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Product Architecture and Strategic Positioning in Information Products Firms

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Introduction

Businesses exist to deliver desired products and services to their markets. The efficient and effective design and development of products meeting market needs is a critical process which must be performed and managed effectively for a firm to remain viable. Product design and development has been dealt with at some length in the literature with regard to the architecture of assembled tangible products (e.g., automobiles (Abernathy 1978), power tools (Lehnerd 1987), production equipment (Henderson and Clark 1990), and computers (Meyer and Roberts 1988)), and process design for non-assembled tangible products (e.g., glass (Utterback 1994)). Less attention has been paid to the architecture for the delivery of services (Chase and Hayes 1991, Harvey and Filiatrault 1991, Heskett 1993, Heskett and Schlesinger 1994), and almost no research has been done with regard to the design and delivery of *information* 1 products and services. The worldwide economy is shifting from one based predominantly on physical goods and energy to one based on information goods and knowledge. Yet we do not understand much about the transformation to an information-based economy comprising firms whose core competency is their ability to create, access, or add value to information.

This paper focuses on the effective design of information products. It develops a framework for organizing, managing, and building a robust information technology platform for the effective design and develop of information-based products and services. Based on that framework, we develop a means for assessing the strategic positioning and defensibility of information products firms.

Background

As with tangible products, the goal of information products firms is to add value to some raw material thereby producing something of greater value, and to capture that value-added within deliverable products desired by some market. This encompasses three streams of relevant research: one addressing the valuation of information, the second addressing the mechanisms by which value can be added to information, and the third addressing how value is most efficiently and effectively captured and delivered as product or service.

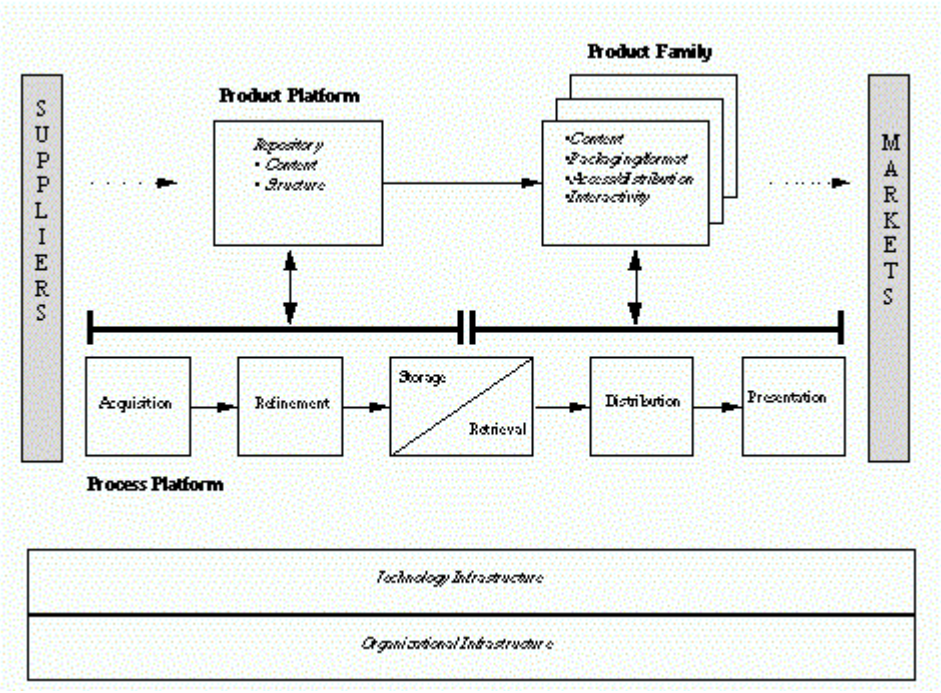
The first issue, the value of information, has been addressed directly at some length by information economists (Spence 1974, Stigler 1961). Their findings, while elegant and

rigorous, do not provide much practical guidance for action. Economists have not been concerned with the process of adding value, only that they be able to identify what value (price) a market might place on certain kinds of information. Value can then be assumed as the price one should be willing to pay for that information. The primary focus has been on valuing "search information", that is, information used by potential buyers to search for sellers and prices in markets. This literature does, however, support the conclusion that information has market value.

Regarding the *process* by which value may be added to information, a small amount of literature from the library science field addresses a limited range of processes by which value is added to information, primarily the processes for abstracting, indexing and retrieving published materials (Taylor 1986). Zack (1992) modeled the firm as an "information refinery" (Clippinger and Konsynski 1989) and considered the information processing infrastructure supporting those flows to represent an "information pipeline". Zack defined five information processing stages: acquisition, refining, storage/retrieval, delivery, and presentation/use. The information refining step most directly addresses value-added processes, including standardization, categorization, analysis, integration, interpretation, and synthesis.

The literature on product design and architecture (e.g., Henderson and Clark 1990, Lehnerd 1987, Meyer et al 1994, Smith and Reinertsen 1992, Utterback 1994) offers guidance in understanding how most efficiently and effectively to design products that address market needs, capture value-added within those products, deliver the products to those markets, and effectively organize and manage the entire process. The core concept is that of leverage created by building common product (for assembled goods) and process (for non-assembled goods) "platforms" from which derivative products (styles, models, etc.) can be created quickly and efficiently. Chrysler's K-car platform is a good example. The question raised is, do these concepts transfer to information products and if so, how? Our research (Meyer and Zack 1995, Zack 1995) indicates that physical product design concepts transfer to information products at the conceptual level, but that the actual design issues for information products require a more detailed understanding of information, information value, and information technology.

Framework



The literature discussed above provided the foundation for our developing a framework for designing information products (Figure 1). Information products comprise characteristics of both assembled and nonassembled goods, having both a product platform and a process platform. The basis of this framework is that of the information refinery or "pipeline" referred to earlier (Zack 1992). The pipeline model presents a means for describing the *process* platform used to create and distribute the information product. The midpoint of the process model is represented by the information storehouse or repository from which actual information products can be derived. The information repository thus represents the *product* platform for information products. The product platform can be characterized by its content and the way that content is structured and arranged for retrieval, analysis, integration, association, and synthesis.

The repository is created from "raw" data or information that is acquired and refined in some manner before being entered to the repository. Refinement can be physical (e.g., moving data from paper to an electronic medium) or logical (e.g., standardizing the format, removing errors, indexing the data, integrating data to common indexes, adding some interpretation, etc.). Once created, the repository serves as the platform from which potentially many different products (i.e., a *product family*) can be derived based on the format, distribution medium, content, and extent of value-added. If structured effectively, one platform should allow for the efficient spinning-off of many different products for different markets at low incremental costs.

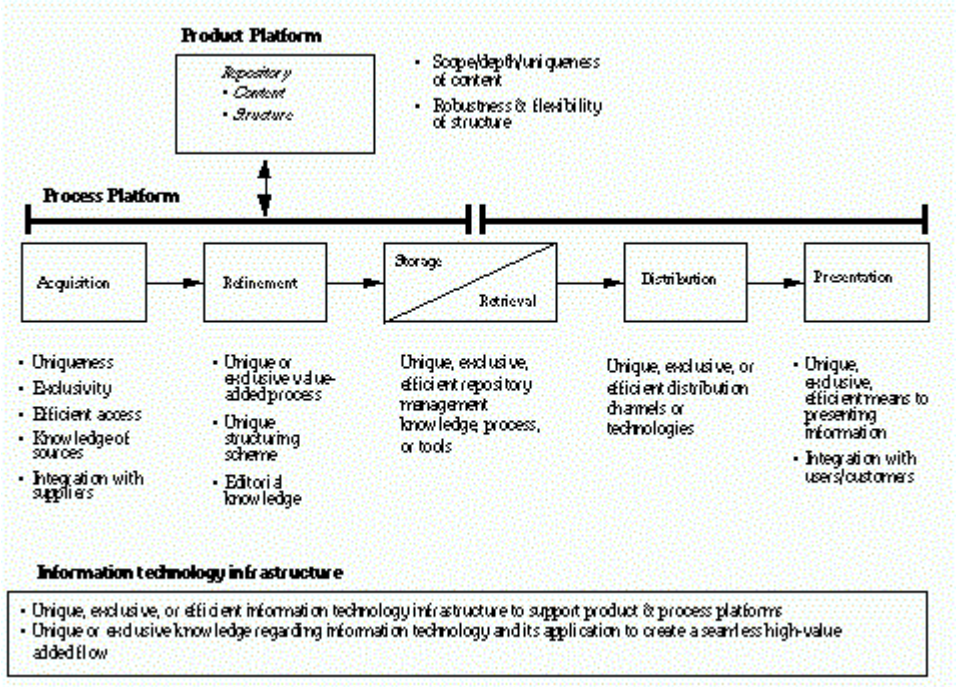
Underlying the process and product platforms is an information technology infrastructure which ideally should support the seamless movement of data, information or knowledge through the pipeline, from source to use. An organizational infrastructure can be mapped to the product and process platforms as well, and should also support the seamless and

effective movement of information through the pipeline as well as effective management and control of the process.

Finally, the process and product designs exist within the context of other firms in the industry representing suppliers, partners/collaborators and customers and who form part of the overall value-added chain. Efficient and effective integration across firms (and in some cases across divisions of the same firm) requires that the firms's process and product platforms (pipeline and repository) mesh with those of suppliers, collaborating firms in the value-added process, and downstream customers.

Strategic Implications

From a strategic perspective, the relative value-added, cost-added, and barriers (both entry and exit) established for each component of the platform will have significant impact on the firms positioning in its industry (Figure 2). One approach may be to classify firms by the level of front-end (acquisition and refining) *vs* back-end (distribution and presentation) costs or entry barriers. The strategic value of a firm's information products may derive from exclusive access to information sources or from a unique expertise in some aspect of refining (front-end barriers) or from exclusive access to electronic distribution channels or modes of presentation (back-end barriers). This value must be compared to the cost for performing those process activities to determine the strategic impact and defensibility of the firm's position.



A second approach examines how a firm applies its product and process platforms to its markets. Our model suggests four generic approaches, discribed here in order of decending leverage. A highly leveraged approach seeeks to apply one platform across multiple market segments by spinning off derivative "models" of the information product

from the same platform for different markets. Reverse leverage seeks to utilize a common product as an interface to multiple separate platforms. Firms which attempt to apply an undifferentiated platform across segments take a "one-size-fits-all" approach, while firms which create separate platforms and derivative products for each segment take an unleveraged "stovepipe" approach to product design.

Firms seeking to compete in the information products arena must apply information technology to support a robust, scalable, and seamless refinery (process platform) and a well-designed repository (product platform), and to provide a competitve advantage via one of the components of these platforms.

References Available on request.

Endnotes

1. We use the term information broadly to include data, information and knowledge. Data represents raw, uninterpreted facts (e.g., raw point-of-sale scanner data), information represents facts placed in a meaningful context (e.g., scanner data reported by product and market before and after a product promotion program), and knowledge is the meaningfully structured accumulation of information that helps to predict or explain some phenomenon (e.g., results of a systematic comparison of competing products by market and time, based on variations in price and promotion).