5 e-Business Systems

Summary

Organizations use IS/IT to execute commercial transactions with customers, suppliers and administrative authorities. The technologies that are used are referred to as e-Commerce and the use of e-Commerce in the organization as e-Business.

The use of e-Commerce can speed up business processes, save cost and develop new markets. There are three distinct e-Commerce technologies that can be deployed:

- Electronic data interchange (EDI): Used for automated, high volume business-to-business (b2b) transactions. Extensively used by multiple retailers (e.g. Tesco) and component assembly manufactures (e.g. Ford)
- Internet e-Commerce (e-Shop): Used for business-to-consumer (b2c) (retail) sales and for b2b procurement of secondary supplies (e.g. for office supplies). The e-Shop allows the consumer to home shop 24/7 but there is generally a waiting time for goods to be delivered. The e-Shop can also be accessed on the move using a mobile device (m-Commerce)
- Electronic market (e-Market): An intermediary service where suppliers post their offering and buyers can easily select the product that best suits their needs. The best-known example of e-Markets are the airline booking systems.

Trade transactions are executed as a number of stages: order, delivery, invoice and payment are the essential steps – known as the trade cycle. Using e-Commerce for transactions changes the dynamics of each of these stages – sometimes speeding things up and making cost savings and sometimes having an opposite effect. The trade cycle is an essential tool for the analysis of e-Commerce and its effect within the wider concept of e-Business.

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Learning outcomes

Having read this chapter and completed the exercises, you should:

- Appreciate that corporate Information Systems are networked to form Inter-organizational Information Systems (IOS)
- Understand electronic data interchange (EDI) as a business-to-business (b2b) technology
- Understand internet e-Commerce (i-Commerce/e-Shop) as a business-to-consumer (b2c) technology
- Understand electronic markets (e-Markets) and the business dynamics that have limited their application
- Be aware of, and be able to evaluate, developments such as mobile e-Commerce (m-Commerce) and Web 2.0
- Appreciate and be able to evaluate e-Commerce technologies and e-Business practices as a tool for competitive advantage.

Key terms

Electronic commerce (e-Commerce), internet e-Commerce (i-Commerce), business-to-consumer (b2c), business-to-business (b2b), electronic business (e-Business), electronic data interchange (EDI), electronic market (e-Market), mobile e-Commerce (m-Commerce), Web 2.0, trade cycle, EDI standard, e-Shop, shopbot.

e-Commerce/e-Business

electronic commerce (e-Commerce): commercial transactions formulated at a location remote from a trading partner and executed using Information and Communications Technologies.

internet e-Commerce (i-Commerce): a business operation processed via an e-Shop. The shop front is a website that connects to a backoffice system on a server. Used for both business-to-consumer and business-to-business operations.

Electronic commerce (e-Commerce) is a term popularized by the advent of commercial services on the internet. Amazon opened its virtual doors in July 1995 and **internet e-Commerce (i-Commerce)** has been growing from that point on.

The growth of i-Commerce has been a part of the internet phenomena. Back in 1995 the internet was a rather obscure facility used by academics for communicating research data and accessing supercomputer centres (the internet was officially opened for commercial use in April 1995). Two decades later it is used for work and play, every day, by many millions of people across the world. The growth of the internet, its applications and its impact on society has been dramatic – it has been called the internet revolution and the term revolution is, in this instance, justified.

Nevertheless, e-Commerce did not start with Amazon's first e-Shop. Predecessor services that date back to the early 1980s included:

- b2c services, using videotex technology, such as France's Minitel and services such as Prodigy in the US
- b2b services using EDI in sectors such as vehicle assembly and the multiple retailers
- e-Markets such as airline booking systems and the financial markets.

business-to-consumer (b2c): transactions between businesses/organizations and their customers (retail consumers).

business-to-business (b2b): transactions between businesses/organizations.

The term e-Commerce is closely associated with **business-to-consumer (b2c)**, i-Commerce, but sensibly is also applied to all forms of **business-to-business (b2b)**, inter-organizational electronic transactions and to the technologies used for those transactions. Turban et al. (2008) define e-Commerce as:

> the process of buying, selling, transferring, or exchanging products, services and/or information via computer networks.

And Jelassi and Enders (2008) have a longer description:

> Electronic commerce deals with the facilitation of transactions and selling of products and services online, i.e. via the internet or any other telecommunications network. This involves the electronic trading of physical and digital goods, quite often encompassing all the trading steps such as online marketing, online ordering, e-Payment and, for digital goods, online distribution.

electronic business (e-Business): commercial operations conducted using e-Commerce.

The use of e-Commerce has changed the nature of business – and we use the term **electronic business (e-Business)** when discussing the broader impact of e-Commerce. e-Business, as used in this chapter, is defined as:

> e-Business is commercial operations conducted using e-Commerce.

The advent of e-Business has enabled new businesses – for example, Amazon and eBay as online retailers and Google and Facebook as online services. e-Business has also changed the way that business is done:

- Business has been speeded up. For example, orders that took weeks to process now require next day (or same day) delivery.
- Customers (business or consumer) can go online and do their ordering/shopping, from wherever they are, 24 hours a day and seven days a week (24/7).

The range of goods and services that can be traded online is virtually unlimited. e-Commerce transactions include, for example, holiday bookings, selling books, auctioning bric-a-brac, just-in-time (JIT) delivery of components to a car factory and share dealings by a hedge fund.

e-Commerce technologies

e-Commerce is, in part, a technology-defined concept: it is electronic. There are a range of technologies used in e-Commerce. The principal distinction is between those transactions where the trading partner (customer) is a person using a computer and where it is a computer system that incorporates automated trading processes (see ***Figure 5.1***).

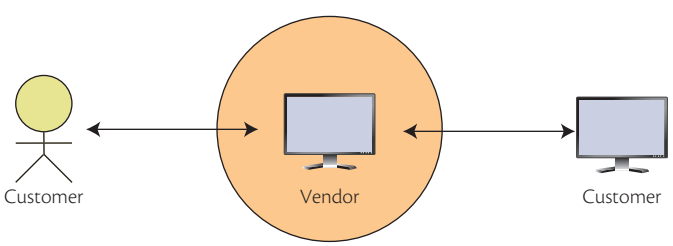

Figure 5.1 e-Commerce trading partners.

electronic data interchange (EDI): the electronic transfer of commercial transactions between Information Systems.

electronic market (e-Market): an Information System, accessed electronically, that allows sellers to list products or services for sale and buyers to search, compare and purchase those products or services.

mobile e-Commerce (m-Commerce): i-Commerce conducted using a mobile device – a smartphone, laptop or tablet – when away from the home or office.

Web 2.0: i-Commerce (or non-commercial internet) system that utilizes user-provided content. The participatory web.

Where a person (business or consumer) operating the transaction uses a keyboard and a screen, the type of e-Commerce is an e-Shop or i-Commerce. Alternatively, an automated trading process, used by business, will code the transaction as an electronic message that will be automatically sent to the vendor: this type of e-Commerce is **electronic data interchange (EDI)**. There are some additional technologies (variances on technologies) that are also deployed:

- **electronic market (e-Market)**: An intermediary system (independent of the vendor) that lists offerings from a number of vendors. An e-Market can be available to business and/or retail customers and would normally be accessed using i-Commerce.
- **mobile e-Commerce (m-Commerce)**: i-Commerce conducted using a mobile device when away from the customer's home or place of work, included in the section on i-Commerce.
- **Web 2.0**: i-Commerce systems that utilize user-provided content (a relatively ill-defined concept but eBay and commercial transactions on social networking sites fall within this concept), also included in the section on i-Commerce.

See ***Figure 5.2*** for a Venn (type) diagram representing all these technologies.

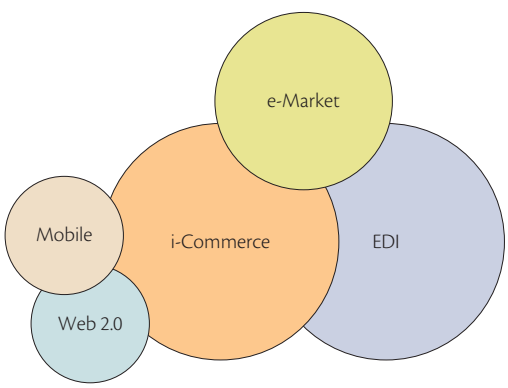

Figure 5.2 e-Commerce technologies.

The trade cycle

trade cycle: the steps/exchanges involved in a commercial transaction, e.g. order, delivery, invoice and payment.

A business transaction involves a number of steps – referred to as the **trade cycle**. The basic steps are best illustrated by looking at a simple, b2b transaction. This involves:

• Search		Finding the trading partner
• Negotiate		Agreeing terms of trade
• Execution	• Order	Specifying the goods (or services) required
	• Delivery	Delivery of the order
• Settlement	• Invoice	The request for payment
	• Payment	Settlement of the invoice
• After-sales		Any follow-up transactions

These steps, for a b2b transaction, are illustrated in ***Figure 5.3***.

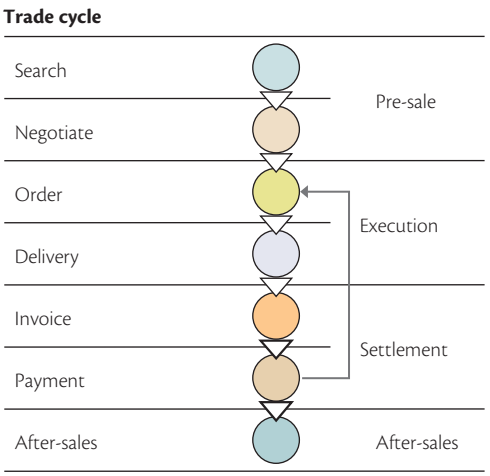

Figure 5.3 Trade cycle (b2b).

b2b transactions are normally conducted on credit terms. The goods are ordered and delivered soon afterwards, in the execution phase. Settlement takes place at a later date with an invoice being sent out (say) at the end of the month and payment (say) after an additional month has elapsed. Many b2b transactions are repeated with regular orders for components or stock – this is indicated by the arrow, on ***Figure 5.3***, with the loopback from payment to order. This repeat ordering requirement is where EDI is likely to be applicable.

Retail, b2c transactions are not normally conducted on credit terms. When we go into a shop the trade cycle is normally as follows: we pick up the goods and put them in our basket (order), take them to the till for checkout (invoice and payment) and then take them home with us (delivery). For conventional b2c transactions, execution and settlement take place as (essentially) a single step.

As with conventional b2c transactions, the e-Shop transaction is paid for at the time of ordering but delivery (of tangible goods) will take place after settlement. This trade cycle is illustrated in ***Figure 5.4***. Note that, while on b2b the seller gives the customer credit, for b2c the customer is paying before the goods are handed over. In both cases there is no simultaneous *exchange of value*, and this has implications for trust in the transaction (a significant issue for b2c i-Commerce). Note also that, for a b2c, i-Commerce transaction, there is unlikely to be any opportunity for negotiation, and this step has been omitted from the diagram.

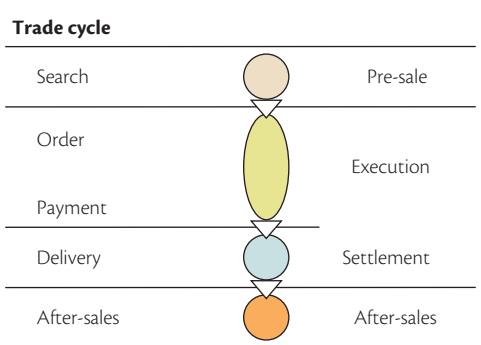

Figure 5.4 Trade cycle (b2c e-Shop).

EDI systems

EDI is used for b2b transactions that occur on a regular basis to a predetermined format. For the most part it is used for purchase transactions – for instance supermarkets buying supplies of cornflakes or a vehicle assembler purchasing wheels to fit to the cars on the production line.

EDI is most commonly applied in the execution and settlement phases of the trade cycle (see ***Figure 5.3***). In the execution of a simple trade cycle, the customer's order can be sent by EDI and the delivery notification from the supplier can also be electronic. For settlement the supplier can use EDI to send the invoice, and the customer can finish the cycle with an electronic funds transfer via the bank and an EDI payment notification to the supplier. This whole cycle may be more complex and other electronic messages can be included. The cycle can be repeated many times, as often as the supermarket wants to buy cornflakes or the vehicle assembler needs new supplies of wheels. For an example of an EDI system, see the ***Teleordering case study*** at the end of this section.

EDI can also be used for standardized and repeated transactions that do not fall within the usual definition of trade exchanges. One major user of EDI for non-trade messaging is the UK Tax Authorities (HMRC), for example for payroll PAYE data. The HMRC provides a number of ways of making PAYE returns, including EDIFACT EDI (see agreed message standards below). The use of EDI is particularly appropriate for this since most payrolls are processed by a relatively small number of bureaus which generate a large number of transactions and have the technical expertise to implement EDI systems.

EDI definition

EDI is often summed up as *paperless trading*. More formally, EDI is defined, by the International Data Exchange Association (IDEA), as:

> The transfer of structured data, by agreed message standards, from one computer system to another, by electronic means.

This definition of EDI has four elements, each of them essential to an EDI system:

1. Structured data:
   EDI is applicable to documents that conform to a standardized format and are composed of codes, values and (if necessary) short pieces of text; each element has a strictly defined purpose. For example, an order has a standardized layout, usually includes codes for the customer and product, and has values such as quantity ordered.

2. Agreed message standards:
   The EDI transaction has to have a standard format. The standard is not just agreed between the trading partners but is a general standard agreed at trade sector, national or international level. A purchase order will be one of a number of agreed message standards.

3. From one computer system to another:
   The EDI message sent is between two computer applications. There is no requirement for people to read the message or re-key it into a computer system. For example, the message is directly between the customer's purchasing system and the supplier's order processing system.
4. By electronic means:
   In almost all cases this is by data communications; sometimes networks specifically designed for EDI will be used.

Structured data: trade transactions, such as orders and invoices, are examples of *structured data* – for example, an order for office supplies (20 staplers and 40 boxes of staples: see ***Figure 5.5***).

ORDER

From:

Office Services Ltd
123 London Road
Sheffield
S2 4HT
Address code: 6464326

To:

Sheffield Stationery
110 Glossop Road
Sheffield
S10 2JT
Address code: 1149646

Order ref: AC6464
Order date: 15.03.2013

Qty	Description	Product code
20	Stapler: metal half strip	50023084156932
40	Staples: 5000 26/6	50023084340447
	end of order	

Figure 5.5 Sample (paper) order.

The order is structured, and each data item has a standard place. Another order to the same supplier for other products or to another supplier for different requirements would have the same structure and similar contents.

On the order many of the data items are represented by codes – for example, supplier address code and product code (although, on the paper order, they are also spelt out in words). A number of trade sectors have their own standardized coding system – the most visible is the EAN/UPC, used on groceries and general merchandise as the barcode (see ***Chapter 1***).

In many organizations, the order (particularly for primary supplies that are required on a regular basis) will be output from a computer system such as a stock control/material and requirements planning (MRP) system. The order will also, usually, be input into an order processing system when it arrives with the supplier. This application of computer systems makes the use of codes important and also raises the question as to why the order cannot be transferred electronically achieving a saving in time, effort and a reduction in errors – hence the requirement for EDI.

EDI standard: a standard for coding business documents as EDI messages, e.g. EDIFACT or standards defined within XML.

Agreed message standards: At the heart of any EDI application is the use of an *agreed message standard*, which requires an **EDI standard**. The essence of EDI is the coding and structuring of the data into an application and machine-independent format – anything less is simply a system of file-transfers.

Coding and structuring the documents for business transactions is no easy matter. There have been a number of EDI standards developed in various industry sectors or within a specific country and there are complex committee structures and procedures to support them. Examples of these standards are Odette (automotive industry), Tradacom (UK ANA) and ANSI-X12 (US Standard).

Following on from the various sectorial and national EDI standards is the United Nations (UN) EDI Standard: EDIFACT. This is the standard that is used in the example in this chapter and it is the standard that should be adopted for any new EDI application.

The application of the EDIFACT standard can be illustrated using the order shown in ***Figure 5.5*** – that order coded into EDIFACT is shown in ***Figure 5.6***.


```
UNH + 000001 + ORDERS : 2 : 932 : UN'
BGM + 220 + AC6464'
DTM + 4 : 20130315 : 102'
NAD + BY + 6464326 : : 91'
NAD + SU + 1149646 : : 91'
UNS + D'
LIN + 1 + + 50023084156932 : EN'
QTY + 21 : 20'
LIN + 2 + + 50023084340447 : EN'
QTY + 21 : 40'
UNT + 11 + 000001'
```

Figure 5.6 Sample EDIFACT interchange.

The interpretation of the EDIFACT order is as follows:

• UNH+000001+ORDERS:2:932:UN'	Message Header
Message Number	000001
Message Type	ORDERS
Version	2
Release	932
Control Agency	UN
• BGM+220+AC6464'	Beginning of Message
Message Name Code	220 i.e. order
Document Number	AC6464 i.e. order number
• DTM+4:20130315:102'	Date/Time/Period
Qualifier	4 i.e. order date
Date	20130313 ~ 15mar2013
Format Qualifier	102 i.e. century date

(continued overleaf)

• NAD+BY+6464326::91’ NAD+SU+1149646::91’	Name and Address
Party Qualifier	BY i.e. buyer SU i.e. supplier
Address Code	6464326 and 1149646
Code List Agency	91 i.e. user defined
• UNS+D’	Section Control
Section Identification	D i.e. detail segment
• LIN+1++50023084156932:EN’ LIN+2++50023084340447:EN’	Line Item
Line Item Number	1 and 2
Item Number	50023084156932 and 50023084340447
Item Number Type	EN = EAN Code
• QTY+21:20’ QTY+21:40’	Quantity
Quantity Qualifier	21 i.e. ordered quantity
Quantity	20 and 40
• UNT+11+000001’	Message Trailer
Control Count	11 i.e. eleven segments
Message Number	000001 as in UNH
• Formatting Characters	
Data Element Separator	+
Component Data Element Separator (within a composite data element)	:
Segment Terminator	’

Decoded, the order is:

The order identification is:

• Order Number	AC6464
• Order Date	15.03.2013

From Office Services Ltd:

• Customer Address Code	6464326

To Sheffield Stationery:

• Supplier Address Code	1149646

For Staplers and (refill) Staples:	Qty	Product
• Line 1 Staplers	20	50023084156932
• Line 1 Staples	40	50023084340447

The EDIFACT coding of the order provides a machine independent, unambiguous specification of the requirements that can be sent/accepted by any system with the appropriate EDI software.

Each transaction, in this case an order, is a message. Several messages can be sent in an interchange and EDIFACT also specifies the interchange header and trailer.

The full EDIFACT standard is defined on the UN website. It is vast and, to the untrained eye, very complex (which is one of the criticisms made of traditional EDI). That said, once one knows one's way around, it is simple enough and only a small number of segments are likely to be needed for any specific requirement.

A number of organizations are now using XML messaging (see the ***XML explanation box***) in place of traditional EDI (e.g. EDIFACT). Users of XML EDI include Walmart and its UK supermarket chain Asda. It is also used by Microsoft in its BizTalk server, Sun for its ebXML and by new internet-enabled markets such as Commerce One (Chaffey, 2007). It is claimed that:

- The standards are simple (you can devise your own).
- XML software is readily available (and some of it is free).
- XML can be transmitted on the internet (but then so can traditional EDI).
- It is new (and by implication, new means better).

The big drawback of XML is that it is a meta-language (that is, a language used to define another language) and hence there are no generally agreed XML EDI message standards for trade transactions within the XML definition. Organizations are defining their own XML EDI messaging standards (there are also attempts by trade standards bodies to bring some order into the scene). Large organizations can define their own messaging standard, and that probably suits them. However, smaller organization could receive differently defined messages from a number of trading partners, each requiring a separate implementation; it takes them back to where they were 30 years ago.

A new technology should be adopted because it provides a new capability or because it improves on an existing facility. It is far from clear what advantage is to be gained from replacing existing EDI applications with XML messaging – but that won't stop it happening.

The order shown in ***Figure 5.5*** and coded into EDIFACT in ***Figure 5.6*** could alternatively be coded in XML (see ***Figure 5.7*** overleaf). The tags have been defined by the author.

One computer system to another: EDI systems are used to communicate business transactions *from one computer system to another*. As we saw above, the EDI message is not designed for ease of reading by the staff of the organization. The intention is that the message will be automatically generated by (say) the stock control/replenishment system of the customer organization and will be read and processed by the order processing system of the supplier organization. The EDI exchanges for the basic trade cycle are shown in ***Figure 5.8*** overleaf.

EDI messaging between the computer systems of trading partners is part of a system of close cooperation between organizations in the supply chain. Linking of systems in this way integrates the operations of customer and supplier organizations. This (virtual) integration of the IS/IT is then referred to as an Inter-Organizational Information System (IOS).

```
<? Xml version = "1.0 standalone = "yes" ?>
<purchase-order order-no = "AC6464">
 <order-header>
   <reference-no>AC6464</reference-no>
   <date>20130315</date>
 </order-header>
 <company>
   <company-no>6464326</company-no>
 </company>
 <supplier>
   <supplier-no>1149646</supplier-no>
 </supplier>
 <order-item>
   <item-ean>50023084156932</item-ean>
   <quantity>20</quantity>
 </order-item>
 <order-item>
   <item-ean>50023084340447</item-ean>
   <quantity>40</quantity>
 </order-item>
</purchase-order>
```

Figure 5.7 Example of XML EDI interchange.

Explanation

XML

XML stands for eXtensible Mark-up Language. XML is a mark-up language designed for use on the web. XML is derived from SGML (standard general mark-up language), as is HTML. Data coded in XML looks similar to HTML but with the important difference that the tags are determined by the system designers/system users rather than being predetermined by designers of the language. Hence XML is a meta-language (a language used to define another language).

The format of XML tags is <name> (start tag) and </name> (close tag). There is no pre-set library of names – the user (or application) define their own. The tag will normally be describing the data – thus in ***Figure 5.7*** the author has, for example, created <purchase-order> and <supplier> tags. Three further rules are:

- Every opening tag must be matched by a closing tag
- Tags can be nested (and any nesting must be a strict tree structure)
- Tags are case sensitive (<item-ean> and </item-EAN> would not match).

The document data is normally included between tags, for example:

<item-ean>50023084156932</item-ean>

The start tag can also be given parameters, for example:

<purchase-order order-no="AC6464">

XML documents can be associated with further XML files, for example:

- DTD or schema: This defines the XML structure allowed in a document and can be used to check that the XML is *well formed*
- Style sheet: Uses XSLT to reformat the XML – usually for display or printing.

XML is used for many purposes. It can be used to interchange data between databases, to specify webpages, for communication in web services and it is also being used for *the transfer of structured data, from one computer system to another, by electronic means* (three out of the four elements of our adopted definition of EDI).

XML is a recommendation of the World Wide Web Consortium (W3C). w3schools.com has excellent material on XML. A useful XML book is Goldfarb's *XML Handbook* (2003).

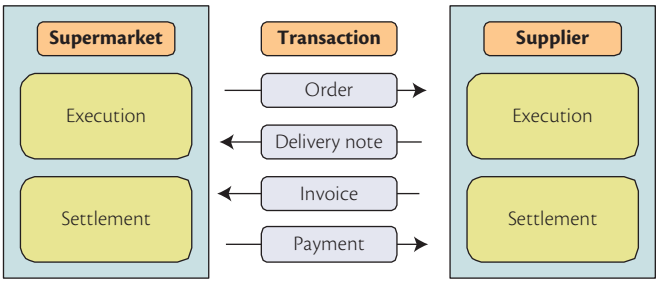

Figure 5.8 EDI exchanges for a stock replenishment system.

Electronic means: the final part of our definition of EDI is *by electronic means*. The normal (or traditional) way of transmitting an EDI message is using a value added data service (VADS) – also known as a value added network (VAN).

The VADS is a *post and forward network*. This network is centred on a computer system with communications facilities. For each user of the system there are two files:

- The postbox – where incoming messages are placed
- The mailbox – where outgoing messages can be picked up.

The use of postboxes and mailboxes provides *time independence* and *protocol independence*, that is:

- The originating organization can send its EDI transmission to the VADS whenever it is ready and using any of the network technology and protocol combinations that the VADS is equipped to receive. The EDI transmission can contain messages for several trading partners.
- The recipient organization can pick up its EDI messages at a time of its choice and, possibly, using a different network and protocol combination from that used to send the message(s) in. The recipient organization may be picking up messages from several trading partners.

The VADS postbox and mailbox arrangement is shown diagrammatically in ***Figure 5.9***.

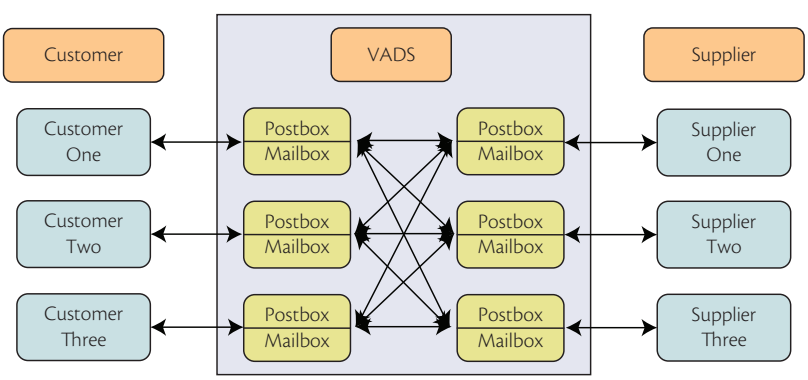

Figure 5.9 VADS – postbox and mailbox files.

If Customer Two, for example, needed to place orders with Supplier One and Supplier Three then it formats an EDI interchange containing a number of orders for those two suppliers. The sequence of events would then be:

- Customer Two establishes a communications link to the VADS system.
- Customer Two then transmits the EDI interchange and it is temporarily stored in its postbox.
- The VADS computer system inspects postboxes, unpacks the interchanges, moves the messages (orders in this case) to the mailboxes of the intended recipients and repackages them as new interchanges. The inspection of postboxes is frequent and, to all intents and purposes, the interchanges are immediately available in the mailbox of the recipient.
- The users of the system establish a communication link to the VADS system at their convenience. Let us assume that Supplier Three comes online.
- Supplier Three inspects its mailboxes for new interchanges. On finding the order from Customer Two (and possibly further messages from other customers) it causes them to be transmitted to its own order processing system.

The EDI interchange is then available for processing in the user's application. A number of organizations have set out to provide VADS. Two such services that are extensively used are the AT&T network and GEIS (General Electric Information Services). The VADS providers emphasize their privacy, security and reliability and offer a number of other services, such as message validation, message logging and consultancy.

The main alternative, and an increasingly popular alternative, to a VADS is the use of the internet for EDI transmission. In particular, the internet is seen as a natural match with the use of XML messaging. The use of the internet for EDI would normally require the use of a protocol such as AS2/AS3 to envelope the EDI message – and possibly a third party to post and forward the messages (this sounds a bit like a VADS!). When using the internet, security and reliability are two of the major concerns; unlike the traditional VADS, the internet does not guarantee the safe delivery of data you send into it. The plus side of using the internet is that it is cheaper than the commercial networks. The cost of EDI VADS services seems to be of particular concern to small organizations that have relatively low usage of EDI.

Implementing EDI

The final technical element of the EDI system is the EDI software. If Office Services Ltd is to send an order from its stock control system to Sheffield Stationery (see the example order in ***Figure 5.5***) it needs to code that order into the agreed EDI standard and transmit it into the chosen VADS. To pick up the order at the other end, Sheffield Stationery has a similar need to extract the data from the network and to decode the data from the EDI message into its order processing system. The coding/decoding of the EDI message and the interfacing with the VADS are normally achieved using EDI software. The overall picture is summarized in ***Figure 5.10***.

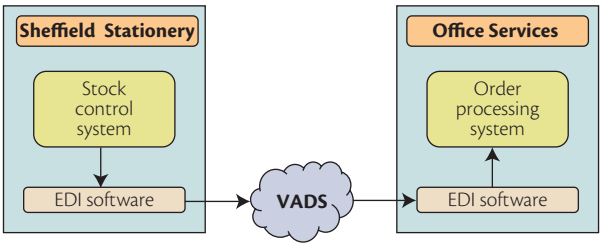

Figure 5.10 Sending an order using EDI software.

The EDI software is normally bought in from a specialist supplier. There are a number of software houses that supply EDI solutions; the EDI software can also come from the VADS, a major trading partner or be a facility of an ERP system. The basic functions of the EDI software are the two already outlined, namely:

- Coding business transactions into the chosen EDI standard
- Interfacing with the network/VADS.

Many EDI software packages provide additional functions. These may include:

- A trading partner database integrated into the EDI software. This can be used to determine which standard and which network is to be used for each trading partner
- Support of multiple EDI standards
- Facilities for the formatting of internal application data to and from the EDI standard
- Facilities for transactions to be sent by fax or e-Mail to suppliers that do not use EDI
- Interfacing with a variety of EDI VADS (including the internet)
- The option to encrypt the EDI message
- Facilities for the automatic acknowledgement of the EDI message
- Message tracking and an audit trail of messages sent and received.

On the administrative side, setting up an EDI system requires a lot of discussion with trading partners. Manual systems rely, in part, on the common sense of the people involved; when these interchanges are automated the machines just do what they are told (well, they do on a good day!).

The appropriate way to document the details of a trading arrangement between electronic trading partners is an EDI Interchange Agreement. The agreement makes clear the trading intentions of both parties, the technical framework for the transactions and the procedures to be followed in the event of a dispute. The EDI Agreement is a document signed by both trading partners before electronic trading begins. Guidance that is provided with the European Model Electronic Data Interchange (EDI) Agreement (EU-IA) includes:

> For EDI to be a successful alternative to paper trading, it is essential that messages are accorded a comparable legal value as their paper equivalent when the functions effected in an electronic environment are similar to those effected in a paper environment, and where all appropriate measures have been taken to secure and store the data.

The EU-IA, in the text of the agreement, includes the clause:

> The parties, intending to be legally bound by the Agreement, expressly waive any right to contest the validity of a contract effected by the use of EDI in accordance with the terms and conditions of the Agreement on the sole grounds that it was effected by EDI.

In addition to the legal (or legalistic) aspects of the agreement it is important to specify the technical requirements. These requirements include:

- The coding systems that will be used for identifying entities such as organizations and products, and attributes such as quantities
- The EDI standard that is to be employed and, within that, the messages and data segments that will be used
- The network and, if applicable, the protocol that is to be used.

Model agreements are available from various parties, including trade organizations.

Themes
Security

An important aspect of EDI is the privacy and security of the messages and their exchange. The first point is to ensure that interchange of messages is reliable. In the first instance this is a matter of procedures at both ends of the trading agreements. Rigid procedures are required to ensure that all the processes are run and that they reach their successful conclusion – an old-fashioned requirement called *data processing standards*. Further aspects of security are:

- Controls in the EDI standards and the transmission protocol, e.g. the control count of segments in the EDIFACT UNT trailer
- Protection against tampering, e.g. by including a digital signature
- Privacy of message – encryption can be used
- Non-repudiation (where a party denies sending or receiving the message). This can be addressed using a receipt acknowledgement message or a *trusted third party* to audit trail all transactions.

The need for security in an EDI system should be kept in proportion; after all, EDI is very probably replacing a paper-based system where computer output orders, without signatures, were put in the post and eventually manually keyed in by an order entry clerk. Transmission and EDI message controls are automatic. Checks over and above that all come at a cost; encryption and digital signatures both require extra software and procedures; message acknowledgements require additional software to generate the message and to match it to the original transaction on the other side of the trading relationship.

The overall facilities for EDI privacy and security are summed up in ***Figure 5.11***.

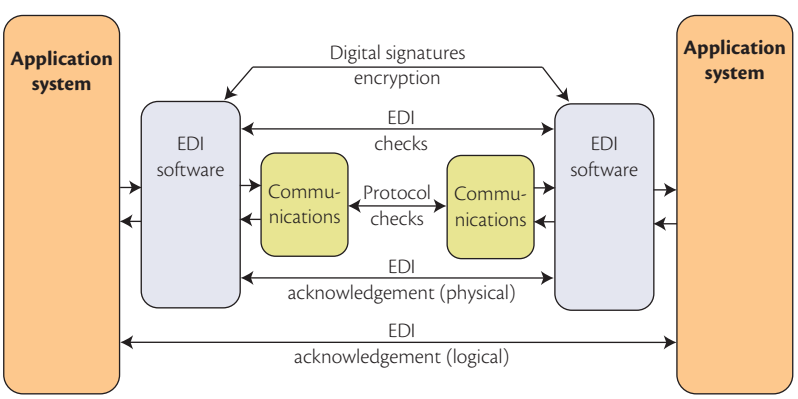

Figure 5.11 EDI privacy and security.

Advantages and disadvantages of EDI

EDI can bring a number of advantages to the organizations that use it. It should save considerable time on the exchange of business transactions and has the potential for considerable savings in costs. The direct advantages of EDI include:

- Shortened ordering time: The EDI message can be in the recipient's system as quickly as required – the same day for overnight processing or within minutes for immediate processing
- Cost cutting: The principal saving from the use of EDI is the potential to save staff costs on data entry and query resolution. Stationery and postage costs are also saved. The cost savings need to be offset against the system development and network costs
- Elimination of errors: No data entry errors
- Accurate invoicing: Electronic invoices should automatically match to the corresponding order and delivery note (not an easy process when performed manually)
- EDI payment: Payment and payment advice can also be made by EDI. An electronic payment advice will be automatically matched against the relevant invoices.

Indirect advantages of the use of EDI can be:

- Reduced stock holding: The ability to order regularly and quickly reduce the amount of goods that need to be kept in a store room or warehouse at the shop or the factory. For many JIT manufacture and quick-response supply systems, stockholding is eliminated altogether, with goods being delivered only as they are needed. Reduced stockholding cuts the cost of warehousing, the double handling goods (into store and then out again into the factory or shop) and the finance required to pay for the goods that are just sitting in store.
- Build to order: The use of EDI (and other technical developments) has reduced the manufacturing cycle time – in the case of car manufacture from about 13 weeks to 2 weeks. This has made it possible for the car manufacturers to build to order. They can take the customer's specification (body colour, trim, accessories, etc.) and build that car. Previous practice was to try to persuade the customer to settle for a car that was already in stock.
- Cash flow: Speeding up the trade cycle by getting invoices out quickly, and directly matched to the corresponding orders and deliveries, can and should speed up payments – and hence improve cash flow.
- Customer lock-in: An established EDI system should be of considerable advantage to both customer and supplier. Switching to a new supplier requires that the electronic trading system and trading relationship be redeveloped, a problem to be avoided if a switch of supplier is not essential.

To gain these advantages EDI has to be seen as an investment – there are costs upfront and the payback is longer term. The costs are the setup of the EDI system (hardware, software and network) and the time required to establish agreements with trading partners. The savings only start when there is a

significant volume of business transacted using EDI, a point that is called the *critical mass*.

Themes
Competitive Advantage

EDI can be simply used to replace paper transactions with electronic transactions – this is the normal route taken in the initial installation of EDI. The full advantage of EDI is only realized when business practices are restructured to make full use of the potential of EDI – when EDI is used as an enabling technology to change the way the business operates: JIT manufacture and quick-response supply being prime examples of where EDI is used as an enabling technology to gain competitive advantage. Competitive advantage gained by innovative IT applications can be short-lived as competitors install similar systems and the use of the IT system becomes a business norm. Requirements for complex and expensive IT systems do, however, become a barrier to market entry.

Case study
Teleordering

Nielsen's Book Data lists bibliographical details of all English language books published worldwide (previously this service was known as Whitaker's Books in Print). Nielsen also provides a registration service that allocates codes, including ISBNs,[1] for organizations involved in the book trade. The Nielsen database, at the time of writing, contains 7.4 million unique ISBNs published or distributed in the UK and Ireland and 16.2 million unique ISBNs in total. Book Data is available to the trade in a variety of formats and forms the basis of the catalogues of most online book retailers.

Built on the Book Data database is Nielsen's Book Net/Teleordering service. This is an EDI system that allows bookshops to place orders with over 60,000 publishers, distributors and wholesalers – users of the service do not need to identify the supplier, the system does that for them. For book trade customers the service can be installed on a simple PC (in a small bookshop), integrated with an EPOS system, and large bookstore chains can build it into their own internal systems. Suppliers (publishers and distributors) will receive their EDI orders directly into their internal Information Systems – small operators can avoid the complications (and benefits) of EDI and opt to receive an e-Mail notification and then access their order as a webpage. The system allows the use of Tradacoms, EDIFACT or ANSI-X12 EDI standards.

Sources include Nielsen (2012). Note there are other providers of EDI services to the book trade.

[1] ISBN is the International Standard Book Number, it is a 13-digit code used to uniquely identify every book that is printed (the same book in different formats, e.g. hard/paperback will have separate ISBNs). The ISBN conforms to EAN standards and can be used as a barcode (see ***Chapter 1***).

i-Commerce (e-Shop)

At the heart of most that is good about the internet lies the simple, seductive offering – what you want, when you want it. You want to buy an obscure book or track down a cheap holiday? Get online. Do it. Now!

(adapted from Waldman, 1999)

Internet e-Commerce (i-Commerce, the **e-Shop**), is used for b2c transactions. Well-known examples are amazon.com and tesco.com, but there are many thousands of other e-Shops and just about anything can be bought online.

e-Shop: the website of an internet e-Commerce business.

The basic model is the e-Shop – and the two instanced above are for tangible goods. i-Commerce, however, has a much wider scope – it can be used for:

- Intangibles such as music downloads, software and tickets
- Account-based services such as a bank account, stocks and share dealing, and gambling
- b2b transactions, typically for secondary supplies, such as office stationery, where EDI would not be appropriate.

i-Commerce can be summed up as:

> A server-based system, for commercial transactions, accessed from outside the organization via the internet and using a web interface.

The essential IT structure is a client-server system (see ***Figure 5.12***).

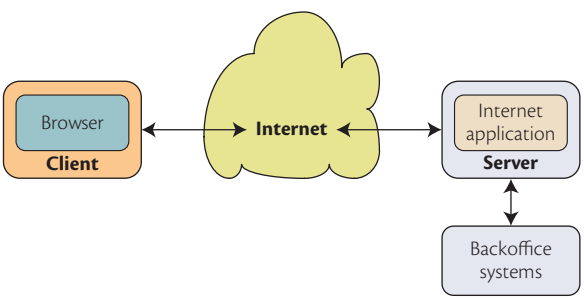

Figure 5.12 e-Shop IT infrastructure.

The concept of setting up a retail operation online sounds simple enough. Possibly the main advantage is that you can have national (or international) coverage without the cost of setting up a chain of retail outlets. But there are real differences that must be addressed:

- Location: You don't pick up customers who just walk past your high street store – customers have to find your electronic location.
- Product: The customer cannot see, smell or touch (or try on) the product – customers can only have words, pictures and possibly sound.
- Payment: This has to be electronic and over a network and this creates security issues.
- Delivery: Customers cannot take tangible products home with them – these will probably take a few days to arrive.
- After-sales: If there is a problem the customer cannot simply take their purchase back to a physical shop.

The e-Shop trade cycle

The importance of these issues depends on what you are selling to whom. These issues arise at different stages of the trade cycle (see ***Figure 5.4*** for the trade cycle and ***Figure 5.13*** for e-Shop interchanges). We will examine the implications for an e-Shop system at each stage of the trade cycle.

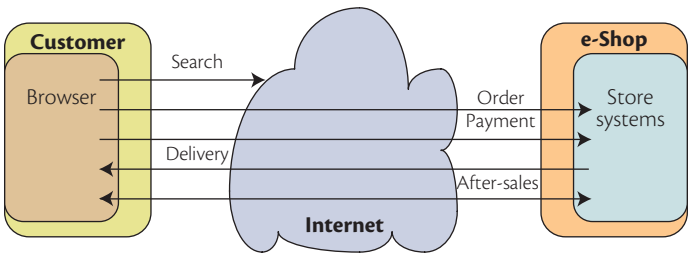

Figure 5.13 e-Shop trade cycle interchanges.

Search: There is no point in setting up a shop unless your target customers can find you. This is true on the high street (or in a shopping mall), where the mantra is *location, location, location*. It is also true on the internet, where the equivalent is getting your site onto the first page of the search engine results.

Search engine optimization (SEO) is big business. There are three basic approaches to getting your site recognized by the search engines:

- Site content: The search engines index sites on their content and their links. The starting point is the content of the <title> and the <meta> tags. The words chosen for the meta tag should be carefully thought out to match likely search terms.
- Paid for listing: The e-Shop can pay the search engine (or search engines) for its site to be linked to particular search terms (and that can be restricted to a geographical area). Again the words chosen must be carefully thought out.
- Optimization: Site owners can get themselves up the listing by playing a few tricks – for example, creating links to their own site or repeatedly accessing the site. That said, the search engines try to detect and then ignore sites that play tricks. There are also consultancies which, for a fee, will optimize your listing position on the search engines.

Note, for example, that in the early days of the internet searches, amazon.co.uk came up with the American term *bookstore* but not the English term *bookshop*.

In addition to the search engine the site can attract traffic by:

- Advertising: Conventional adverts can be placed, for example, in the press, on billboards or on television. These are not cheap options and potential customers still have to get online and find the site – adding a QR barcode that can be scanned to make the link is one way of avoiding this issue.
- Clickthroughs: This is online advertising. The advantage is that the advert leads straight to the e-Shop but, of course, the user has to be on the site with the link in the first place. Clickthroughs are often paid for – this can be per clickthrough or for clickthroughs that lead to a sale. Paid for clickthroughs need software that account for them. A somewhat unusual example of the use of clickthroughs is the *milliondollarhomepage* (see the ***case study***).
- Bricks-and-clicks: Many large, conventional shops have set up a parallel e-Shop, creating a bricks-and-clicks operation. Customers who know the conventional store can also be attracted to the e-Shop.
- Social media: Businesses, including e-Shops, are setting up on Facebook and sponsoring celebrities to include mention of them in their tweets. There is a lot of hype about using new media for advertising and it can backfire

if it provokes a negative reaction. Social media sites can also check your personal data and send you adverts they think could be relevant.

- Reputation: There are a few large and well-known e-Shops whose sites people can go to straightaway. Good feedback from satisfied customers can enhance an organization's reputation and the fact that a site is well known enhances the customer's sense of security.

Case study
milliondollar-homepage

The milliondollarhomepage was set up by Alex Tew in 2005. Alex was a student trying to finance his way through university. The home page contained a million pixels (in a 1000 x 1000 grid). Pixels were sold in 10 x 10 blocks for a dollar per pixel and the purchasers could choose the design for their square.

The idea got a lot of publicity and all the pixels were soon sold – after all, $100 is not a lot of money to chance on what might turn out to be a bit of good marketing. Alex Tew made his million dollars – but did not complete his degree.

The whole site looks like a colourful patchwork quilt. When a visitor runs their mouse over the site the title/slogan of the area pointed to is displayed. If the visitor clicks the area they will be taken on a clickthrough link to the site of the owner of the pixels. The homepage is accessible at: http://www.milliondollarhomepage.com/.

Order: An e-Shop, just like a conventional shop, needs to be well designed and carefully laid out. The customer needs to be able to easily locate what they are looking for and the product needs to be well presented.

In an e-Shop the presentation is limited to description, pictures and (possibly) sound. For many products this is adequate and in some cases could be an advantage – a bookshop can include reviews that would not be readily available in a conventional bookshop. For products like fresh food (where we might like to select our own apples) and clothes (where trying the garment on could be a good idea), the e-Shop has its limitations. Whatever the product the e-Shop must make a good effort to display it – and, for a large e-Shop, this means a significant overhead.

An e-Shop, excepting the very small e-Shop, will have a product database. This allows product data, including prices and stock totals, to be readily updated. The product pages of the e-Shop are then generated *on the fly* from the product database using server side scripts. The requirement for a database also applies to e-Shops selling non-tangible items, such as tickets, where a booking system is required.

Most e-Shops will also include an electronic basket, trolley or cart – an analogy to the supermarket. The basket is an interesting piece of software (we will come to that later). The electronic basket is also superior to its conventional equivalent – you can readily see what is in it, the total spend is displayed and goods can be electronically returned to the virtual shelf (there is also talk of developing a smart trolley for use in a conventional supermarket).

Payment: The payment has to be online, which normally means having to use a credit or debit card. Other options are e-Cash, an account (with PayPal being a hybrid option) or in some cases, and in some countries, paying the

postman on delivery. Payment always has security issues and these are magnified in online transactions. An essential difference is that there is no simultaneous exchange of value. In a shop you make a payment and get your goods at the same time – online, you pay first and (you hope) get your goods later (b2b transactions are different: the standard there is to get the goods first, on credit, and pay at a later stage).

Electronic payments are vulnerable. There are three areas of vulnerability:

- Customer: Is the person making the transaction the legitimate user of the payment instrument?
- Transmission: Are the payment details secure as they are sent over the network?
- Supplier: Is the e-Shop what it purports to be (that is, are the employees honest and is the e-Shop secure)?

Much of the emphasis in e-Shop security has been on the transmission aspect of the problem (which was probably never the biggest threat area). This is amenable to a technical fix – the use of encryption (SSL – Secure Socket Layer encryption, using a public and private key system).

At the customer end, the problem is knowing whether the person submitting the payment details is the legitimate owner of the card/account. Payments are made using the *customer not present* protocol and hence there is no signature/pin number check (and the person submitting the payment may not even be in possession of the physical credit/debit card). The problem is exacerbated by the availability of stolen card details from the supplier end or other e-Commerce transactions. There is also a problem with users who make card payments and then deny making the transaction.

Security at the customer end has been enhanced by small changes. Credit/debit cards now have a three-digit security code and some accounts are associated with an additional password check. Customers of online banking can be issued with a calculator like a password generator. None of these measures solves the problem but, to borrow a phrase, *every little helps*.

It is to be noted that, from the customer's point of view, the credit card is much more secure than a debit card. With a credit card the customer is, in effect, buying from the credit card company and the credit card company is making the purchase – hence it is the credit card company that is liable for any loss should things go wrong. This is not the case with a debit card, where one is spending one's own money and also technically liable for any fraud on the account (although banks in the UK have tended to be very helpful – they do not want the security of the system to be questioned). An advantage of an account/e-Cash is that one only puts at risk the amount of money in the account – presumably not a vast sum.

At the supplier end, problems range from hacking attacks that gain customer payment details to phishing (fraudulent) websites. Website designers need to address security issues – for instance, customer payment details must be encrypted and, arguably, they should not be retained at all. A neat way of minimizing security risks you will see on websites is where you are asked only for a random three characters of a password – hence stopping any employee seeing the full password for that customer.

Delivery: In conventional retail the customer takes the goods home with them. In the case of the e-Shop the goods have to be delivered – and that takes time and costs money. It has been said that you could sell anything online – provided it fits through a letter box. Books and CDs fit into this category, and they have the following advantages:

- Postage is fairly cheap.
- They are not too likely to be damaged or stolen.
- It does not matter whether the recipient is at home or not (provided books are not in oversized cardboard packages that do not fit the letterbox!).

These are some of the reasons why Amazon's founder Jeff Bezos chose books for his pioneering e-Shop.

As i-Commerce has developed, the range of goods available has widened and the e-Shops have had to develop a range of solutions to tackle the fulfilment/delivery problem. The range of delivery options is illustrated in the following list:

Delivery mode	Example products	
Electronic	Tickets, music, software	Cheap to operate, immediate, can fail on large files. Potential for fraud/piracy
Postal	Books, CDs	Low cost, relatively fast (good if product fits through letterbox)
Courier service	Electronic equipment	Significant price, secure for valuable items, needs customer to be at home or in the office
Local depot	Supermarket, white/brown goods	Significant price, needs local delivery depot/booked delivery slots
Click-and-collect	Bookshop, catalogue store, supermarket	Order online and customer picks up at the local branch

The e-Shop needs to carefully think out and plan its e-Fulfilment processes – delivery issues as they affect supermarkets were discussed in the case study in ***Chapter 1***. Warehousing, picking, packing and delivery need to be appropriate, efficient and cost-effective – and it also should consider the customer's needs (picking up goods from the sorting office or arranging a re-delivery is problematic for busy people).

The e-Shop software includes elements of the fulfilment process. This may be a system for the download of electronic products or a system for booking a slot for grocery delivery. An e-Shop for tangible products will also need an efficient order processing, stock replenishment and warehousing system (see ***Chapter 4***). A bricks-and-clicks business has the advantage that much of

the infrastructure is already in place for its bricks-and-mortar operations. An option for a pure-play (online only) operator is to outsource the fulfilment (warehousing, picking, packing and delivery can be outsourced to a specialist logistics company or, possibly, a wholesaler).

Managing Information Systems in the 21st Century: Richard Piercy

Richard Piercy is an executive vice-president at EMI Music. He works in the technology department and has global responsibility for business transformation; he also runs the global digital supply chain which is responsible for the digital manufacturing and distribution of all EMI Music's creative output. Prior to joining EMI Music, Richard ran the digital division of a pan-Asian sports media business based in Singapore, where he managed the internet properties for key brands such as the Asian PGA Tour, Asian Football Confederation, Asian Basketball Confederation and Korean National Soccer Team. Richard's career started as a consultant with Accenture and Boston Consulting Group.

Visit www.palgrave.com/business/whiteley to watch Richard talking about Information Systems and careers as an IS professional, and then think about the following questions:

- In what ways has the advent of digital changed the music industry (for example, the ways in which artists create music and how companies sell and distribute it)?
- Would you describe music companies as b2b or b2c organizations, and why?

After-sales: The e-Shop offering needs efficient and effective after-sales procedures – an e-Shop that does not plan for this can soon get a poor reputation that is very difficult to shake off. As always, the issues that need to be dealt with depend on the nature of the product – some examples are:

- Clothing retailers must plan for a high rate of returns – and have systems to cope with those returns. Most/all e-Shops take returns – some e-Shops send out a pre-paid delivery label for returns. The danger for the e-Shop is that some customers order goods just to try them on and send back most of what they order.
- Electronic goods that don't work. The solution here can be a good help line where the operator can assess the problem. The laptop being used to write this book did not work when first ordered – when I rang up to report the problem the company asked me to try a couple of things and then told me to repack the laptop – and a courier arrived next morning with a replacement: that was good customer service.

Good after-sales is essential but it comes at a cost and some customers will take advantage of it. A bricks-and-clicks operation means that after-sales can be dealt with at a conventional outlet, which could be the best solution all round.

shopbot: shopping robot used to access other internet e-Commerce businesses with or without the agreement of the third-party site.

Shopbots

A special category of e-Shop is the **shopbot** (or price comparison website). The name comes from shopping robots. The original shopbots used to access other e-Shops by a process known as web-scraping – the shopbot would access the

e-Shop, generate an automated transaction and then decode the result from the HTML code of the response. Note that sites that ask you to type in a code that is presented as a distorted picture are doing this to stop access by bots.

Modern price comparison websites work in cooperation with the e-Shops they link to. This is achieved using a web-services interface between the price comparison website and the e-Shops it works with. Using the web-services interface the price comparison site can send a request to the e-Shop (for example for an insurance quote) and the e-Shop will send back its quote. The comparison site will then list the quotes it has obtained – generally these will be in price order and the customer will, very probably, choose the cheapest. The price comparison site is paid for each successful clickthrough sale.

Arguably, however, there is a problem with this process. Easy price comparison pushes down prices. This sounds advantageous for the consumer – but, of course, low prices can mean low quality. For the supplier the marketplace can simply become unprofitable with a downward price spiral where, in the end, everyone loses. To combat these effects certain tricks can be employed. One is to reply with a very cheap deal, such as the basic holiday insurance package, and then, once the customer has clicked through, offer the gold and platinum options at substantially higher prices (a bit like those airfares priced at £1 each way that end up costing £120 for the return flight you eventually book).

m-Commerce

If you can do your shopping at home, why not on the move? (I have even had students using e-Shops in my e-Commerce lectures!)

Initially, m-Commerce was just an e-Shop website displayed on a mobile phone. Issues were the small screen, slow networks and lack of a (good) keyboard. m-Commerce did not take off as the pundits initially predicted (and after all, what is so urgent about doing one's Tesco shopping that it won't wait until one gets home?).

More recently, phones have got smarter and many e-Shops have now issued their own app. We can now have Tesco or Amazon apps on our mobile. In truth, this is not a big change. The presentation in the app can be smarter and there can be more client side tricks, but any transactions still go through to the server for processing – as with the conventional e-Shop. For the e-Shop, the customer who downloads an app seems a bit like a locked-in customer. How much apps progress m-Commerce (and customer loyalty) remains to be seen: the marketers are making a lot of smartphone developments – but then, they always do.

There are some areas where m-Commerce could be a real advantage, though. Doing a supermarket shop or buying a book could wait until you get home – the product will not arrive for a couple of days in any case. Putting in your final bid on an eBay auction is, however, time-critical (even if you are in an e-Commerce lecture). Transactions on a stockbroker or a betting shop site could also be time-critical – m-Commerce could have a real utility for those who indulge in these markets.

Web 2.0

Web 2.0 is a notion. It is the idea that the nature of web usage is changing from being an information source (*read-only*) to a vehicle of participation (*read-write*). The notion of the participatory web is illustrated by facilities such as:

- Wikis and Wikipedia
- Free software and participatory software development.

There is a limit to how much an individual, or an organization, can do. Involving a wider (volunteer) community, or linking together resources, can create an artefact that is better, more relevant and more dynamic than the offering of any single organization or information provider. That is a part of what Web 2.0 is about.

Some of Web 2.0 is community. It is free, like Wikipedia, and as such is not a part of e-Commerce. Where e-Commerce can benefit from Web 2.0 is where user participation and/or user feedback is turned into a commercial asset. A prime example of this is Amazon, where a part of the facility they present to their customers is user feedback in terms of book reviews (Amazon has accumulated much more of that information richness than any of their competitors). A second example could be Tripadvisor which specializes in hotel reviews but also provides clickthroughs to hotel booking sites. Arguably, eBay is also Web 2.0 since its auction content is user-driven.

Another part of Web 2.0 is the social web, with *community* sites such as:

- YouTube: The video upload site
- Instagram and Pinterest: Photo-sharing sites
- Facebook: A social networking site (see the ***Facebook case study*** at the front of the book)
- Twitter: A place to share one's profound thoughts and comment on the minutia of life.

These are privately (commercially) owned sites, but the content comes from the participants. The commercial side of the site is its ability to display and target advertisements – the value of these sites runs to many millions of dollars (or pounds, however you wish to measure it). The sites that gain this value are the ones that attract the most participants. Once one of these sites gets a clear lead then there is a snowball effect – there is no point in belonging to a social networking site where there is nobody to network with.

So for Web 2.0, is it possible to derive an e-Business model? Web 2.0 is a dynamic, evolving concept and new models can and will evolve (some authors are now suggesting a Web 3.0). Existing examples suggest that it is about gaining user participation and then leveraging user data/user supplied content for commercial gain. The business model is summarized as:

> The Web 2.0 e-Commerce Model: A community site built with user-provided content that can be leveraged for profit by the owner of the infrastructure.

Note that the concept of Web 2.0 is closely associated with O'Reilly and a conference hosted by the publisher of that name in 2004. The paper *What is*

Web 2.0 is (at the time of writing) available online (O'Reilly, 2005). (But note that the O'Reilly paper is somewhat orientated to the technical dimension of Web 2.0 rather than the participatory ethos that the concept has evolved to represent.)

The e-Shop as an IS

The heart of an e-Shop is its Information System. The shop front is the website (or a smartphone app) – the operations are the backoffice system.

The website needs to be good. It needs to be simple to use, to be able to download quickly and look attractive. Much of it will probably be created on the fly by server side scripts from the database (as mentioned above). Sites such as those for a supermarket or a large bookshop will offer thousands of products and hence have to be able to generate thousands of different webpages. The site will use client side scripts for form validation and fancy features like image roll-overs. The site will include forms for the user to input data that is then sent to the server side system.

The e-Shop may well provide for user registration and login. This is a form on the website that links to a customer database on the server side. Customer details, once logged in, can be retained, held in session variables and be used as the customer navigates the site. Customer login can lead to personalization of the website. Requiring customer registration has many advantages for an e-Shop but it can, equally, deter new customers – UK and European customers are wary about handing out their personal details.

Themes
Security

The e-Shop customer database needs to be secure (using encryption and firewalls). Customer data can also be used for marketing purposes (but any use of customer data must conform to the requirements of the relevant Data Protection legislation: see ***Chapter 13***).

Database security must also be applied to order data. The order includes electronic payments and the details of the payment card/account must be secured against hacking and also against any dishonest behaviour by e-Shop staff.

The e-Shop may well need a shopping basket. This allows the customer to select a number of items before checkout. A good basket lets the user see what they have selected, how much it will cost and, if required, take items out of their basket. The basket is a temporary data store and is normally implemented using session variables/cookies – using these techniques the basket can belong to the current session but disappear should the session end (without a checkout).

Checkout takes place once the customer has finished shopping. Once the customer and payment details have to be taken (or confirmed if already known to the system) the shopping basket becomes an order that is stored on the e-Shop database. To take payment, the e-Shop will normally connect to its

bank/merchant account provider for authorization. All these transactions need to be as secure as possible (as discussed under the Payments subsection). Any failure during the checkout needs to leave the system in a consistent state and preferably with the customer also understanding the situation.

The e-Shop may have other user interchanges for product search, feedback, storing shopping lists, booking delivery slots and so on. There will also be additional information/interest pages included in the e-Shop.

The e-Shop can be used by many users at any time – the volume is unpredictable. Users are connected over a public access network from computers that are unknown to the system (and possibly using different operating systems and browsers). The path each user will take when navigating the e-Shop cannot be predicted. The server side scripting/software environment needs to cope with this complexity and ensure consistent and safe results for all users. The e-Shop database must be protected: if it does not record a completed, paid-for order the details of the session are wiped out.

Once the order is taken it has to be processed. The IS for an order processing system has been outlined in ***Chapter 4***. Other types of e-Shops – such as ticket booking and music downloads – will need their own specialized backoffice IS. The e-Shop IS is summarized in ***Figure 5.14***.

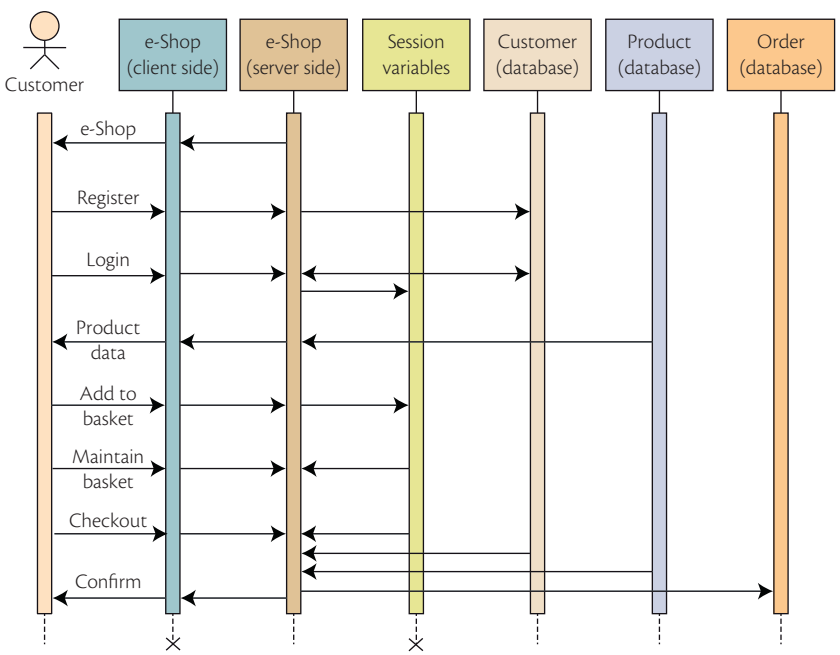

Figure 5.14 e-Shop Information System summary diagram (using UML sequence diagram conventions, see ***Chapter 11***).

e-Shop market changes

At one level, the e-Shop is no more than a virtual shop. The shop buys in merchandise and sells it on to its customers. The shop is online and the goods are delivered from a warehouse – it is a virtual equivalent of a traditional

shop. It is also similar to the traditional mail-order retail model but with the catalogue replaced by the website.

All of this is normal in the development of new forms of IS. The first systems merely automate and computerize the pre-existing business model. However, IS/IT can open the door to *business process re-engineering* – a phenomenon that is developing in i-Commerce.

An example of an industry that is being reshaped by i-Commerce is the music industry (the record industry). This industry was enabled by technology, first the vinyl record, then the CD. The industry had its own structure, with bands signed-up, records made, and massive promotion and sales. The advent of the MP3 player started changing that pattern – since music could be downloaded the record shops started to close. Downloads from official websites could be replicated by file-sharing and pirate download sites. Downloads, official or pirate, reduced the revenue streams of the record companies, which are now in decline. These changes also reduced the royalties of the bands – particularly the top bands. The technology (recording as well as downloads) could also set the bands free to produce and promote their own music without a record company (but also without a sure way of generating income for themselves). The overall effect of these changes on the music scene has been dramatic, and the change is still to play itself out.

Other industries that have (or are) being reshaped by i-Commerce are:

- The book trade: Online sales have meant that conventional bookshops have struggled and the number of high street bookshops has significantly reduced. The most recent development has been the e-Book and the e-Reader – this will further pressurize conventional bookshops. The e-Book makes it possible for authors to self-publish – a development that may well significantly affect conventional publishers.
- Bric-a-brac (and other second hand goods): These items used to be sold via a small-ad in the local newspaper or at auction, or they may have been thrown out. Now they are sold, in massive quantities, on eBay (with Facebook also getting in on the act).
- Holidays: Most flights and many holidays are now booked online with a consequent reduction in the high street travel agent trade. People are also looking around online for bargains and making up their own holiday packages – again affecting travel companies and their profitability. It could be argued that online bookings have been one of the enablers of the budget airline business model.
- PC manufacturing: Here there has been a move to make PCs to order (as opposed to holding large stock): see the ***Dell case study***.

The effect of e-Commerce varies from sector to sector. Online sales of groceries, for example, still represent well under 10 per cent of the market and nobody can be certain it will grow dramatically (see the ***Supermarket case study*** in ***Chapter 1***). Not everyone wants to order food for a week at a time and wait three days for delivery. Not everyone wants their apples and pork chops selected by someone else.

Case study
Dell

Dell Computers was started by Michael Dell in 1984 and achieved top spot in the worldwide PC market in 1999 (since then it has slipped back a bit but is still one of the market leaders).

Source: PhotoDisc/Getty

Dell developed a unique business model. All sales were direct to the customer (through the website or telephone orders) and all manufacture was *configure to order* (all PCs were built to a specific order – never to stock). The manufacturing process also employed just-in-time (JIT) techniques, with frequent orders for components and minimum stockholding at the factory.

This JIT and quick-response model means that the customer gets their PC configured to their specification within a few days and Dell is not left with stocks of PCs with less popular (possibly obsolescent) specifications.

On the financial side there is no intermediary (agent or retailer) to take a slice of the price. The JIT approach gives a *negative cash conversion cycle* (the customer pays for the PC before the supplier is paid for the components).

The Dell process is highly integrated and automated. The online order feeds into the manufacturing scheduling system and is then used to control the configuration of components and software throughout the manufacturing process. Shipping is also highly automated, and customers are given facilities to track their order throughout its build and shipping process.

Since 2005, Dell has lost its leading position in the PC market. Dell's competitors have learnt from and emulated their production and sales methods. Also, Dell has started selling through selected retailers (in addition to direct sales). Stories of poor customer support have not helped Dell's market position.

The Dell story was impressive through the 1990s and into the first part of this century. As with all business models it is difficult to keep at the top of the game for ever. The position of all PC manufacturers is affected by the status of the PC that has become a relatively cheap commodity item (with Apple as an exception, thus far).

e-Markets

The third e-Commerce technology is the e-Market (see ***Figure 5.2***). The e-Market is the oldest of the e-Commerce technologies and can be dated back to the 1970s, when early computerized airline booking systems were extended to offer flights from more than one airline. e-Markets are also widely used in stock and commodity trading.

The e-Market can be seen as a modern equivalent of the marketplace – free markets that are central to liberal economic (capitalist) theory. The base line

model, or analogy, for the market economy is the produce sale in a rural market town. The model is one of supply and demand; let us take as an example the humble potato. If there has been a good potato harvest and supply outstrips demand, then prices will go down until some suppliers withdraw from the market and equilibrium is reached. If there has been a poor harvest and potatoes are in short supply, the price will go up until the number of customers willing to pay the higher price matches the available supply of potatoes.

For a market to work effectively there are three conditions (from McAfee and McMillan, 1997):

- There are as many buyers as sellers and none of these buyers and sellers represents a significant fraction of total demand or supply.
- The goods or service to be transacted is homogeneous or standardized, that is it does not have idiosyncratic or differentiated features across distinct units.
- Buyers and sellers are well informed about the quantity and characteristics of the goods as well as the transaction price.

Whether the market mechanism has ever operated in pure form is a matter of conjecture. The development of the modern industrial, and post-industrial, economy challenges the simple concepts of markets. The market is no longer local, many goods and services have become more complex (and hence less homogeneous), large organizations operate in the market with the power to distort market mechanisms and, as a consequence of all these factors, it becomes harder to be *well informed about the quality and characteristics of the goods as well as the transaction price*.

Electronic markets

An electronic market is an attempt to use Information and Communication Technologies (ICTs) to provide geographically dispersed traders with the information necessary for the fair operation of the market. The electronic market can bring together product, price and service information from many or most suppliers of a particular class of goods or in a specific trade sector. Easy access to information on a range of competing product offerings reduces the search cost of finding the supplier that best meets the purchase requirement. An electronic marketplace can be defined as:

> An inter-organizational information system that allows participating buyers and sellers to exchange information about price and product offerings.
>
> (quoted in Been et al., 1995)

The electronic market is, in effect, a brokering service to bring together suppliers and customers in a specific market segment. The position of the electronic market as an intermediary between suppliers and customers is shown in ***Figure 5.15***.

The electronic market uses a computer system with network access to replace the traditional physical market. The sellers post details of their products or services on the computer system. The details are in a standardized

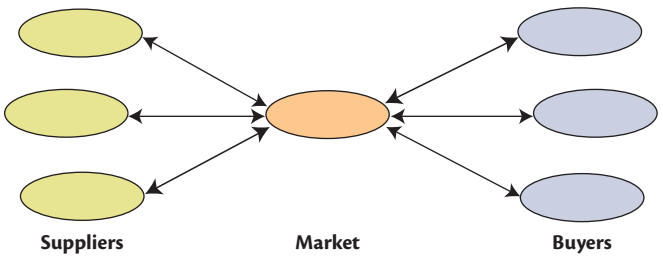

Figure 5.15 Electronic market as an intermediary.

form, set by the electronic market, so that offerings can be readily searched and compared. The buyers then use the electronic market to find an offering that best suits their needs (and often the aim will be to find the cheapest).

The particular strength of an electronic market is that it facilitates the search phase of the trade cycle; it is about finding the best buy (on whatever criteria the customer may wish to apply). Having found an appropriate offering the electronic market will then, normally, include facilities for the execution and settlement of the transaction.

Usage of e-Markets

Electronic markets are exampled by the airline booking systems – first developed in the late 1970s. Currently there are four large airline booking systems that list most scheduled flights available worldwide. These systems are Amadeus, Galileo, Sabre and Worldspan – they are referred to as the global distribution systems (GDS) – see the ***Sabre case study***. The use of these systems was until recently via an intermediary; in this case the customer wishing to purchase a ticket does so via a travel agent.

Electronic markets are also used in the financial and commodity markets and, again, the dealing was done via intermediaries; to buy stocks and shares a member of the public uses the services of a stockbroker.

The advent of the web and its use for e-Commerce has changed the way that some long-standing e-Markets are accessed. The public can now have access to the airline ticket and stock market e-Markets via the web (although the human intermediaries would suggest that you might get a better deal if you availed yourself of their expert advice and personal service). Examples of e-Shops that are front ends to e-Markets are Expedia, Opodo (travel/airlines) and the major banks (and others) that provide stockbroker services.

The advent of the web has also facilitated a new generation of e-Markets. These are generally implemented using the services of software companies/ market facilitators such as Ariba. These new generations of e-Markets are variously referred to as:

- Virtual marketplaces
- Internet enabled e-Procurement systems
- Vortals (vertical portal – a portal specializing in a single market segment).

An example of a b2b market is Covisint, which was set up in the automotive sector (General Motors, Ford, DaimlerChrysler plus Renault-Nissan) for the supply of automotive parts.

Organizations that use these systems can have requirements to integrate their use of the e-Market with their internal procurement systems. The use of e-Procurement systems is further discussed in the next section. Business-to-consumer systems that have similarities to e-Markets are online auctions and shopbots: these have already been discussed in this chapter.

e-Procurement systems

Organizations, particularly large organizations, are automating their procurement systems. For the regular repeat procurement of primary supplies an EDI system is likely to be the appropriate solution. For secondary supplies (and possibly the search stage of the trade cycle for primary supplies) an e-Market might be the optimum approach.

One approach to setting up an e-Procurement system has been to invite a range of suppliers to provide their catalogue details in electronic form. These details are then set up on the e-Procurement system and can be searched to find the best (cheapest) offering for any particular requirement. The catalogue details can also be made available on the company intranet so that budget holders can make their own purchase decisions, which are then processed by the e-Procurement system. Such a system allows users to select the best deals, and then the purchases can go through internal control processes. Also, the purchases can be integrated with the company's payment and accounting systems. A diagram of such an e-Procurement system is shown in ***Figure 5.16***.

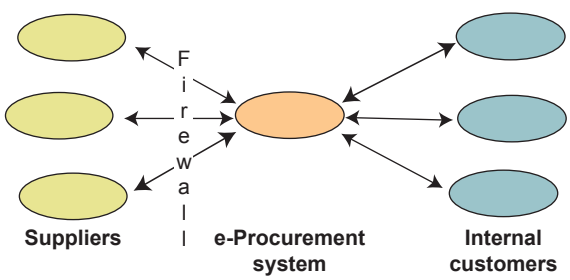

Figure 5.16
e-Procurement.

Advantages and disadvantages of e-Markets

The advantages of an e-Market to the customer are self-evident. An airline booking system, for example, shows a screen with all the flights from (say) New York to Los Angeles. The consumer can make an informed choice without having to spend time and effort finding out which airlines fly that route and then contacting each of the airlines to obtain flight times, price and availability details. Once a flight is selected, the system facilitates the booking of that flight, paying the fare and supplying the e-Ticket.

The use of the electronic market does require that the customer trusts the vendor. This is not an issue in the case of the airline booking (where the risk is arguably no greater than any other sales channel), but it has been an issue when the e-Market mechanism has been tried for natural/perishable products.

A case in point was an attempt to set up an e-Market mechanism by the Dutch flower markets (see Kambil and van Heck, 1998). In this case there was a lot of business logic in using an e-Market. It would have saved shipping the produce from the supplier to the market and then shipping it again to the customer. However, in the end the e-Market arrangement was not successful. One reason put forward for this was that customers did not want to commit to purchase a consignment of flowers/plants unless they had been able to check them for quality and freshness.

For the seller, the advantages of the e-Market are less evident. The most competitive seller may do well; the e-Market makes available information on their product and the advantage of that offering should be apparent. Less competitive suppliers are likely to be forced into price reductions, and the competitive effect may force all suppliers to cut prices, possibly below the level at which it is possible to make a profit (as is the case on some air transport routes). The situation is summed up by Been et al. (1995) as follows:

> The effect of an electronic market in a commodity market is the more efficient distribution of information which decreases the profit possibility for sellers. By the introduction of an electronic market search costs can be lowered. If buyers face lower search costs it will be more difficult for sellers to maintain high price levels.

The paper from which this quote was taken is a case study of Reuters' attempt to set up an electronic market, at Schiphol in the Netherlands, for the sale of air-cargo space. The system encountered opposition from the freight forwarders and the carriers. The freight forwarders feared that prices would be forced down and that their role as an intermediary would be reduced or eliminated. The carriers were similarly reluctant to become involved, arguing, among other points, that the e-Market treated air-cargo as a commodity and did not take into account the service element of business. In the end the operation of the system had to be suspended. The system relied on the carriers providing and updating information on their space availability and on the freight forwarders using the system; since neither of these classes of players was prepared to participate, the system could not function.

Future of e-Markets

Malone, Yates and Benjamin (1987), in their seminal paper *Electronic Markets and Electronic Hierarchies*, predicted a move to electronic markets (from electronic hierarchies, i.e. EDI), a move that has not taken place. The operation of electronic markets is not, in general, to the advantage of the vendors, and it is the vendors who have to provide the information (the computerization of pre-existing financial and commodity markets is a somewhat different case).

The advent of the internet has, however, given the opportunity for a new class of e-Markets in the field of e-Procurement. These new, vortal e-Markets were *hot property* at about the turn of the century (just after the dot.com crash) but the enthusiasm was short lived and probably misplaced; since that time a number of the vortals that were set up have ceased trading.

The (true) e-Market remains a niche application, with most e-Commerce conducted through EDI type systems or using e-Shop (for b2b and b2c) applications.

Case study
Sabre

Sabre is an airline booking e-Market, also known as a global distribution system (GDS). Sabre also caters for hotel bookings, car rentals, etc. but its origins are in airline bookings: this is the aspect of the business we will concentrate on.

Sabre started as an American Airlines (AA) system. Back in the 1950s the growth in air travel meant that AA's manual systems could not cope with the volume of business and so AA had to look for a new solution. Sabre arose from a chance meeting between the airline president and an IBM salesman – it was a joint project between the two companies. Sabre went live in 1960 using two IBM mainframes; by 1964 all of AA's booking activity had been migrated to the system. The system was originally only used by AA agents (taking calls from travel agents) but it was expanded to travel agents themselves in 1976.

By the 1980s, the system was carrying flight listings and taking bookings for other airlines. It became apparent that AA was manipulating the listings to give their own flights prominence over the flights of competitor airlines. The practice was investigated by the US Congress in 1983 and in 1984 the practice of *screen bias* was outlawed.

In 1996 Sabre was opened for direct consumer access through the website Travelocity.com; Sabre also owns other online brands including lastminute.com. AA and Sabre separated in 2000.

Sabre is the largest of the four major GDSs. It connects to over 400 airlines (as do the other GDSs) and interfaces to each airline's own airline reservation system. The airlines pay a commission to the GDSs (and to travel agents), so it is advantageous to the airlines if customers book directly with them through the airline's own website (direct bookings also avoid easy price comparisons with the offering of competitors). Budget airlines generally avoid listing their flights on GDSs.

Sources include Sabre (2012).

Further reading

Books recommended for further reading are:

Chaffey, D. (2011) *E-Business and E-Commerce Management*, 5th ed., Prentice Hall, Harlow.
Doganis, R. (2006) *The Airline Business*, 2nd ed., Routledge, Abingdon (Chapter 7: e-commerce@airline.co).
Spector, R. (2002) *Amazon.com: Get Big Fast*, Harper Business, New York (e-Book edition 2009).
Whiteley, D. (2000) *e-Commerce: Strategy, Technology and Applications*, McGraw-Hill, London.
Whiteley, D. (2002) *The Complete e-Shop*, Spiro, London.

Journal articles recommended for further reading are:

Porter, M. (2001) 'Strategy and the Internet', *Harvard Business Review*, March 2001, pp. 62–78.

Comprehension test

This is a short, simple test to enable you to check you have absorbed the material presented in *Chapter 5*.

Comprehension test: EDI systems

Q1 Which of the following definitions applies to EDI?

a. A commercial transaction formulated at a location remote from a trading partner and executed using Information and Communications Technologies ☐
b. The transfer of structured data, by agreed message standards, from one computer system to another, by electronic means ☐
c. A server-based system, for commercial transactions, accessed from outside the organization via a public access network ☐
d. An IOS that allows buyers and sellers to exchange information about price and product offerings ☐

Q2 Which of the following is the UN EDI standard?

a. Odette ☐
b. Tradacom ☐
c. ANSI-X12 ☐
d. EDIFACT ☐

Q3 Which of the following standards can be used as the framework for EDI messaging?

a. SGML ☐
b. HTML ☐
c. XML ☐
d. XSLT ☐

Q4 The essential facility of a value added data service (VADS) is:

a. Consultancy services from the VADS supplier ☐
b. Use of TCP/IP protocol ☐
c. The ability of anyone to use the service free of charge ☐
d. Post and forward ☐

Q5 For EDI security a trusted third party can be used to:

a. Determine the legal jurisdiction used to resolve disputes ☐
b. Ensure the privacy of the message ☐
c. Prevent tampering ☐
d. Ensure the non-repudiation of the message ☐

Comprehension test: i-Commerce

Q6 Which of the following definitions applies to i-Commerce/e-Shop?

a. A commercial transaction formulated at a location remote from a trading partner and executed using Information and Communications Technologies ☐
b. The transfer of structured data, by agreed message standards, from one computer system to another, by electronic means ☐
c. A server-based system, for commercial transactions, accessed from outside the organization via a public access network ☐
d. An IOS that allows buyers and sellers to exchange information about price and product offerings ☐

Q7 The IT structure of an e-Shop is:

a. An app run on a PC or a smartphone ☐
b. An order processing system run on a mainframe ☐
c. A client-server system ☐
d. Peer-to-peer computing ☐

Q8 Which of the following HTML tags is a prime source of keywords for the search engine indexing system?

a. H1 ☐
b. HTML ☐
c. FORM ☐
d. META ☐

Q9 Which encryption scheme is normally used for secure transmission of e-Shop payment data?

a. Pretty good privacy (PGP) ☐
b. Secure socket layer (SSL) ☐
c. Endpoint encryption ☐
d. Point-to-point encryption (P2PE) ☐

Q10 A price comparison site can also be referred to as a:

a. e-Market ☐
b. Shopbot ☐
c. Web service ☐
d. Smartphone app ☐

Comprehension test: e-Markets

Q11 Which of the following definitions applies to an e-Market?

a. A commercial transaction formulated at a location remote from a trading partner and executed using Information and Communications Technologies ☐
b. The transfer of structured data, by agreed message standards, from one computer system to another, by electronic means ☐
c. A server-based system, for commercial transactions, accessed from outside the organization via a public access network ☐
d. An IOS that allows buyers and sellers to exchange information about price and product offerings ☐

Q12 For an e-Market to work effectively the goods offered must be:

a. Tangible ☐
b. Intangible ☐
c. Homogeneous ☐
d. Non-perishable ☐

Q13 The airline booking e-Market systems are collectively known as:

a. e-Travel markets ☐
b. Global Information Systems (GIS) ☐
c. Global airline booking markets (GABM) ☐
d. Global distribution systems (GDS) ☐

Q14 An e-Market acts as a:

a. Regulator ☐
b. Intermediary ☐
c. Network provider ☐
d. After-sales service ☐

Q15 The major disadvantage of an e-Market to suppliers is:

a. That it tends to force prices down ☐
b. Access to markets is limited ☐
c. Requires 24/7 availability ☐
d. Stops them from running their own e-Shop ☐

Exercises

The following exercises are designed to aid your understanding of the material presented in this chapter. They can be used for self-study or selected exercises can be used for tutorial discussion.

1 **Comprehension** List the four main elements of an EDI system.

2 **Comprehension** List transactions that take place between business trading partners that seem suitable for EDI implementation. Suggest some business communications that would not be suitable for this technology.

3 **Comprehension** In the section on advantages and disadvantages of EDI, EDI is compared with paper orders. If the orders were communicated in a phone call, which advantages and disadvantages would still apply?

4 **Comprehension** Use the internet for an online shopping trip and see how easy it is to find what you want, how well the sites work and whether you get good value for money (but stop before the payment stage!). Set yourself an objective before you start. Suitable subjects are:

- A flight to New York. Choose a set of dates, such as the first Friday in February and returning the following Monday. Set out from your home town choosing the most convenient airport but balancing that with getting a good deal (and if you live in North America set the destination as Paris).
- You have come to university/college with your expensive new PC and you are now rather worried about the level of thefts from student accommodation. A large dog is one possibility but seems a bit impracticable: get online and find some insurance for your PC that would suit your circumstances and your budget.

5 **Discussion** Continuing from Question 4. If the question is done as a class exercise, then compare results. Which search engines with what search keys worked best (or did some students find their e-Shop in other ways)? Did the sites found/sites used belong to the service providers or were they the sites of agents/brokers? Were the sites attractive and easy to use? Who got the best deal and how did they find it?

Now put yourself in the position of the manager of a company providing the services you were looking for (flights, insurances, etc.). On the basis of your search, how do you think that the e-Commerce strategy of such a company might be improved? Discuss.

6 **Research** The music (record) industry has been changed by the move to e-Shop music downloads and has been severely undermined by the widespread availability of pirate copies. The advent of the e-Book portends a similar seismic change in the book publishing/book selling sector. Examine these changes and likely developments in this market. Assess their potential effect on authors, publishers and book retailers.

7 **Research** Facebook was floated on the Nasdaq stock exchange in 2012. To justify its valuation, Facebook needs to derive a substantially greater income from its (commercial) activities than was then the case. Discuss how Facebook could/should increase its revenues without alienating its user base. Note there is a ***Facebook case study*** at the front of the book.