# Developing an Internet Presence with On-line Electronic Catalogs

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## Introduction

The rapid transformation of the Internet from an academic and research-oriented network to a public network of networks without commercial use restrictions has motivated many companies to consider the Internet as a new medium for information and service exchange. Activity in deploying corporate Internet presences has exploded in the last year. Corporations are motivated by the promise of new distribution channels, rapid information delivery between themselves and their customers and suppliers, and reduced transaction costs. A corporate Internet presence might consist of an electronic mail gateway between the Internet and the corporation's existing computer network. The corporation might also extend its presence with on-line catalogs and electronic data interchange (EDI) transaction processing gateways.

The goal of this document is to identify the issues in designing and deploying on-line Internet catalogs. On-line catalogs on the Internet offer the opportunity for interactivity, dynamic content presentation, and interfaces to value-added services. Companies use these on-line catalogs to attract potential customers and sustain an existing customer relationship by offering up-to-date product information, providing on-line ordering capabilities, and delivering after-sale technical support. To successfully deploy an on-line catalog, companies must consider the following areas:

- Catalog functionality: what information and services does the company want its customers to see, experience, and regularly use? How will the company sustain interest in its on-line catalog? The choice of what functions to deploy is highly dependent on the particular business process the company wishes to support.

- Catalog technology: how will the functionality be architected and implemented?

## On-line Catalog Usage

The "canonical" on-line catalog enables the customer to perform a sequence of steps in a "discovery-to-payment" process. A potential customer typically goes to an on-line catalog to discover and "graze" through the supplier's product information. The catalog user may also wish to review additional supporting documentation, such as corporate backgrounders, testimonials, review articles, etc. For technical products, the evaluation will include the product's technical descriptions. Next, a process of negotiation of the business terms (e.g., product price, availability, payment vehicle, etc.) occurs.

Once the customer and supplier have agreed to the terms by which the product will be exchanged, the customer will submit a purchase order to the supplier. The supplier must

determine product availability, deliver the product, and bill the customer under the agreed upon payment terms. This step requires a clear payment and settlement process in which both the customer's and the merchant's accounting organizations and merchant banks are involved. For large monetary transactions, often some form of money management, such as the extension of credit is necessary. For smaller monetary transactions, typically in the consumer market, checks, credit, or debit cards are used.

## On-line Catalog Functionality

If this usage process is examined, one will quickly conclude that the successful deployment of an on-line catalog is more than the one-time creation of multimedia pages. The architect of the on-line catalog will need to consider how catalog users will locate the information they want and how the company will manage the order taking, fulfillment, and payment processes. Handling the information transmitted between catalog deployer and user at different points in the "discover-to-payment" cycle will be routed to different functional organizations. These funcational organizations' information systems and processes will need to be integrated with the company's Internet presence strategy. Finally, continuing processes must be established to maintain and update the on-line catalog's content and services.

As always, the desire for deploying a broad range of catalog functionality is constrained by the available resources and expertise. Corporate presences on the Internet may wish to provide some or all of the functionality listed below. Choices of what functions to deploy for general use are constrained by the specific business model and resource availability.

1. Corporate Communications
    - 1.1 Backgrounders
    - 1.2 Press Releases
    - 1.3 Company Points of Contact (phone numbers, addresses, email addresses, etc.)
    - 1.4 Technology Reports, Papers, Articles
    - 1.5 Financial reports (e.g., SEC reports)
    - 1.6 Quarterly and Annual Reports
2. Product Marketing
    - 2.1 Product Lines
    - 2.2 Individual and Group Product Descriptions
    - 2.3 Pricing
    - 2.4 Inventory Availability
    - 2.5 Technical Descriptions
    - 2.6 Customized product catalog based on user identity and viewing context
    - 2.7 Product models for insertion into CAD systems
3. Locating Products and Services On-line
    - 3.1 Searching on products and other catalog content
    - 3.2 Search over multiple catalogs (across multiple companies)
    - 3.3 Search by product requirements rather than individual product specs
    - 3.4 Product configuration verification
4. On-line Ordering

4.1 Retail Transaction Model – two direct parties involved in transaction; payment usually done via credit card, debit card, digital check; retail terms; single authorized purchaser
4.2 Business Transaction Model – multiple parties involved in transaction; commercial terms and conditions, potentially involving credit

5. Customer Support
   5.1 General product questions, pre-purchase inquiries, product quotes
   5.2 After-purchase support

## Technology Components

The functionality which comprises the overall on-line catalog can be implemented using a variety of technology components. The list below is not meant to be an exclusive list of technology components which are needed, but highlight some of the more important components.

1. Computer – with the appropriate network connection, disks, and memory
2. Internet Servers (World-Wide Web, File Transfer Protocol) – these servers are what customers on the Internet will be connecting to in order to access the company's information and services.
3. Databases – used to store company content (e.g., catalog, inventory, pricing data).
4. Encryption – needed to support message transaction security
5. Authentication – needed to verify an individual or organization's identity. Digital signatures and public key certificates (e.g., third-party issued credentials).
6. Dynamic Domain Name Servers – can help in distributing the computational load across multiple machines which also might be physically distributed. Useful when scaling the corporate presence.
7. Indexing/Search Engines – used to help the customer locate information or services on the company's servers.
8. EDI Gateways – support transmission and reception of EDI messages between the company and its trading partners.
9. Billing Gateways – support the settlement of credit cards and transmission of payment for services rendered.
10. Communication Tools: e-mail, newgroups, Internet audio/video.
11. Translation Tools – format translators which generate content based on existing document and publishing production tools.
12. HyperText Markup Language (HTML) Document Authoring – enabling document publishers to author in the HTML.
13. Document Configuration Management – managing the evolution of documents and services.

14. Access Log Analysis – enabling organizations to analyze server logs for demographics, frequency of document access, threads of discovery, etc.

15. Catalog Authoring Tools – creating and managing on-line catalogs.

16. Catalog Verification Tools – allowing link verification, catalog server stress testing.

17. Transport Protocol Conversions – converting between HyperText Transport Protocol (HTTP) and other content transport protocols

18. Naming conventions and ontologies – formulating company standards for how content is encoded and details for how content may be accessed and searched.

19. Domain translators – tools and specifications used to convert content and search queries among the representations of multiple catalogs within and across multiple companies.

20. Brokers and facilitators – used to support cross-search of multiple catalogs within a company and across multiple companies.

21. Abstracting mechanisms – techniques and tools used to create abstracts of a catalogs coverage for use by indexing/search engines and brokers and facilitations.

## Conclusion

We have outlined some of the issues to developing an Internet presence with on-line electronic catalogs using the World Wide Web. These issues come out of our experiences as part of CommerceNet, a non-profit consortium of over 40 companies, government agencies, and educational organizations building an open infrastructure for conducting electronic commerce on the Internet. Contact William Wong at `wtwong@eit.com` or Arthur Keller at `ark@cs.stanford.edu` for more information.