Learning Curves: Managing Smooth Product Development Cycles in Non-Print Environments

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With the demand for electronic products and desktop access in the past 5-8 years, information providers have had to reorganize their operations to manage and produce digital versions of their publications. They have had to develop new formats and new interfaces while also refocusing business plans to establish new pricing models and collaborative partnerships. Managing these types of fundamental changes to their business has entailed use of project management as well as new product development processes.

Unlike the mature medium of print on paper, publishing in a non-print environment requires established processes of product development and requires expertise in the appropriate management of those cycles. But publishing organizations, at the beginning of this decade, had little familiarity with such cycles as applied to the electronic environment. For print, there was a standard production process for taking an item from manuscript to bound volume or in the instance of secondary bibliographic resources, from published source to full bibliographic citation and abstract entry. But since the burgeoning of the scholarly literature since World War II, these processes had become well-known and expertly done by most organizations in the publishing community.

Conversant with the information requirements of the professional and scholarly research communities, the Institute for Scientific Information (ISI) produces highly-acclaimed Web environments for tools which facilitate serious research at the desktop. In building those environments, like so many other content providers, ISI had to establish new or modify existing processes for conceiving, planning, developing and testing a product prior to commercial release. The context in which this process was developed mirrors the changes at large in the publishing and information industries between the period between 1993 and today.

First Generation of Change, 1993-1995

In these early years of change for the publishing and information industries, there were clearly more outstanding issues relating to delivery of information at the desktop than there were any immediate solutions. Customer demand from both the library and end user communities was for delivery of and access to electronic information resources. But for information providers, there was no immediate consensus from those communities as to what model that access should follow. And product development is (or should be) driven by shaping a product according to customer desires. So how to begin the process?

Publishers had revenue streams from successful print products and they were unsure of how to best to handle the risk of moving toward new formats and delivery mechanisms while still
ensuring commercial survival. And they didn’t want to stray too far from the physical appearance of the print model in terms of either appearance or functionality.

There were some specific concepts and issues related to electronic publishing about which most of the publishing and information industry really knew very little such as:

- Development Costs (how much does it take to build an electronic product)
- Technology issues (creation of user interfaces and product functionality, a new term for many only familiar with a print environment)
- User issues (determining level of appropriate content, concerns with education, training and support, licensing and authentication of users)
- Partnership issues (traditional or unknown).

Many publishers had to begin by hiring consultants or by allocating limited internal staff or other resources to investigate the possibilities. But there were concerns about the levels of investment required to enter the marketplace with a new electronic product. Publishers did not feel sanguine about large investments when there was no previous indication of economic return on investment. And they began to look about for possible partners with whom they could share the learning experience and the investment.

Another element of concern was that decision-making in these initial efforts was difficult, given the lack of standards and performance benchmarks. Nor were there any business models that could easily be drawn from in the electronic environment.

You may have heard of our Electronic Library Project, launched in 1994 in conjunction with IBM. In that instance, we did what many of the publishing community did. We found an interested vendor with whom we could partner to experiment with unfamiliar technical specifications, functionalities, access concerns and content requirements. Specifically, the initial goal of the Electronic Library Project was to develop a prototype for an electronic document storage, management, and distribution system based on a client server architecture. IBM could offer us the technical expertise and components for storage, retrieval, and the delivery of information in a distributed environment. We were looking to gather information on the electronic delivery of full image journal articles, what types of participant and system support might be required as well as learn what we could about patterns of use for electronic information and about economic models for this kind of information delivery.

We elicited cooperation from more than one hundred publishers and we also tapped into our client base for assistance in this trial effort, enrolling participants from academic, corporate and research libraries.

The Electronic Library Project, just as other projects of that period such as TULIP from Elsevier Science and RedSage done in conjunction with Springer-Verlag and the University of California, was initiated as an experiment from which we could build future product development initiatives.

And we were successful in the sense that we learned an enormous amount from that initiative. The Web was going to be the preferred architecture in this environment, both on the basis of the widely accepted user interface as well as from the perspective of delivery to the desktop. None of this seems like news right now, but recall that prior to 1994, most publishers had little knowledge of how to exploit the strengths of the Web in terms of value-added products and
services. There was little recognition of its application, being seen as it chiefly was, as a communications vehicle for academic and scientific research communities.

And even within the period of the Electronic Library Project, technology changed. We had employed TIFF images for this initiative but it became clear even before the project ended, that there were other, more robust possibilities in PDF and SGML that would be preferred by our publishing partners and our users.

Second Generation of Change 1995-1997

The second generation of change as it occurred in the mid ‘90’s for the publishing industry centered around the need to convert content from print to electronic at an acceptable level of cost. Locating and maximizing the technical expertise required in developing technical specifications, programming skills and technical support for one’s partner became key concerns. But it was still clear that for most publishers, for the foreseeable future, print revenues would have to be protected in order for these organizations to invest appropriate resources in the necessary infrastructure and technical expertise.

Publishers discovered that an organization’s product development cycle must be able to take into account the rapidity of technical change. How did one maximize the time, productivity and expertise of staff, particularly the programming staff in this environment?

It was during this period that the Institute for Scientific Information began to work on building a Web-based environment for its renowned Citation Databases. We encountered first hand the problems of applying the strengths and weaknesses of the new technologies to long-established information systems. As an example, one of our biggest challenges initially in developing the Web of Science came when we discovered that the web-based search engine software available to us at the time was inadequate to the needs of our database and the needs of our customers. ISI would have to develop our own proprietary search engine for the Web of Science before we could move the citation product to the web. We were successful but it was a significant challenge. It was not typical for builders of bibliographic resources to be concerned with the actual systems for retrieval — that had always been the purview of the traditional online vendors themselves. The Institute for Scientific Information now regularly builds and refines its own text retrieval programs for its Web-based products.

It was also during this period that ISI moved to a project management approach towards development of tools for the Web environment. This type of approach towards project management entails a constant stream of development for electronic products. As an example, an organization may begin work on version 1.0 of a product and within 6-9 months, commensurate with the beta-testing of that product in version 1.0, be working on the “heads-down” programming for version 2.0 and initiating final technical specifications for version 3.0. Such a development spiral for implementing improvements and additional functionalities for a product requires a focus on targeting specific release dates while understanding that the organic nature of product in the electronic environment means that no one version of a software product will ever be without flaws or without some feature that requires further development.

Even now in the development of future versions of the Web of Science, we must prioritize which features will be considered top priority for inclusion in the next release and which must be considered of lesser value to our users. Should the various bibliographic elements tied to a single source article be displayed on a single screen? Do users feel that the use of two screens in this instance is so disruptive to their work flow that this change must become a top priority?
Or can we postpone that particular change in order to accommodate a pressing release date for
the product.

The Institute for Scientific Information began implementation of project management techniques
in late 1995 and, in less than five years, has expanded that staff to include six project managers
for a wide variety of product initiatives. It is the role of the project managers to work closely in
conjunction with the ISI New Product Development group to make the types of decisions
necessary to bring product to market. Between those two groups, the departments responsible
for project management and for new product development, ISI is constantly launching and
refining both internet and intranet applications intended for both corporate and academic
environments.

**Third Generation of Change, 1998-2000**

The third generation of change for our industry, the current environment, is not yet clearly
delineated. Some things have become clear to content providers. To succeed in this uncertain
marketplace, organizations must partner with one another. The roles of aggregators, online
service providers, and content providers mingle and in some instances marries content in new
ways. The technology makes possible new linkages between different kinds of content that
may never have been considered before in building information resources and the publishing
community has begun to develop the expertise to be able to bring these types of products to
market.

As an example, in early 1997, the Institute for Scientific Information recognized that the overlap
between patent information and journal information was significant. The patent databases from
our sister company, Derwent Information, contained more than 3 million citations to the pub-
ished journal literature. The *Web of Science* contained more than 50,000 patent references. It
made sense to bring the two types of information together in a web-based resource.

A cooperative effort between the two companies began by looking at the way in which the data
was currently structured. In some instances, the two sets of fielded data correlated well. An
author field in the bibliographic record could easily correspond to the inventor field in a patent
record. But there were other ways in which the data structure could not transfer quite as readily.
And it was important that both organizations have a clear understanding of how the other
group processed the different forms of data for inclusion in the product. How Derwent captured
citation data from the patents differed from how ISI captured citation data from the journal
articles. It was working cooperatively in the early stages of product development that permitted
the organizations to develop a high-quality resource from which they could mutually derive
profit.

The resulting cooperative product, **Derwent Innovations Index**, which becomes available in
May of 1999, has an interface that makes the structured patent database compatible with the
Web of Science, linking the two forms of content for greater accessibility and functionality
and ultimately for greater value to the user community. And as you may expect, the process is
ongoing for version 2.0 and upwards.

Product development and project management have value for content providers in the electronic
marketplace. Once fully implemented by a content provider, the processes make it possible for
organizations to stabilize planning and development activities and costs. Ultimately, with that
stabilization comes the ability of publishing organizations to produce electronic resources that
will enable users to actually work in the digital libraries originally envisioned by library
professionals in the early 1990’s.
One final note of caution to this audience, while the processes of project management and product development are customizable to diverse types of organizations, it would be a mistake to apply the successful template of one company onto the processes for another company — even if they would seem to provide similar services to the marketplace.

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