY

While the technical specifications for a gateway may look new and unconventional to an MIS professional who is used to serving his internal client base, there is much precedent for successful implementations. However the operational success depends much more on a service bureau, customer-oriented approach than the in-house MIS philosophy. This change to a more market driven environment often provides a challenge to the mature MIS organizational professional.

It should also be remembered that the gateway installation represents only 5 to 15 percent of total investment. Many of the other costs are absorbed by the private sector and other public sector organizations, and by a multitude of volunteers. They require a different form of support.

This attitude of cooperation is further extended by the need for active marketing and marketing management, rapid and flexible response to external customers and customers on other networks, and the overriding need to meet local business and strategic objectives.

Technology is relegated to the role of the servant of electronic commerce; and electronic commerce users have a voice: they expect to be heard. Technology is therefore the least of the challenges in this milieu.
Annex 4
Sample Terms of Reference for Electronic Trade Facilitation System, Implementation, Supervision, and Mid-term Review

These Terms of Reference, with modifications, have been used in a World Bank Technical Assistance to Enhance Competitiveness Project in Mauritius. The overall objective of the project is to help enhance export competitiveness by facilitating private sector access to technology support services.

BACKGROUND

The Ministry of Finance has initiated an institutional improvement program to improve the competitiveness of the trading sector, speed up the process of trade documentation clearance, and streamline critical procedural and operational areas in import and export documentation. This reform will culminate with the establishment of a new Tradenet system.

The principal aim of Tradenet is to utilize trade databases and EDI for electronic trade facilitation and to reduce trade export-import approvals from days to minutes. This will eventually lead to electronically connecting the principal government departments involved in trade, such as customs, port authorities, government agencies concerned with trade, and their main trade interface partners, such as ports and airport, shippers and container companies, container handlers, customs agents, freight forwarders, banks, insurance companies, and exporters and importers. The benefits will include eliminating the need to physically present documents to various organizations concerned, thus saving time and cutting costs, providing faster turnaround time resulting in quicker delivery of goods, and reducing paper work.

The government has placed high priority on Tradenet and changing the existing operational and administrative procedures in trade. Four Task Groups have been established to apply business reengineering practices to sea cargo procedures, air cargo procedures, government department procedures, and banking procedures. These Task Groups report to a Technical Committee, which in turn reports to a Steering Committee chaired by the Financial Secretary of the Ministry of Finance.

Tradenet is being established under a joint-venture arrangement between the Government of Mauritius and Singapore Network Services (SNS). While the decision of the Ministry of Finance as to partners and the scope of services is sound—Singapore National Services has made an astonishing success of the Singapore Tradenet—there are possible risks that have to be properly managed. Mauritius has little in common with Singapore from the perspective of technological and telecommunications infrastructure, IT knowledge and awareness, availability of skilled technicians, EDI and specific value-added service networks—all of which will be ingredients to making the Tradenet project a success.

Tradenet will be implemented in phases, which include procedural studies, the provision of hardware and systems software, and network management and operation. Concurrent with implementation of Tradenet, tailored training and awareness programs will be undertaken to ensure long-term integration and use of the system following its initial design phase. The experience of several national initiatives in place (Hong Kong's
Tradelink, Australia's Tradegate, Korea's KTNET, Taiwan's (China) TradeVan, and Malaysia's Dagang*Net, among others) indicates that training and "awareness" campaigns go a long way in risk reduction. A consultancy assignment is thus being proposed to enable Mauritius to profit from this initiative with internationally skilled and experienced help.

ASSIGNMENT OBJECTIVES

The goals of this assignment are initially proposed as:

AUDIT AND QUALITY ASSURANCE

The consultant will act as a resource and advisor to the Steering Committee, ensure completion of a basic user requirements specification for the proposed system, review technical specifications, and ensure there is a workable implementation plan.

AWARENESS AND TRAINING

The consultant will prepare and present a range of awareness, training, and promotional activities such that all Tradenet staff, public and private sector users, and influential bodies—internal and external—understand exactly what the aims and objectives of Tradenet are, how it will be used and why, what they have to do to make use of it, and likely costs and benefits.

MARKETING AND BUSINESS PLAN

To ensure Tradenet begins with realistic expectations, a business plan will be prepared assessing the number of potential users of the system, the rate at which they will join, acceptable pricing levels and varying pricing algorithms for the service. The experience levels and potential levels of support for third party software and for software implementation, support, training, and network maintenance will also be assessed. With this information applications will be prioritized, types and messages documented, and an implementation program prepared—both mandated (for example, for customs) and induced (for example, appropriate pricing). Clear and measurable outcome indicators for the use of Tradenet will also be established by the Steering Committee so that cost-benefit data can be used for overall program evaluation.

SCOPE OF WORK

The consultant's work includes, inter alia, the following tasks:

(i) Review and approve all technical, system and procedural documentation, data flows, EDI standards, functional specifications and outputs delivered by each Task Group.

(ii) Participate in Steering Committee meetings to review project implementation and propose revisions or changes in policies, technical specifications or schedules.

(iii) Ensure the technology used for Tradenet will be open and state-of-the-art to avoid locking the government into any particular proprietary system and to facilitate any software modifications following policy or procedural changes, and advise on the likelihood of acquiring suitable off-the-shelf software.

(iv) Propose comprehensive measures and procedures to be taken to ensure stringent protection of the confidentiality and security of data, including physical security, back-up procedures, access controls, and periodic auditing of controls.

(v) Provide an audit report of the recommended technical specifications for the architecture of Tradenet, standards, procedural, and telecommunications linkages.

(vi) Organize the acceptance and support tests for determining compliance with specifications for hardware, software and communication systems, backup and recovery procedures, documentation, and the functionality of the overall system.

(vii) Assist the Steering Committee in preparing the business (including cost-benefit study) and marketing plan for Tradenet.

(viii) To the extent possible, provide information on potential downstream
impacts resulting from Tradenet’s implementation.

(ix) Advise on the measurable outcome indicators for the use of Tradenet for each Task Group, which will be used for overall program evaluation.

(x) Produce practical promotional brochures on the aims and objectives of Tradenet, how it will be used and why, what users need to do to make use of it.

(xi) Assist designated agencies in the production and delivery of short courses, workshops, and industry-specific presentations on EDI and Tradenet to senior managers, supervisors, and terminal operators in both the private and public sectors. The courses and workshops should include: introduction to EDI for managers; management workshop; technical workshop; special topics, such as trade facilitation, supply management, electronic funds transfer, and business process reengineering.

(xii) Advise, with cooperation from customs, the Technical Committee on a selectivity-risk analysis module to Tradenet to permit better targeting of high risk consignments.

(xiii) Advise the Steering Committee on setting up an EDI association, appointing a delegate to the UN-EDIFACT ASEB board, and attendance at appropriate conferences.

REPORTING RELATIONSHIPS

The consultant will report to the Steering Committee chaired by the Financial Secretary of the Ministry of Finance. To ensure a coordinated and effective implementation effort, the consultant should work closely with: (a) the Project Director; (b) chairperson of the Technical Committee; (c) chairpersons for each of the four Task Groups that have been established to streamline existing operational and administrative processes involved in trade; and (d) the National Computer Board for the training and awareness programs targeted to take full advantage of the new system.

DELIVERABLES

The consultant is expected to complete the assignment within an elapsed period of 10 months. The consultant should provide the Steering Committee an initial report four weeks after the start date, summarizing the progress of each task group, review of training program, and the organization and schedule of future work. Monthly progress reports should be prepared showing important milestones and the need for any interim decisions. At the end of 10 months the consultant shall submit a post-implementation review and a plan for further expansion of Tradenet in support of private sector access to strategic information such as statistical databases, company information, and so on. The final report, due 11 months after the initiation of the assignment, should describe the outcome of the overall work, and suggest any changes that may be required.

MID-TERM REVIEW

The computerization process in the public sector as well as in the private sector in Mauritius has so far focused mainly on the development of stand-alone systems, with the exception of some of the commercial banks which have set up more advanced networking systems. Government and private sector have taken the initiative to create a value-added network service provider to supply communication services, including EDI facilities, as well as database services. One of the first applications being developed is a trade facilitation application. This project is an important step in the national drive towards the creation of an information based economy. The Government of Mauritius is actively seeking other areas for further exploitation of EDI technology in the public sector as well as encouraging private sector adoption of EDI.

For this review, the consultant will:

(i) Provide an assessment for further exploitation of EDI within the public sector. Priority areas which have been identified include contributions to the National Pension Fund and welfare funds, submission of monthly sales tax returns and collection of excise duty.

This work is to be carried out with work groups made up of representatives from the public institutions involved, private sector representatives as well as
officers from the Central Informatics Bureau (CIB) which is the coordinating body responsible for computerization within the public sector.

The consultant will chart the critical path of activities and provide details of the steps required to be taken towards successful implementation of EDI in the selected areas. The consultant will be expected to identify critical technical, regulatory, and organizational issues that need to be accounted for other than technical issues. Some illustrations of user requirements, and alternate solution that are available to address and the identified areas should be provided. Rough estimates of implementing the priority areas as well as measurable performance indicators should also be included.

(ii) Conduct an independent assessment of the technology orientation of the EDI services provided to date.

Government has no internal specialized expertise in EDI and given the strategic importance of the network which is being put in place, an independent expert perspective on the system architecture and the applications in development, as compared to technology being used elsewhere, is sought.

The focus for this assessment is on the key components that make up the network services environment and the extent to which they make up for an environment which is flexible enough to cater to the variety of national applications which is being envisaged.

The consultant's findings should highlight the cost effectiveness of the existing infrastructure, its major features as well as any major shortcoming that may exist, with appropriate recommendations on solutions to those.

DESIRED QUALIFICATIONS OF CONSULTANT

The selected consultant/s shall have at least 5 to 10 years of intensive experience in EDI, and be able to supply references to confirm successful implementation and knowledge of EDI applications in more than one country. Knowledge of the experience of other regional implementations of trade facilitation networks is a prerequisite to ensure that the implementation management advice given to the Steering Committee is appropriately focused and relevant to the project. Appropriate client contact skills, writing, and verbal skills are required for this assignment. Previous experience with a value-added network or EDI supplier, bilingual capability (French and English), and willingness to spend appropriate amount of time in the country to provide the required assistance and expedite the project are all highly desirable.
Annex 5
UN-EDIFACT

The following is an introduction to UN-EDIFACT: to message standards, to the standards setting process, to the organization and current status of UN-EDIFACT EDI messages. It is not intended as a text book for the technician or the specialist; rather, as a primer for the technologist and a reference source for managers and generalists.

Those in search of greater detail should contact UN-EDIFACT direct, or read the UN-EDIFACT Draft Directory of current message standards.

Incompatible (a): opposed in character, discordant, inconsistent (with).
Oxford English Dictionary

Thirty years ago, the word “incompatible” was associated with personal relationships, the visual and performing arts, and almost anything nontechnical. Today the word has an entirely new meaning.

Incompatibility between international voltage and power plugs and sockets is now a common experience. Perhaps less well known are the battles between rival products which led to compatibility between electrical domestic appliances, audio visual products and the components of information technology; for example, the struggle for supremacy between Beta and VHS VCR technologies. Developed independently of each other, these rival technologies were quite incompatible. Ultimately VHS triumphed in the marketplace to become the world standard. A standard was necessary in this case to ensure that all devices which used VCR technologies, such as the cassette, need only be produced to a single set of specifications.

Where competition or cooperation has not evolved the rules for compatibility (or a standard), the production costs for each rival format make the end product more expensive and less useful. Where the opposite is true, where an accepted standard evolves, or is accepted by an industry, the product is cheaper, more useful to the consumer and there is a wider choice for the consumer. Thereafter, suppliers differentiate on quality, functionality and service—not on standards, formats or levels of compatibility.

The situation is no different in the field of IT.

For 30 years as more, IT vendors created and protected their own markets based on proprietary hardware and software, on unique operating systems and communications protocols. Indeed a major selling point for the industry leaders was their de facto standards.

The explosion in the IT market over the last 10 years has been almost entirely due to the new interchangeability or compatibility between hardware, software and communications. Over 35 million users could not access the Internet without a very considerable body of international agreements on supporting technologies. Over the same period, 100 million personal computers have been installed using compatible hardware and software.

A “standards industry” has been evolving; committees have been set up to negotiate acceptable standards for every imaginable product or service which requires compatibility for full market acceptance.

UN-EDIFACT, or United Nations EDI for Administration, Commerce and Transport, is the international organization which addresses the process of agreeing standards for business messages exchanged directly between computers and between organizations by means of EDI. EDIFACT facilitates the removal of paper and fosters the substitution of electronic based processes between entities involved in international and domestic trade.
WHOSE STANDARD: YOURS OR MINE?

Generally speaking, larger corporates and government departments have already set their own internal standards. Database systems define the information to be exchanged; programs manipulate that information and present reports to users in a corporate standard layout by means of hard copy or screens. Incompatibilities occur between computer systems as corporates acquire other companies who already have their own differing internal standards, and between government departments who operate independently of each other. No matter how large the organization may be, the standards they have developed for information interchange are still unique to that corporation. In messaging applications these have come to be known as private standards.

About 30 years ago, corporates and government departments began to reach out to their suppliers and clients in an effort to impose their own standards (or agree common formats), in order to reduce the costs and time involved in data entry, error correction and paper handling, which influenced their reaction speed and potential economies. Clearly there were also strategic marketing and supply chain issues involved at the same time. As these intercorporate systems began to adopt EDI technologies and to embrace the wider industry rather than just a few key trading partners, industry wide information exchange initiatives evolved. This gave rise to industry standards.

A small number of the industry message standards of the time applied to global industries, most particularly to air transport and banking. Even today, these global industry standards are only accessible to specific members of that industry, although efforts are being made to broaden eligibility for use. Nevertheless, these type of standards can still be more properly described as closed user group standards, such as SWIFT for the banking industry and SITA for the air transport industry. True industry standards are accessible to all participants in an industry. End users cannot yet access SWIFT and SITA from their own systems, although this will, in time, come about.

Industries cannot exist in isolation from other industries. For example, supermarkets obtain around 80 percent (by value) of their purchases from industry suppliers; the other 20 percent is spent with suppliers who are not industry-specific, such as construction and maintenance, vehicles, information technology, banks, financial institutions, insurance companies and the like. They also have to exchange information with labor unions, taxation and regulatory authorities and industry bodies. All industries have similar information exchange problems.

This has led to a movement towards cross-industry, or national standards. So far, the leaders in national standard setting have included the United States with ANSI X12 (American National Standards Institution, Accredited Sub Committee (X) 12), and the United Kingdom. The United Kingdom developed a retail industry standard called Tradacoms which evolved into a national cross-industry standard during the 1980s. With the possible exception of France, no other country has embarked upon setting national standards for cross-industry trading, for a number of reasons.

These reasons vary but notably include: cost, leadership, technology infrastructure (and therefore the need), and in some countries, such as Japan and Korea, business culture. Japan and Korea operate under similar business cultures which are aimed at locking suppliers exclusively into an industry or supplier-specific supply chain to the exclusion of their competitors. This trading system (Keiretsu and Chaebol-centric) is at odds with the principles of EDI and standards setting.

These ideals include precompetitive cooperative standards development in order to upgrade a whole industry's ability to compete. Proponents argue that you cannot steer only part of a ship. The Australian rail system, where some states have incompatible gauges with other states, is a classic example of the penalties for nonstandardization.

Corporates, industries, countries and regions which are committed to private standards as a means of excluding competition or raising barriers to entry have actually constructed electronic barriers to
trade which lock themselves in as well as exclude competitors. In so doing they are creating a double problem for themselves: they will undoubtedly have to remove these barriers with, in some cases, substantial cost and time penalties. They will also have to invest in rejoining the world trading community systems, based on agreed standards.

These reasons apart, the major motive for deferral of agreeing national standards has been the undoubted success of the international standards movement under the aegis of the UN.

Most countries now have, or are in the process of adopting UN-EDIFACT as both their national and international standard. The more important trade is to a country or region, the more important to them are international standards or UN-EDIFACT.

MESSAGE STANDARDS

Electronic commerce is a series of techniques which involve electronic delivery and receipt of information. The term embraces electronic mail, information services, electronic forms and work flow automation products, databases and bulletin boards, and their multimedia enhancements. Most notably, it includes electronic data interchange, or EDI. EDI is the "senior" technique in electronic commerce, involving specific business information transfer from computer application to computer application. There is no human interaction in the process; it operates independently of time, distance, and proprietary protocols, using electronic communications and (generally) electronic mail boxes. Third party operators known as Value Added Networks or VANS, carry the majority of EDI traffic, both locally and internationally.

The specific standards covered by the EDIFACT process embrace all structured messages deployed in the trade, transportation and administration process. Conceptually, this includes all information contained on paper documents used in current processes. However, it is important to emphasize that EDI does not envisage substituting electronics for paper, nor automating current processes: this is merely the starting point for the proper application of EDI.

For any message standards setting exercise there is a common objective: to facilitate the rapid movement of data from computer application to computer application, reliably and with predictability. A more sophisticated aim may include moving only the minimum amount of data necessary for this purpose. It is implied that this exercise is a prerequisite for software package development which are able to deploy the standards in commonly used applications. Hence, when standards have been approved and tested, they are handed over to software developers (in paper or electronic media formats). The developers then integrate the standard messages into their existing translation software packages, or develop more appropriate software.

Any structured message (such as a purchase order, invoice, and so on) which is exchanged between trading partners can be broken down into four categories of information:

- Administration data: such as identification of parties involved in the transaction, names, addresses, codes.
- Transaction data: such as specific buy-sell information, products-services, quantities, codes.
- Financial information: such as values, payment terms, discounts.
- Regulatory or mandatory data: such as tax identification, taxation type and amount, company registration details, tax year date.

Every type of standards setting exercise, be they at the private, industry, national or international level, needs to agree on the information content and on the rules for exchange of each message type. At an industry level, for example, the retail industry, it is assumed that the message, such as an invoice, is industry-specific. Therefore it contains information which is designed only for that industry. At the international level that invoice is a generic message, including all of the information exchanged for any invoice type, for all industries.

There are a number of sequential steps in the standards setting process:
(i) Agree data content:
- Identify all messages exchanged between partners in a trading community.
- Allocate titles and functional descriptions to each message type.
- Identify each individual specific piece, or field of data (data element) contained within each message type.

(ii) Syntax:
- To agree the rules of layout, and grammar for identification.
- To compile a data dictionary for all data elements, and all variations.
- To identify all usage of data elements.
- To define frequency of usage.
- To agree a unique identifier for each data element contained in the data dictionary.
- To agree and define a single, common standard data element for all future usage, for all variations.
- To document any exceptions and all rules for use.
- To identify all codes and standard tables used in the messages under consideration.

(iii) Interchange:
- To agree the character set to be used in the electronic exchange of messages.
- To agree electronic addressing conventions, headers, trailers and separators for identification of message and data element types, and any component of a file of messages which may be exchanged.
- To agree where data elements are required (mandatory) or where they may be optional, or conditional.
- To agree rules for exchange, logic and exceptions, where possible.

Once started, message standards setting becomes a continuous process. Rules for updating messages, for release to software developers and other standard bodies need to be agreed. Quality assurance processes, media and distribution, training and publicity all need to be provided.

Factors which distinguish international standards such as UN-EDIFACT from national and industry standards are, therefore, geographic scope and application breadth of the process; an interindustry rather than an intraindustry (and international rather than an intranational) approach; and the support of all national governments, national standards associations, and international agencies involved in the trade process.

This mandate also defines UN-EDIFACT's latent weaknesses, which include the following:

- The magnitude of UN-EDIFACT's scope means that only powerful and wealthy corporations and industries can afford active participation in the process. Smaller industries, countries and SMEs (Small and Medium Enterprises) have to depend upon these participants to represent their best interests.
- UN-EDIFACT concentrates on messages and message content. There is no formal process for critically evaluating the genuine business need for that message or that specific information, nor for messages which may be eliminated, subsumed or even added to by the electronic commerce process, particularly following reengineering. Many say there is need to add a best practice component to UN-EDIFACT work. Others argue that this work should be undertaken by a separate agency.

- International messages are, by definition, all-inclusive. The U.K. retail industry evaluated the UN-EDIFACT Purchase Order message (ORDERS) as a substitute for their Tradacoms purchase order. The EDIFACT purchase order contained over 200 data elements; the retail industry in the U.K. needed less than 10 percent of these. This perceived "overengineering" for specific industries is leading to the development of industry subsets of EDIFACT.

In the case of the European retail industry this has led to the development of the EANCOM (European Article Numbering Communications) subset of message standards. They use EDIFACT data elements, data dictionary, code sets and syntax, but have specifically structured messages for their industry. The EANCOM software is now designed to handle these shorter messages which leads to better use of information technology resources and faster processing.
A CONNECTION contains one or more interchanges. The technical protocols for establishment, maintenance and termination, are not part of this standard.

An INTERCHANGE contains:
- UNA, if used
- UNB, interchange hardware
- Functional Groups if used, or only messages
- UNZ, interchange trailer

A FUNCTIONAL GROUP contains:
- UNG, Functional Group header
- Messages of the same type
- UNE, Functional Group trailer

A MESSAGE contains:
- UNH, message header
- Data segments
- UNT, message trailer

A SEGMENT contains:
- A segment tag
- Simple data elements, or
- Composite data elements

A SEGMENT TAG contains:
- A segment code, and if explicit indic., rep/ nest value(s)

A SIMPLE DATA ELEMENT contains a single value

A COMPOSITE DATA ELEMENT contains component data elements

A COMPONENT DATA ELEMENT contains a single value

Annex 5 Figure 1: The UN-EDIFACT Standard Reference Model (ISO 9735)

EANCOM is expected to be a model for other industries.

- The specific use of EDIFACT messages for an application is defined within documents called Implementation Guidelines. While not normally the province of UN-EDIFACT, local implementation guidelines are proving to be incompatible with otherwise identical international applications. This might not be important in closed user groups, but where messages have to be exchanged between industries or between global trading partners this is proving to be counter-productive. This is particularly true for the import-export, customs and transportation processes.

THE COMPONENTS OF EDIFACT

UN-EDIFACT uses its own terminology to describe the components of the EDIFACT reference model. (See Annex 5 Figures 1 and 2.)

Europeans tend to prefer the use of message branching diagrams to help define a message. North Americans tend to use an EDIFACT message table for the same purpose. UN-EDIFACT publications provide further detailed information on all topics mentioned in this overview.

THE UN-EDIFACT REFERENCE MODEL

The UN-EDIFACT EDI standards articulate the rules that define the exchange and
interpretation of data between systems. The standards have also been designed to achieve machine and communication media independence. Thus, it is possible to create and transfer a structured message in accordance with the standard in any machine environment and over any type of supporting communications function. This could be anything from physical media transfer (disk or magnetic tape) to the use of a VAN. UN-EDIFACT (ISO 9735) describes the standard reference model.

EDI message exchange is represented in EDIFACT by the concept of an interchange. This is the structure containing messages and subsequent data elements. An interchange is a hierarchical structure using segments to separate the levels. There are two types of segments, defined as Service Segments and User Data Segments. Service Segments are always transmitted because they identify the boundaries between various levels. User Data Segments are contained within the messages and carry the user data. All segments are identified by a unique three character alpha tag, preceding the data within that segment. All Service Segments are defined by tags in which the first two characters are “UN,” followed by another character to signify the different types. In brief the interchange structure consists of:

<table>
<thead>
<tr>
<th>Segment Name</th>
<th>Segment Tag</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service String Advice</td>
<td>UNA</td>
<td>Conditional</td>
</tr>
<tr>
<td>Interchange Header</td>
<td>UNB</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Functional Group Header</td>
<td>UNG</td>
<td>Conditional</td>
</tr>
<tr>
<td>Message Header</td>
<td>UNH</td>
<td>Mandatory</td>
</tr>
<tr>
<td>User Data Segments</td>
<td>As Required</td>
<td></td>
</tr>
<tr>
<td>Message Trailer</td>
<td>UNT</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Functional Group Trailer</td>
<td>UNE</td>
<td>Conditional</td>
</tr>
<tr>
<td>Interchange Trailer</td>
<td>UNZ</td>
<td>Mandatory</td>
</tr>
</tbody>
</table>

Annex 5 Figure 2: A UN-EDIFACT Branching Model
UN-EDIFACT SYNTAX

UN-EDIFACT syntax defines the structures to be used for the interchange of data. Syntax rules specify the grammar for EDI communications which define how the EDIFACT components, that is, data element, segment, message, functional group and interchange, are combined to produce an EDI communication.

EDIFACT syntax is based on three fundamental assumptions on the data and how data are interchanged between trading partners. They are:

- character based data;
- batch data transfer; and
- predefined, structured messages.

The UN-EDIFACT data types are based on characters: alphabetic, numeric and alphanumeric. Bit strings are presently not included. Discussions are taking place on how to represent drawings and pictures which complement, for example, an inquiry message.

The syntax is intended for batch transfer of data, or the transfer of one or more messages. Messages may be prepared in advance, in such a manner that the sending and receiving applications cannot further influence the processing while file transfer is in progress. There are situations where interactive EDI is needed, for example transport reservation systems where a confirmation message is required instantly. This kind of communication is typically bi-directional, with small data volumes and short response time requirements. An interactive EDIFACT syntax alternative is currently being progressed to meet these needs.

The data are interchanged in messages which are structured according to predefined formats agreed by the EDIFACT process. The work of the EDIFACT organization primarily focuses on the design of such predefined message structures.

EDIFACT syntax has the following characters:

- hierarchical structuring;
- implicit data element identification;
- special character data separation;
- flexible length data structures;
- mandatory or conditional status of data elements and segments.

The syntax defines interchange and functional group as syntactic components for the identification, addressing or routing and control of the data, that is, messages. These functions are mainly used by EDI software and communication services. From the user application perspective, the main syntactic component is the message.

Messages are structured by means of segments, that is, standard building blocks, and groups of segments. The segments, in their turn, are built from composites and simple data elements, and the composites are built from data elements. The data elements are represented in an interchange by data values.

The syntax offers basic (default) choices for character set, separators and representation of characters. User groups may make other choices as well.

The syntax also specifies some components designated to have a special syntactic meaning to control interchanges of data. They are:

- service messages (many still under development);
- service segments;
- service composite data elements;
- service data elements; and
- separators for data elements, composite data elements and segments.

DATA ELEMENTS

Before any conversation can occur between either people or computer systems, a set of conventions and a dictionary of terms is required. In EDIFACT these terms are
called Data Elements, the vocabulary of an application. Each data element will identify an individual field or item of data designed for a specific purpose, for example, product number, quantity, unit price, and EAN code.

Individual data elements may be combined to form composite data elements, for example, a weight of 24 kilograms is represented by the composite data element 24:KG. The database which contains all data elements is known as the data element directory.

A data element is a unit of data which may be considered indivisible (source: ISO 2382/4). In EDIFACT a data element is specified through

- a tag, or an identifier for the data element, which is unique in the data element directory;
- a name;
- a description; and
- a representation, or format, for the values of the data element.

Approved user data elements are registered in the EDIFACT Data Elements Directory, which is a subset of United Nations Trade Data Elements Directory (UNTDED). This is the database of all registered data elements, be they on paper or used in EDI.

There are established conventions for the specification of data elements. The tag is four digit numeric, designated to the data element according to these principles:

- First digit: used to group data elements into broad categories according to their nature, for example,
  - 0xx for service data elements;
  - 1xx for documentation, references;
  - 2xx for data, time, period of time.
- Second to fourth digits:
  - 000-499 for internationally agreed data elements;
  - 500-699 for national use;
  - 700-799 for EDIFACT trial use;
  - 800-999 for private use.
- Fourth digit:
  - even for text form of data element;
  - odd ("even+1") for the coded form of data element.

Names and descriptions are expressed in natural language. The working language of EDIFACT is normally English but, through various international and national initiatives, data element directories are published in several languages. The tag is the key in cross referencing language versions.

The notation for data types is "a" for alphabetic, "n" for numeric and "an" for alphanumeric. The data element may be of fixed or variable length. For fixed-length data elements, the length is given immediately after the data type. A variable data element length is indicated by two dots after the data type, immediately followed by the maximum length indication.

Some general guiding principles are used to standardize data element lengths, for example,

- data elements in coded form are designated an..3;

<table>
<thead>
<tr>
<th>Data Element Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>3039  Party id identification (tag)</td>
</tr>
<tr>
<td>Desc: Code identifying a party involved in a transaction (description)</td>
</tr>
<tr>
<td>Repr: an..17 (represented by alphanumeric, up to 17 characters)</td>
</tr>
<tr>
<td>3042  Street and number/PO. box</td>
</tr>
<tr>
<td>Desc: Street and number in plain language, or Post Office Box No.</td>
</tr>
<tr>
<td>Repr: an..35</td>
</tr>
<tr>
<td>3055  Code list responsible agency, coded</td>
</tr>
<tr>
<td>Desc: Code identifying the agency responsible for a code list.</td>
</tr>
<tr>
<td>Repr: an..3</td>
</tr>
</tbody>
</table>

Excerpt from the data elements directory, EDIFACT trial directory set 91.1

Annex 5: UN-EDIFACT 89
• data elements in plain language are given a format of either an..17, an..35 or an..70.

DATA ELEMENT VALUES AND CODE LISTS

A data element value is a specific entry of an identified data element, represented in a data element directory. Depending on the form of the data element, the value is expressed as plain text or code.

In a few instances specific structures may be defined for data element values, for example, for dates to be expressed as YYMMDD (year, month, day).

A code list is a set of code values with defined meanings, designated to a particular data element.

Depending on the source, EDIFACT code lists are divided into four categories, or classes.

1. Code lists for service data elements, maintained jointly by ISO and EDIFACT.
2. Code lists for user data elements, maintained by EDIFACT.
3. International code lists for user data elements, maintained by ISO or UN/ECE.
4. Code lists maintained by parties other than EDIFACT, ISO or UN-ECE.

Code lists of classes 1 and 2 are to be found in the UN Code Lists Directory. Class 3 code lists are referred to in the UN Code Lists Directory.

For some data elements only one code list is specified, but in most cases more than one code list may potentially be used. In such instances, the users may agree in the interchange agreement to restrict their use to one single code list. Alternatively, the code list can be identified by specifying the two data elements in association with the code value.

1113 Code list qualifier, and
3055 Code list responsible agency, coded.

COMPOSITE DATA ELEMENTS (COMPOSITES)

A composite data element is a standard structure of two or more data elements. In EDIFACT, a composite data element is specified through a tag, that is, an identifier for the composite data element, unique in the directory; a name; a description; and a specification of content, that is, two or more data elements where the data elements are taken from the EDIFACT Data Elements Directory, in a significant sequence, and with a designated status for each element within the composite.

The tag of a composite data element is composed of four characters.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3055</td>
<td>Code list responsible agency, coded</td>
</tr>
<tr>
<td>Desc: Code identifying the agency responsible for a code list.</td>
<td></td>
</tr>
<tr>
<td>Repr: an..3</td>
<td></td>
</tr>
</tbody>
</table>

5 ISO (International Organization for Standardization) Self explanatory.
6 UN-ECE (United Nations Economic Commission for Europe) Self explanatory.
7 CEFIC (Conseil European des Federations de lIndustrie Chimique) EDI project for chemical industry.
8 EDIFICE EDI Forum for companies with Interest in Computing and Electronics (EDI project for EDP/ADP sector).
9 EAN (International Article Numbering association) Self explanatory.
10 ODETTE Organization for Data Exchange through Tele Transmission in Europe (European automotive industry project).

Code values for data element 3055 code list responsible agency, coded excerpt from EDIFACT trial directory set 91.1
Examples of Composite Data Elements

C080 PARTY NAME

Desc: Identification of a transaction party by name, one to three lines.

3036 Party name M an..35
3036 Party name C an..35
3036 Party name C an..35

C082 PARTY IDENTIFICATION DETAILS

Desc: Identification of a transaction party by code,

3039 Party id identification M an..17
1131 Code list qualifier C an..3
3055 Code list responsible agency, coded C an..3

Excerpt from the composites directory, EDIFACT trial directory set 91.1

• First character:
  S for service composites;
  C for user composites.

• Second to fourth characters:
  three digits (0-9), no particular
  meaning implied.

  The status of the data elements of a composite is

  • M for mandatory data elements; and
  • C for conditional data elements.

  When defining a composite data element, the data elements are arranged as
  follows:

  • mandatory data elements are placed
    before conditional;
  • frequently used data elements are placed
    before less frequently used;
  • when updating a composite, any new
    element is added to the end of (the new
    version of) the composite.

  Composites are used to combine related
data elements into a structure. Composite
data elements are used to relate a generic
data element to a qualifier; relate data
elements that express code and plain text
representation of the same data item; relate
an amount to a measure unit specifier; and
to specify an interval (range of values).

SEGMENTS

There is a need in EDIFACT to provide
logical groupings of data, known as seg-
ments. A segment is a standard structure of
functionally-related data elements and
composites values, for example, an address
segment, a goods description segment, or a
payments segment, which are identified by
their sequential positions within the struc-
ture.

In EDIFACT, a segment is specified
through a tag, a name, a function and a
specification of content, very much like
composite data elements.

There are, of course, conventions for the
specification of segments. The segment tag
is alphabetic, and three characters in length.

  • First character:
    U for service segments;
    any other letter but U for user compos-
    its;
  • Second and third characters:
    no particular meaning implied.

  The status of the data elements of a
composite is M for mandatory elements;
and C for conditional elements.

  When defining a segment, the data
elements and composites are arranged as
follows:

  • the segment tag is placed as a first data
element in the segment;
### Segment Examples

**NAD NAME AND ADDRESS**

**Function:** To specify the name/address and their related function, either by C082 only and/or unstructured by C058 or structured by C080 thru 3207.

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Mandatory</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>3035</td>
<td>PARTY QUALIFIER</td>
<td>M</td>
<td>an.3</td>
</tr>
<tr>
<td>C082</td>
<td>PARTY IDENTIFICATION DETAILS</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>3039</td>
<td>Party id identification</td>
<td>M</td>
<td>an.17</td>
</tr>
<tr>
<td>1131</td>
<td>Code list qualifier</td>
<td>C</td>
<td>an.3</td>
</tr>
<tr>
<td>3055</td>
<td>Code list responsible agency, coded</td>
<td>C</td>
<td>an.3</td>
</tr>
<tr>
<td>C058</td>
<td>NAME AND ADDRESS</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>3124</td>
<td>Name and address line</td>
<td>M</td>
<td>an.35</td>
</tr>
<tr>
<td>3124</td>
<td>Name and address line</td>
<td>C</td>
<td>an.35</td>
</tr>
<tr>
<td>3124</td>
<td>Name and address line</td>
<td>C</td>
<td>an.35</td>
</tr>
<tr>
<td>3124</td>
<td>Name and address line</td>
<td>C</td>
<td>an.35</td>
</tr>
<tr>
<td>3124</td>
<td>Name and address line</td>
<td>C</td>
<td>an.35</td>
</tr>
<tr>
<td>C080</td>
<td>PARTY NAME</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>3036</td>
<td>Party name</td>
<td>M</td>
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<tr>
<td>3036</td>
<td>Party name</td>
<td>C</td>
<td>an.35</td>
</tr>
<tr>
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<td>Party name</td>
<td>C</td>
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</tr>
<tr>
<td>C059</td>
<td>STREET</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>3042</td>
<td>Street and number/P.O. Box</td>
<td>M</td>
<td>an.35</td>
</tr>
<tr>
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<td>C</td>
<td>an.35</td>
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<td>C</td>
<td>an.35</td>
</tr>
<tr>
<td>3164</td>
<td>CITY NAME</td>
<td>C</td>
<td>an.35</td>
</tr>
<tr>
<td>3229</td>
<td>COUNTRY SUB-ENTITY IDENTIFICATION</td>
<td>C</td>
<td>an.9</td>
</tr>
<tr>
<td>3251</td>
<td>POSTCODE IDENTIFICATION</td>
<td>C</td>
<td>an.9</td>
</tr>
<tr>
<td>3207</td>
<td>COUNTRY, CODED</td>
<td>C</td>
<td>an.3</td>
</tr>
</tbody>
</table>

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- Mandatory elements are positioned before conditional elements;
- Frequently used elements are positioned before the less frequently used;
- When updating a segment, any new elements are added to the end of (the new version of) the segment.

When presenting segment specifications, the names of simple data elements and composites are written in upper case: the names of the components of the composite data elements are written in lower case.

The concept of the segment has an important role from the data interchange perspective. It is the smallest data unit interchanged with explicit identification (using the segment tag as identifier).

**QUALIFIERS**

A qualifier is a data element providing a specific meaning to the function of a generic data element, a composite or a segment. The values of the qualifier are always expressed in coded form.

The combination of qualifier and generic element(s) offers great flexibility. Several types of information can be defined in one single data structure. New requirements are met by adding new qualifier values while leaving the data element directories and message structures unchanged.

For the development of new segments, composites, and data elements, EDIFACT encourages the use of generic rather than specific alternatives.

There are certain construction rules involving qualifiers.

If only one data element is to be qualified, the qualifier is placed immediately after that data element; together the two elements form a composite.

If two or more elements are qualified,
Approved messages are published in EDIFACT Standards Directories, while messages accepted for trial are published in Draft directories.

The conventions for specification of messages demand that the identifying code of the message is alphabetic, and six characters of length.

The status of the segments and segment groups of a message is M for mandatory usage; and C for conditional.

For a segment in a group inside another group, the status (M or C) is conditioned by the status of the parent group.

The message header (service segment UNH) is the first segment in a message, and the message trailer (service segment UNT) is the last.

To document the message structure, either segment tables or branching diagrams are used. Their main purpose is to secure the correct sequencing of segments.

When specifying new or changed messages, great care should be taken to avoid segment collision. This occurs when a segment is used for different purposes in different positions in the message without separating the positions by means of mandatory elements. One mechanism often used is to place "stand-alone" segments before segment groups; another is to make use of the service segment section control (service segment UNT) to divide the message into sections.

MESSENGES

A message is an ordered series of characters intended to convey information (source: ISO 2382/16). In EDIFACT, a message has been allocated a well-defined business function and a predefined structure, expressed by means of segments. Within the message, each segment is identified by the segment tag and its sequential position in the message structure.

In EDIFACT a message is specified through a unique identifying code, a name, a function, and a specification of content, which includes

- service segments for message header, message trailer and, as appropriate, message section control, plus a selection of user segments taken from the EDIFACT Segments Directory;
- segments structured in groups to show hierarchical data dependencies, as needed;
- specified sequence of the segments and segment groups in the message;
- status and repetition factor stated for each segment and segment group in the message;
- clarification of usage for each segment and segment group in the message.

The qualifier for segment NAD, an Example

Segment NAD is qualified by data element 3035 Party qualifier.

Depending on the value of 3035, the segment can carry name and address information about various parties.

For example,

- NAD+BY+... means Buye's name and address data
- NAD+SE+... means Seller's name and address data
- NAD+CN+... means Consignee's name and address data

the qualifier is placed before these data elements; together the elements form a composite.

If a segment is to be qualified, the qualifier is placed as a simple data element immediately after the segment tag.

Excerpt from message PARTIN, EDIFACT trial directory 91.1
Each segment position has a unique function. The data for this function is carried in a defined type of segment. To further structure a message, segments can be grouped.

Segment group 4:
NAD-DTM-FII-SG5-SG6-SG7-SG8
A group of segments for giving the details of a party.

NAD, Name and address
A segment for identifying the party identification code and the corresponding function, name and address. The party identification code is mandatory, and the structured address form is preferred.

DTM, Date/time/period
A segment specifying the date and the time details relevant to the party information identified in the NAD segment.

FII, Financial institution information
A segment identifying the financial institution, (e.g. bank) and relevant account numbers for the party identified in the NAD segment.

Segment group 5: LOC-DTM
A group of segments for giving locations and dates relevant to party.

LOC, Place/location identification
A segment specifying the locations relevant to the party identified in the NAD segment, e.g., internal building number on a site.

DTM, Date/time/period
A segment specifying dates and times relevant to the LOC segment.

Segment clarification (excerpt). Message PARTIN, EDIFACT trial directory set 91.1

THE ORGANIZATION

In 1986, the UN-ECE approved the acronym EDIFACT, which translates to EDI For Administration (Government or Public Administration), Commerce and Transport. The concept is to provide a single international EDI standard flexible enough to meet the needs of government and private industry.

In 1987, three events marked the beginning of the formal EDIFACT development process. The UN-ECE appointed EDIFACT rapporteurs for North America, Western Europe and Eastern Europe; EDIFACT syntax was adopted by ISO and UN-ECE; and the first message was adopted for trial use. The organization has since evolved (by June of 1995) as illustrated in Annex 5 Figure 3.

Authority is delegated by the UN to the ECE, which then delegates authority to its committees. The UN-ECE is one of the United Nation’s regional economic committees. Others include ESCAP (Asia Pacific) and ECLAC (Latin America). Full members of the UN-ECE include the countries of Eastern and Western Europe as well as the United States and Canada. Other members of the UN are entitled to participate under Article 11 of the UN charter. Among the many countries that participate under Article 11 are Australia, Japan, Korea, New Zealand, Singapore, and so on.

Under the UN-ECE’s Committee on the Development of Trade, the trade facilitation activities are undertaken by the Working Party on Facilitation of International Trade Procedures, commonly referred to as Working Party 4 (WP.4). Within WP.4 there are two groups of experts, GE.1 and GE.2. It is GE.1 that manages the development of the global UN-EDIFACT standard, and its parallel committee, GE.2 that deals with procedures and documentation.

The UN-ECE WP.4 appoints individuals called rapporteurs who are nominated by the local governments, and delegates regional responsibility to develop the standard in the best interests of that region.

The rapporteurs are required to set up the appropriate machinery and facilities in their region, including the appointment of a local Rapporteur’s Team secretariat. They also coordinate regional activity in message development, technical assessment, promotion and documentation, and special projects.
The segment table for message PARTIN, Party information message. Excerpt from EDIFACT trial directory set 91.1

STANDARDS APPROVAL PROCESS

United Nations General Assembly

Economic and Social Council

Regional Economic Commission UN/ECE

Committee on Trade

WP.4 GE.1

STANDARDS DEVELOPMENT PROCESS

African EDIFACT Board AFEB

Australian/New Zealand EDIFACT Board ANZEB

Eastern Europe EDIFACT Board EEEB

Asia EDIFACT Board ASEB

Pan American EDIFACT Board PAEB

Western Europe EDIFACT Board AFEB

Annex 5 Figure 3: UN-EDIFACT, the Organization

Annex 5: UN-EDIFACT 95
Regional Boards are appointed locally to support the rapporteurs in the execution of their responsibilities. The Boards' constitution is not regulated by WP.4. It varies to allow for regional differences in geography, language and political environment.

**DEVELOPING A MESSAGE**

Although involvement in the EDIFACT message development process is relatively simple, there are a number of important procedures to be followed. In the first instance, the industry group must identify the functional and business need for an EDIFACT message and submit these details on the appropriate “New Message Request” (NMR) form to the local EDIFACT Board secretariat. (See Annex 5 Figure 4.) At this stage of the process some consideration needs to be given to the technical aspects of the message.

When an NMR is received by the secretariat, it is logged and then passed through the local board to the EDIFACT Technical Assessment Group (TAG) for initial consideration of the following:

- Whether there is an existing message which has similar or identical functions and could be used to meet the stated business needs.
- Whether there is a similar or identical message currently under development which would meet the stated business need.

The results of this technical assessment are then advised to the industry group by the EDIFACT secretariat and depending on the assessment the following actions are initiated.

Where there is a similar or identical EDIFACT standard message already in use, the industry is advised of this, provided with the details and invited to submit any changes which they might consider necessary to meet their specific needs. Any such change requests are again referred to TAG for consideration.

Where there is a similar or identical message under development, the secretariat recommends that the industry group join in the development with the group currently working on the message. Where this development is taking place in another region, the rapporteur consults with the chair of the industry group to ensure that the group is prepared to commit both the necessary financial and human resources to the
When this has been established, the rapporteur consults with the rapporteurs in the other region(s) and arranges for the chair of the group in the other region(s) to liaise on further development work.

Where there is no similar or identical message already established as a standard, and none under development, and the rapporteur is satisfied that sufficient human and financial resources are available to develop the message, the secretariat forwards the validated NMR to all other regions. They are then given a period of six months to notify joint development. During

<table>
<thead>
<tr>
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<tr>
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<table>
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<td>Coordinating Committee</td>
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<table>
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<th>Technical Assessment Group (TAG) T1</th>
<th>Maintenance Group (MAG) Change Request Agreement Group (CAG) Code Group</th>
<th>Procedures and Documentation Group (PDG) PPT</th>
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</thead>
<tbody>
<tr>
<td>Awareness Group (AWG)</td>
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</tr>
</tbody>
</table>

**Message Development Groups**

- JM 1 Materials Management
- JM 2 Purchasing
- JM 3 Product and Quality Data
- JM 5 Customs
- JM 6 Finance
- JM 7 Construction/ Architecture
- JM 8 Statistics
- JM 10 Tourism/ Travel/ Leisure
- JM 11 Healthcare
- JM 12 Social Admin/ Employment

**Special Interest Groups**

- Interactive T3
- UNSM User Guides/ Standard Liaison T6
- Security T4
- Business Information Modelling T5

Annex 5 Figure 5: A Typical Regional EDIFACT Organization Description, WEEB
this period the industry group which has submitted the new message request can commence development work.

Once the NMR has been submitted onto the international scene, the message development moves through three formal stages:

- **Status 0.** This is when a “working draft” of the message is submitted to the United Nations Working Party on Trade Facilitation (UN-WP.4) to notify users worldwide that the message is currently under development. The message at this stage is not in the public domain, but will be made available under a caveat arrangement by the local rapporteur to encourage other possible users of the message to join in the development process.

- **Status 1.** When the message has been developed to the point where it is considered to have sufficient stability for a trial, it is resubmitted to WP.4 with the recommendation that it be granted Status 1—“Recommended for Trial Use”.

- **Status 2.** Following a minimum of 12 months trialling of the message during which any necessary changes are made, the message is again submitted to WP.4 with the recommendation that it be granted Status 2—“Recommended as a United Nations Standard Message” (UNSM).

Status 0 and Status 1 messages are subject to changes which must pass through the approval process. To request a change the appropriate Change Request Form must be completed and submitted to the secretariat. These are reviewed by TAG. If approved, they are distributed to other regions. If rejected, the relevant industry group is notified. Change requests coming in from other regions also pass through the local TAG. Every attempt is made to ensure that interested industry groups are provided with copies of the changes for review and action if necessary.

Annex 5 Figure 5 describes a typical regional EDIFACT organization.

**UN-EDIFACT DELIVERABLES**

The main deliverables from the EDIFACT process are the UN-EDIFACT set of directories, formally known as UNTDID (United Nations Trade Data Interchange Directory). The directories include the rules of conduct for interchange, syntax rules, message design guidelines, directories of messages and their supporting directories, both draft and standard, descriptions of messages, segments, composite data elements, and data elements, and that of codes with reference to their maintenance agencies. Joint technical support groups also develop documentation such as guidelines for business modelling, check lists for technical assessment, and guidelines for implementation of messages.

The UNTDID and all other deliverables are available via the secretariat of the UN-ECE as paper printout; the directories of messages and their supporting directories are distributed on diskette only. There are plans to make all documentation available electronically in the near future, via e-mail connection.
This glossary is aimed at those new to EDI, and merely provides a starting point. It may be expanded as need and opportunity allow.

It should be noted that there are occasionally quite different definitions of terms between data processing usage and data communication usage; the term “baud” is a good example. The definition selected here, where any contention exists, is that which is clearest and most appropriate for the EDI aspirant.

A

ABI See Automated Broker Interface.

access To log on, to sign on, or to begin using a system. telecommunications connection to an electronic commerce system.

acknowledgment An EDI message in response another EDI message.

ad valorem Literally: according to value. In shipping, a freight rate set at a certain percentage of the declared value of an article. In customs, an ad valorem duty is assessed as a percentage rate or value of the imported merchandise. For example 5 percent ad valorem.

ADS Aligned Documentation System.

advising bank The bank (also referred to as the seller’s or exporter’s bank) which receives a letter of credit or amendment to a letter of credit from the issuing bank (the buyer’s bank) and forwards it to the beneficiary (seller or exporter) of the credit.

AIAG See Automotive Industry Action Group.

AID Automatic Identification. This includes such technologies as radio frequency identification, ear tags, bar codes and so on.

AIM Automatic Identity Marking, such as bar codes, radio tagging, and so on.

air freight forwarder A freight forwarder for shipments by air. Air freight forwarders serve a dual role. To the shipper, they are an indirect carrier, because they receive freight from various shippers under one tariff, usually consolidating the goods into a larger unit, which is then tendered to an airline. Many air freight forwarders operate their own aircraft.

air way bill (air bill) A document used by the airlines for air freight. It is a contract for carriage that includes carrier conditions or carriage including such items as limits of liability and claims procedures. The air way bill also contains shipping instructions to airlines, a description of the commodity and applicable transportation charges.

The airline industry has adopted a standard, formatted air way bill that accommodates both domestic and international traffic. The standard document was designed to enhance the application of modern computerized systems to air freight processing for both the carrier and the shipper.

ALFA An automated clearance system for German Customs at Frankfurt Airport.

alphabetic character set A character set that contains letters and may contain control characters and special characters but not numeric digits (ISO 2382/4).

 alphanumeric character set A character set that contains both letters and digits and may contain control characters and special characters (ISO 2382/4).

America Online A client support electronic network for users of PC software.

American National Standards Institute The body set up to define, maintain,
and coordinate standards in the United States. Data-processing-related standards are supervised by committees which are named X followed by a number as an identifier. For example, ASC X9 is the banking data encryption committee, X12 is the EDI document standards committee.

**ANA** See Article Numbering Association (United Kingdom).

**ANSI** See American National Standards Institute.

**ANSI X12** The ANSI subcommittee overseeing EDI standards setting.

**ANZEB** Australia-New Zealand Edifact Board.

**APEC** See Asia Pacific Economic Cooperation.

**APNA** Australian Product Number Association.

**application program** Computer program written to process a particular function within a business, such as, sales order processing, inventory control.

**archiving** The process of storing and arranging historic records. In the case of computer-related activities this is generally done for audit, backup, and security purposes.

**Article Numbering Association (United Kingdom)** One of 36 such organizations set up in as many different countries. Their original technological task was to establish bar codes, particularly in wholesale and retail trade. Their duties are expanding now. For example, bar codes will soon denote size, style, and so on.

**ASC X12** Accredited Standards Committee X12, part of the ANSI organization.

**ASCII** American Standard Code for Information Interchange. A standard binary notation for numbers, letters, and control characters. ASCII is the basic communication method of computing.

**ASEAN** See Association of Southeast Asian Nations.

**AEB** Asian Edifact Board.

**Asia Pacific Economic Cooperation** An informal grouping of Asia Pacific countries that provides a forum for ministerial level discussions on a broad range of economic issues.

APEC includes the six ASEAN countries, plus: Australia, Canada, China, Hong Kong, Japan, South Korea, Taiwan (China) and the United States. The secretariat is located in Singapore.

**ASN** Advanced shipping notice. A goods delivery note sent to arrive before the goods so as to alert goods inward and supply personnel at the receiving end of the supply chain.

**Association of Southeast Asian Nations** Established in 1967 to promote political, economic and social cooperation among its six member countries: Indonesia, Malaysia, Philippines, Singapore, Thailand and Brunei.

**assumed receipt** The principle of assuming what the shipping note or delivery note says of a shipment is correct. Hence goods inward personnel do not need to check the delivered quantity. Used in conjunction with bar code reading and an EDI-delivered ASN as a device for eliminating the invoice.

**async** Asynchronous: transmission which is not related to a particular frequency, that is, bits-per-second rate. A method of data transmission where each character sent is framed by start-stop signals. Used in slow-speed devices like teleprinters. This is generally the method used by PCs. See sync.

**ATA Carnet** ATA stands for the combined French and English words “Admission Temporaire/Temporary Admission.” An ATA Carnet is an international customs document for temporary duty-free admission of certain goods into a country in lieu of the usual customs documents. The Carnet serves as a guarantee against the payment of customs duties which may become due on goods temporarily imported and not re-exported.

**ATM** Asynchronous Transfer Mode. A more recent telecommunications technique.

**AT&T (Istel)** American Telephone and Telegraph, now owners of Istel, a British EDI service provider and
various other national VAN operations.

**audit trail** The series of logs and data which follow a transaction from beginning to end. An audit trail is used to ensure that a transaction has actually reached its destination and is complete.

**authentication** The process of ensuring that someone who has logged on to a service is a *bona fide* user of that particular service.

**auto answer** Process in which a terminal, PC, or modem responds to an incoming call on a dial-up line in order to establish a data link with an (often) unattended device.

**auto dial** A function of some modems which will automatically dial up and access a network on a given command, at a given time, or on recognition of a given condition in a program. Also known as auto call.

**Automated Broker Interface** A part of U.S. Customs' Automated Commercial System, permits transmission of data pertaining to merchandise being imported into the United States, directly to U.S. Customs. Qualified participants include customs brokers, importers, carriers, port authorities, and independent data processing companies referred to as service centers.

**Automotive Industry Action Group** A specific automotive industry manufacturing group set up under the auspices of the ANSI X12 committee. Its purpose is to set standards for the North American automotive manufacturing industry.

**B**

**backup** Facilities which enable a computer or network to function even if a vital component fails. Involves the provision of extra hardware and software. See fault tolerant.

**bandwidth** The difference between the highest and lowest frequencies of a transmission channel. Expressed in hertz (Hz). It can also be used as a measure of line capacity.

**BAPLIE** See Bay Plan.

**bar code** An automatic identification technology which encodes information into an array of varying widths, parallel rectangle bars and spaces.

**bar code reader** See scanner.

**batch processing** Procedure in which data processing records are collected together and then processed in sequence, one immediately after another, as opposed to interactive processing, where each record is processed as it arrives.

**baud** A rate of transmission over a channel or circuit. The number of pulses which can be transmitted in a second is the baud rate. Thus baud translates as pulses per second. This is sometimes taken to be bits per second (bps) but since not every pulse measured represents data, this is an inaccurate, although not totally inadmissible, definition.

**baudot** The baudot code is similar in concept to ASCII. It assigns codes to letters of the alphabet, numbers, and punctuation marks. Baudot uses only 5 bits for 32 possible combinations. It does not have a unique code assignment for each character. Two codes are used for case shifting (letters and figures) which thus allows a total of 60 different characters to be represented. Baudot, named after the French pioneering telegraphic engineer, was for many years used for telegraphic traffic. Digital techniques have caused ASCII and other, more advanced codes, to largely replace the baudot code.

**Bay Plan (BAPLIE)** An EDIFACT message describing the location of containers in ports, harbors and container ships.

**BBS** Bulletin Board Service.

**best practice** A generic term describing the adoption of the latest technology and reengineering practices in order to evolve new commercial practices.

**bill of exchange** An unconditional order in writing, signed by a person (drawer) such as a buyer, and addressed to another person (drawee), typically a bank, ordering the drawee to pay a stated sum of money to yet another person (payee), often a seller, on demand or on a fixed or
future date. The most common versions of a bill of exchange are:
(a) A draft, wherein the drawer instructs the drawee to pay a certain amount to a named person. Sight drafts are payable when presented. Time drafts (also called usance drafts) are payable at a future fixed (specific) date or determinable date.
(b) A promissory note, wherein the issuer promises to pay a certain amount.

**Bill of Lading** A document issued by a carrier to a shipper, signed by the captain, agent, or owner of a vessel, furnishing written evidence regarding receipt of the goods (cargo), the conditions on which transportation is made (contract of carriage), and the engagement to deliver goods at the prescribed port of destination to the lawful holder of the bill of lading. A bill of lading is, therefore, both a receipt for merchandise and a contract to deliver it as freight. There are a number of different types of bills of lading.

**Bisync** Binary synchronous transmission of data, used for high-speed continuous transmission. Sending and receiving devices are controlled by clock pulses which regulate the rate and timing of data flow. Bisync is a character-oriented means of transmission.

**Bond Store** A storage area where cargo still under customs control may be stored. See also free store.

**Box** Colloquial term referring to a trailer, semitrailer or container.

**BPR** Business process reengineering: the process by which new commercial methods of operation may be established, often employing electronic commerce techniques.

**Broadcasting** Simultaneously sending a message to more than one destination. This technique eliminates multiple sequential transmission of the same message and, more importantly, ensures that identical messages arrive at the same time at all intended recipients’ computers.

**BSP** Bank Settlement Plan. The system by which travel agents pay airlines and wholesalers electronically, using EDI messages.

**BT** British Telecom.

**BT-Tymnet** The merged McDonnell Douglas-EDINet and BT company; an EDI service provider. A later merger with MCI now sees them trading as Concert, a BT-MCI merged entity.

**Bulletin Board** Electronic notice board used in information networks for storage and display of general information. Available to all users of the system or to specified groups (for example, for price lists). See BBS.

**Bureau** Service bureau. A commercial computer operation which sells time and services.

**C**

**Cabotage** Water transportation, navigation or trade between ports of a nation.

**Call ID** Each leased line which has access to an EDI system based upon X.25 protocols has a unique ID, hence calls can easily be traced. With dial-up calls, an ID needs to be embedded within each call by the network. (Note: Not to be confused with caller ID.)

**Callback** The process by which an EDI server system checks the source of access to the system in order to ensure that the caller is an authorized user. The process often uses a callback modem, password-activated. When called, it will hang up and then call back the user’s number to set up data communication.

**Caller ID** A telephony technique whereby the caller’s originating telephone number is displayed on a small display screen built into a telephone handset, enabling the recipient to see who is calling the call and to make decisions on screening the call.

**Cargo Manifest** A list of a ship’s cargo or passengers.

**CARGO-IMP** An IATA standard for airline messages, referring to cargo.

**CARGONAUT** An internal clearing system at Schipol airport in Amsterdam.

**Carnet** A customs document permitting the holder to carry or send merchandise
temporarily into certain foreign countries (for display, demonstration, or similar purposes) without paying duties or posting bonds. See ATA Carnet.

carrier (i) An individual or legal entity that is in the business of transporting passengers or goods for hire. Shipping lines, airlines, trucking companies, and railroad companies are all carriers.
(ii) Authorized network operator; carrier of voice and data traffic. Generally known as PTT (posts, telephone, and telegraph) in a duopoly or a regulated environment, for example, Telstra. Bell Atlantic of the United States is an example of a carrier in a deregulated environment. Also known as telcos and telecom authorities. See also BOC; RBOC; RHC.

CAS Community Access Service.
CCC Customs Cooperation Council (based in Brussels). Now known as the WCO.
CCITT See Consultative Committee on International Telegraph and Telephone.
CDC Control Data Corporation; formerly operated REDINET, an EDI service.
CDN Cellular Data Networks.
CEC Commission of the European Communities.
CEDI*FIT Customs EDI for Import Transactions.
CEFIC Federation of European Chemical Industries. EDI for the chemical industry in United Kingdom and Western Europe; one of the first transnational EDI projects in Europe; pilot started September 1987.
cell The on-board stowage space for one shipping container on a ship.
CEN See European Committee for Standardization.
CEPT See Conference of European Posts and Telecommunications.
CER Common Economic Relationship. The Australasian common market between Australia and New Zealand.
Certification of Origin An official document issued by a national trade department which validates goods for sale originated or largely produced in that particular country. There are UN-EDIFACT versions of CO obtained through Chambers of Commerce, for example.

CETS Community Access Service.
CFR See Cost and Freight.
chaebol Korean conglomerates, characterized by strong family control, authoritarian management, and centralized decision making. Chaebol dominate the Korean economy. By 1988, the output of the 30 largest chaebol represented 95 percent of Korea’s GNP.
channel A physical or logical communication path for transmission of data.
character A standard representation of a symbol, letter, number, or special character. In a computer, represented by bits. Often taken to mean the same as byte. Not strictly accurate, but near enough.
character set A finite set of different characters that is considered complete for a given purpose (ISO 2382/4).

Chemical Industry Document Exchange An ANSI X12 subcommittee dealing exclusively with the chemical industry’s document standards.
CHIEF Customs Handling of Import and Export Freight. A U.K. Customs project (successor to DEPS).
CIF See Cost, Insurance, Freight.
CIFCI Cost, insurance, freight, commission and interest.
CIG See common interest group.
CIM Computer-integrated manufacturing.
CIT Customer input terminal.
classification The categorization of merchandise according to a Harmonized Tariff Schedule (HTS). Classification affects the duty status of imported merchandise, and is initially the responsibility of an importer, customs broker or other person preparing the entry and declaration messages.
clearing house In the context of EDI, a clearing house comprises a network and central-computer-based mailbox service enabling many trading partners to send documents electronically and receive messages from a single central system, independent of time or traffic.
CNAB  National Council For Banking Automation, Brazil.

CO  See Certification of Origin.

Codabar  (2 of 7 code, code 27) A numbers-only bar code consisting of seven modules, two of which are wide.

Code 39  (3 of 9 code) A four alpha numeric bar code consisting of nine modules, three or which are wide.

Code 93  A four alpha numeric bar code capable of encoding all 128 ASCII characters.

Code 128  An example of a long symbol broken into sections and stacked one upon another, similar to sentences in a paragraph. These are extremely compact codes.

combined bill of lading  A bill of lading covering a shipment of goods by more than one mode of transportation.

commercial invoice  A document identifying the seller and buyer of goods or services, identifying numbers such as invoice number, date, shipping date, mode of transport, delivery and payment terms, and a complete list and description of the goods or services being sold including prices, discounts and quantities. A commercial invoice is often used by governments to determine the true value of goods for the assessment of customs duties and also to prepare consular documentation. Governments using the commercial invoice to control imports often specify its form, content, number of copies, language to be used and other characteristics.

commercial paper  Negotiable instruments used in commerce. Examples of commercial paper are bills of exchange, promissory notes, and bank checks.

commercial set  The primary documents for a shipment of goods. A commercial set usually includes an invoice, bill of lading, bill of exchange, and certificate of insurance.

commodity code  A system for identifying a commodity by a number in order to establish its commodity rate in freight transport.

common access reference  The key which relates all transfers of data to the same business file.

common interest group  A group of network users who may have professional interests in common, rather than trading interests, such as doctors, engineers.

common user group  A group of network users whose shared interest is their need to use a particular service; for example, a financial data base service.

communication controller  Generally, a hardware and software unit which monitors and controls telecommunications traffic within a computer network. It optimizes line usage, allocates priorities, talks to the outside world; for example, OSI, SNA, X.25.

communication session  Slices of time established and agreed on by communicating computers, during which data is exchanged, or interconnection takes place. The more complex the network, the more sophisticated the task.

communities  Trading groups or end user collectives.

compliance checking  In processing messages or transaction sets within an EDI system, an essential part of the software logic is to ensure that all transmissions contain the minimum mandatory information demanded by the EDI standard being used. Compliance checking does not necessarily mean that the document is complete or accurate, but it does ensure rejection and identification of missing data elements or syntax errors. Hence it is the comparison of information sent by an EDI user against EDI standards, and the reporting back of anomalies.

component data element  A simple data element which is a subordinate portion of a composite data element, and in interchange, is identified by its position within the composite data element.

component data element separator  A character used to separate the component data elements in a composite data element.

composite data element  A data element containing two or more component data elements.
CompuServe  An electronic network providing databases, information services and bulletin board services in addition to electronic mail.

concentrator  A hardware device which connects several communication lines (coming in or going out) and condenses the data traffic onto one line for speed and economy.

Concert  The merged BT-MCI messaging service company.

conditional  A statement commonly used as a test value in computer programming. In standards setting, it indicates that the presence of a segment or element is at the discretion of the sending party, that is, used as required or based on mutual agreement, or is dependent on the value of another data element in the message. Also, a statement in a message directory or a segment of a condition for the use of a segment, a data element, a composite data element, or a component data element (see mandatory).

Conference of European Posts and Telecommunications  A subsidiary body to CCITT, specific to Europe, including Scandinavia. It concerns itself with data services connectivity. Some of its most recent work has been on incompatible videotex systems.

conferencing  Technique of using interconnected terminals and computer systems, including PCs, for interactive messaging or electronic mail.

confirmation  A formal notice (by a message or code) from a mailbox system or EDI server that a message sent to a trading partner has successfully reached the intended mailbox or has been retrieved by the addressee. See functional acknowledgment.

connect time  The time that a device is connected to a circuit, and hence to a computer.

connection  Established link for transmission of data.

connectivity  Ability of a particular computer or network architecture to be connected to and integrated with incompatible systems. OSI and X.400 standards address connectivity issues.

consignee  A person or party named in the bill of lading or waybill as the person or party to whom the goods are consigned.

consignment note  The document which is completed to cover a particular delivery or consignment. There is a UN-EDIFACT version of the consignment note.

consignment  Shipment of one or more pieces of property, accepted by a carrier for one shipper at one time, receipted for in one lot, and moving on one bill of lading.

consignor  Individual, company or entity that ships goods, or gives goods to another for care. The consignor is usually the exporter or his agent.

consolidation  Combining of less than truckload (LTL) or less than container load (LCL) shipments of cargo from a number of shippers at a centrally located point of origin by a freight consolidator, and transporting them as a single shipment to a destination point. Consolidation of cargo often results in reduced shipping rates.

consular invoice  Invoice covering a shipment of goods certified by the consul of the country for which the merchandise is destined. This invoice is used by customs officials of the country of entry to verify the value, quantity, and nature of the merchandise imported. There are outstanding demands by numerous international agencies for the elimination of this document from international trade.

Consultative Committee on International Telegraph and Telephone  A committee within the ITU. Among other things, it concerns itself with the conventions which enable incompatible networks and computer systems to exchange data. CCITT operates within the broader standard issues set out by the ISO.

container  A single rigid, sealed, reusable metal box which comes in standard lengths, in which merchandise is shipped by vessel, truck, rail or air. Container types include: standard, high cube, hardtop, open top, flat platform, ventilated, insulated, refrigerated, bulk.

container number  An up to seven-digit
number (six plus a check digit) used to identify the size and type of container, usually preceded by a four-letter alpha (letter) code prefix designating container ownership.

**Container Parks** A Customs endorsed storage area where it may handle overseas cargoes in FCL containers.

**containerization** The practice or technique of using a container in which a number of packages are stored, protected, and handled as a single unit in transit. Container descriptions have been broadened to include a unitized load on a carrier-owned pallet, loaded by shippers, and unloaded by receivers at places other than on airline premises, and restrained and contoured so as to permit proper positioning and tie down aboard the aircraft.

**continuous process improvement** The system whereby every process is constantly analyzed in order to spot weaknesses and eliminate them so as to improve the process.

**CONTRL** An EDIFACT message: acknowledgment-rejection advice.

**correspondent bank** A bank that acts as a depository for another bank, accepting deposits and collecting items (such as drafts) on a reciprocal basis.

**corruption** Data corruption, the loss or scrambling of data in a computer storage medium.

**COSAC** Hong Kong air terminal's system for import-export clearance.

**COST** European Cooperation in Scientific and Technical Research.

**Cost 306** A message series under development for physical transport of goods in Europe.

**Cost and Freight** A condition under which a seller must pay the costs and freight necessary to bring the goods to the named port of destination, but the risk of loss or damage, as well as additional costs due to events occurring after the goods have been delivered on board, are transferred to the buyer when the goods pass the ship's rail in the port of shipment. The CFR term requires the seller to clear the goods for export.

**Cost, Insurance, Freight** A condition under which the seller has the same obligations as under cost and freight (CFR) but with the addition that he has to procure marine insurance against the buyer's risk of loss of or damage to the goods during the carriage. The seller contracts for insurance and pays the insurance premium.

The buyer should note that under the CIF term the seller is only required to obtain insurance on minimum coverage. The CIF term requires the seller to clear the goods for export.

**CPI** Characters per inch as applied to bar code density.

**cross dock** The process which takes place at a distribution center, whereby goods are delivered to a dock at one end of the building. Loads are then made up and consolidated and delivered from the other end.

**CRS** Computer reservation systems; the airline specific reservation systems. See GDS.

**crypology** The science from which data encryption and decryption for secure systems is derived. Banking services, in particular, make great use of encryption techniques. ANSI X9.9 defines encryption algorithms (the complex calculations which encrypt and decrypt data).

**CUG** See common user group.

**CUSDEC** The standard European Customs declaration format, employed in EDIFACT standards.

**CUSRES** An EDIFACT message. Customs response.

**Customs** The excise, duty, and tariff agency handling the national customs process.

**D**

**DagangNet** EDI Malaysia's messaging network.

**data** A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human beings or by automatic means (ISO 2382/1).

**data communication** The process of transmitting, receiving, and validating nonvoice data over one or more
data links, according to an accepted protocol (for example, SNA-OSI).

data dictionary A table of terms within a message standard or a specific application with precise meaning for all users of the system. For example, in the ANSI X12 grocery document standards, CA is the code for a case of canned goods, of a known size and known number of cans. Each use of CA in a specific message is entered into a data dictionary.

data element The smallest named item in an EDI message which can convey data. Also, a unit of data which, in certain contexts, is considered indivisible (ISO 2382/4, EDIFACT); a unit of data for which the identification, description, and value representation have been specified.

data element attribute A defined characteristic of a data element.

data element directory A document which describes the attributes of all data elements, within EDI standards. Also, a listing of identified, named, and described data element attributes, with specifications as to how the corresponding data element values shall be represented.

data element name One or more words in a natural language identifying a data element concept.

data element representation The format (for example, numeric, alphabetic, variable length) of a data item.

data element requirement designator A character which indicates the mandatory or conditional status of a data element.

data element separator A syntax character used to separate data elements in a segment.

data element tag A unique identifier for a data element in a data elements directory.

data element value The content or data item within the data element. Also, the specific entry of an identified data element represented as specified in a data elements directory.

Data Encryption Standard Cryptographic algorithm designed by the U.S. National Bureau of Standards to encipher and decipher data; uses a 64-bit key. RSA is the newer encryption standard. See RSA.

data entry The task of keying in data to a computer system from a source document.

data integrity Condition of data in a whole, original, and uncorrupted form.

data item The alphabetically and numerically coded contents of a data element.

data segment requirement designator A character which indicates the mandatory-conditional status of a data segment.

data transfer The physical process of initiating and sending data to a corresponding computer system. This is generally taken to mean the transfer of a file of data, in a batch; hence the terms batch file transfer and file transfer. See batch processing.

DB See data base.

DC See Distribution Center.

DCE Data circuit (terminating) equipment. In a network, an access point to the network or a network node on which a data circuit terminates.

DDP Digital data processing.

decoder Part of a bar code reading system; the electronic package which receives signals from the scanner, performs the algorithm to interpret the signals into meaningful data and provides the interface to other devices.

decryption Returning an encrypted message to its original clear text (plain text).

dedicated line A nonswitched data channel; a private line; a leased line.

DELFOR An EDIFACT message. Delivery instruction.

delivery advice The document or EDI message which confirms to a supplier or transporter that goods delivered have been received intact. An advanced shipping note (ASN) or ship note manifest (SNM) are examples of delivery advice.

DELJIT An EDIFACT message. Despatch advice.

demurrage The detention of a freight car or ship by the shipper beyond the time permitted for loading or unloading; the extra charges a shipper pays for
detaining a freight car or ship beyond time permitted for loading or unloading. Used interchangeably with detention. Detention applies to equipment. Demurrage applies to cargo.

DEPS  Departmental entry process system (for U.K. Customs; see also CHIEF).

DES  See Data Encryption Standard.

DESADV  An EDIFACT message. Despatch advice message.

detail area  The portion of an EDI message which encompasses the actual body of the business transaction.

dial-up  The act of accessing a network by dialing an access phone number, or by initiating a computer to dial the number. The dial-up line makes a connection to the network access point, via a node or PAD.

digital (communications)  The transmission of information using binary digits as opposed to analog signals.

direct transmission  Data transmission via an intermediary, such as a mailbox, introduces a time delay. Hence this can be said to be indirect transmission. Transmission of data from one host computer system to another (host to host) is direct. If the host-to-host transmission utilizes a public network, simply for carriage, this is known as message switching.

DISA  See Document Interchange Standards of America.

DISH  Data Interchange for Shipping, a value-added network for trade facilitation.

Distribution Center  The organization which performs the cost docking function. Goods are received at one end and consolidated into loads for particular stores and delivered from the other end. The Distribution Center may also add value to goods; it may offer quality assurance, wrapping and price ticketing services for retailers.

Distribution Requirements Planning  The computer system takes sales data input from POS devices, compares against stock on order and policy and then generates (EDI) purchase orders.

distributor  The mailbox manager program which moves messages from recipient to destination mailboxes.

DLMB  Dead Letter Mailbox.

dock receipt  A receipt issued by a warehouse supervisor or port officer certifying that goods have been received by the shipping company. The dock receipt is used to transfer accountability when an export item is moved by the domestic carrier to the port of embarkation and left with the international carrier for movement to its final destination.

document  For the purposes of EDI, a document is a form, such as an invoice or purchase order, which trading partners have agreed to exchange and which the EDI software handles within its compliance-checking logic. See Message.

Document Interchange Standards of America  The ANSI secretariat which is the administration arm for ASC X12 activity within the United States.

document standards  The data element directory, syntax and codes which describe approved standards for a given form (for example, an invoice) in a given industry (for example, the grocery industry). See ANSI; EDIFACT.

document translation  The process by which the EDI software translates incoming documents using agreed logic for computer storage. It translates documents on retrieval into the format in which the receiving party wishes to receive them. Hence there can be three different forms for a single document in EDI, between two partners: the original input format; the translated, stored (standard) format, and the retrieved format.

documentation  (i) The narrative which records the logic of a program or a system or a standard. It is not necessarily contained on paper; it may be held on magnetic media or on the computer system, in which case it may be called on-screen documentation.  
(ii) All or any of the financial and commercial documents relating to a trade transaction.

domain  A notional geographic area, or, when applied to networking, a sphere
of activity. See private domain; public domain.

**domestic network** A telecommunication network within a given (home) country. A noninternational network.

**drawback–refund of duties** Refund of all or part of customs duties, or domestic tax paid on imported merchandise which was subsequently either manufactured into a different article or reexported. The purpose of drawback is to enable a domestic manufacturer to compete in foreign markets without the handicap of including in his costs, and consequently in his sales price, the duty paid on imported raw materials or merchandise used in the subsequent manufacture of the exported goods.

**DRP** See Distribution Requirements Planning.

**DTE** Data terminal (terminating) equipment. The sending-receiving equipment in a network, such as a PC or video display terminal.

**DTI** Department of Trade and Industry (United Kingdom). Also direct trader input (for direct entry from traders to HMCE).

**DUA** Directory user agent. An X.500 entity which allows a user access to directory services.

**duplex** See full duplex; half duplex.

**duty** A tax levied by a government on import, export or consumption of goods. Usually a tax imposed on imports by the customs authority of a country. Duties are generally based on the value of the goods, some other factors such as weight or quantity (specific duties), or a combination of value and other factors (compound duties). See ad valorem.

**E**

**EAN** European Article Number Association. See ANA.

**EANCOM** European Article Numbering Communication.

**EAS** European Association of Shipping Informatics.

**EBCDIC** Extended binary-coded-decimal interchange code. Used for computer storage and processing. An 8-bit code.

(Pronounced ebbseedick.)

**EBDI** Electronic business document interchange, the original generic term for EDI.

**EBT** Electronic Benefit Transfer; a Canadian system whereby financial benefits (such as unemployment benefit) are issued to beneficiaries by using an Automatic Teller Machine (ATM).

**EC** See electronic commerce.

**ECA** Electronic Commerce Australia.

**ECE** The United Nations Economic Commission for Europe (under whose auspices the EDIFACT standards are being developed).

**ECN** Export Certification Number. The number issued by a typical EDI trade system to an exporter upon receipt of an EDI declaration (CUSDEC).

**EDI** Electronic data interchange, sometimes electronic document interchange or electronic business document interchange. See EBDI.

**EDI association** A national body created to propagate and control the use of EDI within a country.

**EDI server** The computer system at the heart of an EDI service, comprising computer, software, mailboxes, and translation facilities.

**EDI service** The provision of a secure EDI mailbox and document translation facilities via a network.

**EDIA** EDI Association, United States.

**EDIANZ** EDI Association of New Zealand.

**EDICA** EDI Council of Australia.

**EDICC** EDI Council of Canada.

**EDICON** The U.K. construction industry project for EDI.

**EDIFACT** Electronic Document Interchange for Administration, Commerce and Transportation, the ISO standards which will determine a unified international EDI standard. Developed by ECE. Syntax is initially contained in ISO 9735. Known as UNEDIFACT since the early 1990s.

**EDIFICE** The European electronic industry project for EDI.

**EDX** An organization for EDI for the electronics industry.

**EEC** European Economic Community.

**EFT** Electronic funds transfer, the generic term for sending payment instructions over a computer network. EFT
can be regarded as a set of standard documents in EDI jargon.

**EFTA** European Free Trade Association: the non-EEC European countries (Scandinavia, Switzerland, and so on.)

**EFTPOS** Electronic funds transfer at point of sale: the use of credit or debit cards over a network to facilitate payments for (generally) retail sales, by an individual consumer.

**EIE** Electronic information exchange. A generic term for complementary electronic services including EDI, X.400 messaging, data bases, videotex, and so on.

**ELC** Electronic letter of credit.

**electronic commerce** The use of electronic networks and services to conduct business, such as information services, data bases, electronic mail, EDI, enhanced voice and fax services.

**electronic banking** The substitution of electronic techniques for paper and bank notes. See FEDI.

**electronic documents** The electronic images created at a computer terminal or PC that replace the paper trading documents.

**electronic envelope** Data sent with EDI messages when the system does not employ document standards. It consists of a header in front of the message and a trailer at the end, to enable recognition and authentication. No data translation is performed, hence it is of limited use to large trading communities.

**electronic health care** The substitution of EDI and electronic commerce techniques for the administration of health care services.

**electronic lodgment** The declaration of tax and government duties using electronic commerce techniques.

**electronic mail** Interpersonal messaging: the process in which an individual using a terminal or PC can access a network to send a keyed-in, unstructured message to another individual or group of people. X.400 is one of the standards which governs the exchange of electronic mail between services.

**electronic software distribution** The transmission of software, generally via the intermediate medium of floppy disk, to another location (or locations) over an electronic network. Functions as a file transfer.

**electronic supply management** Stock control and inventory management using electronic commerce techniques.

**electronic trading** A full implementation of EDI, particularly the buying and selling process within an industry or common interest group. See paperless trading.

**ELS** Electronic Lodgment Service.

**EMA** Electronic Messaging Association.

**Email, e-mail** Electronic mail.

**enabling** The process of integrating translation software into an application software process.

**encoding** Turning plain text into code, of any sort, by any means.

**encryption** See cryptology; DES.

**end to end (supply, value chain)** The conceptualization of a complete end to end process from raw material to purchase of the final product at the retail point of sale.

**end user** The specific individual involved in the active use of an EDI system, indeed in any computer-based system.

**entrepôt** An intermediary storage facility where goods are kept temporarily for distribution within a country or for reexport.

**entry** A statement of the kinds, quantities and values of goods imported together with duties due, if any, and declared before a customs officer or other designated officer.

**entry documents** The documents required to secure the release of imported merchandise. These may comprise Entry Manifest, evidence of right to make entry, commercial invoice or a pro-forma invoice when the commercial invoice cannot be produced, packing lists if appropriate, other documents necessary to determine merchandise admissibility.

**EPC** Export Promotion Council.

**EPOS** Electronic Point of Sale. This is the generic term for cash registers and EFTPOS devices connected to net-
work. An EPOS device does not necessarily have an EFTPOS or settlement function.

**ETSI** See European Telecommunications Standards Institute.

**EU** The European Union, until 1994 known as EC, or the European Community.

**European Committee for Standardization (CEN)** The CEN (Comité Européen de Normalisation), is an association of the national standards organizations of 18 countries of the EU and of the EFTA. CEN membership is open to the national standards organization of any European country which is, or is capable of becoming, a member of the EU or EFTA.

**European Telecommunications Standards Institute** Established in March 1988 in response to the inability of CEPT to keep up with the schedule of work on common European standards and specifications agreed to in the 1984 Memorandum of Understanding between CEPT and EU. ETSI has a contractual relationship with EU to pursue standards development for telecommunications equipment and services, and cooperates with other European standards bodies such as the CEN.

**excise** The revenue raising function of Customs and Excise, particularly for import duties. In some countries this also includes the collection of value added taxes.

**excise tax** A selective tax on certain goods produced within or imported into a country. An example is a tax on the import of motor vehicles, or a tax on certain luxury goods.

**EXIT** An Australian system for automated EDI trade clearances.

**expiration date** In letter of credit transaction, the final date the seller (beneficiary of the credit) may present documents and draw a draft under the terms of the letter of credit. Also called expiry date.

**explicit representation** The technique used to give absolute identification of the location of a data segment within an EDI message.

**export quotas** Specific restrictions or ceilings imposed by an exporting country on the value or volume of certain exports, designed to protect domestic producers and consumers from temporary shortages of the materials or goods affected, or to bolster their prices in world markets. Some International Commodity Agreements explicitly indicate when producers should apply such restraints. Export quotas are also often applied in orderly marketing agreements and voluntary restrain agreements, and to promote domestic processing of raw materials in countries that produce them. Quotas are the central plank of a managed trade policy.

**exported user** A user of a domestic EDI system in a foreign country. Overseas users of a Canadian grocery EDI system (that is, suppliers) would be regarded as exported users of the system, since they would be paying the Canadian EDI operator for the use of its EDI service.

**extract** To select and remove (nondestructive, generally) items with a message, which can be used for other purposes. For example, message numbers can be extracted to compile a transaction log and audit data.

**f**

**facilitation** Programs designed to expedite the flow of international commerce through modernizing and simplifying customs procedures, duty collection, and other procedures to which international cargo and passengers are subject. Facilitation includes simplifying the processes, adopting internationally approved codes for computer processing and EDI and electronic techniques for information interchange.

**fault tolerant** Attribute of computer architecture so designed that even if various components fail, including a processor or data channel, the computer will still continue to function, albeit in a degraded (that is, slower) fashion.

**fax on demand** The inverse of the normal fax or facsimile transmission system.
In this case, the user dials in a particular number to a fax machine and the fax is then delivered to the user.

FCL Fuel Container Load.

FCP 80 A U.K. computerized port cargo handling system.

FDX See full duplex.

FEDI See financial EDI.

feeding The movement of containers or general cargo, undertaken by the shipping company, by land or sea, to complete a sea voyage contracted within the terms of Bill of Lading. Feeding is analogous to airline "hubbing."

FIATA International Federation of Freight Forwarders Associations.

fiber optics A high-capacity signal-carrying medium in which signals are carried by light, as opposed to current in conventional copper carriers.

file A collection of related information stored in a computer. For example, all purchase orders for a given period would be stored in a file.

file conversion Files may be held in a variety of data formats or code conventions. So that a file can be read by an incompatible system, it is translated, or converted, to a format which the other system is able to read.

file transfer File transfer comprises a wide range of specific data communications protocols, for example, TCP-IP (Internet Protocol), OFTP (ODETTE protocol), and so on. See data transfer.

financial EDI The substitution of EDI for checks and paper remittance advice.

financial instrument A document which has monetary value, or is evidence of a financial transaction. Examples of financial instruments are: checks, bonds, stocks certificates, bills of exchange, promissory notes and bills of lading.

float (information, inventory, financial) The amount of excess inventory, information or finance created by a paper-based system in order to make allowances for delays and for safety stock.

format Set of rules governing a file or a document, drawn up so that a program can be written for translation or reformatting. Not exclusive to EDI.

forms See document.

frame relay A data communications process analogous to fast packet switching. See packet switching.

franco Free from duties, transportation charges and other levies. Used also as delivery condition, under which the seller must bear all transportation charges and duties up to a named place of delivery.

free store A storage area which can store only cargo that has been cleared by customs.

free text As opposed to formatted text used in EDI and message standards. Free text is continuous string of information just as in a normal letter or conversation. Electronic mail is free text.

freight All merchandise, goods, products, or commodities shipped by rail, air, road, or water, other than baggage, express mail, or regular mail.

freight forwarder A person engaged in the business of assembling, collecting, consolidating, shipping and distributing less-than-carload or less-than-truckload freight. Also, a person acting as agent in the trans-shipping of freight to or from foreign countries and the clearing of freight through customs, including full preparation of documents, arranging for shipping, warehousing, delivery and export clearance.

full duplex Simultaneous transmission of data in both directions over a data communication link.

full set All the originals of a particular document (usually the bill of lading). The number of originals is usually indicated on the document itself.

functional acknowledgment Automatic response by the EDI server that a message, or batch of messages, has been received along with an indication of syntax errors.

functional definition The precise purpose of a message (for example, invoice or purchase order). A specific but nonexclusive term used in standards setting.

functional group Used within EDIFACT standards to identify one or more
messages of the same type; headed by a functional group header service segment and ending with a functional group trailer service segment.

**functional group header** The service segment heading and identifying the functional group.

**functional group identifier** Identifies the type of message in the functional group.

**functional group trailer** The service segment ending the functional group.

**funds transfer** See EFT.

**G**

**GDS** Global Distribution System; one of the four major international airline reservation systems which connects local and airline specific reservation systems together.

**gateway** A point of interconnection: the open door between one electronic network and another. For example, an electronic mail message to a correspondent overseas must go through a number of gateways. The rules describing the exact structure of a gateway for electronic mail and (probably) EDI are contained in ISO X.400. The CCITT rules describing gateways between international X.25 packet switched networks are contained in X.75. International data destination codes are contained in X.121.

**GATT** General Agreement on Tariffs and Trade. See WTO.

**GDP** Gross domestic product.

**GEIS** General Electric Information Services. An EDI service provider.

**GENRAL** An EDIFACT message. General message.

**good funds** The funds transferred into a payee’s account which have been checked against the payer’s account for validity and availability.

**goods movement** The physical process of moving goods from the supplier to the consumer. Used in the same context as information exchange and value exchange.

**GPS** Global Positioning Systems. A satellite based system which can keep track of devices fitted with a global positioning system, such as ships, aircraft and goods vehicles.

**GTDI** Guidelines for Trade Data Interchange, the original European UNECE EDI standards-setting body, now subsumed by ISO’s EDIFACT. Sometimes referred to as UNTDI (United Nations TDI).

**guideline** A recommended set of procedures for use within EDI, particularly standards setting.

**H**

**half duplex** A circuit allowing two-way data transmission, but the terminals connected to the circuit can receive only or transmit only at any one time.

**hand off** In EDI document translation, the act of handing over sorted, merged, and translated data to the next stage in the computer system.

**handshake** The name given to the act of recognition and opening of gateways by two computer programs or two incompatible computer systems.

**hard benefits** Costs savings or financial advantages which can be quantified as the result of a system change.

**harmonized codes** An initiative of the WCO by which all goods being imported and exported are classified in the same way, by all of the world’s customs authorities.

**Harmonized System** A multipurpose international goods classification system designed to be used by manufacturers, transporters, exporters, importers, customs, statisticians, and others in classifying goods moving in international trade under a single commodity code. Developed under the auspices of the Customs Cooperation Council (CCC, now WCO), this code is a structured product nomenclature containing approximately 5,000 headings and subheadings describing the articles moving in international trade.

**Hayes-compatible** Hayes is a prominent manufacturer and a leading supplier of modems for personal computers for over 10 years. To ensure compatibility between modems in PC-based systems it may be necessary to specify
Hayes-compatible equipment. Never-otherwise dissimilar types.

HDLC High-level data link control. A bit-oriented data link control protocol. See SDL; X.Series. Also description of OSI in text.

HDX See half duplex.

header Data at the front of an EDI message, inserted for initial recognition.

header area In EDI standards, the portion of the message which precedes the actual body and trailer of the business transaction, and which contains information relating to the entire message.

hertz (Hz) The measure of frequency (for example, of alternating current) measured in cycles per second: 60 Hz means 60 cycles per second.

HL/7 Health Level 7; a set of EDI-type messages, although generally sent and received in real time. These messages are used to exchange medical information between hospitals and health departments.

HMCE Her Majesty's Customs and Excise (UK).

honeypot A jargon term used by EDI service providers to describe a large company which is able to dictate to its own trading partners the rate at which a whole industry, or the large company's own trading partners will adopt EDI. A hub, or center of a one-to-many network.

hooks Predefined entry points in a program where other programs might be added or where data might be accessed under program control.

host The computer at the heart of a network-based computer system.

host to host Direct data communication between two computer systems in a network.

HOTLINE A proposed VAN for the port of Hong Kong. Now replaced by Tradelink.

hub The pivotal center of a trading network. The EDI mailbox-server computer, in a one-to-many network. See broadcast; honeypot.

hybrid A mix of different technologies in computer systems. A mix of document types. A functional mixture of otherwise dissimilar types.

Hz See hertz.

I

IAPH International Association of Ports and Harbors.

IATA See International Air Transport Association. See SITA.

IBM 360/20 An early IBM computer.

IBM 3270, 2780/3780 IBM proprietary communication protocols.

IBM International Business Machines, an EDI service provider operating under the business name IBM Information Network Services (INS).

ICAA International Civil Airports Association.

ICAO International Civil Aviation Organization.

ICC See International Chamber of Commerce.

ICL International Computers Limited. A joint operation, with GEIS, of several UK-based EDI services, including INS, International Network Services.

ICR Intelligent Character Recognition.

ICS International Chamber of Shipping.

ID Identification, identifier. See call ID; line ID.

IDEA International Data Exchange Association (Belgian-based international cross-industry association).

identifier A character or group of characters used to identify or name an item of data and possibly to indicate certain properties of that data (ISO 2382/4).

IFTMFR An EDIFACT message. International forward and transport message framework (six messages).

III Institute of Information Industry.

IIN Institutional Information Network.

images Coded electronic representations of, say, a document within a computer system. More generally used to describe line drawings or graphic information.

IMO See International Maritime Organization.

implementation The activities involved in converting an idea (or contract) into a working computer system. Includes everything from consultancy to hardware installation.
implicit representation  Technique whereby the location of a data segment is implied from its relative position within the message.

imported users  The reverse of exported users.

importer  The individual, firm or legal entity that brings articles of trade from a foreign source into a domestic market in the course of trade.

impost  A tax, usually an import duty.

in-house system  A system which operates within an enterprise instead of being operated by a third party.

incompatible  Applied to systems that cannot communicate with each other because of, for example, dissimilar documents, files with different formats, or differing communication protocols.

Incoterms  A codification of international rules for the uniform interpretation of common contract clauses in export-import transactions. Developed and issued by the ICC in Paris. The thirteen Incoterms (1990) were:

1. Ex Works (EXW),
2. Free Carrier (FCA),
3. Free Alongside Ship (FAS),
4. Free On Board (FOB),
5. Cost and Freight (CFR),
6. Cost, Insurance and Freight (CIF),
7. Carriage Paid To (CPT),
8. Carriage and Insurance Paid To (CIP),
9. Delivered At Frontier (DAF),
10. Delivered Ex Ship (DES),
11. Delivered Ex Quay (DEQ),
12. Delivered Duty Unpaid (DDU), and

incremental paper trail  The sequential process in paper-based import-export processes. See additive trading relationships, trade facilitation.

industry bodies  Trade and industry groups which represent the membership of a whole industry, for example, article and product numbering associations and manufacturers associations.

Information services  The generic term for electronic mail, Bulletin Board Services and data bases.

Information superhighway  A media term for the proliferating electronic network services industry. Commonly, but incorrectly, applied to denote the Internet.

Information technology  The combination of computing, communications and broadcasting technologies.

information exchange  Sharing of all information in the supply cycle. Used in the same context as goods movement and value exchange. See EIE.

INS  See IBM; ICL.

integration  The process of harmonizing systems and standards in order to overcome incompatibilities.

intelligent network  See network.

interactive processing  Time-dependent data communication, in which a user enters data and then waits for a response. See batch processing.

interchange  Communication between partners in the form of a structured set of messages and service segments starting with an interchange control header and ending with an interchange control trailer.

interchange control header  The service segment starting and identifying an interchange.

interchange control trailer  The service segment ending an interchange.

intercompany  Between companies. Applied, for example, to a message from one company to another. See intracompany.

interconnect  A full, transparent-to-end-user connection between networks, offering end-to-end security and a single access process.

interface  A shared boundary; a recognized and definable crossover point between two systems. See gateway; handshake.

Interleaved two of five code (I 2/5)  A number-only bar code symbology consisting of five bars, two of which are wide. In this case both the bars and spaces carry information.

intermodal transport  The coordinated transport of freight, especially in connection with relatively long-haul movements using any combination of freight forwarders, piggyback, containerization, air-freight, ocean freight, assemblers, motor carriers.
International Air Transport Association  A trade association serving airlines, passengers, shippers, travel agents, and governments.

International Chamber of Commerce  A non-governmental organization serving as a policy advocate for world business. Members in 110 countries comprise tens of thousands of companies and business organizations. The organization aims to facilitate world trade, investment, and an international free market economy through consultation with other intergovernmental organizations.


International Standards Organization  Established in 1947, this is a worldwide federation of national standards bodies, representing approximately 90 member countries. The scope of work covers standardization in all fields except electrical and electronic engineering standards, which are the responsibility of the International Electrotechnical Commission (IEC). Together, the ISO and IEC form the specialized system for worldwide standardisation, and the world’s largest nongovernmental system for voluntary industrial and technical collaboration at the international level.

International Telecommunications Union  A specialized agency of the United Nations with responsibilities for developing operational procedures and technical standards for the use of the radio frequency spectrum, the satellite orbit, and for the international public telephone and telegraph network. There are over 160 member nations of the union.

Internet  A global family of electronic networks originally connecting defense and tertiary education establishments. Now generally available to any user of electronic network services.

interpret  The reverse of translate; to use translation software to exactly match a system to the input requirements of a receiving computer system within an EDI community.

interwork  A limited version of full interconnect that gives networks the ability to exchange messages.

INTIS  An EDI project of the port of Rotterdam (the Netherlands).

intracompany  Within a single company. Applied to internal dealings. See intercompany.

INVOIC  An EDIFACT message. Commercial invoice.

invoice  A document identifying the seller and buyer of goods or services, identifying numbers such as invoice number, date, shipping date, mode of transport, delivery and payment terms, and a complete listing and description of the goods or services being sold including prices, discounts and quantities.

IRC  International record carrier. The transnational communication and carrier companies, such as, ITT, RCA.

IRD  Inland revenue department. A generic term for a domestic taxation authority.

irrevocable letter of credit  A letter of credit which cannot be amended or canceled without prior mutual consent of all parties to the credit. Such a letter of credit guarantees payment by the bank to the seller/exporter so long as all the terms and conditions of the credit have been met.

IRS  Internal Revenue Service, the US-based domestic taxation authority.

IRU  International Road Transport Union.

ISDN  Integrated services digital network. The networks and equipment for integrated broadband transmission of data, voice, and image, from rates of 144 kbit/sec up to 2 Mbit/sec.

ISO 7372  The ISO trade data element directory; identical to UN Trade Data Element Directory.

ISO 9000  A series of voluntary international quality standards. Its formal name is ISO 9000 Series of Standards.

ISO 9735  The ISO application level syntax rules used in constructing EDIFACT documents.

ISO  See International Standards Organiza-
ISSC  An international standard code for newspapers, magazines and regular publications.

Istel  See AT&T.

IT  Information technology. The broad, generic European term, embracing telematics. See telematics.

ITU  See International Telecommunications Union.

IVAN  International Valued Added Network Services. See VANS.

IVR  Interactive Voice Response. The technology which is able to respond with prompts to spoken input across telephone services.

J


JEDI  See Joint Electronic Document Interchange.

JIT  Just in time (applied to inventory control). The technique whereby only the exact amount of stock to be consumed is delivered to the next link in the supply chain. It is intended to free the final assembler in the supply chain of work-in-progress and goods inward stocks.

Joint Electronic Document Interchange  A transitory U.S. standards committee aimed to bring together standards-setting work on X12, GTDI, etc. In practice this work has now been handed over to EDIFACT. See UN-JEDI.

K

K  Popularly taken to mean 1000 (kilo). In fact K = 210 which totals 1024. Hence K in Kbit, Kbyte, Kbaud should strictly be taken to mean x 1024, and the prefix k to represent 1000. Kbits per second (or kbits per second) is a measure of the rate of data flow across a network.

Kanban  The piece of paper used in Japanese JIT and QR systems.

Keiretsu family of companies  Keiretsu refers to the horizontally and vertically linked industrial structure of post-war Japan. The horizontally linked groups include a broad range of industries linked via banks and general trading firms. There are eight major industrial groups, sometimes referred to as Kigyo Shudan: Mitsubishi, Mitsui, Sumitomo, Fuyo, DKB, Sanwa, Tokai, and IBJ. The vertically linked groups (such as Toyota, Matsushita, and Sony) are centered around parent companies with subsidiaries frequently serving as suppliers, distributors, and retail outlets.

Key  The unique code necessary for encryption and authentication processing.

Key management  The organization and change procedures for cryptographic algorithms. See DES, RSA.

Kilo  See K.

Kompass  A system for data exchange within the port of Bremen, West Germany.

LAN  Local Area Network.

Landbridge  The movement of cargo (containers) by land for a portion of the voyage, to reduce the total distance involved. An example is the landbridge across North America, where cargo from Europe to (say) San Francisco moves by sea across the Atlantic, then by rail across the United States. However, the tendency is simply to regard the shorter distance as feeding and the longer distance as landbridging.

Laser scanner  An optical bar code reading device using a low energy laser light beam as its source of illumination. Often hand-held.

Layer  One level of the seven-layer hierarchy of functions in the OSI model.

LC  See letter of credit.

LCL  See less than container load.

Leased line  A line permanently assigned to connect two points, as opposed to a dial-up line which is only available and open when a connection is made by dialing the target machine or

Glossary and Abbreviations 117
network. Also known as a dedicated line.

less than container load A shipment of cargo that does not fill a container and is merged with cargo for more than one consignee or from more than one shipper.

less than truckload A shipment weighing less than the weight required for the application of the truckload rate.

letter of credit A letter of credit is a document issued by a bank stating its commitment to pay someone (supplier-exporter-seller) a stated amount of money on behalf of a buyer (importer) so long as the seller meets very specific terms and conditions. Formally called documentary letters of credit because the banks handling the transaction deal in documents as opposed to goods. The terms and conditions listed in the credit all involve presentation of specific documents within a stated period of time. The documents the buyer requires in the credit may vary, but minimally include an invoice and a bill of lading.

level Relative hierarchical position of a data segment within a message. Also used to define layers in the OSI seven-layer model.

lex loci actus A legal rule to apply the law of the place where a wrongful act occurred. A court may apply this law in a legal action if the parties have not expressly agreed to the law that will govern their contract and if the laws of more than one jurisdiction could apply.

lex loci solutionis A legal rule to apply the law of the place where payment is to be made or a contract is to be performed. A country may apply this law in a legal action if the parties have not expressly agreed to the law that will govern their contract and if the laws of more than one jurisdiction could apply.

light pen In a bar code system a hand-held scanning wand which is used as a contact bar code reader.

line A communication line; part of the network.

line ID The address of a leased line as assigned by a network controller or an EDI authentication validation process.

LOC See Letter of credit, ELC, LC.

LOCODE Location Code: a UN system which uses an acronym to describe destination ports or harbors.

log The act of centrally recording transactions by the systems management function of an EDI service.

log on To connect to an EDI service by dialing the access number, entering user ID and password, and then being authenticated as a valid user of the system by the EDI server. After a correct log-on, the system is likely to respond with a menu or choice of required actions. Also called sign on.

Low tech no tech EDI A generic for nonconventional low technology methods of accessing EDI services.

LTL See less than truck load.

M

MAC Message authentication code. See message authentication.

MAF A generic term for Ministry of Agriculture and Fisheries.

mailbox A repository for messages in an electronic mail system or EDI server. Only authorized messages are allowed into mailboxes. The EDI server authenticates each message before depositing the message in the appropriate pigeonhole of a mailbox.

maintenance agency The accredited standards organization or committee responsible for processing requests for changes or additions to messages, segments, and data elements and related procedures. The process is a standard procedure, especially within EDIFACT.

maintenance procedure The authorized process mechanism for requests for changes or additions to EDI messages, data segments, or data elements and related procedures (EDIFACT).

mandatory A statement that a data segment, data element, or component element must be used. Used in every translation process (see conditional).

manifest The listing of goods contained on
a ship or vehicle. There are UN-EDIFACT versions of the manifest document.

many to many Applied to an EDI network in which many users may talk to many others (this is not desirable without a clearinghouse).

maritime Business pertaining to commerce or navigation transacted upon the sea or in seaports. Maritime law may be administered by the court of admiralty or of common law.

Mb Megabyte; one million bytes (eight million binary digits, or bits).

MBK Hungarian Bank for Foreign Trade.

MCI A network and networking provider. A partner with BT in Concert. See Concert.

media Storage devices such as tapes (paper or magnetic), floppy disks, disks, even paper.

medium exchange The process of electronic data interchange whereby the data is contained on files (tape or floppy disk normally) and delivered to another trading partner (say by courier) on a regular basis.

merchant A generic term for any trader. Applied specifically by banks to EFTPOS or point of sale device users.

Mercury Communications The deregulated British carrier, set up to compete with BT.

message authentication The process involving encryption. Ensures that only authorized originators and recipients exchange messages.

message code A unique reference identifying a message type in EDIFACT.

message directory Directory of standard messages. Also, a listing of identified, named, described, and specified message types.

message handling services Generic term applied to X.400-facilitated services currently being planned (these have already implemented in some countries).

message header segment Service segment starting and uniquely identifying a message in EDIFACT.

message standard The sequence, attributes, and usage of data elements within a message. Used in every kind of document standards and in SITA and SWIFT.

message structured diagram A graphic representation of the message layout.

message switching The circuit routing and direct transfer of a message from one computer to another, without any time-delay service (such as a mailbox) or adding of value.

message trailer segment Service segment ending and uniquely identifying the end of a message.

message type Application for which a message is designed. Also, an identified and structured set of data elements covering the requirements for a specified type of transaction.

MHS See message handling services.

messaging A generic term for the electronic mail family of services. Also, an ordered series of characters intended to convey information (ISO 2382/16). In EDIFACT, a set of segments in the order specified in a message directory starting with the message header and ending with the message trailer. In EDI only selected data elements are used by a message, not the complete document.

MICR Magnetic Ink Character Recognition.

MIS Management Information System.

MIT Ministry of Industry And Trade.

MITI Ministry of International Trade And Industry.

modem An acronym for modulator-demodulator; a device for interfacing communication equipment nodes, such as terminals or PCs, within communication networks.

MOF Ministry of Finance.

MRS Material Release Schedule. The JIT document used for calling off deliveries against contracts for the automobile manufacturing industry.

MTA Message transfer agent. An X.400 message switch which can be interconnected to facilitate interworking.

MTCW Ministry of Transport, Communication, and Water Management.

multiplexer Somewhat like a concentrator; a device to enable one communication line to be shared by several terminal devices, and vice versa.

multivendor Applied to an environment where several different hardware,
communication, and software vendors combine to provide a total service or configuration.

N

NACS An automated air freight clearance system run by Japanese Ministry of Finance, airlines, and forwarding agents.


natural language A normal spoken language, like English or French, as opposed to computer programming languages, like COBOL or FORTRAN.

NBS U.S. National Bureau of Standards (see NIST).

NCB National Computer Board

NCC National Chamber Of Commerce

negotiable instrument A written document that can be transferred merely by endorsement or delivery. Checks, bills of exchange, bills of lading and warehouse receipts (if marked negotiable), and promissory notes are examples of negotiable instruments.

nested segment A segment which directly relates to another segment in an identified and structured group of segments covering the requirements for a specific message type.

nesting A technique of locating a segment or segments in a precise hierarchical position with respect to another segment. Used in programming and standards setting.

nesting identifier Number used to explicitly identify level and sequence of the repeat of a data segment in a nested relationship.

nesting level The position of a segment in a nested relationship.

network A physical structure of telecommunication access paths (circuits between different end users). A network may be point-to-point, that is, a fixed line between two access points, thus forcing data to take prescribed paths. It may be a switched network, where the computers in the network calculate the optimum data path. It may also be an intelligent (software-defined) network, capable of the functions of a switched network, of integrating various other networks and computers, and of optimizing pathways, times, and costs. It may also be a packet switched network, where data is assembled into packets. The nodes in this case are PADS (packet assembly and disassembly switches), which control the connect switches and the correct sequence and routings of data packets in a software-defined network.

network management Overall supervision of the equipment and the performance of a network.

NIST U.S. National Institute of Standards and Technology, supersedes NBS.

node An access point in a network. See PAD.

nonvessel operating common carrier A carrier issuing bills of lading for carriage of goods on vessels which he neither operates nor owns. May also be regarded as a broker.

NPSI An IBM proprietary product, network processor systems interface. Enables SNA to communicate with a public packet switched network.

NSA National Security Administration (United States). Involved in setting and enforcing data encryption standards. ANSI committee X9.9 is now taking over the responsibility for encryption standards for public systems while NSA concentrates upon military needs.

NTFC National Trade Council Facilitation Committee.

numeric character set A character set that contains digits and may contain control and special characters but no letters (ISO 2382/4).

NVOC See nonvessels operating container carrier.

O

OCR Optical Character Recognition. A scanning process whereby characters may be read from paper, such as bank account numbers from checks or electrical account numbers from bills.

ODETTE Organization for Data by Telegraphic Transfer within Europe. The
original French has it: Organization du Données Echanges par Télétransmission en Europe. ODETTE was formed to implement EDI in the European auto industry.

OECD Organization for Economic Coop- eration and Development. A trade organization for the wealthier nations of the world.

OFTP Open file transfer protocol.

online Applied to a terminal or computer actively connected to a computer, either directly or through a network.

one to many Applied to a system in which a hub or central company connects to a range of trading partners, who do not in turn trade with anyone else within that network. See hub, broadcast, honeypot.

one to one Applied to a point-to-point relationship, in a network, involving two trading partners.

open-routed network A switched network that has already set up the send-to-receive pathway, or a network between those points that is permanently open.

Optus A deregulated Australian telecommunications provider.

ORDCHG An EDIFACT message. Purchase order change.

order to payment cycle The end to end process from receipt of an order to the financial settlement of that order.

order to receipt cycle The end to end process from receipt of an order to delivery of the goods against that order.

ORDERS An EDIFACT message. Purchase order message.

ORDRSP An EDIFACT message. Purchase order response.

OSI Open Systems Interconnection. A general-purpose standard architecture leading to application-to-application communication.

P

packet A sequence of data structured to a format defined by CCITT X.25 recommendations.

packet switching Switching by using PAD units to assemble data into packets, switching packets over a circuit completed merely for the duration of the call (during which packets of data are transmitted to the next node in the network), and disassembling the packets. X.25 is the CCITT recommendation which covers packet switching.

PAD Packet assembly and disassembly. See network, packet switching.

PAEB Pan American Edifact Board.

paperless payment See EFT; EFTPOS.

paperless trading EDI, the process of exchanging trading documents electronically, supported by messaging and various other electronic network services.

parallel processing The use of several processors within a single computer system to facilitate fault-tolerant processing. Occasionally called nonstop processing.

parallel running The simultaneous use of two systems (paper and electronic), to enable one to check the other.

parity checking An error checking technique used in programming and data communication to ensure receipt of complete and valid data.

partner to partner relationship The new electronic (paperless) trading relationship between trading partners in an EDI network.

passthrough Access of data to a network by traveling across another network via gateways.

password A unique, generally six-digit, word which identifies a specific EDI end user to the system. A user ID, system validation, and authentication must also be satisfactorily entered and processed and then accepted by the system before messages can be sent or received. The messages themselves are subject to compliance checking.

PAXLST A passenger manifest document codified by UN-EDIFACT, contains names and loading information of all passengers on board a commercial aircraft.

payment instruments Checks, EFT, EFTPOS, credit-debit notes, credit memos, letters of credit, and so on. Value exchange is the generic term for this process of replacing money with
new technology tokens.

**payment terms** In the EDI context, the time delay between the acceptance of a valid (electronic) delivery document and the specific time-data at which money is received in the trading partner’s account. Not the traditional payment terms, for example, 7, 14, or 28 days net. With EDI, this period may be reduced to a few days. In the future this process will involve principles such as unchecked receipt of goods (such as, assumed receipt) and elimination of invoices.

**PC** Personal computer.

**PDA** Personal Digital Assistant. A handheld portable or mobile computer.

**PE** UK Customs period entry declaration data entry service.

**Pedi** A mnemonic for the committee work under way to integrate EDI requirements into X.400 standards.

**pilot systems** An EDI system in the initial testing phase, performed by perhaps just two trading partners. Pilot tests are utilized to check connectivity, document standards, speed, and internal systems.

**PIN** Personal Identification Number, used for ATM and debit cards access at security.

**pipeline** A term used for the description of stock moving through the end to end supplier chain.

**PNA** Product Numbering Association (U.K.). Several PNAs are active in coordinating EDI activities. See Universal Product Code. Also see ANA.

**PO** Purchase Order.

**POD** See proof of delivery.

**point to point** See network; one to one.

**polling** A communication control procedure by which a computer periodically interrogates nodes in the network, or terminals, to establish if they wish to gain access to the network.

**port of entry** A port at which foreign goods are admitted into the receiving country by the importing country’s government.

**port** The physical access point within a communication controller.

**ported** Software developed for a particular computer which has been rewritten for a different computer is said to have been ported to the new computer.

**POS** Point-of-sale.

**POTS** Plain old telephone service. Voice services.

**Price Catalogue** An EDI message used to inquire or update on price or catalogue information to or from a data base.

**private domain** In X.400, applied to those networks which provide in-house word processing and in-house electronic mail. See domain; public domain.

**private formats** Where a honeypot or major company intends to implement EDI only with its own suppliers and customers, it may decide not to implement an industry document standard. In this case it develops something unique for the company or just utilizes an electronic envelope for transactions. See electronic envelope.

**private key** A unique key, assigned to only one entity in a data encryption system.

**private line** A nonswitched circuit, leased from the PTT.

**private network** A proprietary network established for a specific in-house purpose; not available to other users.

**pro forma** When coupled with the title of another document (pro forma invoice, pro forma manifest), it means an informal document presented in advance of the arrival or preparation of the required document in order to satisfy a requirement, usually a customs requirement.

**pro forma invoice** An invoice provided by a supplier prior to sale or shipment of merchandise, informing the buyer of the kinds and quantities of goods to be sent, their value, and important specifications (weight, size, and similar characteristics). A pro forma invoice is used: (1) as a preliminary invoice together with a quotation; (2) for customs purposes in connection with shipments of samples, advertising materials, and so on.

**process improvement** See continuous process improvement.

**process reengineering** The analysis of
existing systems and processes in order to effect an improvement.

**product number** A catalogue number, an EAN or bar code number, or any other numeric indicator describing a product.

**product numbering association** See ANA.

**progressive data transfer** A technique allowing a sender to transfer data, as it becomes available, to the recipient who creates, for this purpose, a business file. Each transfer is linked by common access reference data.

**promissory note** Any written promise to pay. A negotiable instrument that is evidence of a debt contracted by a borrower from a creditor, known as a lender of funds.

**proof of delivery** Information provided to payer containing name of person who signed for the package with the date and time of delivery.

**protocol** The set of rules which defines the way in which information can flow within a computer or communication system. A protocol comprises: syntax: commands and responses; semantics: the structured set of requests and actions permissible by each user; and timing: types of events and sequences.

**protocol conversion** The process of enabling systems to communicate with systems operating under a different communication protocol. Such protocols include SNA and OSI.

**PSA** Port of Singapore Authority.

**PSTN** Public switched telephone network. See POTS.

**public domain** In X.400, applied to gateways between the networks of public service providers for such things as electronic mail. See domain; private domain.

**public key** A publicly available key which, in connection with a private key, can provide an extra level of addressing and identifying in an encryption system.

**Q**

**QALITY** An EDIFACT message. Quality data message.

**QR** See quick response.

**qualified data element** A data element whose precise meaning is conveyed by an associated qualifier.

**qualifier** An element of data that gives a qualified data element or segment a specific meaning. An EDIFACT term.

**qualifier code list** A list of qualifier values. An EDIFACT term.

**quality management** The process whereby quality is monitored and measured and thereafter improved. TQM, or total quality management, is a more modern version of quality management. ISO 9000 is a measurement of initial quality standards.

**queue** Any group of items waiting for service by a processor. The act of sequencing for the next process.

**quick response** Quick response systems. The use of EDI with data bases, bar coding, container and goods coding, and universal product codes in fast-moving retail, apparel, and other industries.

**R**

**R&D** Research and Development

**R/A** See Remittance Advice.

**RACE** R&D into Advanced Communications for Europe (an EU program).

**ramping** The process of adding many new users onto a system.

**rapporteur** Person who prepares an account of proceedings of a committee for a higher body (OED). Specifically applied to the EDIFACT organization; there are now six regional EDIFACT rapporteurs.

**RBOC** Regional Bell Operating Company.

**read only** Applied to a service in which information can only be read from a screen or printer, but cannot be altered, nor can responding data be sent back down the line to the sending computer.

**real time** The usually brief time for data to be entered and processed during an interactive session. See interactive processing.

**receiver (receiving computer)** A (temporarily) passive computer in anEDI network. The computer which receives or retrieves EDI documents directly or via a mailbox.
release character A character used to restore to its original meaning any character used as syntactical separator.

Remittance Advice A message indicating amount to be paid and for what purpose, in response to delivery of goods or services.

remote job entry The submission of jobs by using a device connected to the processing computer by a data link or network. IBM 2780, 3780 are remote job entry devices. Known as RJE.

remote support Technical and systems assistance provided over a telephone or a terminal. This is now typically the first level of support in an EDI system. See help desk.

REP Request For Proposal.

repeating segment A segment which may repeat in a message as indicated in the relevant message specification.

replenishment cycle Apropos JIT inventory control, time between ordering stock and receiving it, with allowance for usage during the time taken for order entry, manufacturing, and delivery.

Request for Confirmation An EDI message used for requesting acknowledgments.

reroute The action of sending data to a different node (or network of nodes) in a circuit if the original route is obstructed or unusable.

resource usage A billing method based upon actual usage of computer, network, storage, and so on.

revolving letter of credit A letter of credit which is automatically restored to its full amount after the completion of each documentary exchange.

RF Radio Frequency.

RFI Request for information, a formal tendering process. The next step after a requirements specification.

RFID Radio Frequency Identification. This is an automatic ID device used in, for example, transponders.

RFP Request for proposal. Usually follows an RFI. Interchangeable with RFT.

RFT Request for tender. The next step after an RFI.

RFW Request for work. A document form or procedure used in some industries as the internal trigger to create a new design or custom design for a product.

RHC Regional holding company. Created by the deregulation and splitting up of AT&T into the Bell RHCs. See telco, PTT. Also known as RBOC, Regional Bell Operating Company.

RJE Remote job entry.

RPQ Request for price quotation, sent by EDI means.

RSA The abbreviation for Rivest, Shamir, Aldeman, the developers of an asymmetrical public key encryption system. See DSA, encryption, cryptology.

RTEL Restrained Textiles Export License.

S

SAD Single administrative document. The official export, transit and import customs form for international trade. Introduced in the EEC in 1988 and also used between EEC and EFTA.

SAGITTA A national Dutch customs clearance system.

SANCR Sanitation Certificate.

scanner An electronic device which reads bar codes which electro-optically converts bars and spaces into electrical signals.

scanning fax A facsimile machine which also performs limited optical scanning functions. See OCR.

SCP Simplified clearance procedure (for U.K. exports).

SDLC Synchronous data link control. An industry standard data communication technique. SDLC is a subset of HDLC, originally developed by IBM. See HDLC; IBM 3270, 2780/3780.

sea waybill A transport document which is not a document of title or negotiable document. The sea waybill indicates the on board loading of the goods and can be used in cases where no ocean bill of lading, that is, no document of title is required. For receipt of the goods, presentation of the sea waybill by the consignee named therein is not required, which can speed up processing at the port of destination.

SEAGHA System for Electronic and Adopted Interchange in the Port of
Antwerp, Belgium.

**section control segment** A service segment used within the EDIFACT standards to separate header, detail, and summary sections of a message where necessary to avoid ambiguities in the message segment content.

**security** A generic term generally describing the methods adopted to protect data from loss, corruption, and unauthorized access and retrieval.

**security fence** The term given to security procedures in mailbox, EDI, and other network-based systems.

**segment** A predefined and identified set of normally functionally related data elements which are identified by their sequential positions within the set. A segment starts with a segment tag and ends with a segment terminator. It can be a service or a user data segment. An EDIFACT term.

**segment code** A code which uniquely identifies each segment as specified in a segment directory. An EDIFACT term.

**segment directory** A listing of identified, named, described and specified segments.

**segment name** One or more words identifying a data segment concept. An EDIFACT term.

**segment qualifier** See qualifier.

**segment specifications** The contents, structure, and attribute of a segment. An EDIFACT term.

**segment tag** A composite data element, in which the first component data element contains a code which uniquely identifies a segment as specified in the relevant segment directory. Additional component data elements can be conditionally used to indicate the hierarchical level and nesting relation in a message and the incidence of repetition of a segment.

**segment terminator** The syntax character which is used to identify the end of a segment. An EDIFACT term.

**separator character** A character used for syntactical separation of data.

**server** The computer at the heart of an EDI system. See EDI server; mailbox.

**service data element** A data element used in service segments.

**service segment** A segment required to service the interchange of user data. An EDIFACT term.

**service string advice** A character string at the beginning of an interchange defining the syntactically delimiting characters and indicators used in the interchange.

**service vendor** See vendor.

**session** See communication session.

**settlement** The process of exchanging payment for the supply of goods.

**ship's manifest** A list, signed by the captain of the ship, of the individual shipments constituting the ship's cargo.

**ship's papers** The documents a ship must carry to meet the safety, health, immigration, commercial and customs requirements of a port of call or of international law.

**SHIPNET** A network for EDI in international trade, specific to the freight carriage and forwarding industry.

**shipper's letter of instruction** A form used by a shipper to authorize a carrier to issue a bill of lading or an air waybill on the shipper's behalf. The form contains all details of shipment and authorizes the carrier to sign the bill of lading in the name of the shipper.

**shipping agent** An organization which books export cargo on behalf of the ship's operator, handles the administration of import cargo discharged from the ship and generally looks after the interests of the operator, his ship and cargo.

**shipping instructions** Information supplied by the shipper-exporter providing detailed instructions pertaining to the shipment (for example, shipper, consignee, bill-to party, commodity, pieces, weight, and so on).

**shipping order** Instructions of shipper to carrier for forwarding of goods.

**sign on** See log on.

**simple data element** A data element whose data item representation embodies a single concept, that is, a data element which is not made up of component data elements.

**simple segment** A segment which requires no qualification, whose meaning is fixed and explicit.
SiSTEMI TeLEMATICA A VAN for the port of Genoa, Italy.

SITA Systeme Internationale Transport Aérienne (or Aéronautique), an organization that provides all of the communication and message switching services between international airlines. SITA is actually a VAN, since most of the application tasks are performed by the computers belonging to the airlines themselves (SITA's membership. SITA is represented on EDIFACT committees.

SITPRO An acronym for Simpler Trade Procedures Board. Originally set up as a department within the British Department of Trade and Industry, the organization now operates commercially. SITPRO's task was to design a universal set of documents to be used by British industry involved in import and export. It now offers software for document translation and is represented on EDIFACT committees.

slack See float.

smart card A card shaped device containing electronic contacts, electronic memory and a miniature processor.

SME Small and medium enterprise, as used in data gathering and research reports by various government departments.

SMMT The (U.K.) Society of Motor Manufacturers and Traders, the organization which represents British auto manufacturers. SMMT commissioned the first auto-specific EDI scheme, in close coordination with ODETTE.

SNA Systems Network Architecture. An IBM proprietary communication protocol. Although a de facto standard, employed by 30,000 IBM hosts around the world, SNA does not yet conform to ISO standards as does OSI, since SNA was developed on the basis that it would be talking only to IBM hosts, with leased lines between them. Sophisticated additional software is required by an IBM communication controller to use an X.25 packet switched network, enabling SNA to operate in a polling manner. See NPSI, polling, X.25.

SNM Ship Note Manifest. The ANSI X12 retail equivalent of Advanced Shipping Note (ASN). SNM is confirmation by a retail supplier that the goods have been shipped. It may also include transport details.

SNS Singapore Network Services

SOFI (1 and 2) A French equivalent of the U.K. Customs CHIEF system.

software-defined network See network.

SOSOFA Manufacturers Association, Chile

special interest group See common interest group; common user group.

SPEDI Shared Project for EDI

SPIC Simplified Procedure for Import Clearance (part of DEPS).

standard level The specific release level of a standard, effective at a given date. A new release occurs once or twice a year.

standards The rules which are laid down to enable incompatible computers and communication systems to exchange information and to enable document types to be exchanged. See ANSI, CCITT, UN/EDIFACT, document standards, message.

store and forward The term commonly applied to a messaging system (such as, electronic mail) where a message is stored before delivery to a third party. The term implies that the mailbox system itself performs delivery to the addressee, that is, direct delivery. This is the key difference between store and forward and store and retrieve. In point of fact most mailbox systems allow retrieval and perform direct delivery. Provided there is a time delay induced by the mailbox system, they are both acceptable services under most telecommunication regimes.

store and retrieve Applied to a system in which a message is sent to a mailbox and resides there until retrieved by the addressee, or possibly by being purged to an archive file if the message lies dormant for, say, four weeks. Purging routines vary with the system being used.

suite (of programs) A series of computer programs which interact with each other.

summary area The portion of the message following the body of the message
supply chain  All organizations involved in the production cycle from raw material right the way through to retail organizations.

supply cycle  The lead time between placing one order and the next. See JIT.

support  The assistance necessary to install, test, and fully implement a system. Support includes consultancy advice, software provision and installation, education, training, fault diagnosis and correction, help desk, and so on. Not everyone needs cradle to grave support, but, in the early stages of EDI, more rather than less support is likely to be necessary.

SWIFT  Society for Worldwide Interbank Financial Telecommunications. SWIFT is a VAN originally set up by banks for the purpose of international EFT. SWIFT now has over 3000 members, is a full-fledged multidocument (financial) EDI system, and has codified over 150 message types.

switched network  See network.

sync (synchronous)  A clock-controlled method of data transmission for use in high-speed circuits or networks. See bisync, async.

syntax rules  Rules governing the structure of an interchange and its functional groups, messages, segments, and data elements.

system administration  The function of allocating mailbox addresses, user ID, passwords; checking security routines; bulk printing; conducting audit routines; housekeeping; gathering statistics; billing; etc.

system interconnect  See network; integration.

systems integration  See network.

systems management  The tasks involved in keeping a network in service and providing access to valid users. It also involves security, logging, and providing statistics, billing, and central services such as printing. It embraces systems administration within its function.

systems study  A review of existing internal methods of operation to set the scene for anticipated changes induced by paperless methods of performing the same task. Changes will include clerical tasks, job functions, computer systems, possibly even office locations.

table-driven program  A program in which the factors, variables, data, etc. to be used are looked up from a table or matrix, held on a file or in memory.

tag  A unique identifier for a segment or data element. An EDIFACT term.

target computer  The computer for which a specific message or file is intended. In EDI systems this could be sent direct from computer to computer or via the intermediary of a mailbox system. Data volumes determine the method used. See host to host.

TARIC  The EC’s Integrated Customs Tariff, based on HS. See EC, HS.
tariff  A schedule of duties or taxes assessed by a government on goods as they enter (or leave) a country. Tariffs may be imposed to protect domestic industries from imported goods and to generate revenue. Types included ad valorem, specific, variable, or compound.

TC 154  Technical Committee 154, a UN committee affiliated with UNECE WP.4 for the purpose of agreeing on EDIFACT document standards through ISO.

TDB  Trade Development Board.

TDCC  Transportation Data Coordinating Committee. An early (1960s) standards-setting committee, established to assist American transportation modes coordinate EDI standards for air, motor, rail, and ocean transportation.

TDED  UNECE Trade Data Elements Directory.

TDI  Trade Data Interchange, directory developed by UNECE. See GTDI.

TDL  A Scandinavian trade facilitation organization.

TEDIS  An EC and EFTA program to promote the use of EDI. Trade Electronic Data Interchange System.
telco  An American acronym for telephone.
company (a carrier or PTT). Basically the national, regulated carrier o: (now) in the case of the United States, since the breakup at AT&T, an RHC (or baby Bell). See deregulation.

Telecom Gold  British Telecom electronic mail and X.400 messaging systems.

telecommunication (also comms or telecoms)  The use of a network for the transmission of voice, data, or image. All that is implied by the switching process. The generic name for remote communication using modern technologies.

telemetrics  The technological area of overlap between data processing and data communications.

telephony  The engineering science of converting voice into electrical signals and reconverting them to voice.

teleprinter  A printer used (now) generally remotely as a telegraph, telex, or limited-character-set printer. Early computers used them as consoles and system printers.

teletext  An attempt to provide a black box approach to solving problems of incompatible devices. New network and software technology, together with standards development, has caused a very low acceptance rate of teletext services.

Telstra  The rebadged Telecom Australia.

terminal  (i) A point where data can either enter or leave the network. See DCE, DTE.
(ii) An area at the end of a rail, ship, air or truck line which serves as a loading, unloading and transfer point for cargo or passengers, and often includes storage facilities, management offices and repair facilities.

time charging  A method of charging for the use of network which calculates charges on the basis of network connect time rather than a flat fee.

time definite delivery  Range of service performance standards offered by air freight carriers which permit the customer to select a specific time frame for delivery based on requirements for service and economy.

time delay system  A network-based system where, as a consequence of adding value to a message, a time delay is added. For example, EDI or a mailbox electronic mail system.

time slot  The time set by communicating computers during which they will exchange data.

time-out  Occurs when time limit established for a certain action, for example, receipt of a message, has been exceeded. The message is rejected and the end user is so informed. Some systems allow only a certain time between accessing a mailbox and sending a message. If the mailbox is open for, say, 5 minutes, and a message has still not been sent, the computer will disconnect the mailbox with an appropriate message to the terminal operator. This is for both security and economic reasons.

time-sharing  The original term given in the late 1950s to the technique which enables multiple users to simultaneously access a large computer without being aware of each other. As the cost of computing declined, especially after the PC was introduced, time-sharing services gradually fell from favor, but with mailbox services, MHS, EDI, and the like, time-sharing principles have made a comeback.

TQM  Total Quality Management. The current term for the Quality Assurance and Quality Measurement movement.

tracer  A request upon a transportation line to trace a shipment for the purpose of expediting its movement or establishing delivery.

track and trace  (i) The use of bar codes or other AID technologies to monitor the movement of goods from end to end.
(ii) A carrier’s system of recording movement intervals of shipments from origin to destination.

Tradacoms  Message standards for data interchange between major U.K. retailers and their suppliers. Developed by the ANA, it utilizes much of the UN-EDIFACT and GTDI syntax and standards.

trade clusters  A grouping of interested
trading partners, generally for international trade. See facilitation.

**trade facilitation** See facilitation.

**trade management** The logistics and systems involved in managing the supply chain.

**trade terms** The terms of a sale. The setting of responsibilities of the buyer and seller in a sale, including: sales price, responsibility for shipping, insurance and customs duties. The most widely used trade terms are Incoterms 1990, published by the ICC.

**Tradegate** An Australian trade facilitation organization comprising QANTAS, shipping and container companies, Australian Customs, and a variety of traders and industry bodies.

**Tradelink** The Hong Kong EDI trade facilitation organization. See HOTLINE.

**Tradenet** A Singapore EDI trade facilitation service.

**TradeVan** A Taiwanese EDI trade facilitating body.

**trading bodies** See industry bodies.

**trading partner agreement** A generic term for a contract describing new electronic terms and conditions of trading.

**trading partner** Suppliers or clients in any trading relationship.

**trailer** Data at the end of an EDI message indicating the conclusion of the message.

**transaction** A single completed transmission, for example, the transmission of a single invoice over an EDI network. This is no different from data processing usage, where a transaction could be an inquiry or a whole range of updates and trading transactions. The definition is important for interpretation of invoices from EDI service operators.

**transaction header** Control information at the beginning of any EDI message. The transaction header includes electronic addresses and information on the type of transaction which follows.

**transaction pricing** A charging and billing system based upon the numbers of transactions of different types processed by the EDI system, over a given period of time. See resource usage.

**transaction set identifier** Synonym for message code.

**transaction set** In EDI standards, the name given to a complete trading document sent electronically. Also known as a message.

**transaction set trailer** Synonym for message trailer.

**transactional voice response** A voice services technology which enables a computer connected to a voice network to collect information in order to process it.

**transcription errors** Mistakes and omissions caused by copying information from one document to another, whether done clerically or via a keyboard.

**transfer** A communication from one partner to another.

**translation package** A software package which performs a function of converting custom data to specific EDI standard formats.

**transmission rates** See baud, bps.

**transmittal letter** A list of the particulars of a shipment and a record of the documents being transmitted together with instructions for disposition of documents. Any special instructions are also included.

**transparent** A commonly used computer term which refers to technically difficult environments which are not apparent to the end user, who for example, may be sending a message from an IBM system to a mail box system for subsequent retrieval by a Unisys computer. The user should not be aware of the work involved in making this possible. The difficulties should be transparent to the end user.

**transponder** A device containing RFID technology.

**transport** A generalized term for the function of a network, that is, the network transports data.

**transport documents** All types of documents evidencing acceptance, receipt and shipment of goods. Examples: bill of lading; ocean bill of lading; air waybill; rail waybill; dock receipt; and so on.
transpotel An international freight market information system operating in U.K. and Europe.

U

U.K. United Kingdom.
U.S. United States of America.
UA User agent. A term in X.400 to describe the protocol for user access to MHS.
UCC See Universal Commercial Code.
UCP See Uniform Customs and Practice.
UCS Uniform Communications Standard. An X12 subcommittee on document standards for the grocery industry in the US.
UIC International Union of Railways.
UIRR Union of International Rail and Road Transport.
UN United Nations.
unattended mode Operating without manual (operator) intervention.
UNCID The ICC’S Uniform Rules of Conduct for Interchange of Trade Data by Teletransmission.
UNCTAD United Nations Conference on Trade and Development.
UNECE United Nations Economic Commission for Europe.
UNECE WP.4 United Nations Economic Commission for Europe, Working Party No. 4. Part of the EDIFACT organization.
UN-EDIFACT United Nations EDI for Administration, Commerce and Transport. See EDIFACT.
UN-GTDI UN Guidelines for Trade Data Interchange. See GTDI.
UNICORN An EDI project for ferry sailing in Europe.
UNIDO United Nations Industrial Development Organization.
Uniform Commercial Code A set of statutes purporting to provide some consistency among states’ commercial laws. It includes uniform laws dealing with bills of lading, negotiable instruments, sales, stock transfers, trust receipts, and warehouse receipts.
Uniform Customs and Practice Full name: Uniform Customs and Practice for Documentary Credits (UCPDC). The internationally recognized codification of rules unifying banking practice regarding documentary credits set up by a working group attached to the ICC.

Uniform Rules for Collections The internationally recognized codification of rules unifying banking practice regarding collection operations for drafts, their payment or non-payment, protest and for documentary collections. Set up by a working group attached to the International Chamber of Commerce (ICC).

uninterrupted power supply Special backed-up power supplies for computer systems which ensure that current keeps flowing to the computer.

unit load device Term commonly used when referring to containers and pallets.

unit load The strapping or banding together of a number of individual cartons, packages, sacks, drums or other cargo, often on a pallet, in order to create a single unit.

unitization The practice or technique of consolidating many small pieces of freight into a single unit for easier handling.

UNIVAC The original name for Sperry Univac, later Sperry. One of the first commercial computers.

Universal Product Carton Code See ANA, UPCC.

Unix A widely used computer operating system.

UN-JEDI United Nations Joint Electronic Data Interchange committee working on converging European and North American EDI standards. The committee proposed and is developing the EDIFACT standards.

UNSM United Nations Standard Message. An international message which has been approved by the UNECE.

UNTDDED UN Trade Data Element Directory (developed by the UNECE). Identical to ISO 7372.

UPCC Universal Product Carton Code, a standard administered by UCC (Universal Code Council of USA).

UPS See uninterrupted power supply.

URC See Uniform Rules for Collections.
**user data segment** A segment containing application data. An EDIFACT term.

**USS** Uniform Symbol Specification. The series of symbology specifications published by Automatic Identity Manufacturers around the world.

**V**

**V. Series** A series of recommendations by CCITT governing data transmission over telephone circuits.

**VADS** See Value Added Data Service.

**validation** The process of checking whether a document is the correct type for a particular EDI system and whether it comes from and is going to an authorized user. All of the editing and syntax checking involved in standards conformance. See compliance checking.

**value chain** A chart illustrating the addition of value, not cost, throughout the supply chain.

**value exchange** In context with goods movement and information exchange, this term refers to the payment cycle and new payment methods.

**value-added data service** A network-based data service which adds significant value to the basic function of carriage or message switching, provided by a PTT. An EDI service is considered to be a VADS.

**value-added network** The hardware, particularly communication systems, which facilitate a VADS. A VAN does not provide application processing capability; that is provided by other systems connected to the VAN.

**value-added service** An early name for VADS; VAS can apply to voice, data, and image services. Broadly speaking, only data VAS (VADS) is approved in most countries at the moment.

**VAN** See value-added network.

**VAS** See value-added service.

**vendor** The commonly accepted computer-electronics jargon for sales organization. Hence IBM is a computer vendor, a PTT is a service vendor.

**verification** See compliance checking, validation.

**version number** Number used to identify the particular release or version of a standard. Can also widely be applied to software, to standards, and to documentation.

**VICS** Voluntary interindustry communication standards, document standards in use by supermarkets, retail industries, and so on.

**VMI** Vendor Managed Inventory. A process by which inventory is owned by the supplier until a point designated by the purchaser of those supplies.

**voice messaging** A generic term for voice services implying the store and forward of particular messages.

**voice recognition** Technologies which recognize individual components of speech it then digitizes them and either stores or manipulates them for later use.

**voice response** A voice recognition service whereby recognized sounds or tones generate selected automatic responses from the voice service.

**voice services** The generic which covers all voice related value added services.

**W**

**waybill** Document prepared by a transportation line at the point of shipment, showing the point of origin, destination, route, consignor, consignee, description of shipment and amount charged for transportation services, and forwarded with the shipment, or direct by mail, to the agent at the transfer point or waybill destination.

**WCO** World Customs Organization. The new incarnation of the Customs Cooperation Council. See CCC.

**Windows** A personal computer operating system.

**WINS** An X12 subset. Warehouse Information Network Standards. Applies to grocery warehouses and refrigeration warehouse document standards. See ANSI; UCS.

**wire services** News services, originally based on telex but now screen-based. Service providers include Reuters, AP, UPI, etc.

**WP.4** See UNECE WP.4.

**WTO** World Trade Organization. The new incarnation of GATT, General Agreement on Tariffs and Trades.
X

X. Series A confusing label. X applies to either a committee setting a standard or the standard itself. For example, ANSI has, among many, the following committees: X3 for FORTRAN upgrades, X9.9 for data encryption standards, and X12 for EDI. CCITT has X.25 for communication recommendations and has X.400 for messaging recommendations. The X followed by a dot refers to CCITT recommendations. The absence of a dot implies an ANSI ASC committee prefix. See ANSI; CCITT; ISO. Note: ISO has its own series of alternate numbers for CCITT recommendations.

X modem A protocol used in conjunction with a PC to protect the transmission of data across a dialed-up line. It is also called X PC by some network operators.
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