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CLASSIFYING DIGITAL PRODUCTS

Classifying

Digital

Products

A framework for classifying digital products is essential for devising successful e-commerce strategies.

THE SUCCESS OF THE INTERNET has created many interesting challenges for companies globally to market their products in the new realm of e-commerce. In particular, increasing numbers of companies, including publishers, news agents, banks, and insurance agents, among others, are now remodeling their product concepts in order to create and market the digital counterparts of their traditional goods and services.

The growing popularity of selling digital products as a major profit-making endeavor has led business executives and academic researchers to explore the optimal competitive strategies involved in selling these products. A key component in the process of formulating such strategies is to understand the implications behind the product attributes. This requires a good understanding of the nature and characteristics of different digital products. As advocated in a research report [10], different digital products tend to exhibit different growth rates, which are largely dependent on the underlying product characteristics and market environments. In spite of that, there has been no solid framework for classifying different digital products according to their inherent characteristics. Here, we attempt to fill this void by proposing a framework that classifies digital products based upon their major types and characteristics.

Broadly speaking, digital products refer to any

goods or services that can be digitized (converted into a binary format). Examples include conventional digital products like software or music, as well as reports, magazines, or books that are now increasingly digitized and sold via the Internet. Obviously, each of these products entails unique characteristics and their trading terms and conditions may vary from one another. For instance, while statistical packages like SAS or Internet telephony services like Zeroplus (www.zeroplus.com) can control the usage periods by incorporating proper time stamps, pay-per-use or pay-per-period pricing may not be readily applicable to electronic texts. Currently, popular electronic text sellers such as SmartEcon.com (www.smartecon.com), OECD Online Bookshop (electrade.gfi.fr/cgi-bin/OECDBookShop.storefront/) or Barnes and Noble (www.barnesandnoble.com/ebook/) charge customers a one-time cost for accessing particular electronic content. For these kinds of content-based digital products, it is easy for customers to keep their own copies and therefore difficult to prevent future reuses, since information in the products can be easily retained once the access right is granted. Pay-per-period revenue models like leasing or licensing, while being increasingly applied to digital products like software or services, may not be readily applicable to these content-based digital products.¹

¹Although a lot of software packages are still being sold through the Internet using the traditional selling approach, licensing is becoming a prominent revenue model for relatively large software systems like server software, statistical packages, database development, or CASE tools. On the contrary, almost all content-based digital products (except extensive information collections like digital libraries or electronic journals) are being sold individually using the one-time selling approach. That is, customers need to pay only once for the digital content and then are allowed unlimited access to the information.

Another example that can illustrate why understanding product attributes is important when one tries to market a digital product is online services. While data or reports can be easily reproduced and shared among multiple customers, online services, particularly those that offer real-time solutions, may not be readily or desirably sharable from a customer's point of view. A good example in this case is an online therapy service (see sidebar), where the companies charge users by the total time of medical consultation. "Sharability," in this case, is not an issue from the seller's point of view since revenue models such as pay-per-period or visit are usually applied. From the customer's point of view, however, he or she may not want to share or intermix his or her medical records with others.

In short, a proper classification framework for digital products can serve several purposes. First, it characterizes the properties of digital products, which can serve as a foundation for specifying product and process development platforms [6]. This is particularly important for digital products since even some small and often neglected product features may open up new areas for creating new product variants. For instance, the interactivity of online services allows service providers to devise various value schemes such as charging by amount of usage or by subscription. Currently, entertainment service providers like OKBridge (www.okbridge.com) offer customers a yearly renewal membership scheme for unlimited play, while also providing pay-per-play tournament services. Since the Internet is capable of handling real-time transactions and micropayments, pay-per-use pricing mechanisms can be easily implemented to other online services such as Microsoft WebTV (www.webtv.com), Reuters (www.reuters.com) or Bloomberg (www.bloomberg.com).² There are simply unlimited opportunities to achieve vertical product differentiation in digital product markets, but doing so requires a good understanding of product characteristics.

Second, a classification framework that matches product characteristics with corresponding product categories can be a useful tool for devising appropriate marketing strategies. Some commonly employed revenue models, like one-time selling, subscription or periodic licensing, are sometimes not suitable for particular types of digital products and marketers may need to segregate the details of the products before devising their marketing strategies.

Finally, based on the classification framework,

digital product sellers can identify the critical features and dimensions of the products deserving further attention and treatment. While the quality of content-based digital products has been recognized as one important dimension, there are other dimensions (such as product granularity or trialability) that

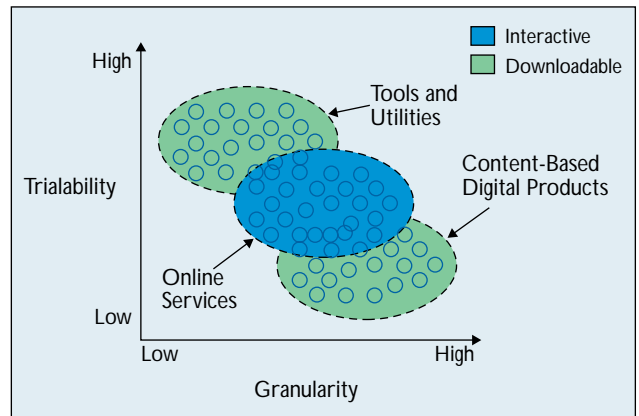


Figure 1. Classifying digital products based on product category and characteristic.

may be equally, if not more, important for their success in the market.

A Proposed Framework for Classifying Digital Products

We propose a framework for classifying digital products based on two dimensions: product category and product characteristic (Figure 1). There are three digital product categories in the framework, namely tools and utilities, content-based digital products, and online services. Each of these product categories possesses different product attributes and serves different purposes for buyers.

Tools and Utilities. These products assist users to accomplish specific goals or tasks. In general, they are software programs that either help users perform specific functions (for example, F-Secure for virus scanning and disinfections or Adobe Acrobat for creating and viewing PDF files) or act as supplementary utilities for achieving other purposes (RealPlayer, which allows users to listen to online broadcasts or audio clips, is a good example). In general, commercial software, shareware, or freeware that is easily downloadable via the Internet is grouped in this category.

Content-based Digital Products. The value of these products lies in their information content. Typical examples include electronic newspapers and journals (the *Wall Street Journal*, www.wsj.com; ProQuest Direct, www.proquest.com), research reports or databases (International Data Corporation (IDC), www.idcresearch.com), and online entertain-

²Although only the subscription option is currently provided by all those service providers.

ment products such as music, magazines, or videos. Some others may include public listing databases (EDGAR Online, www.sec.gov/edgarhp.htm) or industry or countrywide performance reports (The Annual National Accounts published by the OECD Online Bookshop) that sometimes are attached with other added-on functions or utilities to assist in the information retrieval or data manipulation process. Note that it is the objective of consumers to acquire the information, not the add-on functions.

Online Services. This includes services that provide access to useful resources like server connections as well as online utilities that assist users in accomplishing specific tasks. Examples of the former include Internet telephony (PC-to-Phone, www.webkall.com; Zeroplus, www.zeroplus.com) and group support services (Group Systems Online, www.ventana.com); examples of the latter include the online search services Consultant Search Service (www.searchcon.com) and Searching4U (www.searching4u.com). While these latter products are in some sense related to what we have previously called tools and utilities, there is one subtle difference: customers cannot actually “purchase” the product. They only pay to use them to locate target information.

The second dimension of the classification framework relates to the intrinsic characteristics of the

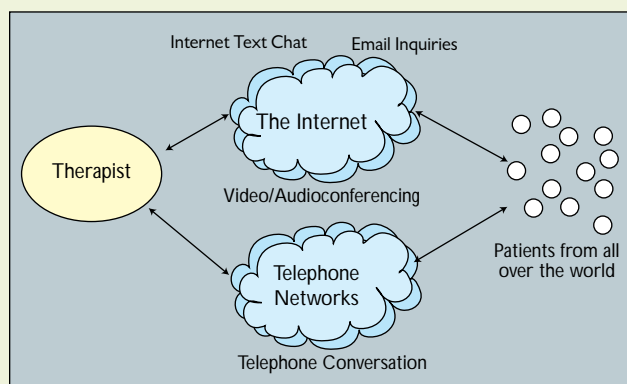
products, that is, those features that are “born” with the product and cannot be easily altered by the sellers. We focus on three intrinsic characteristics: delivery mode, granularity, and trialability.

Delivery Mode. This refers to the delivery mechanism of products from sellers to buyers via the Internet. Generally speaking, digital product sellers can deliver products by two means. Either they can deliver the full product at one time through Internet downloads or they can deliver the product interactively on a continual basis. A crucial line of distinction here is whether or not the digital product is downloadable. Tools and utilities and content-based digital products are often downloadable, as they are by and large the digital counterparts of their physical goods. When the product is delivered (via download), the value of the product is transferred to customers in a relatively clear-cut fashion. Conversely, for digital products such as online services, interaction between the customers and the service provider (via the Internet) is often needed during the transaction. Therefore, the functions or the values of the products are provided in a piecemeal fashion and in an interactive mode.

Granularity. This characteristic captures the divisibility of digital products. Highly divisible digital products present sellers more opportunities for

Online Therapy Services

Typical online therapy services (such as Reality Therapy, www.realitytherapy.com; The Therapy Office, www.therapyoffice.com; The CyberAnalysis Clinic, www.cyberanalysis.com; Internet Therapist, www.internettherapist.com) allow patients to communicate with the therapists via the Internet. Four different communication channels are commonly offered: telephone conversation, Internet video/audioconferencing, Internet text chatting, and



Online therapy services.

and email exchange (see the accompanying figure). Consultation is primarily charged based on the amount of time connected, and the service rates typically range from one U.S. dollar to several U.S. dollars per minute. Some of these online clinics also offer volume discounts, where if patients purchase a longer time slot (or more email messages), they get cheaper rates. Since all service channels allow ubiquitous connections from all over the world, the service is truly global and treatment requests from patients in most other countries are well accepted.

To ensure the service fits with customers' expectations and to allow customers to get a sense of the online therapy sessions, some of these online clinics also feature free trials, where customers can talk to the therapist for a limited time period or they can send questions/queries and receive answers for an online inquiry without paying anything. However, just like free tryouts with shareware, such tryout options are generally limited to one use, and usually last for approximately 15 minutes. **G**

vertical differentiation, which is an important competitive element for sellers to distinguish themselves from competitors. For instance, in the category of content-based products, research companies selling industry reports may offer to sell 10 years of data, 20 years of data, or the complete series on selected subsets of industries. Similarly, some e-book sellers such as SmartEcon.com offer chapter-by-chapter sale of their electronic texts. This can cater to the needs of different customer segments and hence bring in additional revenue.³

The same case also applies to products in the other two categories because, at least from a technological point of view, the products can be versioned by bundling or limiting certain features and functionalities provided to the customers. From a business perspective, however, some sellers of digital products may not prefer having their products too granular especially when the products have only a few main features/functionalities and are targeting a specific market niche.

Trialability. Not every digital product is desirably trialable by customers and/or sellers. While some digital products may allow customers to preview a subset of the full product or use the product for a limited trial period, others may not. One cannot try out the e-books sold by the SmartEcon.com or the OECD Online Bookshop. Similarly, the research reports marketed by IDC are largely nontrialable. For these latter cases it is sometimes difficult to judge the product quality, as customers do not have accurate information on the product features. Since consumers cannot gain sufficient experience of the full products, sellers may need to resort to other means like advertisements or third-party evaluations to create appropriate means by which to judge the product quality.

E-Commerce Strategies for Digital Products in Different Categories

Figure 2 summarizes the overall classification framework by assigning the three product groups into the intrinsic characteristic space. Depending upon the product category and the underlying product characteristics, some e-commerce strategies may be more appropriate for certain digital products than others.

Tools and Utilities. Because tools and utilities are essentially software programs that can be downloaded via the Internet, the value of the products is completely transferred to the customers who can then examine and try out the products according to

their own schedules. Since transactions are relatively clear-cut, there are only limited options in terms of pricing the products. Repurchases tend to be sparse and usually appear when the tools and utilities are upgraded to a newer version. The revenue stream that the sellers can collect tends to be discrete and the overall revenue also tends to be limited.

One way to get around this constraint is to apply restrictions on the usage period. Currently, a number of well-known software packages such as Group Systems Online (www.ventana.com) are sold under regular subscription schemes where buyers need to renew their licenses after a certain amount of time. This can effectively secure a long and constant stream of revenue to sellers, since customers have to pay regularly if they wish to continue to use the products. Also, such schemes can induce buyers to upgrade their products when new versions appear, since the incremental cost of upgrading is comparatively lower than that of purchasing a whole new package. The upgraded version can be easily downloaded via the Internet.

Tools and utilities generally have low granularity

Category/ Characteristic	Tools and Utilities	Content-based Digital Products	Online Services
Delivery mode	By download	By download	Interactive
Granularity	Low•	High•	Medium•
Trialability	High•	Low•	Medium•

• In relative sense

but high trialability. Due to the download time constraint, many tools and utilities sold on the Internet are smaller than others sold via traditional means—in the form of CDs, for example—in terms of the size (measured in MB). This makes this type of digital product typically have low granularity, not because they cannot be improved technically, but because it may not be desirable to do so. This is especially the case when the tool or utility is designed for some limited or specific functions and the market competition is intense with strong demand for versatile features of the tool. A good example is anti-virus software, where Norton Anti-Virus, McAfee Virus-Scan and F-Secure can all be purchased and downloaded online and they contain extensive lists of virus information. It would be unattractive to customers if these software products can only handle particular subsets of viruses.

Relatively low granularity implies limited differentiation capability. Therefore, unless the demand is

Figure 2. Classifying digital products based on product category and characteristic.

³Such chapter-by-chapter selling model, however, may not be readily applicable to book categories like novels or fiction. Currently, electronic novels, for example, those written by Steven King, are only available in a single version in major online bookstores.

highly inflexible, sellers of tools and utilities in general could capture only a small portion of consumer surplus from customers. An alternative for the sellers is to try to broadly segment their markets into smaller niche groups and sell different product versions, each with not too much granularity. An excellent example is Eudora 4.3 (www.eudora.com), which offers three different versions: a light mode with limited functionality; a sponsor-supported mode that is complete but with onscreen advertisements; and a paid mode that is complete and contains no advertisements but requires payments from customers. In this case, the seller has truly exploited an irrelevant dimension (the onscreen advertisements) in differentiating its software. As emphasized by Choi et al. [1], it is always beneficial to sell multiple product versions since differentiation generally increases total welfare and sellers' profits.

Tools and utilities are usually highly triable, a strategy popularly used in the shareware market because this kind of free trial, in general, is not detrimental and will not severely disrupt sellers' profits. Through limited-period free evaluations, users are allowed to test the product (probably with limited functionalities) within a specified period. After the trial-usage period, the evaluation copies expire and cannot be further activated unless users pay to purchase the full product. The growth of this free-trial practice is highly facilitated by the ubiquity and the high bandwidth of the Internet, and the digital nature of software products. For instance, in popular shareware sites like TUCOWS (www.tucows.com) and CNET Download.com (download.cnet.com), it is easy to download trial copies of thousands of software packages. Many sellers might refrain from offering a trial option if they had to actually ship the evaluation copies (for example, on CDs or diskettes) to customers due to the highly escalated cost but with no guaranteed sales. With the Internet, however, customers can download the trial copies without costing sellers anything. Therefore, the Internet facilitates try-outs of tools and utilities and offers sellers an efficient channel for demonstrating their product qualities. Also, sellers can now reach customers directly in a more effective way via the Internet.

Content-based Digital Products. Like tools and utilities, customers can get content-based digital products by downloading them via the Internet. Because of this downloadable nature, the pricing and marketing issues faced by the sellers are essentially the same as those selling tools and utilities. Sellers can exert little control on the post-purchase usage behavior of customers and resale and redistribution of the product among customers are difficult to prevent.

Since the products are informational in nature, even one single access to the information may be sufficient for customers to replicate the whole product for self-use. It is difficult for sellers to forbid a customer from further referring to or reproducing the information contained within the products.

To secure the profits of sellers in this kind of market, a possible technique is digital watermarking since it establishes a formal mechanism for identifying illegal product copies. Customers, when illegally replicating and/or reselling the product, may need to bear the legal responsibility once they are found reproducing the product, which is the major goal of digital watermarking. Such a protection scheme is becoming increasingly popular on digital content over the Internet. For instance, Index Stock Imagery (www.indexstock.com) embeds Digimarc's watermark into its almost 500,000 still images, while BARCO (www.barco.com) also adds the watermark into its personalized document-printing systems.

Compared to tools and utilities, content-based digital products are more granular but less triable. It is easy to divide information into pieces and then sell different combinations of the pieces. For instance, daily stock quotes can be offered in different schemes. A basic version may provide information on only 50 of the most fluctuating or frequently traded stocks, while a complete version may offer information on every stock being traded in a particular market. A good example is InterQuote (interquote.com), an agent that offers online financial quotes. Currently, InterQuote offers two different quote packages: a supreme version that offers real-time quotes on 300 different stocks, futures, and options, while there is another express version that only offers real-time quotes on 100 stocks and futures. The price charged for the express version is substantially lower than that for the supreme package.

The high granularity of content-based digital products implies sellers marketing these products are much more flexible in packaging, marketing, and pricing their products. High degrees of vertical differentiation can be achieved by appropriately dividing the information. This has two important implications. First, compared to the tools and utilities market, the content-based digital product market is less likely to be perfectly competitive, since sellers can easily differentiate themselves from peer competitors. Instead, monopolistically competitive markets, where each seller can retain certain market power in setting prices, are more likely to occur [1]. Second, because of the high differentiability, sellers have a much better chance of capturing more consumer surplus. The prerequisite for this, however, is

that sellers can solicit the real preferences of customers. Therefore, collecting customers' preferences and value distributions is vital for sellers of content-based digital products to achieve favorable profits in this market.

Because of the informational nature of the products, content-based information products are generally less trialable than tools and utilities owing to two subtle differences. While tools and utilities can have a choice of offering a trial version of the full product limited by time (30 days is a common limitation) and a version with limited functionalities/features, it is difficult, if not impossible, for some content-based digital products to choose the former. For example, if customers are allowed to access the entire copy of a new book on sale via the Internet (such as the two volumes of *OECD National Accounts*), they can download the complete book and retain their own copies. This kind of free trial can be very detrimental and severely disrupt the sellers' profits. A second problem in trying out a content-based digital product is that no matter what a customer gets, it is still just a sample, which in theory cannot adequately convey a sense of quality, which is often the case when trying out a software program. It is typical for online booksellers to offer publishers' reviews, tables of contents, or sometimes an introductory passage of their e-books. However, it is often difficult for customers to judge the overall suitability or usefulness of the book based on such limited samples. To address these problems, sellers may have to rely on advertisements, building up reputation through word of mouth or trusted third parties (for example, most online bookstores offer customers' reviews). Also, they may rely on intermediaries to convey quality messages. These intermediaries can act as a centralized marketplace or additional sources for quality information [1]. Since content-based digital products may encompass many different versions and direct marketing between sellers and buyers may not always be feasible, the role of intermediaries can be crucial.

Online Services. One essential feature of online services is their interactivity. Customers typically need to submit interactive requests and receive interactive responses. Such interactivity has a number of implications for online service providers. First, the value of the goods tends to be delivered in multiple

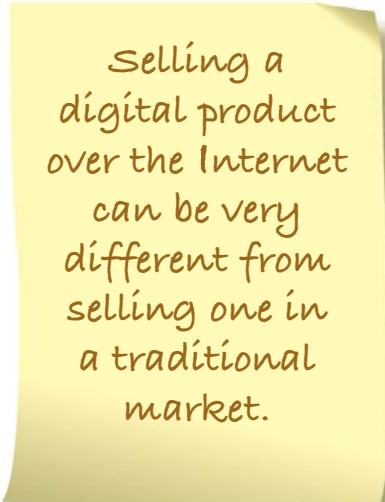
instances. Different schemes such as lump-sum payments, periodical subscriptions, or usage-based pricing are all viable for this kind of product. This flexibility in pricing mechanisms is very valuable to both sellers and customers. For sellers, they can preserve higher network efficiency and prevent inefficient use of valuable bandwidth, which has important profit implications when the service is congested. For customers, variable pricing or multi-part tariffs improve the chance of getting the service for those who value the service higher than others. Therefore economic efficiency can also be improved, and such pricing flexibility has positive implications toward overall social welfare [4, 5].

Second, resale or redistribution of products is not a big problem for online services since it is always difficult, if not impossible, for customers to "retain" or "replicate" the whole service. Finally, sharing of services is not always feasible (since the service providers often explicitly forbid concurrent access) or desirable (as the charge may be by the amount of usage). Compared to tools and utilities and content-based digital products, online services are moderately granular and trialable. They are

granular as sellers can easily divide their services into different components. An online casino (USA Casino, www.usacasino.com) allows users to select single player or multiplayer game modes, while it also offers wide varieties of different games like Poker, Roulette, and so forth. Similarly, in some online search services like Searching4U, various search options like statewide, nationwide, or death index searches are available. It is possible for sellers to differentiate their services by restricting certain service attributes.

Yet, the degree of granularity of online services is not as high as that of content-based products, the main reason being the costs involved in restricting the nature of the service. While the cost of dividing information can be quite low, more effort is needed in restricting the offering of the online services. Additional programming or controlling mechanisms are required most of the time.

Online services are also trialable. For instance, in Reality Therapy (realitytherapy.com), customers can try the online consultation for 15 minutes without paying. If they desire to continue using the service after that evaluation period, they need to pay the full consultation fee. Similarly, certificate authorities like



Selling a digital product over the Internet can be very different from selling one in a traditional market.

Verisign (www.verisign.com) issue free digital IDs to individuals that are valid only for two months, so that customers can try the essential service features during the trial period and then decide if they would like to continue to use the service provided.

Such tryout options are possible because online services are continuous. Even if customers are allowed to try the services, they still need to pay if they want to access the same service in subsequent periods. Replication is not a big issue here, nor are illegal acquisitions or redistributions. Just like tools and utilities, such tryout options can allow sellers to convey an effective sense of quality, which is important for marketing on the Internet. Also, since Internet transmission is almost costless, a tryout option is generally feasible for online service providers.

Nonetheless, there are some online services that are discrete in the sense their services are offered once in awhile to particular customers. This typically happens on online search services, where repeated requests from customers are sometimes rare and infrequent. Therefore although online services are in general trialable, the degree of trialability is smaller than software tools and utilities, which are almost fully trialable by customers.

Conclusion

A key element of the Internet is information, which is also described as the “gasoline” in an information economy [9]. Selling digital products over the Internet has become a major source of revenue for many business organizations around the world. How to make it work is thus a major question for many marketing executives who are selling or planning to sell their company’s digital products in the e-commerce marketplace.

Here, we have outlined a classification framework for digital products based on product category and product characteristics. Such a framework is necessary because selling a digital product over the Internet can be very different from selling one in a traditional market, due to either the uniqueness of the product itself, the nature of the Internet, or the newness of the distribution channel. The Eudora example described here illustrates how software sellers can combine different dimensions in achieving horizontal product differentiation. We believe there is ample space for further exploitation of other novel ideas in the Internet realm, but that requires good knowledge and insight into the underlying product.

Devising an appropriate e-commerce strategy for a digital product requires understanding of not just the product itself but also other important marketing mix elements including price, place, and promo-

tion (see [3, 7, 8, 11]). Furthermore, the service orientation of many digital products requires several more “P”s in the formulation of e-commerce strategies. One such “P” is the process, which involves how the digital product or service is delivered to or consumed by the customer. Since the customer might reside on the other side of the globe from the seller, appropriate “process” must be developed to ensure proper consumption of the digital product/service. Another “P” that may be important in the Internet world is “professionalism,” which refers to the “look” of the product or service. In traditional service marketing, professionalism. In the Internet world, this professionalism moves into what kind of Internet technologies, security technologies in particular, a Web site uses. A customer may choose to transact with a particular Web site because it looks professional, which may reflect a form of trust.

Many believe the emergence of electronic commerce has dramatically affected and will continue to affect national and international trade, business operations, and society in general [2]. Selling digital products in this new marketplace presents a number of challenges. How much we can capitalize on the power of the Internet depends upon how we develop and utilize this new global marketplace. **G**

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