Chapter 4
Defining E-Business

Electronic business commonly referred to as "eBusiness" or "e-business", or an internet business, may be defined as the application of information and communication technologies in support of all the activities of business. Commerce constitutes the exchange of products and services between businesses, groups and individuals and can be seen as one of the essential activities of any business. Electronic commerce focuses on the use of information and communication technologies to enable the external activities and relationships of the business with individuals, groups and other businesses.

The term "e-business" was coined by IBM's marketing and Internet teams in 1996. Electronic business methods enable companies to link their internal and external data processing systems more efficiently and flexibly, to work more closely with suppliers and partners, and to better satisfy the needs and expectations of their customers.

4.1 E-business ‘A Transformation’

Since evolution of networks, business environment rapidly changed. The ways in which business is conducted are going through very significant changes. Some companies are already organised in new ways, whereas others are still thinking about it; however, there is a growing general awareness of a new and different way of running a business, namely the e-business approach. In this section we describe the main characteristics of an e-business and provide a definition of the term.

4.1.1 Basic concepts and terms

Defining e-business security and to provide a working definition of an e-business organisation, a series of definitions from the business world are first given. A progression from basic terms towards the final definition that forms the conclusion of this section is necessary in order to provide a methodical explanation of the subject under discussion. Because we address a topic spanning both business and technology, the definition we adopt needs to address both business and technological perspectives. We start by providing a definition of ‘business’ as a concept, followed by other key business-related basic terms, including business functions, business environment, supply chain and value chain. We start with the most basic concept, i.e. that of a business. A variety of definitions have been given for this term. The various definitions have been reviewed by Pateli and Giaglis [16]. Previous work on this topic has focussed on purpose and scope, as well as relationships with other business concepts such as strategy and business processes. Some previous studies make use of the term ‘business model’, which is variously used to mean a system combined of component
pieces, a specification of primary elements and relationships, or a specific architecture to
provide value to customers.

Laudon and Laudon ([141]) provide a series of consistent definitions for terms associated with
a business organisation, three of which are presented below.

A business organisation is a complex, formal organisation whose goal is to produce a product
or service.

A business environment is the [set of] external conditions in which a business organisation
operates; the general environment includes government regulations, economic and political
conditions, and technological developments, while the task environment includes customers,
suppliers and competitors.

Business functions are the specialised tasks performed in a business organisation for example,
manufacturing and production, sales and marketing, finance and accounting, and human
resources activities.

Using these definitions, we say that a business is a formal organisational unit of any size,
having a goal production of a product/service characterised by specific business functions,
performing specialised tasks in order to achieve its goals, and surrounded by an environment.

Any organisation that is consistent with the above definition is deemed to be a business.

Traditional businesses usually operate by physical means, business resources and assets such
as employees, equipment, raw materials, documents, goods, products etc. which are located in
a specific geographic region, occupying specific buildings, using physical means of
production, shipping goods, using specific physical links for transmitting documents, and
acting within a known and well-defined boundary.

A business, by definition, performs a sequence of actions and operations in order to be able to
provide the results of its production to the final consumer. Such a series of actions is known
as a supply chain. In this chapter we will use the following definition of this term. A supply
chain is a combination of the core business activities that allows a company to create and
deliver a product or service from concept through development and manufacture or
conversion into a market for consumption [41].

The supply chain encompasses activities that need to be performed in order to make possible
the execution of business functions. These business functions/activities are carried out by
processes [161]. The supply chain starts from an initial stage of developing the product
concept, through product development and manufacturing, to the final stages of the business
process, in which a consumer purchases the product and/or service. A typical supply chain
involves the raw materials suppliers, equipment and parts suppliers, manufacturers/producers
which convert the incoming supplies into finished goods, distributors and consumers, which may be either individuals or other businesses. A business customer could be another manufacturer in an extended supply chain, which involves several steps before reaching the final point of business consumption ([41]). A business supply chain is made up of a chain of integrated and coordinated industrial processes [244]. A business organisation not only runs its own supply chains, but is typically also a part of the supply chains of the organisations with which it interacts.

Business activities can be classified into internal - those performed within the organisation and external - those involving interactions with environmental forces. A well-recognised tool for analysing internal business processes and functions, with the goal of improving these activities by introducing information systems, is the Porter Value Chain model [167]. A value chain is defined by Porter [95] as a set of discrete, but interconnected, activities classified as either Primary or Support activities through which a product or service is created and delivered to customers; these activities have points of connection with the activities of suppliers, channels, and customers.

An organisation's value chain incorporates inbound logistics, manufacturing, outbound logistics, sales and marketing, and service as primary activities and human resource management, accounting, administration and infrastructure, product technology and development, and procurement as support activities. The value chain model makes it possible to view a business as a series of activities that add value to the firm's products or services. Part of the following discussion and analysis is based on this model. Immediately below we provide an explanation of the meaning of each of the activities involved in the model:

Inbound logistics: raw materials, parts, resource handling i.e. receiving, storing, shipping.
Manufacturing: producing the product/service of the organisation transformation of raw materials using specific knowledge and/or equipment, following specific procedures.
Outbound logistics: storing the finished goods and/or distributing them to the customer (the final product could also be a service).
Marketing and sales: activities related to promotion, marketing, distribution channels, customer definition, selling and delivering the product/service of the company
Service: activities performed after the sale has taken place such as repairing, maintaining and supporting use of the product.
Corporate Infrastructure: support given to the entire value chain, involving finance, administration, and general management.
Human resource management: hiring, training, promoting and compensating employees.
- **Product and technology development**: Research and development activities for the product, and the processes and technology needed for its production.
- **Procurement**: The processes along the value chain of acquiring raw materials, equipment and information technology.

Porter's value chain model is a widely known and well used tool for identifying the areas that might provide an organisation with additional business and operational capabilities. A value chain analysis makes it possible to separate a business's basic activities into primary and support activities. Performing such an analysis gives managers the opportunity to identify the importance and contribution to the business goals of each activity, and to focus on the specific areas that add most value to a business and, therefore, to the business goals. In general, the value chain is a part of the business supply chain; indeed in some business modes these two terms refer to the same sequence of activities.

Apart from having its own specific value chain, a company is typically also a component of the value chain for other organisations. So, acting together in the market, each in its own environment, companies affect each other through interactions, co-operation and collaboration. However, at least for a traditional organisation, there are still clear boundaries that separate organisations. A business needs to monitor its own business actions and also its connections and interactions with the external partners of its supply chain. By doing so, a business can analyse not only its internal processes and functions, but also its business environment. Such a supply chain analysis enables a company to improve its operations and also its competitive position in the relevant market. Thus, the supply chain is a key tool for describing, analysing and improving business activities i.e. business processes.

**4.1.2 Business Activities & Information Technology**

Business activity requires data exchange between participants based on requirement and the understanding. In practice, business activities involve transforming documents between stations involved in a specific series of actions in order to complete a specific mission. Documents contain data necessary to perform each of the stages of a specific process. In other words, we use documents as a convenient way of carrying data. Traditionally, documents were paper-based, but advances in information technology enable the business world to use electronic means to transfer business data.

These electronic means are increasingly replacing paper for carrying data. In practice, any kind of interaction between two organisations requires information to be exchanged between them. Obviously, these exchanges and any associated transformations of data are performed by means of information technology. Such technology is rapidly changing, especially the
technology involved in data transformation. The business world has adopted information technology since the very early stages of computer history. Computing and communications technologies, such as mainframes, minicomputers, PCs, LANs and WANs, provide a company with means to support its internal operations. Until relatively recent, companies exchanged data by physical delivery of reports, files, papers, books, etc. The introduction of computer technology has led to the use of computer networks initially WANs and more recently the Internet and associated application layer protocols for e.g. EDI and email in order to communicate data between businesses. Although the Internet was seen from its very early stages as a potential tool for social interactions [107], widespread use of the Internet by the business world only took off in the 1990s. Information technology has had a very significant influence on the value chain [95]. Computing and networking technologies have contributed to improving parts of the corporate supply chain i.e., the value chain.

Technologies such as WANs and EDI initiated improvements in external operations by allowing communications with the business environment i.e. with suppliers and they also provide improved part of the supply chain. Today, tools such as Enterprise Resource Planning, a collective name for software that provides integration of major business functions such as production, distribution, sales, finance, and human resource management [52]), Customer Relationship Management, an approach to building and sustaining long-term business with customers and Supply Chain Management, that enables coordination of all supply activities of an organisation from its suppliers and partners to its customers are widely used. In a modern business environment, the entire organisational supply chain is considered as a value system [95].

The value chain serves as the basic tool for understanding the influence of information technology on companies [95]. Porter describes the evolution of the use of information technology in business in terms of the following five overlapping stages:

- The first step: Automation of discrete transactions - Order entry and accounting.
- Greater automation and functional enhancement of individual activities such as human resource management, sales force operations, and product design.
- Cross-activity integration accelerated by the Internet similar to linking sales activities with order processing, linking together multiple activities through CRM, SCM, and ERP.
- Integration of the value chain with the entire value system (the state of the art).
- In the future: optimisation of the value system in real time.
We are currently seeing the integration of the value chain with the entire value system that is the various company value chains are being integrated across entire industry sectors, with tiers of suppliers, channels, and customers. This integration involves merging tools (e.g., CRM and SCM), and linking the end-to-end applications of various value chain activities and participants [95]. Hence, in today's technology intensive reality, a major opportunity for adding value to a company's supply chain is to further computerise its business functions and activities, i.e. the business processes. This means increasingly introducing information system and information technology into and between business activities, i.e. using computer networks to interconnect business functions both inside the organisation and between the organisation and its environment.

The business activities that an organisation performs through its supply/value chain combine the organisation's business processes. Hence, the modern inter-organisational supply chain involves computerising the participants' business processes. This was first achieved using computer networks to enable the use of EDI. EDI typically did not offer public access, but was a relatively expensive and proprietary technology, supported by private networks. These private networks were typically controlled by one large organisation e.g. a manufacturer or supplier, and supported back end activities, such as exchanging invoices or order documents [144]. This kind of business interaction is now achieved in e-business by using the Internet, and is strongly integrated into the value chain at both the front and back ends. Hence, there are significant differences between the use of EDI and e-business. We have seen a transition from proprietary networks to IP-based intranets as an infrastructure for internal organisational activities and the Internet as an infrastructure for interactions with suppliers and/or customers. The Internet also makes it possible for organisations to perform all their business connections electronically, including interactions with suppliers and customers. It also provides a channel for advertising, and enables interactions with financial institutions, governmental bodies, potential suppliers, potential customers, partners, competitors, etc. Businesses now use the Internet to support operations across the entire supply chain, and for interactions with other company's supply chains. The old supply chains can be viewed as information-based value chains that link suppliers, customers and system integrators. By computerising the entire supply chain, the traditional supply chain becomes a supply network. In terms of structure, supply chains can be seen as systems of links and nodes [244]. Moreover, by introducing advanced information technology into the supply chain, the supply chain becomes, according to Porter's model, a value chain, i.e. a value network or electronic value network. As a result of changes in the global business environment and technological
advances, partly caused by the Internet, flexible collaboration between businesses occurs on a
global scale involving the alignment of their business processes [193]. The new borderless
enterprises collaborate with other organisations to produce goods and services, across national
boundaries. The importance of opening organisation borders has been widely recognised
[193].
E-business involves the computerisation of the entire enterprise to automate its business
processes across its entire supply chain. By doing so, the organisation creates a Portal Value
Network (PVN) connecting all the participants in the e-business. When two businesses
establish a partnership, say Leymann et al. [77], i.e. when the corresponding service partners
are interconnected, cooperation begins, and messages can be exchanged through the
established links. However, linked operations have to be executed in a particular order, which
needs to be specified. This is achieved by defining a flow model. According to Leymann et al.
since flows often represent business processes, a flow model is sometimes referred to as a
business process model, or simply a process model.
From a business perspective, e-business involves the integration of activities, organisations
and systems, while from the technological point of view, e-business and e-commerce make
use of a vast range of information technology concepts and tools. Open Internet standards are
used to integrate and automate the value chain by providing a common language for processes
to intercommunicate and exchange data [196].
It follows that the following definition of the e-business can be formulated:
"E-business is a way of performing supply chain activities over Portal Value Networks by
means of Internet-based Information Technologies".
We use a slightly more detailed version of the above definition in the remainder of this thesis:
An e-business is one that performs its supply chain activities by means of electronic processes
only, using Internet-based Information Technology for integration of, and cooperation and
interaction with, its participants' PVNs and business processes.
Note that the term ‘Virtual Business’ (v-business) has recently been used. There is no widely
accepted definition of this term-some authors use v-business to mean any e-business, whereas
others define it as a temporary network of independent companies, linked by information
technology to share skills, costs, and access to one another’s markets. It will have neither
central office nor organisation chart. It will have no hierarchy and no vertical integration'.
The definition of e-business given above is quite broad, and encompasses all types of
electronic business, as well as the existing definitions of v-business. As a result we do not use
the latter term here. It is important to note that in this thesis we distinguish between ‘e-
business’ and ‘e-commerce’. The term e-commerce refers only to the activities of buying and selling products electronically. That is, e-commerce is just one part of e-business. This thesis is concerned with e-business. Guided by our adopted definition of e-business, we now identify the main characteristics of this type of business, and describe various types of e-business organisations.

4.2 E-business characteristics
The main characteristics of e-business organisations are their business models and the fact that they operate using the Internet and information technology. All e-business functionality-related properties are derived from these two main characteristics, discussed in sections 4.2.1 and 4.2.2 immediately below.

4.2.1 E-business models
In order to analyse e-business, it is important to identify models of its functionality. We need a structured approach for describing e-business functionality, so that we can identify e-business characteristics relevant to information security. To be able to operate as an e-business, an organisation must change its business model, usually in a very radical way [196]. Based on the working definition of e-business given in section 4.1, it follows that, both practically and theoretically, e-business is a new business model.

Unlike a traditional business, e-business is not focused on static, internally managed and operated chains, but on dynamic business processes, performed through external webs of relationships, that take advantage of the digital arena's power and flexibility [155]. The traditional supply chain has changed into a value network of portals (Portal Value Networks). Portals provide both the employees and the customers of an organisation with a new way of working and/or buying. Two types of portals are possible: horizontal and vertical [43,196]. A portal that provides functions meeting common user requirements, such as search functions, email, chat, etc. via the Internet, is a horizontal portal. Google and Amazon provide examples of horizontal portals. The objective of a horizontal portal is to provide solutions to a broad range of Internet users [196]. A portal that includes the same functions as a horizontal portal, but that focuses on a specific community and industry, is a vertical portal. Thus the portals of companies such as Blackwells books and Dell computers are good examples of vertical portals also known as vortals. They address a very broad audience, but also offer clear and focused functionality aimed at a specific audience. Microsoft's portal is a further example of a vortal, whose target audience includes users with specific requirements. When a company's vortal is directed at business customers, it involves interactions with value chains i.e. at PVNs, as defined above.
It follows then that one aspect of the business model must be deciding on the type of portal to be provided, i.e. whether it should be horizontal or vertical. Some authors suggest that businesses should build a portal, not only because portals improve distribution networks as compared to traditional distribution, but also because a portal provides production capabilities, and so will enable the exploitation of the Internet as a business tool [148]. An e-business operating via portals either horizontal or vertical has to decide upon its business model, which, as stated above, is a different model to that applying to a traditional business. Applegate [148] argues that e-business models can be divided into two categories, depending on the type of company involved:

- Digital businesses, i.e. organisations that are built on the Internet;
- Businesses that provide the platform upon which digital businesses are managed and operated.

Gloor [196] provides a more detailed classification of e-business models, based on four fundamentally different types of organisation, as suggested by Malone (in [196]):

- Creators-producers of goods (physical or information), such as General Electric, Cisco, Dell, Microsoft, and on-line versions of newspapers.
- Distributors-companies that distribute and/or supply goods, such as electronic shops for books or music (e.g. Amazon).
- Brokers-companies that act as intermediaries, such as on-line auctioneers or travel agencies.
- Extractors-companies that exist only on the Internet, that operate as portals, and whose business model is based on advertising revenue. Examples include Yahoo, MSN, and Google.

This classification appears to be sufficiently detailed for our purposes. Today's e-business environment involves e-businesses which use more than one of the above models. For example, an e-business organisation might be classified as a creator, but also operate as a broker, and/or might also operate a web site to provide services available only via the Internet i.e. in the extractor role. Airline companies are typical examples of such organisations. There are also companies that do business exclusively via the Internet defined by Applegate [148] as digital companies, to provide an e-business platform for other organisations, which fall into Applegate's second category. Hence, we propose here an additional two-category classification:

- Type I - A generic e-business organisation - creator, distributor, broker, extractor, or any combination of these roles.
• Type II - An infrastructure-supportive e-business organisation.

This classification is also consistent with the definition of e-business given in section 4.1. The two case study companies described later in this thesis have been chosen to represent these two types of e-business. E-business organisations can also be classified according to how they collaborate with other organisations. The main current business model types in such a classification are as follows [228]:

• The old-economy ‘one-to-one’ EDI model providing direct point-to-point transactions between participants.
• The ‘one-to-many’ model providing a supplier with access to a group of buyers.
• The ‘many-to-one’ model providing a buy-side solution for one buyer facing many suppliers.
• The ‘many-to-many’, or net markets, model involving the aggregation of large groups of buyers and sellers around a central hub offering a wide range of services.

We draw the following conclusions from the above discussions:

• An e-business can operate via either a horizontal portal or a vortal;
• An e-business organisation can perform all its activities in an e-business mode or operate in an e-business mode only to support its main activities;
• An e-business organisation can collaborate with other parties in various ways.

All the types of e-business organisations described above can only operate by deploying Internet-based technologies. The ability to operate using information technology only is one of the most important characteristics of an e-business.

4.2.2 E-business technology infrastructure

It has become common for businesses large and small to make some of their services available on the Web. Using such services typically requires use of a web browser. E-business operates using the Internet [95,144 ], and involves providing broad connectivity between the organisation's front end namely, sales and customer service and back end namely, coordination and procurement [144]. The Internet makes it possible to exchange real-time information between an e-business organisation and other participants, such as customers and suppliers [143]. The open-standard nature of the Internet means that e-business has a number of unique characteristics. E-business use is decentralised, and is often driven by a variety of technological, structural and environmental factors. Hence, e-business is affected both by the technological competence of the organisations, and by organisational and environmental factors, such as international scope, legal protection issues for online transactions, and web functionality [144].
A typical web-application architecture involves three tiers: web browsers to provide a ubiquitous user interface, application servers to manage business activities, and back-end databases to store the persistent data [87]. Although this architecture does not appear to be very complex, implementing it requires a good understanding of both the applications hosted on the application server, and of the appropriate network configuration for a specific e-business organisation [165].

Employees from different organisations share information, business plans, strategic issues and challenges. ‘In a real-time global supply chain, companies and their business partners by necessity share competitive and operational secrets. ... some opacity remains necessary, and transparency isn't always easy. Trade secrets and personal data, for example, should be confidential’ [61].

4.3 Summary
In this chapter a conceptual framework that facilitates the development of a clearer picture of an e-business and its characteristics was given. E-business has unique features, derived from its use of Information Technology. The term ‘e-business organisation’ was defined. This definition identifies an e-business as a company running its business processes electronically. E-business processes are enabled by the transmission of information flows. E-business, in order to succeed, must provide value to its users (including employees and customers). To deliver the value proposition to all its customers, a business must ensure that it possesses a range of capabilities that underpin the proposed value [15].

E-business capabilities are realised through the organisation’s underlying e-processes. The correct execution of these e-processes is crucial for the e-business mode of operation. Robust e-process design and implementation is the first line of defence [281]. From the discussion in this section, we conclude that a process-based security approach is a rational way to address e-business information security. In order to protect e-business information, we need a methodological approach to come to decisions regarding the degree and type of security protection that should be provided to information. The main goal of this chapter was to create a basis for subsequent discussion, and the presentation of a model for designing and managing information security for an e-business. The main focus was on business processes, and the information systems infrastructure present in an e-business. In order to explore the main security challenges for e-business information system, we next provide a review of information system security domain, and characterise the current information security capabilities and constraints in information system in general, and in particular the security challenges present in e-business mode of doing business.