

Information Management for Commerce Solutions



chain management effort, business-to-consumer (B2C) Web sites focus on selling directly to consumers. For that reason, a Commerce solution in a typical B2C environment provides features and functionalities that appeal to end consumers by enhancing their online shopping experience. At the same time, Commerce solutions are usually integrated with transactional systems such as order management to ensure timely execution of the orders placed on a Commerce site.

A large amount of data from multiple sources is consolidated within these Commerce solutions, which affects the quality of the end-consumer shopping experience. This information includes data classification by the type of items sold, organization of the product assortment and various assets that correspond to an item such as detailed descriptions, images, music, video or manuals.

The utilities that come with Commerce applications such as bulk data import, manual user data maintenance and some approval processes provide tools to manage data. But, with the growing need to make dynamic changes to a site, these tools often fall short in the following areas.

- Complex data validation capabilities to support management and

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Introduction

Publishing enriched product data to new or existing Commerce solutions presents unique challenges. This white paper presented by the IBM InfoSphere® MDM for PIM team is a result of our experiences in implementing Product Information Management (PIM) solutions for customers to meet such challenges. The purpose of this white paper is to capture and document various consumer requirements as they relate specifically to Commerce solutions. The goal is to provide readers with an understanding of the overall capabilities a PIM solution should include to meet those requirements.

PIM benefits to Commerce Solutions

While business-to-business (B2B) Web sites are primarily part of the supply

- enrichment of item information
- Functionality to manage multiple states of catalogs
- Functionality to manage multiple hierarchies with varying category data
- Lack of user-friendly data management tools to mimic the site structure

Therefore, Commerce is just one piece of the puzzle. A PIM solution can help manage product information for an organization, meeting many of the requirements a typical Commerce solution cannot.

Benefits of implementing a PIM solution to support Commerce:

- Implementing business processes around the introduction, enrichment, and management of product information for data publication to a commerce solution
- Consolidating data from existing repositories by feeding existing data sources into PIM
- Increasing business-user involvement in managing data, leading to improved business processes and reduced dependencies on IT personnel
- Going beyond publishing to Commerce solutions by publishing data to a variety of external systems, eliminating the need to maintain product information in multiple applications

Organization and logical groupings of items

Imagine visiting a new department store to shop for a black leather sofa from a popular brand. Unless you are aware of the physical layout of the store, it is going to take you some time to find the exact location where the item is displayed. The location of the sofa can be identified more quickly by following the signs on each floor/aisle, bringing you to the right area. Once you get to the exact location, you can narrow down your search to the specific brand, color and size of your choice.

Now that you have chosen the sofa, you might be interested in a chair. It is highly likely that the matching chairs are stored near the sofa. This type of association is classified into up-sell and cross-sell techniques. The store may study customer buying patterns and organize merchandise to improve the customer buying experience and also to increase store sales. The store may also wish to sell these products together such as in promotional bundling, which could have a combined price that is less than buying the sofa and chair at individual item prices.

Items are stored and organized in a similar way in most retail businesses, where the end consumer navigates to the specific item of choice to make a purchase. This applies to both physical and online stores. The better the store is organized, the better the customer experience, which adds to overall customer satisfaction.

To support this type of experience while shopping online, a PIM solution supporting a Commerce solution should be able to:

- Store the various sellable items (SKUs)
- Create logical groupings of items

(products). In the previous scenario, the ultimate purchase is the SKU. However, the user first looks at the leather sofas from Brand XYZ and then narrows down to the specific size and color. In this case, the sofas from Brand XYZ form a logical group (see Figure 1).

- Create logical groups of existing logical groups. For example, a bundled item can be a separate logical group. The additional flexibility needed includes the creation of logical groups comprising specific SKUs from other logical groups, logical groups comprising of other logical groups (sub-groups) or primary vs. secondary associations between logical groups and SKUs (see Figure 2).
- Provide the ability to create associations between logical group to logical group, logical group to SKU, SKU to SKU and SKU to logical group (see Figure 3).
- Create flexible views (hierarchies) and organization (categorization) of items with the ability to have items mapped to multiple views and to multiple locations (categories) within a view (see Figure 4).

New item introduction and synchronization

Ways of introducing items to support a Commerce solution

Existing SKUs in an organization can be introduced into PIM, which triggers the logical group creation process. In such situations, the SKUs are known and uniquely identified. There will be situations where businesses start from the logical groups and add new SKUs to these groups. This requires new SKU creation with a unique identity. Rarely, businesses have existing SKUs maintained in a master item repository and would also like to use PIM to introduce

Figure 1

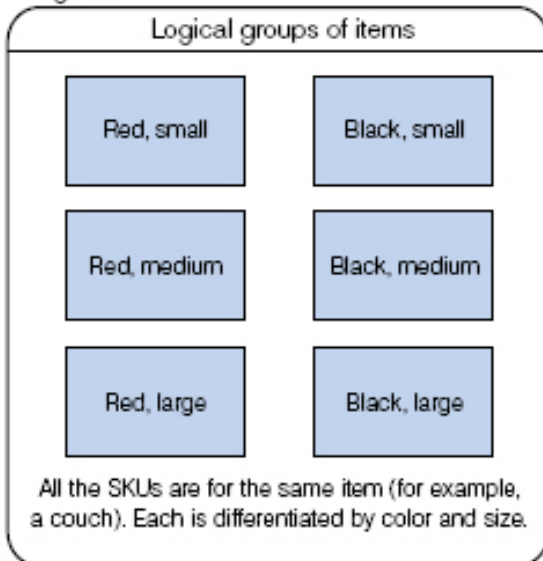


Figure 2

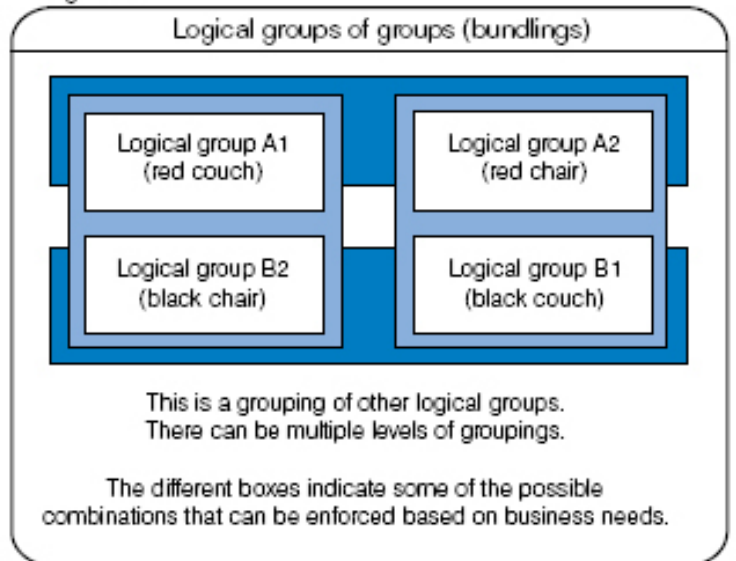


Figure 3

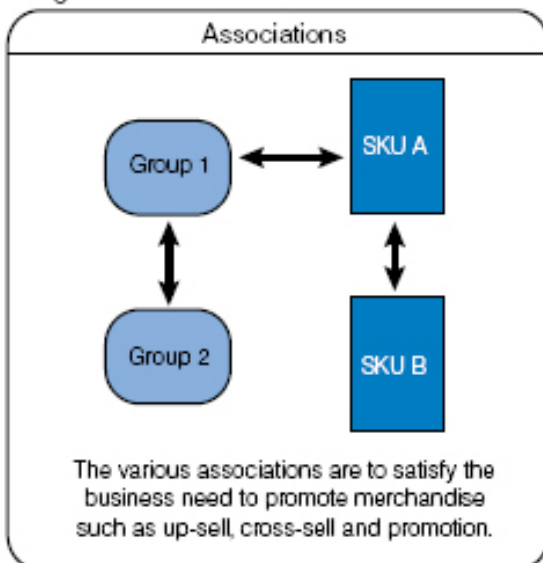
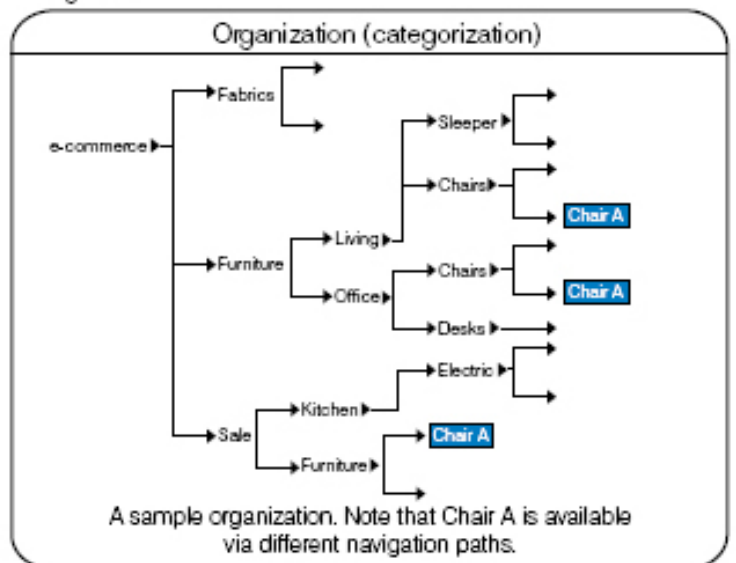


Figure 4



new ones. This is not a recommended practice, primarily because this defeats the purpose of having one single master item repository.

As mentioned in the previous section, a SKU in a group is uniquely identified by its characteristics. For example, for SKUs in a group (product) with size, color and finish as characteristics, a SKU with values Red, Small and Cherry form a unique SKU within the group.

There are different ways in which today's businesses introduce new items (SKUs/ logical groups).

These include:

- Maintaining a master item repository of items (SKUs) in which a manual or automated process provides the introduction.
- Including approval processes at various stages of the item introduction, which again can be a mixture of manual and automated processes.
- Introducing various peripheral items such as products or bundles to address Commerce solution needs. In some situations, this peripheral item creation is left to the application that needs this information.
- Including manual/semi-automated processes for managing

obsolescence in the master repository and propagating the change in a timely manner to downstream systems.

PIM solutions can play the role of a master item repository. In such cases, a PIM solution is required to include several features to enable item introduction including:

- A one-time integration of the SKUs from existing legacy systems.
- The formation of a single repository, serving the needs of all systems needing item information.
- Manual or semi-automated

mechanisms to introduce new items (SKUs/logical groups) including creating new SKUs with unique identifiers, creating logical groups with existing SKUs and/or new SKUs and maintaining unique SKU characteristics with a logical group.

- Approval mechanisms at various stages in item introduction and maintenance.
- Management of obsolescence and propagation of timely changes to all destination systems.

In cases where PIM plays the role of a data source to Commerce solutions, PIM needs to include the ability to:

- Import SKUs from external sources and include them in existing or new logical groupings.
- Associate any Commerce related information to the imported SKUs.
- Create new logical groups with existing SKUs and/or new SKUs.
- Include approval mechanisms for the logical group creation/changes.
- Maintain the uniqueness of the SKU characteristics within a logical group.
- Manage an active assortment communication to Commerce solutions.

As a good business process, the introduction of SKUs should all take place in one system to avoid unnecessary integration and synchronization.

Synchronization

Each organization has specific requirements when it comes to introducing a new item into a PIM system and all downstream systems. These requirements range from a simple process to a more complex one. A major part of this has to do with the nature of the business and, more importantly, the evolution of processes and related corporate policy of an organization. This in itself is an

exhaustive topic, but the important point to consider is the need for synergy of this process between PIM and Commerce related information.

The information used in a Commerce solution at a high level is of two types. The first type is static information. This is product information including attributes and related static assets (such as images, fact sheets or assembly instructions). The second type is dynamic information such as inventory and various transactional data. PIM and content management solutions typically store static data, while ERP or other operational systems store dynamic (transactional) data.

For a product to be sellable on a Commerce site, both static and dynamic information is essential. Due to the nature of this data, both types should be managed separately outside of the Commerce solutions, which can lead to having separate hooks into the Commerce solution.

Because these disparate systems exist in retail environments, an item tends to be introduced into each solution at different times. When a new item is introduced into a PIM solution and is then published to a Commerce solution, this item technically cannot be sold until it is recognized by all other systems requiring this new product information. It is essential to synchronize the item introduction process with dependent systems while providing information to Commerce. There are various ways in which this can be achieved. The ideal way is to control the information flow into Commerce until all the systems have the required information. This can be achieved by:

- Introducing a message-driven integration between PIM and dynamic/transactional systems to initiate and acknowledge the item introduction. EAI tools can be useful here.

- Having a manual or automated approval process for new items to ensure the item is introduced to the required systems before publishing to Commerce.
- Allowing the Commerce solution to handle the consolidation of all information flow and providing access to an item on the site only if this item is available in all the components.

Frequency of data change

With the explosion of Internet commerce, most companies now have an online presence with Commerce capabilities for selling directly to end-consumers. For many, this online presence augments their main selling channel, which might be through physical stores or through catalogs and call centers. This has recently become quite common among companies in industries such as discrete manufacturing and consumer electronics, which traditionally sell through extensive networks of channel partners.

With increasing consumer demand for product information to assist in the evaluation process before purchasing, it became a requirement for end-consumers to access information or to even buy directly from the manufacturer. In the case of retail businesses, some entered the market strictly through the online channel while others have traditionally been retail outlets who have now started utilizing online Commerce as another sales channel.

Regardless of industry, not only do companies need a strong market presence, but they also need to be up-to-speed and adaptable to market changes in order to be competitive. As a result of market awareness, data accuracy and speed-to-market of updated information on commerce sites are essential and key to the business. Companies have implemented various techniques to ensure that the latest data appears on their Commerce

sites in order to meet the demands of the consumer. But these techniques can vary based on the nature of the business. For example, a hardware or auto parts retailer may not have items that change often when compared to apparel or a specialty store, where the nature of business demands changes at a higher frequency.

These data changes may include introducing new items, changes in characteristics of items such as modified descriptions, new image associations or changes in up-sell or cross-sell relationships, and changes due to discontinued items.

Business factors influencing these changes can include seasonal data or data driven by dates or events. Some retail businesses such as apparel or specialty stores are driven by seasons. These retailers make changes to the majority of their assortments to correspond to a season in which the products are offered. In some cases, these changes can result in the re-introduction of items from prior-year seasons. But in most of the cases, a large number of new items are introduced. Date or event-driven changes, on the other hand, can be related to special events, promotions or discontinued products.

In order for a PIM solution to support these needs, the following capabilities are required.

- The ability to quickly introduce a new assortment of products
- A mechanism to publish data in full and incremental modes to capture frequent changes and to reflect those changes on the Commerce site
- The capability to capture and publish attribute-level state changes of an item based on effective dates including all types of assets such as images, files and prices

- Features to incorporate major assortment changes for businesses driven by seasonal factors while providing archival capabilities to enable reintroduction of existing items

Most of these features are available in PIM products. The areas that need additional work include attribute-level state changes based on effective dates and enablement of major assortment changes without duplication of data.

Content Management

Web sites that include Commerce usually contain an extensive amount of information. This includes images, banners, manuals, articles, video and a host of other information in addition to the pure product information. As previously mentioned, information that is not tied to products can be stored and managed by content management applications.

Content management and PIM solutions can jointly manage Commerce data that falls into two areas:

- Pure content management that includes the storage and management of binary information such as images, manuals and video. This type of information cannot be broken down but it can be referenced in PIM while being stored and managed by a content management system.
- Structured content management includes the management of information such as an article, recipe or FAQ. This information can be structured by providing a defining set of attributes where the information is captured. This makes it easy for a data entry user to introduce such new information by identifying the common elements and breaking them down into manageable

attributes. An article, for example has a header, introduction, multiple paragraphs and footer. Each element can be managed using a separate attribute.

The PIM solution can integrate to an external content management system to provide various associations between existing content. For example, if an image managed by a content management system is associated with a product managed in a PIM system, the PIM solution will provide a mechanism to associate this image as a product attribute and is responsible for managing the product information and all such associations. However, the external content management system is responsible for managing and storing pure content-related data.

For structured content that can be broken down into manageable attributes, it is beneficial to have the capability of defining these elements in a PIM solution with features to modify such data. Only structured content that can be broken down into manageable attributes should be managed in PIM, however. This will make the data maintenance process easier. The presentation should use a template approach so that the PIM solution only provides the data for the elements managed in PIM that are applicable to the template.

Information Exchange

Ensuring complete information exchange The elements of an entity in PIM include the data stored in the system in addition to the other components stored externally. There are various ways for this data to be delivered. It can be in the form of user entry, imported information from external systems or messages.

This information is accumulated and enriched in PIM before publishing to external systems. If the information related to an entity in PIM is incomplete, it cannot be published to external systems. At the same time, it is essential for a PIM system to ensure that all the various components of an element are published as a single unit to the external systems. This is to ensure complete data integrity. For example, if an entity in PIM has a list of attributes with textual information, associated images (stored in content management systems) and linkages to unstructured content, this information all needs to be provided to the Commerce solution for the entity to be complete. This requires coordination with all the contributing systems used by Commerce. This type of information exchange falls into:

- Complete configuration, assortment information and all the associated attributes.
- Referenced information such as

images, files, unstructured content or any other externally stored information.

For completeness of information in a Commerce solution, and to enable execution of orders, the required information flow from transactional systems managed outside of PIM is also essential.

Transmission of data

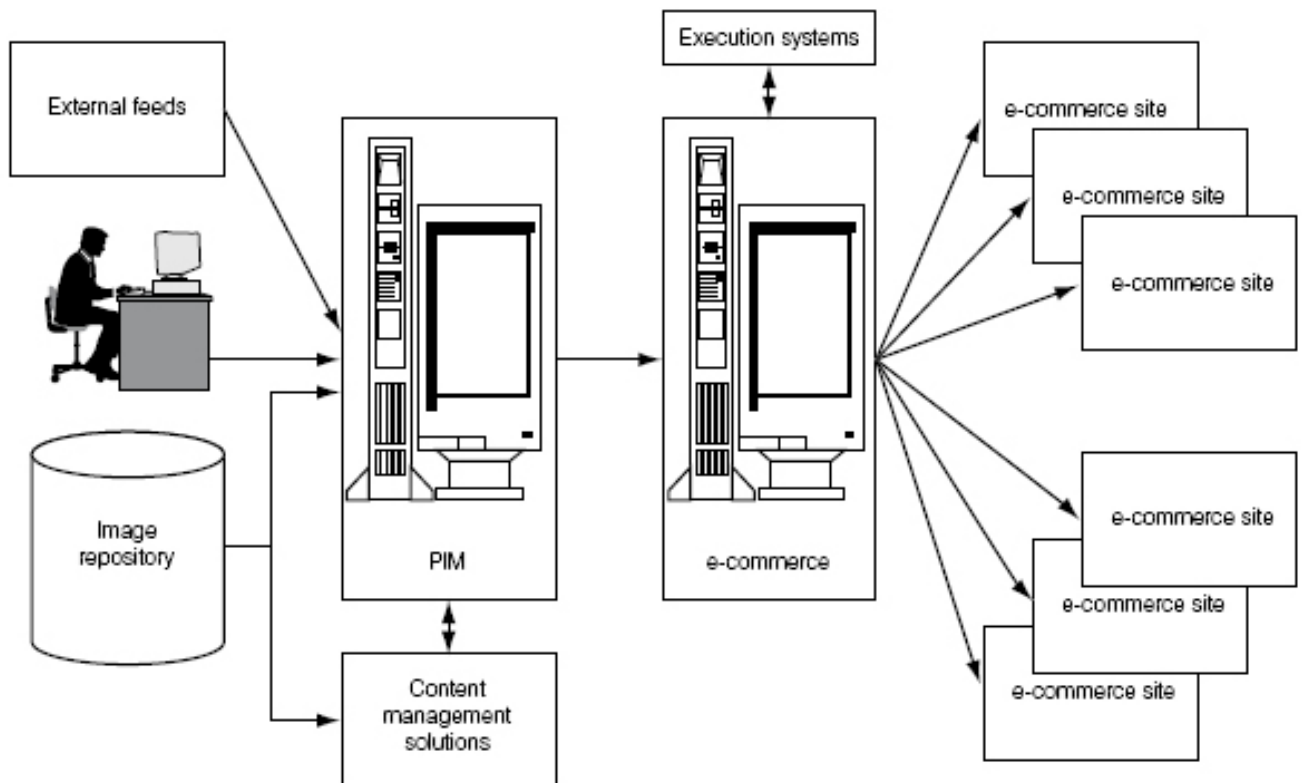
The data transmission approach depends primarily on the capabilities of the PIM system, the Commerce solution and the integration framework. The PIM system should be able to provide a complete assortment publish when necessary, while the Commerce solutions should be capable of accepting and loading the volume data. Sometimes only a subset of information or only changed information is needed. In these instances, the PIM system provides a delta export and the Commerce solution loads the data. This is specifically true for businesses that

have many data changes due to frequent assortment changes, seasonal factors or promotions.

Various transmission modes can be used for the data transfer. This could be a simple file transfer or a more robust and reliable mechanism such as enterprise application integration (EAI). The risk with a file transfer is its reliability and its recoverability from transmission errors. EAI tools, on the other hand, are created to provide a more reliable mechanism and are the preferred approach for such transmissions for the following reasons:

- Significantly more robust than File Transfer Protocol (FTP)
- Transformation capabilities without low level programming
- Guaranteed delivery
- Automatic restart and recovery
- Auditing and journaling capabilities, which simplify maintenance

Implementing EAI requires some amount of planning for the overall usage and



integration with various other applications within an enterprise. Consumers lacking this infrastructure can use FTP to quickly enable this data exchange. However, a long-term approach of moving to EAI should be put in place for best results.

Preview capability

Successful Commerce sites include ease of navigation, appealing presentation and the availability of accurate information. While navigation is highly dependent on the design of the site, the presentation and information are dependent on the data provided by the PIM and content management solutions. In such cases, there will be multiple iterations of the data sent to the Commerce solution to make sure the site looks good and provides accurate information. These multiple iterations can lead to numerous incremental updates.

A preview mechanism can help enable quick verification of the PIM data to ensure it matches the Commerce solution needs. There are three different ways in which a preview can be done:

- The data entry user explicitly logging into a Commerce environment and previewing on the system.
- Providing a preview capability within PIM systems by mimicking the Commerce presentation.
- Integrating PIM systems with Commerce to invoke the relevant Commerce solution screens and present these screens with the user-entered data.

Although the first option is the simplest mechanism, it reduces user productivity and increases the number of iterations of data push, directly impacting the time taken to validate data.

The second option gives the user a look similar to the Commerce page. However,

the preview is not the same, which can lead to last minute surprises on the site. There is also more development effort involved in PIM constantly keeping up with Commerce screen changes. And there are challenges in implementing some specific functionality tied to the actual Commerce environment such as presenting other data residing on the Commerce solution when PIM does not have visibility into this data. Therefore this is not a recommended best practice.

The third option is preferred, even though it involves some technical challenges. With this option, the PIM system invokes a Commerce application from a PIM application by passing the entity information. This gives users the ability to perform a preview on a real Commerce solution from PIM as data is entered. This way, users can quickly update incorrect information. This significantly reduces physical data transfers, increases user productivity and reduces the time it takes to introduce products onto the site.

Enabling a simplified integration requires PIM to extract and push a single entity (such as a product) along with all its relevant data. Similarly, Commerce needs a mechanism to invoke the system with this data resulting in a presentation of the relevant page with the provided data. An example of one such implementation is the integrated preview mechanism from IBM InfoSphere MDM for PIM and WebSphere Commerce.

Keys to a successful PIM implementation

Drawing upon the experience of implementing PIM projects, the following are certain aspects that one should consider while designing and implementing a PIM for Commerce solution:

- Always picture an enterprise PIM/MDM solution
- Position PIM as the Master Item Solution
- Establish generic PIM integration interfaces
- Leverage an enterprise integration layer
- Avoid Web Content Management System (WCMS)-like features within PIM
- Design PIM as an enabler to promotional systems
- Not all Commerce related data comes from PIM
- Classifying and handling pure content versus structured content
- Approach the PIM implementation in a phased manner
- Handling parallel PIM and Commerce implementations
- Clearly articulate PIM and Commerce solution responsibilities
- Develop integration and migration components early

Always envision an enterprise PIM/MDM solution

While designing the PIM for Commerce solution one should consider potential requirements from other channels and downstream systems that the enterprise will need to support in the future. It may be beneficial to conduct multiple brainstorming sessions upfront to get answers to questions: what does our enterprise item model look like (multiple channels, additional attributes, varying item types, item relationships, multiple item classifications, etc), enterprise business processes (how item setup differs across enterprise, can it be standardized, any common components etc), integration (how item data gets into the enterprise, how does it get consumed, different technologies and formats used, etc).

Position PIM as the Master

Item Solution

The PIM repository should be positioned as having the most up-to-date, accurate item data within the enterprise as the Master Item Solution / system of record. Even if item data gets authored externally it should be imported into the PIM solution validated and approved, and then published out to the enterprise. Positioning the PIM solution as the system of record for items and attributes helps lay down the right foundation for expanding the solution towards an enterprise-wide PIM solution making item data available to applications across an enterprise.

Establish Generic PIM

Integration Interfaces

From the beginning, it is important to establish standard interfaces for both inbound and outbound data that the PIM application will support. For example, an export to a Commerce solution should not be developed as a “Commerce specific” export, unless tight coupling is required by the business. Instead, a generic interface should be developed that can be leveraged by other systems within an enterprise in future phases. The interface(s) should be capable of incorporating different PIM entities such as item, categories, item classifications, and item relationships. Ideally these integrations should include both structure and data of information being exchanged to reduce the impact of model changes to upstream and downstream systems.

Leverage an Enterprise

Integration Layer

While the PIM application has an inbound and outbound component to bring data in and out of the solution, these components are not meant to address complex transformations and support point-to-point integrations with multiple systems. Ideally an enterprise would have an

Integration Layer composed of Integration Tooling (EAI/ETL) and an Integration Bus (MQ, ESB). This should be leveraged to transform multiple input sources and formats into the standard input interface for consumption by PIM. Similarly, for outbound data from PIM an export format can be transformed in a similar manner by this type of a tool to support multiple formats followed by distribution various downstream systems. This simplifies the data integration within the PIM layer and makes the enterprise solution more flexible and adaptable to support varying data sources and formats without the need for modifying PIM application.

Avoid Web Content Management System (WCMS)- like features within PIM

Despite the flexibility of a PIM application, functionality to support content layout and website look-and-feel should not be incorporated into the PIM solution. For example, a user may look to define a web page template (position, color and layout of different sections such as item description, images, promotions etc) within PIM and then associating items to that template. This type of functionality is best managed within a Website Content Management System (WCMS) which is typically provided as part of the Commerce solution.

Design PIM as an enabler to Promotional systems

When considering features such as promotional pricing and effective dating, one should design the PIM application such that it stores and publishes ‘static’ item data (effective dates, initial cost, suggested retail price etc) to consuming applications such as Commerce solutions & pricing engines. The downstream systems should have the capability of acting upon the data provided to generate the needed dynamic information such as final

promotional price, availability of product (seasonal, location), and so on.

Not all Commerce related data comes from PIM

Just because the Commerce solution requires certain attributes to be displayed on a web site, it does not imply that this data should be provided by the PIM solution. Typical examples are list pricing and up-to-date inventory levels; this type of data should be provided to the Commerce solution directly from the Pricing and Warehouse Management systems. Keeping this notion in mind helps one design the Commerce solution and other downstream systems to obtain data from multiple data sources based on the corresponding System of Record. It is generally a good practice during design to layout all the key item components (core item, content, pricing, inventory, classifications, locations, suppliers etc) and assign the appropriate System of Record to each component.

Classifying and handling pure content versus structured content

Classifying between pure content and structured content can be difficult. Any information that can be structurally broken down into manageable attributes can be stored in a PIM solution. Examples include recipes, tip of the day, articles, FAQs etc. If this type of data is available in binary form they can be stored and managed within a Content Management Solution (CMS), and can be referenced using links from the PIM system. Pure content such as images should only be kept as reference links within PIM. It is important to note here that a PIM system should not be treated as a content or image management system. When dealing with references to content within PIM it generally helps to have a predefined naming convention for all the different

types of content. These values can then be automatically generated and stored in PIM.

Approach the PIM implementation in a phased manner

While the overall objective would be to manage all items across the business in a consistent manner within a central item repository, the delivery of this should be done via a phased approach. Even supporting only the commerce channel within one phase may be large to address depending upon the item assortment volume and complexity. Therefore, one should look across various dimensions such as item model (item types, volume, item categories, relationships etc), business processes (item setup/maintenance, supplier setup/maintenance etc), downstream systems (commerce, ERP, pricing, data warehouse etc), and custom tools (custom search screen, custom item display etc) to determine a suitable approach for each phase that will deliver incremental business value while ensuring user adoption.

Handling parallel PIM and Commerce implementations

The discovery and high level design of the overall solution architecture should be performed as a first step. It may be beneficial to develop the critical components of the Commerce solution first before the detailed design of the PIM system is done. Nevertheless, a PIM Solution Architect should be involved throughout the requirements gathering and the design of both solutions.

Clearly articulate PIM and Commerce solution responsibilities

Functional requirements and responsibilities should be clearly distinguished for both the Commerce and PIM solutions. In addition, the dependencies between the two systems should be identified and

taken into account during project planning, requirements, and design efforts.

Develop integration and migration components early & iteratively

PIM exports to Commerce should be developed and tested during the initial iterations of the PIM solution implementation. If the PIM solution includes any data migration and/or inbound integration components (e.g. ERP Import) for importing the data which Commerce requires, then these components should also be developed early on in the project. This would help mitigate risks early on in the process.

In addition, it is recommended to use an iterative approach to developing both the inbound and outbound integrations because many risks are only addressed and discovered during system integration. Divide integrations into smaller integrations and start with fewer elements to integrate. For example, Commerce solution integration can be broken into the publication of multiple delta updates: item updates, category updates, relationship updates etc. Span these tasks across several iterations, and integrate them and test progressively.

Summary

Implementing a PIM solution for Commerce does have its challenges but the rewards can be experienced in the end product: a retail site with well-managed data providing a consistent user experience. A PIM solution can help manage product information by improving business processes, consolidating existing information, reducing IT personnel dependency and eliminating the need to maintain product information in multiple applications. Used together with a content management solution, a PIM solution can also help make complex Commerce information more manageable.

For more information about using a PIM solution to complement an IBM WebSphere Commerce investment, visit ibm.com/websphere/prodinfomgmt



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