



Teaching Information Economics to undergraduate Information Science students at the University of Pretoria

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1 Introduction

Information has played an increasingly more important role in several economies, particularly in those of developed countries. As a result, a separate and distinct sector of the economy, the information sector, has arisen. When the information sector becomes dominant in a particular economy, it is called an information or knowledge economy (Webster 2000).

Given this development in economies, information has become a commodity and as a result the value of information is important. Information, however, has certain characteristics that distinguish it from other economic products and services and which lead to an atypical cost structure, namely that the marginal cost tends to zero. Since competitive markets will drive

prices toward marginal costs, the prices of information goods tend to zero. To counter this, specific pricing and packaging strategies for information are used such as versioning. Furthermore, because of the nature of information leading to sub-optimal markets, the value of, and therefore also ability to charge a price for, information must be protected, which is enforced legally through intellectual property rights. These rights also serve to stimulate and support the creation of information in societies and economies.

There are, however, calls for changes to the paradigm upon which intellectual property rights are based: Rather than controlling copies, compensation should be based on the uses to which the information is put. Others even go so far as to say that it is about the creators' and/or producers' relationship with the users and/or consumers of the information or control over the channels to access these users, customers and/or consumers. Increasingly these relationships are becoming necessary to survival in the marketplace. Relationships are facilitated through the sharing of information between organizations, particularly for organizations in the manufacturing sector. Such sharing of information is facilitated through electronic commerce and business intelligence.

The study of such factors relating to the economic aspects of information in the discipline of Information Science is collectively called 'Information Economics' (or alternatively 'Economics of Information'). In Information Science at the University of Pretoria, the study field of Information Economics covers the economic aspects related to information: it addresses not so much the application of pure economic theory to information products or services but examines the political economy of the production and distribution of information in the marketplace. The focus is on the social, political, and legal implications of information as a resource and its relationships in the economy. Thus Information Economics is of a multi-disciplinary nature. However, it cannot be assumed that students have formal education in all these relevant disciplines. Students must therefore either receive instruction in the basics of Economics in order to understand the material, or Information Economics cannot be taught using the same course material as in the discipline of Economics. Therefore it is necessary to either adapt the Economics course material or to develop course material specifically catering for Information Science students.

Deciding on the contents of an Information Economics course is not a straightforward or trivial exercise and it is subject to the view one takes of Information Economics within the context of Information Science. The degree of difficulty depends on the audience – undergraduate or postgraduate students – and would logically co-determine the course contents. The aims of an Information Economics course would therefore be expected to vary between different institutions and for different student audiences. However, it is useful to document and examine the different approaches taken in order to perform comparative analysis and allow for discussion to further clarify the direction one might take when presenting such a course at a tertiary educational institution. The aim of this article is not to perform such a comparative analysis but to document a specific Information Economics course presented. It is furthermore hoped that this article will contribute to stimulate a debate on the teaching of Information Economics within the discipline of Information Science.

The next section describes the [contents](#) of an Information Economics course developed specifically for final year undergraduate students in the Department of Information Science at the University of Pretoria.

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2 Information Economics at the University of Pretoria

Based on the overview presented in the introduction above, the aims of this elective course in

Information Economics are to introduce the students to information as an economic good, the role of information in a national economy, the pricing and packaging of information goods, the economics of intellectual property, and the exchange of information to facilitate relationships between organizations in an information economy. The duration of the course is seven weeks and completion of Economics courses is not a prerequisite for enrolling in the course.

Given the aims of the course, the following study themes were identified:

1. Origins of the information society and the information economy.
2. Information as an economic good.
3. Pricing and packaging of information goods.
4. Economics of intellectual property.
5. Information exchange to facilitate relationships in an information economy.

No particular textbook could be found that adequately covered the selected study themes. As a result, the required reading for the course consisted of reading lists. Material included both articles from peer-reviewed journals of a scientific and academic nature as well as articles from business, trade and popular literature. One of the aims of the reading material *is* to expose students to the core aspects of the various study themes and to introduce them to a variety of viewpoints. Students are required to interpret the various viewpoints presented in these articles and to participate in critical discussions during lectures. The following sections discuss the main ideas contained in each of these study themes in more detail, with particular reference to the required reading material and its interpretation. The learning outcomes of each study theme are also listed.

2.1 Study theme 1: Origins of the information society and the information economy

An information economy is based on the idea that the processes of production, transmission, and use of information are replacing or at least dominating over industrial processes as they in turn did an agrarian economy centuries ago. Therefore an economy consists of different sectors, each present to a greater or lesser extent. These sectors are:

- Agricultural.
- Industrial.
- Service (sometimes discussed separately from the information sector, sometimes as an intermediate stage of the information sector).
- Information [there is general consensus that information has changed from a common good to a commodity with market value and that it is recognized as the most important input to production (Webster 2002)].

Although the concepts of information society and information economy are difficult to define exactly, there are a number of different approaches to both of these concepts. These are detailed in Braman (1998) together with an overview of the historic development of these concepts. This theme focuses specifically on the size and growth of the information sector in South Africa.

Various methods have been developed to attempt to define and measure the extent of an information economy; Machlup (1962) and Porat (1977) were the pioneers in this regard. However, there are a number of criticisms to these approaches, most important being the basis of calculation and comparison to the gross domestic product (GDP) (Boon, Britz and Harmse 1994; Miles 1989; Poirier 1990). Although a number of variations have subsequently been developed with a focus either on people, products or their use, or the information cycle, these methods are always limited by the availability of data, particularly in an appropriate

format (Boon *et al.* 1994; Miles 1989; Rubin and Sapp 1981).

Given these problems, it is still important to measure the size of the information economy (or sector) – primarily for policy and planning purposes by national governments. Therefore Britz, Boon and De Lange (1993) developed a framework to measure the size of the information sector in South Africa using two methods:

1. Determining the number of information workers in South Africa (where the information cycle is used for demarcation and limited to collection, storage, organization, processing, tracing and provision of information on behalf of another person or organization).
2. Determining the size of the information sector on the basis of national input-output tables.

In 1996, Harmse, Boon and Britz (1996) revisited this extensive study and made some additional comments relating to future prospects, taking into account the changed political circumstances of South Africa.

According to Boon, Britz and De Lange's (1993) measurement of the information sector, South Africa has not yet moved from the industrial era to the information era. Furthermore, Boon *et al.* (1993) recognise that South Africa does not compare favourably to the United States with more than 50% of the American workforce comprising of information workers. Harmse *et al.* (1996) do not express a comparative opinion but state that although we are not an information society, the information sector does play a vital role in the South African economy.

After the completion of this study theme it is expected of students to understand the following:

1. Contribution of the information sector to the economy of a country.
2. Methods for measuring the size of the information sector in a country.
3. Interaction between the information sector and the rest of the economy in a country.
4. Understand the emergence of the concept of the information society.
5. Understand the role of key figures such as Umesao, Machlup, Porat, Bell and McLuhan in the development of the conceptualization of the information society and information economy.
6. Define and differentiate between the concepts of informationalization, an information sector and an information economy.
7. Describe the increasing commoditization of information.
8. Identify the characteristics of information that differentiate it as an economic good.
9. Define and distinguish between *information as primary goods* and *information as intermediary or secondary goods*.
10. Describe the role of the value of information in the measurement of the information sector.
11. Describe information-related occupations as used to determine the number of information workers in South Africa.
12. Describe and evaluate the framework used by Britz, Boon and De Lange for describing the information sector in South Africa.
13. Describe and interpret South Africa's position in the global information economy with particular reference to:
 - o Boon, Britz and De Lange (1993).
 - o Harmse and Boon (1996).
 - o Braman (1998).

2.2 Study theme 2: Information as an economic good

In study theme 1 it is illustrated that information has become a commodity and is regarded as an important input in production that can be measured. However, information has certain characteristics that differentiate it as an economic good that suggest that the value and pricing of information goods need special attention. Furthermore, the value of information plays a fundamental role in the economy: 'An information economy is based upon the premise that information has economic value and requires an information marketplace in which such value can be exchanged' (Branscomb 1994). Therefore, study theme 2 examines the economic value of information in closer detail.

Both Varian (1998) and Bates (1988) reiterate the distinct nature of information as economic good. Varian (1998) defines an information good as anything that potentially can be digitized and he structures his discussion on the nature of information as follows:

- *Information as experience good* – an information good must be used or consumed in order to demonstrate the good and to determine the associated value that is not fixed or constant.
- *Returns to scale* – information has a singular cost structure: high fixed cost but low variable and marginal cost as illustrated in Figure 1.
- *Public good* – information goods are non-rival, that is, one person's consumption doesn't diminish another's ability to consume the same information good, and sometimes they are non-excludable, that is, one person's consumption cannot exclude another person from consuming the good. Here Varian (1998) does not include ancillary social value as discussed by Bates (1988).

Figure 1 Diagrammatic representation of returns to scale of non-information and information goods



Varian (1998) further discusses the problem of information overload, namely that information production is exponential while information consumption is linear at best. He proposes two solutions, namely, (a) collaborative 'recommender' systems, and/or (b) institutional filtering. Note that this filtering approach links back to the mechanisms discussed to address the characteristic of information as an experience good, namely reviews and reputation.

Varian (1998) is of the opinion that real-life markets are flexible and robust enough to handle information as opposed to the problems encountered in economic theory. On the other hand, Bates (1988) is of the opinion that, where ancillary social value is concerned, real-life markets seem neither economically efficient nor generate maximum social welfare resulting in sub-optimal markets. According to him, it will threaten the sustainability of information-based societies and contribute to the digital divide and widens the gap between the so-called information 'haves' and the 'have-nots'. A possible reason for this discrepancy could be that Varian omits ancillary social value from his overall approach.

Kelly (1996) examines the economist Paul Romer's theory. Romer has some controversial views on economic growth theory namely that scarcity of resources is no longer valid and that growth is driven by ideas, which can infinitely reconfigure physical objects. He seems to disregard the needs or wants for limited physical objects that traditional economists use. What is of particular interest is the creation of monopolies in the market as a result of significant fixed cost in the form of research and so-called 'first copy cost' and low variable cost of production. It is interesting to note that Romer supports and illustrates Bates' (1988) view of education as having a positive ancillary social value although he seems to recognize neither social costs nor benefits:

'Romer suggests concentrating funds on universities, both to stimulate basic research and to create cadres of highly educated people who will fan out into the economy and generate new technologies' (Kelly 1996).

Within the context of developing countries, Kelly refers specifically to Romer's idea of leap-frogging:

'Countries must be open to new ideas and capture the benefits of the latest technologies. The only logical path ... is to embrace free trade and encourage investment by large corporations. These companies will then bring the necessary knowledge of industrial organization, international markets, and product differentiation to allow developing nations to become truly global players' (Kelly 1996:4).

Romer's view can arguably be said to be the ultimate consequence of the free reign of markets.

One could argue that Romer's theory is based on the idea raised by Braman (1998) that agricultural and industrial sectors are replaced by an information sector, rather than an increasing information intensity in all economic activities in all sectors. Fundamentally, agriculture and industry is still required for human survival. In these sectors, scarcity is very much the order of the day as is evidenced by hunger and poverty worldwide. For example, developed countries heavily subsidize their own agricultural industry and import food from other (mostly developing) countries to cover any shortfall. There is also an increasing move to relocate portions of the information sector to developing countries through outsourcing in order to reduce costs, such as programming and call-centre work.

After the completion of this study theme it is expected of students to understand the following:

1. Define an information good.
2. Distinguish between a public and private good.
3. List and explain the three characteristics of information that arguably cause difficulties in market transactions.
4. Define fixed, variable and marginal cost.
5. Understand and explain the cost structure of information goods versus non-information goods in terms of fixed and variable costs and the impact on the marginal cost of information goods.
6. Understand and recognize ancillary social value.
7. Describe and discuss the problem of information overload – the growing gap between information production and consumption with a ratio tending to zero together with possible solutions.
8. Understand and explain the rise of monopolies in information markets with particular reference to the role of the cost structure of information goods.

2.3 Study theme 3: Pricing and packaging of information goods

In study theme 2, the value of information is examined in some detail. The pricing of information is integrally linked to the value thereof. For example, to address the problem of information overload discussed in the previous study theme, filtering services add value by eliminating information that is not needed by a customer, therefore a customer will be willing to pay a higher price for more valuable information. Furthermore, because competitive markets will drive prices of all economic goods toward the marginal cost and the marginal cost of information goods tend to zero, this implies that, in order to maintain non-zero prices for information goods, sophisticated pricing strategies are called for. Therefore, this study theme examines the pricing and packaging of information goods in more detail.

The pricing of information products and services is discussed within the framework of the distribution of products and services – in other words – the basic economic problem namely to:

'allocate resources among members of the society to maximize the welfare of the society as a whole. To achieve this welfare objective, each resource should be utilized to perform a function in order that it contributes most efficiently to society' (Du Toit 1994:162).

One of the main mechanisms through which resources are allocated is price (Du Toit 1994:162; Rowley 1997:179). Price is a measurement or function of the value that a consumer places on the product or service exchanged (Du Toit 1994:162; Rowley 1997:180). According to Rowley (1997:179), price plays a central role in the availability and access to information products and is therefore 'central to the concept of an information society'.

Du Toit (1994) presents an overall integrated framework for the development of a pricing strategy, whereas Rowley (1997) presents a structured and detailed discussion. These two articles can be read in a complementary manner as indicated in Table 1.

Table 1 Corresponding factors in Du Toit (1994) and Rowley (1997)

Du Toit (1994)	Rowley (1997)
<ul style="list-style-type: none"> • Step 2 on the formulation of price objectives (164-165). 	<ul style="list-style-type: none"> • Pricing objectives (182). • Factors affecting pricing decisions (182-185).
<ul style="list-style-type: none"> • Step 3 on the determination of the basic price. • Step 4 on the determination of the final price (165-166). 	<ul style="list-style-type: none"> • Selection of a pricing policy (185-186). • Pricing methods (187-188).

Note that what Du Toit (1994) calls the target price is called the equilibrium price by Rowley (1997), which in both cases is the result of a balance between supply and demand. Over and above the guidelines offered, a critical factor in the determination of price is 'reliable cost information ... on every aspect of the business' (Du Toit 1994:167) – the availability of such cost information across organizational boundaries is revisited in study theme 5.

Shapiro and Varian (1998:109) are of the opinion that the only pricing method for information goods that can succeed in the marketplace is price differentiation based on different customer segments, which the authors call 'versioning'. The quality of information products is often difficult to determine, quite possibly because of its nature as an experience good as discussed in study theme 2. A higher price can create an image of quality in the

market, which is explained in Du Toit (1994:166) as a psychological factor; Rowley (1997:186) refers to this as a pricing policy based on psychological pricing. This is in effect what Shapiro and Varian's (1998) 'versioning' is based on – the perceived quality and its value or utility to the customer determines the customer's willingness to pay a particular price and in this way customers segment themselves: 'The version they choose reveals the value they place on information and the price they are willing to pay for it' (Shapiro and Varian 1998:110). Furthermore, Shapiro and Varian (1998:108) discuss the propensity for monopolies or dominant players in the market to be created through the unique cost structure of information goods, confirming the findings reported in study theme 2.

After the completion of this study theme it is expected of students to understand the following:

1. Describe the link between value and price when dealing with information as an economic good.
2. Discuss the importance of and list typical pricing objectives as a departure for pricing decisions.
3. Outline and discuss a framework for the development of a pricing strategy or policy.
4. Discuss the different pricing strategies and methods available to an organization and be able to select a pricing strategy or method in a given scenario and motivate the selection.
5. Discuss the role of cost in the determination of price.
6. List the factors affecting pricing decisions.
7. Discuss the mechanisms for pricing different versions of information.

2.4 Study theme 4: Economics of intellectual property

In study theme 4, intellectual property rights are considered in order to determine how firms, organizations and societies are motivated to create information. This study theme links very closely with study themes 2 and 3, which is why some of the reading material for these study themes are repeated here.

Generally compensation is required to induce information creators to create new information products or goods in order to cover the costs incurred in the process. The right to compensation is protected through intellectual property rights (IPR). Note that the creation is the phase in the information cycle of an information good where the fixed cost (see study theme 2) generally is located and the variable (or marginal cost) is largely attributable to the distribution of the information good, from the producer's point of view. There are three main compensation mechanisms, each of which may lead to economic inefficiencies (National Research Council 2000):

1. *Payment of royalties.* The fixed cost is included in the final price by increasing the margin. Increasing sales leads to increased revenue. Promotional activities must also be covered by the margin. Information products will be less widely disseminated in society than economic efficiency dictates, that is, a consumer be allowed to purchase a product when he or she is willing to pay at least the marginal cost for his or her copy.
2. *Use of grants.* Generally applicable to basic or sometimes applied research, it is based on the principle of cost reimbursement rather than on the value of the output since the form of new knowledge can obviously not be predicted. To manage costs, monitoring and performance is usually built in.
3. *Combining information and ancillary products for sale.* Most prevalent with media products. This is most similar to the price strategy of bundling as discussed in study theme 3.

As discussed in the *National Research Council Report* (2000:7), no system for compensating information creation can provide a perfect solution to the three central economic problems and therefore result in certain trade-offs. These three central economic problems are:

1. Adequately compensating those who create new information products;
2. maximally disseminating and using the new information in the economy; and
3. selecting the most valuable information products that will be produced.

Furthermore, like any other property rights, IPR can be costly to enforce and these costs must, at least partly, be factored into the cost and therefore the price of the information good (National Research Council 2000:11-12).

Although, according to Dyson (1995), information goods (which Dyson refers to as content) have value and will not always be free, information goods are increasingly being made available for free, particularly because of the influence of the Internet. From her point of view, providers or suppliers of information goods must rethink their business models and by implication their pricing objectives and strategies. She is of the opinion that a relationship with the customer through subscription or membership is vital (linking to study theme 3 with regard to pricing decisions). Dyson (1995: 4) also alludes to the success of leaders in the market based on their brand identity and strategy, a theme already seen in the article on Romer by Kelly (1996) and by Shapiro and Varian (1998) with regard to the tendency for monopolies to be established. The authors indicate the premium that is increasingly being placed on uniqueness, which can't easily be replicated, particularly over the Internet. The example given is of the software industry where the business model focuses on ancillary services such as support, future upgrades, regular training with certification programmes, and so on. This business model is essentially based on a strategy of customer 'lock-in' in a relationship with a particular provider or supplier where the cost to break off the relationship and re-establish another is higher than staying with the existing relationship.

On the other hand, in the media and entertainment industry there is a tendency to combine information and ancillary products (National Research Council 2000). Dyson (1995:6) envisions the sponsorship of corporations for the creation of information goods for distribution.

Dyson (1995:6) also points out the limited attention capacity of human beings and the fierce competition to secure it. This is echoed by Varian (1998) who quotes Herbert Simon: '[A] wealth of information creates a poverty of attention.' A section by Dyson (1995) entitled *Return of the middlemen* discusses the increasingly important role that intermediaries will play in the market for information goods in terms of authenticity and reliability, in other words quality, of information goods through, for example, 'brand name, identity and other marks of value' which is seen in the previous study theme to play an important role in charging a premium price. This discussion also supports Shapiro and Varian's (1998) approach of 'versioning' with different intermediaries creating different versions from basically the same underlying content as discussed in study theme 3.

This discussion can be summarized as follows:

'The final result for creators in this new world is that intellectual value markets will bifurcate into content assets of premium prices and high value, and services and processes built around free or cheap content' (Dyson 1995:8).

Furthermore, Dyson (1995:8) notes that there will also be 'strong legal and social pressures for authenticity, integrity, trademarks, and identification'. It will be possible to copy freely but not to 'claim for it an identity or origin it doesn't have' (Dyson 1995:8).

Varian (1998) discusses intellectual property and software patents as mechanisms to make information goods excludable, that is, to legally make public goods private goods. Importantly, he indicates the positive relationship between per capita income in a country and recognition of IPR: as the demand for local content increases when consumers have more disposable income, the protection of local as well as other content is increasingly recognized in order to stimulate creation. Therefore overall economic security should automatically result in recognition for IPR but, in the absence thereof, one can expect there to be little incentive to create information goods.

Branscomb (1994) holds an altogether different view. According to her, while there are many legal mechanisms to protect information goods, there are still many problems for a number of reasons. She is of the opinion that in a computerized or digital environment access to organized information is what is valuable. Since it is then possible to copy the information, the paradigm for legal protection of information goods should rather be based on the *uses* to which information is put rather than on the making of copies thereof (Branscomb 1994:6). She does not, however, offer any insight on how this could be achieved.

Branscomb (1994) further discusses technology as a solution for universal service or access and is of the opinion that although technology makes it possible to offer universal service, the world may not have the collective will to so. Here we see a link to the ancillary social value (Bates 1988) discussed in study theme 2; one could argue that while ancillary social value is disregarded in the structure of the economic system, the so-called digital divide is an inevitable result.

After the completion of this study theme it is expected of students to understand the following:

1. Describe the role of intellectual property in the economy.
2. Discuss the methods for compensation for information creators.
3. List and discuss the three central economic problems in compensation for information creation and the trade-offs required.
4. Discuss the threat of marginal costs of information goods tending to zero, that is, the increasing tendency for information to be free.
5. Describe the impact of enforcement of IPR.
6. Discuss the possible impact of the Internet on IPR.
7. Describe the positive relationship between per capita income in a country and recognition of IPR and the reason behind this.

2.5 Study theme 5: Information exchange to facilitate relationships in an information economy

Dyson (1995), in one of the articles listed in study theme 4, indicated as early as 1995 the role that information can play in an economy at a micro-economic level with regard to the interaction between organizations:

'But in a knowledge world, the quality of those relationships will matter more than the contractual conditions (as in a marriage). The best cement is a two-way flow of information, or visibility. Companies will try to find partners not by offering discounts but by sharing information about themselves and by exchanging their competitive wisdom. In order to make their wisdom credible, they will have to be self-revealing' [authors' emphasis].

The vital role that information plays in forging inter-organizational relationships is described by Goleman (1998:98-99) in the context of emotional intelligence in the following excerpt:

'Consider the behavior of the senior executive at a large food company. The executive was scrupulously honest in his negotiations with local distributors. He would *routinely lay out his cost structure in detail, thereby giving the distributors a realistic understanding of the company's pricing*. This approach meant the executive couldn't always drive a hard bargain. Now, on occasion, he felt the urge to increase profits by withholding information about the company's costs. But he challenged that impulse – he saw that it made more sense in the long run to counteract it. His emotional self-regulation paid off in *strong, lasting relationships with distributors that benefited the company more than any short-term financial gains would have*' [authors' emphasis].

This view is echoed by Butcher (1998:5), emphasizing not only information flow internal to an organization but also the flow of external information into an organization:

'... information must flow between people within the organisation, and between the organisation and the external world. Such communication is vital for the successful functioning of the organisation, and most organisations establish formal mechanisms and processes with vertical and horizontal channels of communication to provide for the exchange of such information ' [authors' emphasis].

For customer-facing organizations, this is not a problem as they interact directly with the customer but there are a multitude of other role players who do not own the customer relationship or channel, as Kumar (2001:58) accurately describes:

'Customer-facing firms at the retail level, whether large department stores, automobile dealerships, or fast-food franchises, are only the tip of the iceberg. Behind them exist entire networks of manufacturers and distributors, transportation and logistics firms, banks, insurance companies, brokers, warehouses and freight-forwarders, all directly or indirectly attempting to make sure the right goods and services are available at the right price, where and when the customers want them.'

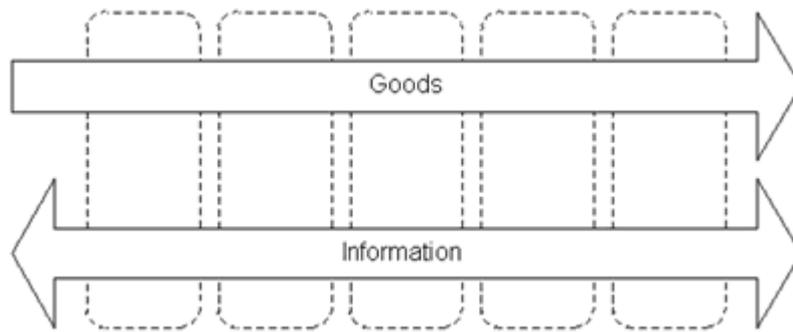
Many organizations, however, experience problems with obtaining customer data. This is mainly due to the volume and frequency of interactions (Pralhad and Krishna 1999:113).

It is clear that in manufacturing environments, the flow of information in the [supply chain](#) is vital (see Figure 2); therefore, supply chain partners form partnerships. According to Corbett, Blackburn and Van Wassenhove (1999:71) even 'modest partnerships [can] lead to rapid improvements in logistics facilitated by candid information exchange and better coordination'. Furthermore,

'failing to collaborate results in the distortion of information as it moves through a supply chain, which in turn, can lead to costly inefficiencies. ... Through the more open, frequent, and accurate exchange of information typical of a long term supply-chain partnership, companies can eliminate many of these problems [excess inventories, slow response, and lost profits] and ensure ongoing improvement' (Corbett *et al.* 1999:71).

Thus, partnerships go a long way to ensure that data are available and accessible to all parties in a supply chain.

Figure 2 Conceptual view of information and product flow between supply chain channel partners



Finding an effective means to share the data is vitally important in order to make both tactical and strategic decisions in both marketing and production. Furthermore, given that important information (data) resides outside of the organization, the implication is that data must be managed across the boundaries of an organization, not only internally across departments or functional areas, for example, marketing and operations, but also externally across other organizations in the supply chain. For this purpose, information systems are used (Ross 1998; Talvinen and Saarinen 1995).

The information systems primarily referred to in this discussion are:

1. *Electronic commerce* – to exchange information between organizations (previously electronic data interchange or EDI). Electronic commerce is the use of Web-based technology to communicate order-related information between organizations. This is used either for procurement where orders are transmitted to suppliers or for order entry where orders are received from customers.
2. *Business intelligence* – to analyse external and internal information within an organization (with a particular focus on marketing and production within the context). Note that business intelligence is generally enabled by a central, integrated database of data that is called a data warehouse:
 'Many manufacturing companies, including Polaroid, and retail organizations, such as Target Stores, have very sophisticated product data warehouses that are designed specifically to support their marketing operations. Both organizations are attempting to improve total product sales by improving the quality of the information available for the thousands of decisions that are necessary to continuously improve the marketing of products in dynamic and highly competitive businesses' (Tanler, 1997:7–8).

Furthermore, Tanler (2000) indicated that data warehouses must operate outside the boundaries of a single enterprise and that 'extending the boundaries of data warehousing ... has the potential to change the rules for how a company operates and competes'. Thus, a data warehouse can play an important role in making data received from channel partners available to users.

After the completion of this study theme it is expected of students to understand the following:

1. Describe the importance of relationships or partnerships in an information economy (or increasingly information-based economy).
2. Discuss the role of information exchange in facilitating inter-organizational partnerships.
3. Define the concept business intelligence and describe the role it plays in information exchange.
4. Define the concept electronic commerce and discuss the role it plays in information exchange.

3 Conclusion

From the above discussion of the respective study themes, it is clear that each study theme covers one or more of the stated aims of the course. Table 2 indicates the respective aims and the corresponding study themes that address the aims.

Table 2 Course aims covered by the respective study themes' contents

		Study theme				
		1	2	3	4	5
Aim	Characteristics of information	✓	✓			
	Information as a national asset	✓				
	Contribution of the information sector to the economy of a country	✓	✓			
	Methods for measuring the size of the information sector in a country	✓				
	Interaction between the information sector and the rest of the economy in a country		✓			
	Marketing and pricing of information products and services		✓	✓	✓	
	Business intelligence					✓
	Electronic commerce					✓

From the many cross-references in the discussion of the study themes, it is clear that the material is of an integrated nature. As a result, students are required to operate at higher levels of cognitive skill or cognitive domains, according to Bloom and Krathwohl (1984), namely analysis, synthesis and evaluation, as one would expect of third-year undergraduate students.

As mentioned in the introduction, there are many possible configurations when compiling the contents for an Information Economics course for Information Science students. This article aimed to present the contents of one such configuration for senior undergraduate students at the University of Pretoria in some degree of detail in order to stimulate discussion and to contribute to the further development of this area of Information Science.

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