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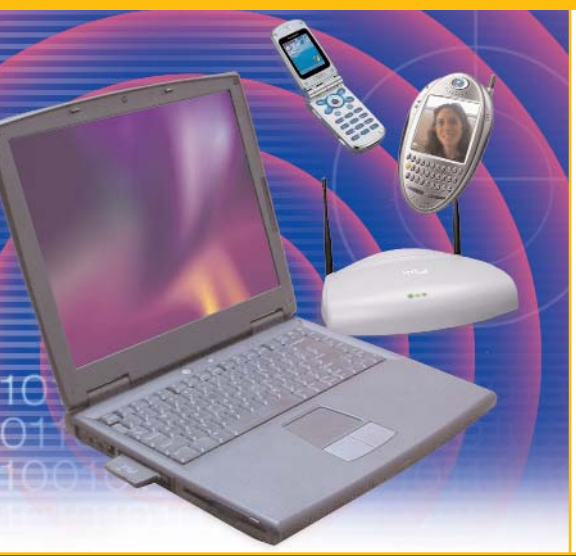

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Open Platform Innovation: Creating Value from Internal and External Innovation

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Open Platform Innovation:
Creating Value from Internal and External Innovation

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ABSTRACT

This paper explains the Open Innovation approach to managing innovation, with particular emphasis on the use of platform technologies in the Information Technology (IT) sector and, more specifically, on the personal computer industry. Platforms provide an architecture to combine internal and external innovations in ways that create value throughout the chain of activities that deliver a useful technology to the market. Value creation is vital for adoption of the architecture by third parties and customers. The architecture must also enable the platform architect to capture a portion of the value created. This value capture is critical to sustaining the advance of the platform.

The value of building a platform technology will be illustrated briefly by the early history of Adobe Systems, while the difficulty of doing so will be demonstrated by a comparison with another early software company, Metaphor Computer Systems. Implications for other IT platform architects, such as Intel, will be examined, including the appropriate metrics for managing an Open Innovation approach.

INTRODUCTION

The process of industrial innovation has undergone a significant shift, since the heyday of Vannevar Bush's vision of "Science–The Endless Frontier" [1]. That vision assumed that industrial corporations would be able to innovate only by conducting basic research activities internally, and by carrying the results of that research through to the market.

While that approach worked well for a variety of US corporations during the 20th century, as demonstrated by business historian Alred Chandler [2], events in the past thirty years have eroded the conditions that supported that approach. As explained in more detail elsewhere [3], these conditions include

- The increasing mobility of technical and managerial personnel across firms.
- The rising quality and relevance of university research.
- The explosion in college graduates and the increasing quality and quantity of human capital.
- The growth in the quality and quantity of international research.
- The dramatic growth in venture capital and private equity, enabling startup companies to attract high-quality talent.

These erosion factors have rendered the internally focused model of Closed Innovation obsolete in most industries. Today, the earlier model has been overtaken by a model of Open Innovation. Open Innovation can be briefly defined as utilizing external as well as internal ideas as inputs to the innovation process, combined with employing internal and external paths to market for the results of innovative activities.

Figure 1 depicts this new Open Innovation paradigm. It shows internal and external ideas flowing into the R&D process, and it shows the outputs of that process going to market through external paths, in addition to the internal path. Of particular importance is the flow of ideas and technologies into and out of the process throughout. Ideas can come into the process, for example, from internal research investigations, from external research, from licensing in another company's technology, or from an acquisition of a company's product. Similarly, ideas can flow out of the process to market in numerous ways. Many go to market through the company's own channels, while others may be licensed out, or spun out into a new venture, or into a new joint venture.

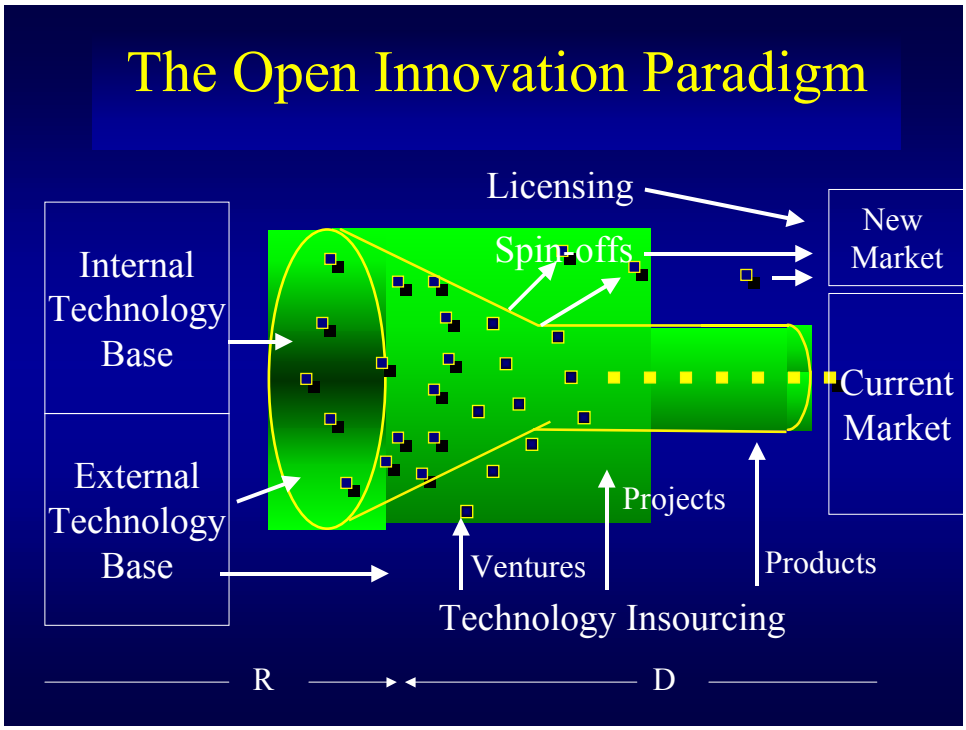

Figure 1: Open innovation paradigm

The opportunities and challenges of managing Open Innovation processes have particular relevance to the IT sector of the economy. The example of Platform Technologies [4] is used to illustrate the value and the difficulty of this approach to managing industrial innovation. The contrasting experiences of Adobe and Metaphor will explicate these issues, and the paper closes with some observations regarding the new and different metrics needed to manage a platform technology effectively.

PLATFORM TECHNOLOGIES AND THE BUSINESS MODEL

A technology by itself is worth very little. Most patents are worth almost nothing, while a very select few are worth an enormous amount [5]. While some of this disparity may be due to the difference in the quality of the technology, business history is full of examples where an inferior technology overtook a superior technology in a battle to set a standard [6].

A significant portion of the success of an inferior technology over a superior one results from differences in the business model employed to commercialize the two technologies. While a detailed definition of a business model can be found elsewhere [7], its key elements for the purposes of this paper are 1) the creation of value through a chain of activities that extend from raw materials through to the end customer of the product or service; and 2) the capture of a portion of that value within the chain of activities.

The first of these two requirements requires an architecture that combines a variety of constituent parts in a coherent way to form a complex system. In any such system, the number of possible combinations of these parts vastly exceeds an organization's ability to try them all. Heuristics and experience are employed to restrict the number of feasible solutions evaluated. "Heuristics" means human and organizational cognition plays an important role in the creation of an architecture. Experience implies that the prior history of a company and an industry play a continuing role in shaping the types of future architectures that are created within an industry.

Today, we have the tremendous business success of companies such as Intel and Microsoft in creating and managing the many combinations of Intel® X86 and Pentium® microprocessors with Microsoft's DOS* and

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Windows* operating systems. The success of this platform has drawn attention to the value of an effective, widely supported platform. What is perhaps forgotten is how tremendously difficult it was to establish a platform in the first place, and then how difficult it is to sustain the advance of that platform over time.

We review a brief history of two software companies, Adobe Systems and Metaphor Computer Systems, and use the comparative history to explore the difficulty of creating and sustaining a platform over time. Those interested in a more extensive treatment of these companies can find it elsewhere [7].

Adobe Systems' Early History

Today Adobe Systems is known as one of the most profitable and most valuable (as measured by its stock market value) software companies. The company's first important product, PostScript, created a new industry segment within the personal computer industry, known as *desktop publishing*. This has been an important platform technology since the mid-1980s.

In its infancy, however, its technology was developed within Xerox's Palo Alto Research Center (PARC). The journey from internal laboratory to successful software giant was far from straightforward and illustrates the challenges of creating a platform technology.

Within PARC, what was then called Interpress was a means of allowing Xerox's laser printers to print what was displayed on a Xerox Star workstation. This capability became known as WYSIWYG, or "what you see is what you get." Thus, the Interpress technology was a component of the entire Xerox system, consisting of a number of networked workstations, connected to a shared laser printer via what would become known as the Ethernet networking protocol.

John Warnock and Charles Geschke, who both worked on this technology while at PARC, wanted to create a standard around Interpress. However, their management within Xerox resisted this, because they did not want to give away one of the primary differentiating features of the Star system. Eventually, Warnock and Geschke would leave PARC over this dispute.

Once outside of Xerox, the two had to create a business to exploit the technology that they labeled PostScript*. Initially, they decided to create a turnkey publishing system, complete with proprietary hardware, software, fonts, and applications. This complete systems approach was very similar to that of Xerox in its Star workstation.

As they tried to raise money to fund their venture, though, Warnock and Gescke ran into resistance from venture backers, as well as from leading companies of the day. Both Gordon Bell of Digital Equipment Corporation and Steve Jobs of Apple Computer persuaded them to pare down the scope of their technology efforts and to focus upon the fonts themselves. Other companies would work with Adobe to utilize the PostScript fonts in their products. Eventually, Hewlett Packard and Canon agreed to bundle in PostScript as a standard item in their laser printers, while Apple agreed to support PostScript in its software. The PostScript platform was now in place, and Adobe grew to become a valuable company. So valuable, in fact, that Microsoft would later team with Apple to create a rival standard known as TrueType*, to take away some of the profits from the PostScript platform.

Metaphor's Illustrative Failure

Metaphor Computer is another software company that was started by people who were previously employed at Xerox. The two founders were Donald Massaro and David Liddle, both of whom were highly regarded in their roles at Xerox. They had envisioned a user-friendly software approach to construct database queries, to allow analysts to address a number of questions that were currently being held up by the long queue of projects within the MIS organization. It was to become one of the very first client-server applications.

Like Adobe, Metaphor initially chose to construct the entire computing system environment to support their user-friendly query construction approach. And Metaphor persisted for a number of years in pursuing a "do it all yourself" approach to implementing their technology.

Unlike Adobe, Metaphor chose not to partner with other firms to commercialize its technology. If a customer valued the ability to generate database queries of corporate mainframe data, the customer had to buy the entire stack of Metaphor's offering. There was no layer that was carved out and shared with other firms. The lack of third-party support greatly restricted Metaphor's market penetration, and the company was sold in 1991. The Metaphor product was withdrawn from the market.

Challenges in Building a Platform Business Model

Why did Adobe and Metaphor initially choose to implement entire systems? This can be explained in part by the Xerox PARC legacy, where there were researchers working on basic physics and materials, as well as computer scientists, and even anthropologists and sociologists. PARC celebrated the multi-disciplinary scope of its research capability, and successful

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researchers from that institution may have carried that value forward with them. And Xerox, its parent company, ran its business by selling complete solutions to its (primarily) corporate customers. This entailed pricing at gross margins in excess of 50%, maintaining a direct sales force, and performing all of the R&D necessary to advance the product line.

But a more general reason is that creating new architectures to connect disparate parts is a complex and interdependent undertaking. Initially, the best way to partition the functions within a system is far from clear, and changes in one part of the system often create problems in other areas, even those that might seem at first to have no connection to the change. It helps greatly to be able to manage this interdependency inside a single firm. The many tradeoffs and compromises that must be made do not involve any monetary payoffs to outside organizations.

Why, then, did Adobe eventually shift away from a turnkey approach, and build a platform instead? Adobe was able to mature its technology sufficiently to envision partitions and interfaces between the constituent elements of its offering. It readily appreciated the greater market penetration it would realize if Canon, HP, and Apple embedded the PostScript library in their printers. It also focused its business model to deliver and enhance the fonts themselves, leaving the other functions to others in the platform. This allowed it to make money, without having to charge too high a price to cover unnecessary overheads that weren't directly related to its value added.

Once a platform is established, new challenges arise. On the one hand, the platform architect wants to encourage as many third-party developers as possible to make investments to create products that leverage the platform, thus increasing its value. This leads to a policy of neutrality towards any specific developer.

On the other hand, the architect cannot order third parties to develop any specific applications, or to make improvements to existing applications. If important applications are missing or inferior, the platform could be at risk of being supplanted by a rival platform. This leads to a policy of favoritism towards certain developers, and even selective forward integration into making the application. If the desired new or improved application requires substantial interdependency with the architecture of the platform itself, this again encourages closer organizational integration to execute the task.

METRICS FOR MANAGING OPEN PLATFORM INNOVATION

It is a well-known axiom of management that, in order to get better, an activity must first be measured before it can be improved. (W. Edwards Deming's work in quality improvement is but one example of this.) How then, can one measure open platform innovation, in order to manage it more effectively?

The first step is to realize that many of the traditional measures of R&D exclude vital elements of a healthy, Open Innovation process. Consider the percentage of sales spent on R&D. A moment's reflection reveals that this only captures the spending on *internal* R&D and omits entirely any investment by any other party, including suppliers, customers, or third parties. Yet the amount of external spending may be a critical leading indicator of the vitality of one's platform. Few, if any, companies today track this number, and it is ignored by Wall Street analysts, but it is as important to the value of one's platform as the amount of internal money one spends. Indeed, outside financial analysts would do well to track such external spending in their own evaluation of the vitality of a company's technology, and by inference, that company's stock price.

Another obsolete metric is the number of patents generated from internal R&D. While patents can be useful and a few of them can turn out to be quite valuable, becoming a "patent mill" is a poor way to manage industrial innovation. It is far better to track how many patented technologies are used in one's own products—as well as in other companies' products. It is after all the discipline of getting products to market that is vital to finishing the innovation process and delivering value to the market.

Furthermore, many companies pay small awards to researchers when those researchers are awarded a patent for work they have done at the company. However, there is usually no equivalent recognition given to an employee who finds an equally useful external technology. A bounty program for locating and accessing such technology makes good sense.

A few companies have gone still further, tracking the extent to which their portfolio of upcoming R&D projects utilizes external ideas, as well as ones generated internally. One company discovered that its internal ideas were 90% of the portfolio, and it decided to raise the external portion of the pipeline to 50% over the next five years. Other companies are setting stretch goals to increase the number of new products coming to market from R&D each year, which has the effect of motivating the R&D organization to supplement its internal R&D projects with additional ones located on the outside.

CONCLUSION

Technology companies create substantial value when they are able to establish platform technologies that are

broadly accepted. However, these platforms are challenging to create and also challenging to advance once they are established. Companies will need to blend some amount of internal organization with open coordination with outside companies to manage these challenges. In an innovation environment that is characterized by broadly distributed knowledge, industrial companies will need to open up their innovation processes to leverage the wealth of external knowledge available. In the process, new measures and metrics will be required as well.

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