IBM Product Master 12.0

A functional overview

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Introduction

Product information management (PIM) is a subset of the overarching Master Data Management (MDM) space, and its primary purpose is to help you create a master copy of product information. This information can be used to address strategic business initiatives throughout an organization.

Creating a complete and consistent PIM solution requires addressing different data requirements across existing systems, aligning implementations with existing business processes and workflows, establishing appropriate role-based access and offering business users an easy and intuitive system. However, organizations deploying PIM must ensure that their implementation leverages existing data models and business processes and integrates into their existing systems landscape. The solution must also adapt to the continuing needs of the business— allowing the data model, the business processes and the systems they integrate with to change as requirements evolve or as the business grows.

Any supplier, distributor, manufacturer or retailer must deal with high product data expectations of their stakeholders irrespective of their focus on B2C or B2B. As the products grow in numbers and with the availability of more and more channels, keeping a check on quality is a major challenge. A PIM system manages all information between the various systems which are in use in any organization such as: ERP, PLM, procurement, supply chain management systems, POS, ecommerce and many other systems. The core objective is to efficiently offer product information, which is consistent across channels and on every touchpoint.

IBM provides these foundational elements with IBM Product Master. IBM product Master is designed to be implemented in a wide range of industries and can be optimized for an organization's business needs. It includes a host of features that help ease the integration of PIM into enterprise systems, help capture broader collaborative business processes within the system and rapidly deliver value from PIM implementations.

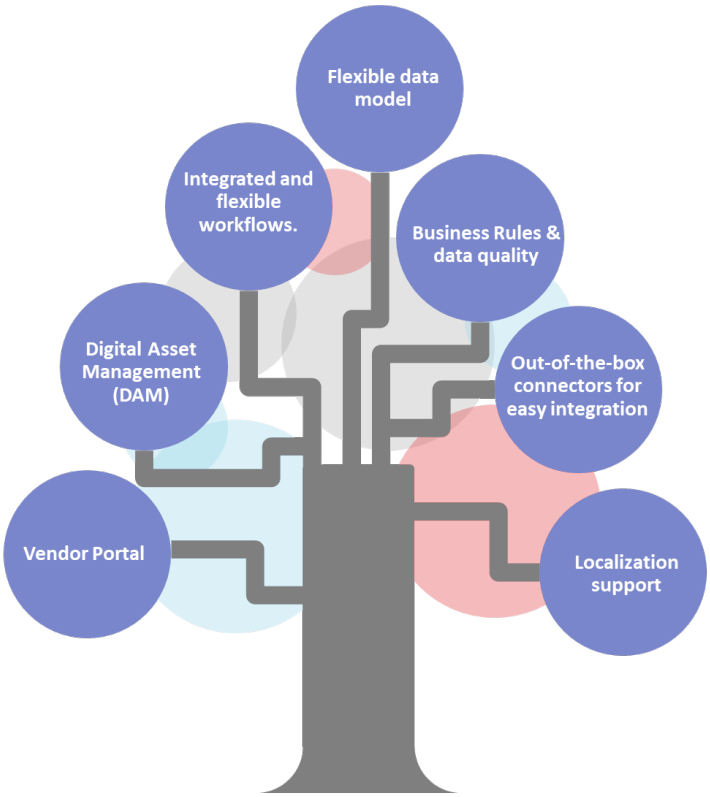

Figure 1

IBM Product Master: A functional overview

Organizations face growing demands on their product and service information. Consumers want more personalized information as they increasingly make buying decisions based solely on product information as opposed to physical interaction with the product. Tradespeople demand access to detailed information on mobile devices at their work location. Producers are catering to consumer demand by introducing new, differentiated products and services that can be tailored easily to specific consumers and markets. And governments are requiring that vital information about products and services be managed accurately and effectively.

These challenges are often compounded by the conflicting requirements of current and future system landscapes, as well as increasing merger and acquisition activity that adds integration (business and system) pressures. In such environments, there are five key requirements for a PIM system: a flexible data model, business processes that can quickly adapt to changing business needs, the ability to

manage multiple hierarchies, the ability to connect to disparate systems and a granular and easily extensible security model.

IBM Product Master meets those requirements by enabling companies to create a single, up-to- date repository of product and service information that can be used throughout their organization for strategic business initiatives (see Figure 2). Organizations using IBM Product Master can benefit from its robust features, including:

- Intuitive and extensible out-of-the-box user interfaces
- Business process collaboration tools including workflow
- Data aggregation and syndication capabilities
- Granular access privileges based on roles
- Flexible data modeling capabilities
- Sophisticated hierarchy management features
- A robust service-oriented architecture (SOA)

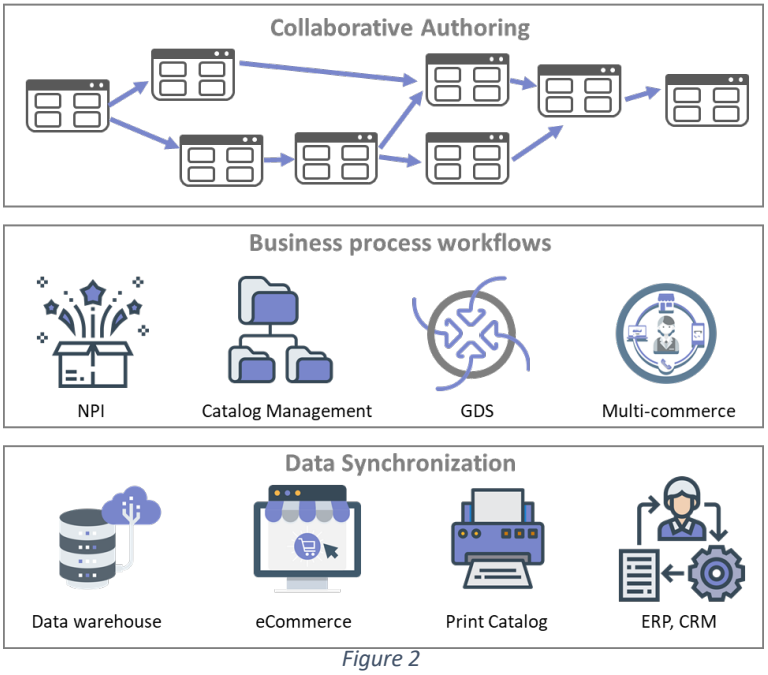

Figure 2

Key Concepts of IBM Product Master

- **Data model**: A representation of business and data requirements, designed using various and flexible business objects such as Catalogs, Items or Lookup Tables.
- **Catalog**: A collection of items related to each other via a business context. Catalogs are containers for items and can be associated with any number of hierarchies. For example, the Spring Print Catalog is a collection of just the print catalog products from the spring collection. It has its own hierarchy to organize the products within the print catalog and holds only the fields that apply to the print medium or channel.
- **Hierarchy** (or category hierarchy, category tree or taxonomy): A hierarchy is composed of categories and the relationships between them. Typically used to organize browsing or navigation, categories are like folders that can contain items or other categories.
- **Categories:** Categories are used both for browsing and organizing products. A category must be created within a hierarchy.
- **Items**: Items represent products and services, for example, stock-keeping units (SKUs), global trade item numbers (GTINs), market offers, or any other objects as defined by the business.
- **Specs**: A specification (spec) defines the data model (meta-model) for items, categories, locations, import or export files, and lookup tables.
- **Sub Spec**: Sub Spec is a portion of the Spec that can be contained within a main Spec and can be re-used by several other Specs.
- **Attributes** (or attribute names): An attribute is the definition of a field, allowing data to be collected on an item or category. An attribute has a type, the validations and other metadata used in the capture of data against this attribute.
- **Attribute value**: The data that is captured against an attribute on an item or category.
- **Lookup tables**: Lookup tables provide a way of storing highly used, constant data which needs to be looked up by the users many times. Like a catalog or a hierarchy, lookup Tables are also driven by Specs for data modelling.
- **Attribute collections**: An attribute collection is a group of item or category attributes that is associated or behave the same way in a context. Attribute collections are used for workflow step validation and catalog and hierarchy views.
- **Views**: A set of attribute collections, using which user can control what they want to see on screen. Users can select the view that they want to work with so that they see limited information on the screens.
- **Workflow**: Workflows define the business flow – steps are defined to perform certain business logic and these steps are connected to establish the flow. Workflows define the meta data for Collaboration areas and runtime behavior of these collaboration areas are controlled by the definition of workflows.
- **Collaboration Areas**: Collaboration areas are runtime manifestation of the workflows. You can define collaboration areas for a hierarchy or a catalog, based on the workflow definition. Once defined, items from a catalog or categories from a hierarchy can be checked out under these workflows for reviews and approvals by various people in the organization.
- **Role**: A Role entity represents the role that is being played by different set of users. E.g. roles can be Admin role, Approver role or Reviewer role. Multiple users can have the same role.
- **Company**: A Company is the top most container in IBM Product Master. All the PIM operations are done under a company. You can create multiple companies within the same application instance.
- **Access Control Group** (ACGs): Access Control Groups provide a way to control the access to the users. An ACG allows or restricts access to different parts of the systems like view catalogs, view items in the catalogs, edit items, delete items etc. ACGs are assigned to Roles, which in-turn provide the access to users having these roles.
- **Selections**: Selections are used to select a subset of items. You can either predefine these or select the items at runtime. Items selected from a selection can be used for various purposes like running exports, reports or simply display on the screens.
- **Static Selections**: Static selections are a type of selection that has the predefined criteria for selection of items. E.g. All items under set of categories are selected.
- **Dynamic Selections**: Dynamic selections also select a set of items but the criteria for selection of items is driven by a query (using the query language WQL). Hence, the result set can vary based on the criteria provided in the query.
- **Imports**: Imports let users import data into IBM Product Master. The data may correspond to items or categories. Imports support mass import of data and are run in asynchronous mode.
- **Exports**: Exports lets users send the data out of IBM Product

Master into external systems. Data is sent out asynchronously and users can control how data is sent out.

- **Reports job**: Reports are asynchronous jobs that can be used for doing various operations as jobs.
- **Environment import-export**: Environment import-export supports is sort of back and restore functionality within IBM Product Master which helps in cloning of a running system. E.g. a test system can be exported to a production box and all entities are cloned on the production system.
- **Document Store** (docstore): Document store is the store of documents which are required by the system. E.g. any custom scripts, Java code, or data files can be kept here, and other part of application can easily refer to docstore to get access to these documents.
- **Custom Tools**: Custom tools lets the users add their own screen via custom tools functionality and these custom screens can be invoked using the system menus. This is a great help in cases where customer wants to build their own customizations.
- **Extension Points**: If users want to extend any out-of-the-box functionality, they can provide their own functionality using the extension points. These extension points can be written using the Java APIs or scripting language and can be hooked to the system so that those are run at certain invocation points in the system.
- **Entry Preview**: It is a type of extension point which allows you to create a sample view of a current item set, which can be ran from the data entry screens. For example, you can write a script to view how an item displays when you use an XML format.
- **Pre-Processing**: This is an extension point that is run when items or categories are being saved. Preprocessing extension point is invoked prior to the saving of the item and before any processing for save starts.
- **Post Processing**: This is an extension point that is run when items or categories are being saved. Post processing extension point is invoked prior to the saving of the item but after processing operation is completed.
- **Post Save**: This is an extension point that is run after items or categories are saved.
- **Java APIs**: Java based APIs which can be run from any extension points. Java APIs expose the complete system functionality.
- **WQL**(WebSphere Query Language): IBM Product Master provides its own SQL like query language called WQL, using which users can directly access all the internal entities/ objects.

Developing a flexible solution

Just as no one business model fits every industry, no one data model will fit every organization. Successful execution of a PIM strategy requires the ability to adapt as the organization changes over time and data model requirements evolve. The organization may grow organically into new product and service areas, or may need to integrate the systems, products and services of a merger or acquisition.

Organizations considering a PIM system must anticipate these demands and develop a system that can meet them quickly and with minimal expense. A company's specialized business processes can ultimately differentiate the company from its competitors, and it is important for the systems the company uses to provide the most flexibility to adapt to unique and changing needs.

IBM Product Master fulfills these requirements with a unique approach of abstracting the underlying physical database representation from the data model. Rather than relying on a visual representation of a database, IBM Product Master offers a simple and intuitive object model designed from business objects such as Catalogs, Hierarchies, Items and Categories. This separation delivers the data model flexibility and ease of use that organizations demand, while simultaneously allowing them to take advantage of the latest database technologies.

Having an adaptive UI which is backed by a flexible data model is key to success in PIM. Adaptability refers to the ability of the UI to adjust automatically according to the underlying data model, without needing additional coding or implementation efforts. Flexibility refers to the ease of providing data model extensions, adding or updating attributes, and provisioning multiple hierarchies or categories.

Adding a new attribute to a product category is a common action required by business users. Given its frequency, you need a solution which can adapt to changes quickly.

IBM Product Master supports a very rich set of data modelling features, including the data types, available facets and validations around them.

IBM Product Master offers several features that help organizations create data solutions that make intuitive sense to business end users, including the key personnel with responsibilities for managing master product data.

For example, a company may create a Spring Print Catalog comprised of a limited set of products, require a hierarchy specific to the print organization of the products and require the data to be tailored for print format. This flexible approach can translate into lower change management costs and encourage faster user adoption.

Finally, as business requirements change and grow, updating or adding product attributes, catalogs, sales channels or any other business object should not require intensive development efforts. IBM Product Master data models can be easily extended and modified by business users, often in just minutes. New information managed in the PIM solution can be automatically integrated with other systems.

IBM Product Master includes features that address several segments of a PIM strategy, including catalog management, hierarchy management, category management, item management, location hierarchies and localization, and Global Data Synchronization (GDS). Those features allow information to be tailored for specific audiences and compiled logically to help enhance productivity and analysis.

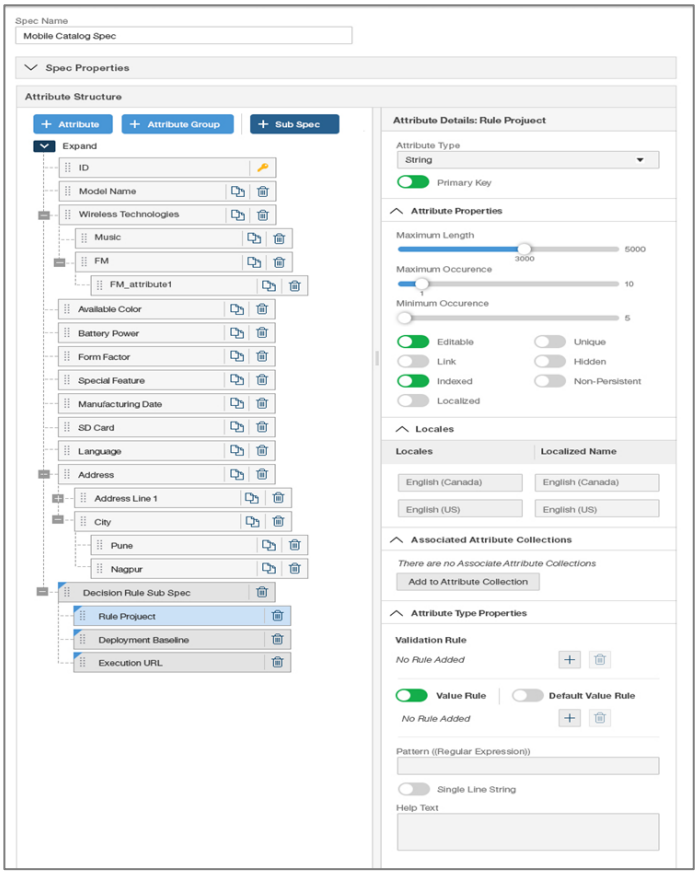

Figure 3

Catalog management

A catalog holds a set of products or services, represented as items, as well as any type of relationship between items (bundles, packaging hierarchies, bills of materials, cross-sells and up-sells, and so on). Catalogs are also used to represent product offerings within a channel, to either a certain market or customer. They can present not only a specific set of products or services, but also the entire experience, from browsing and organization via tailored hierarchies to additional required fields and content or imaging tailored for that channel, market or customer (see Figure 4).

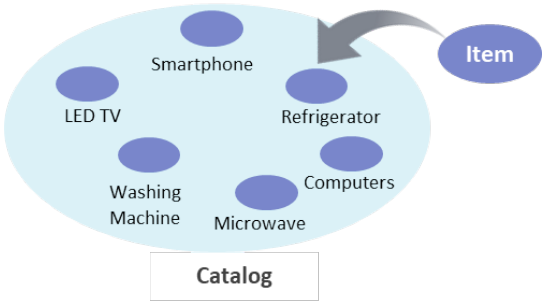

Figure 4

Organizations may have multiple catalogs, depending on how their products and services are browsed and used and how closely related the products are.

Catalogs are essential organizational tools, but businesses need to selectively give users access according to their job function, role or other business parameters. Without these tools, organizational productivity and security can be at risk.

The IBM Product Master security model allows filtering on multiple dimensions. With category-level security, users' default views can be set to their specific department or category, preventing them from viewing, altering or launching processes in departments or categories for which they have not been granted access.

IBM Product Master also allows system- level restriction of any field, helping businesses keep sensitive data secure. For example, visibility into sensitive fields, such as cost, can be restricted to only the buyer who owns that product and finance personnel. To further improve security, organizations can assign the rights to edit a given field to a specific user or job role and make those editing rights subject to a set of preconditions or actions as part of a larger business process. An advanced history logging mechanism makes it possible to track and leverage changes applied to any type of data as well as metadata (the data model). These history logs can then be used for auditing purposes or delta exports to a downstream system.

Presenting information in a productive format is just as important as security and access control. IBM Product Master allows end users to see the information relevant to their job and function in a layout that is productive and meaningful to them. For example, organizations operating in multiple countries, languages, locales and currencies can improve productivity by assigning users to a set of languages (users can also designate primary and secondary preferred languages). Users can then search, browse and view entirely in their language, currencies and units of measure, in addition to seeing tailored marketing messages for the products in their market.

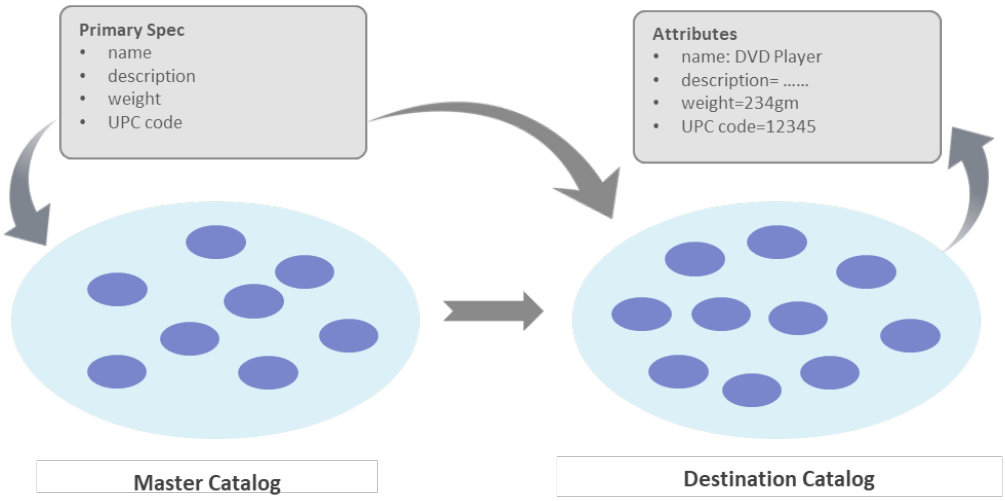

Figure 5

Hierarchy management

A hierarchy is collections of categories and the relationships between them. It is used to organize, browsing or navigation, categories are like folders that can contain items or other categories.

In large enterprises, hierarchies suffer from the same symptoms and problems as products and services. There may be multiple hierarchies from which the business can organize and browse products and services, such as product type, an organizational hierarchy, a departmental hierarchy, a web hierarchy, enterprise resource planning (ERP) hierarchies and other system hierarchies. Existing systems often manage just a fragment of a hierarchy, so compiling a complete picture is a manual exercise requiring significant reconciliation and data cleansing. Processes to maintain corporate-wide, global hierarchies often do not exist, much less systems that attractively display a hierarchy.

In IBM Product Master, hierarchies use the same features and functions that apply to products and services. By supporting all data types for a category, all details describing a category can be captured. Just as products require different fields depending on type (a television might need a "screen size" field while a radio needs "number of pre-set stations"), so do categories. Therefore, a single category can have fields that differ from other categories.

Through this extended category functionality, IBM Product Master helps organizations tailor their hierarchies to specific needs and manage them with the same ease and precision they experience when managing products and services.

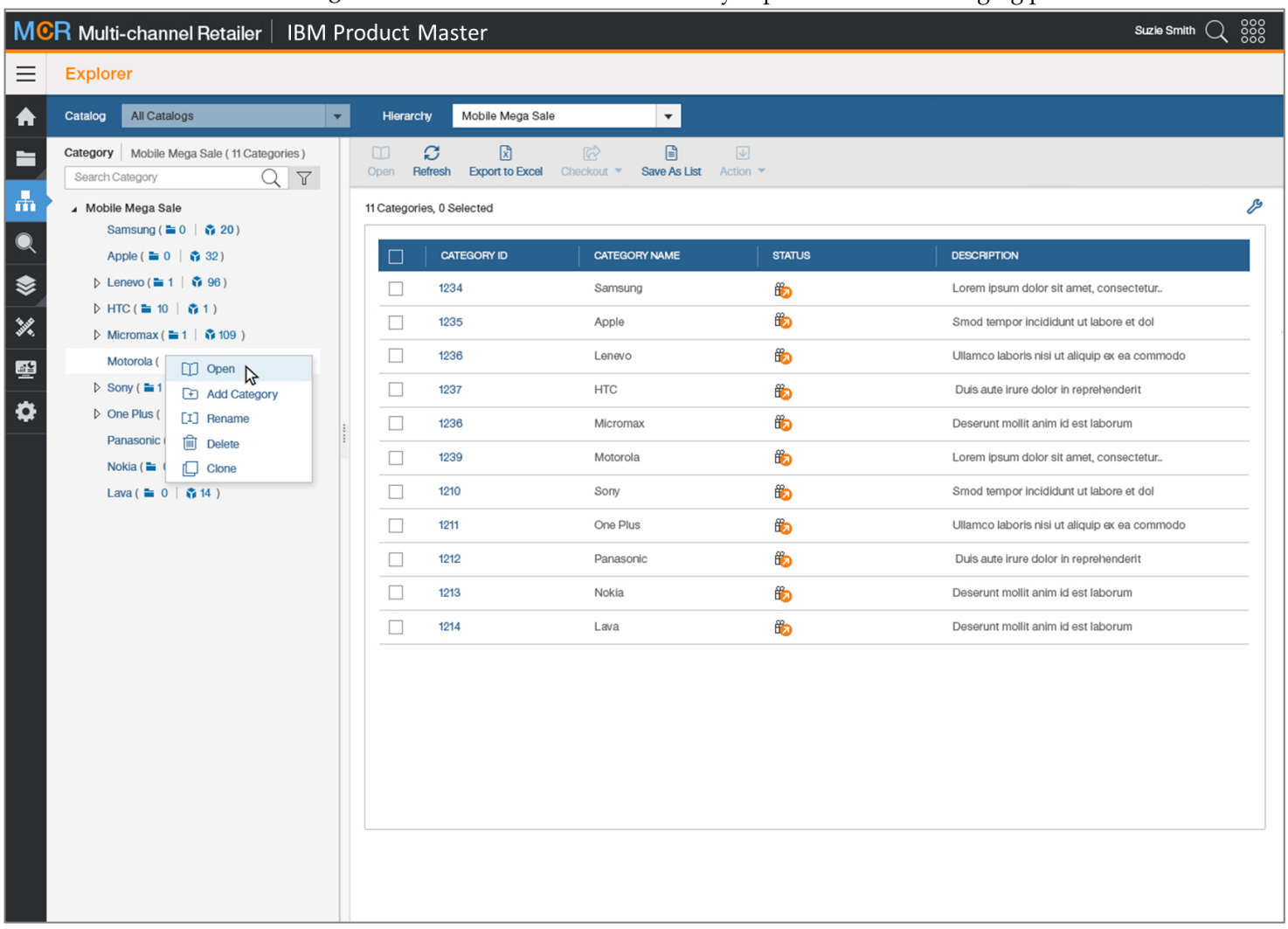

Figure 6

Category management

Organizing and updating products and services is another important dimension of enterprise-wide product information management. A user should be able to browse a product or service via multiple routes and still retrieve the same information. If a change is made to the product or service, it should be reflected everywhere that item appears.

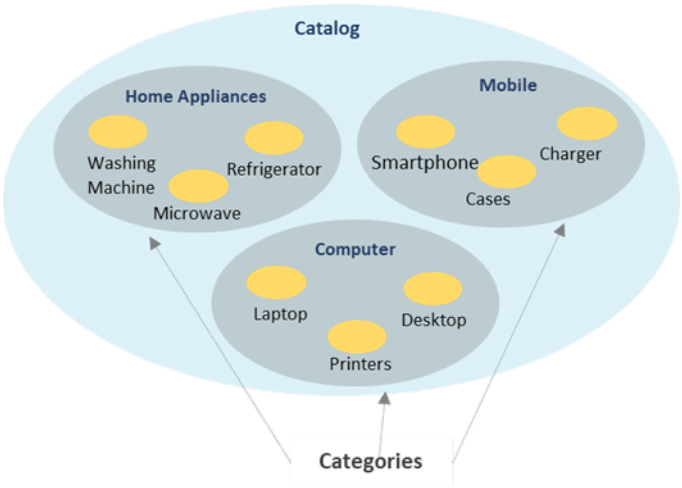

Figure 7

Products and services may also need to be organized in several ways. For example, a country with only a subset of the products and services could have a very different browsing structure. Furthermore, within a market there could be different ways to organize the products depending on the channel to market, such as a separate organization for the website and the print catalog.

All these processes are enabled (or hindered) by the category management tools available to an organization. Therefore, robust category management capabilities are vital to a successful PIM implementation. In IBM Product Master, products and services (modeled via catalogs) are independent of categories and hierarchies. This allows a product or service to be mapped to multiple categories within a given hierarchy or simultaneously be mapped to other categories in other hierarchies. Because catalogs and hierarchies are independent, the same hierarchy can be used to organize multiple sets of products or services.

Item management

The IBM Product Master item management functionality captures a 360-degree view of a product or service. Therefore, an item in a catalog captures all attributes of the product or service, such as the key go- to-market information, rich assets such as PDFs or images, data required to drive operational and supply chain systems, relationships to other products or services and mappings to categories in multiple hierarchies. Because these structures reflect the way individual organizations view their products and services, the resulting data model is closely aligned with the business.

There are two types of item attributes in IBM Product Master:

- **Global or common attributes:** These are attributes that all items belonging to a catalog must have. Typically, they tend to be attributes requiring global visibility, such as Name, Part Number, GTIN and Short Description. These attributes are defined as the catalog's primary attributes and are associated with every item in the catalog.

- **Item category attributes:** These are attributes that an item acquires by its relationship with a category. For example, all items under a category called "LED TV" may need to have an attribute called "Screen Size," but the Screen Size attribute may not have relevance for other categories. Such attributes are associated to a specific category within the category hierarchy.

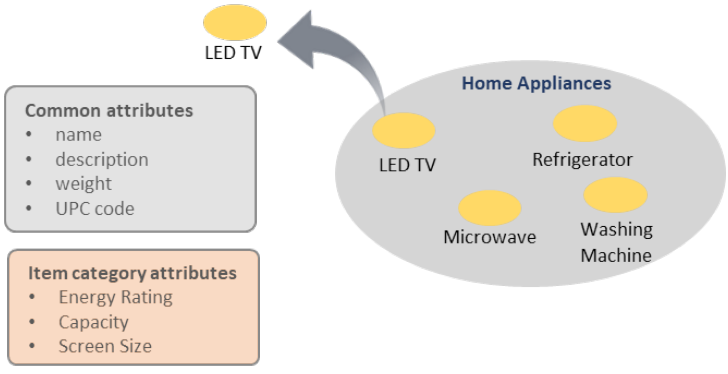

Figure 8

IBM Product Master can accommodate many attributes and handle a wide variety of data types including String, Rich Text, Number and Integer, Currencies, Lookup Tables, Dates and Times, Flags, Images, Documents and other binary assets. It also supports complex attribute structures, such as a hierarchy of attributes (that is, an address composed of a number, street name, city, state and postcode) and multiple instances of attribute values (that is, a recurring field or groups of fields, such as a contact having multiple phone numbers).

Lookup tables are also a useful feature within IBM Product Master. These allow meaningful text to be displayed to users in drop-down menus and allow selection by an internal or external system code or by some additional description. For example, users see "Contiguous

U.S.A." in the drop-down menu, but they can also select it by choosing "U.S.A. except Alaska and Hawaii" or "48 states," or by the ERP system code "48USA." When faced with larger tables, users can search to find the appropriate value.

Location hierarchy management

Large manufacturers and retailers can gain competitive advantage by micro-merchandising and managing location-specific data more effectively. But location-specific data can multiply quickly, becoming a data management challenge. Consider managing 10 location-specific attributes across 100 locations for 20,000 items. This alone amount to managing 20 million attributes.

IBM Product Master helps control unmanageable data volumes. When a user defines an attribute for a product, service or supplier specific to the region, country, market/cluster or store level, all locations below that level inherit the attribute. For example, a materials price set at the market level will be inherited by every store in that market and can be overridden for exceptions if necessary. This facilitates access to reliable information and helps dramatically reduce the data management maintenance burden.

Likewise, for a product say iPhone, there may be different set of promotions and terms & conditions for each Location. E.g. North America (NA) might offer free headset while Germany may not have any such offers. With such kind of Location specific conditions, it is fairly easy to manage items using Location hierarchy.

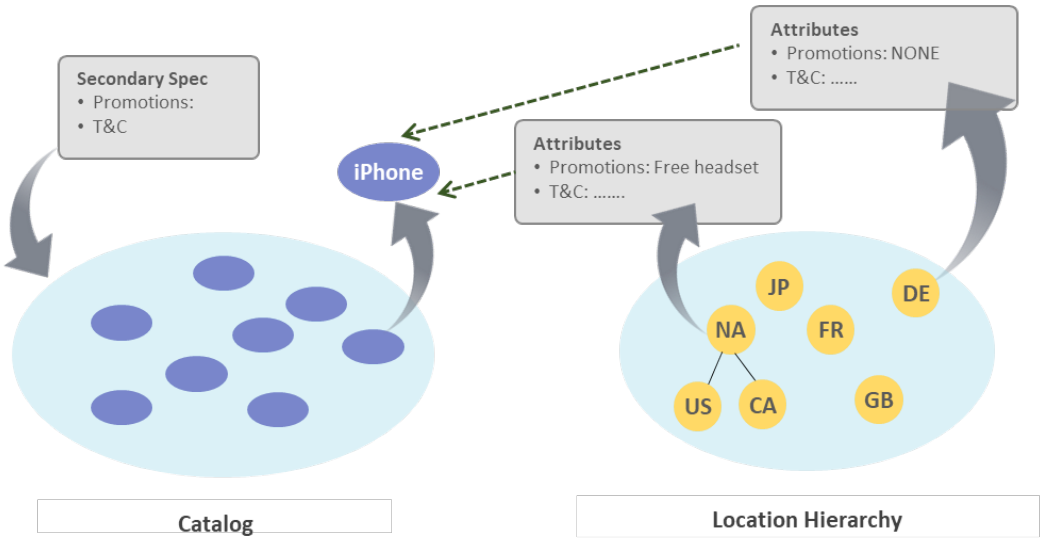

Figure 9

Localization

For organizations operating in many countries, creating product and services offerings tailored to the local market is a critical requirement. This goes beyond creating country-specific catalogs to customizing the product information and selecting available products and services.

To support this customization, IBM Product Master stores all information in the Unicode character set, enabling the capture of information in any language. Information including marketing or technical data may need to be altered for the local market, translated, reviewed and approved. IBM Product Master enables relevant fields to be designated as target market–specific, allowing them to contain an additional local market–specific value. It also contains country-specific formats and displays for numbers, currency and units of measure.

However, it is not just the information that needs to be managed in multiple languages and formats—the UI also needs to be available in the user's language. The native UI in IBM Product Master is presented in 14 global languages, and everything from the hierarchy used to browse the products and services to a field's label can be

localized into multiple languages. Users can view data side by side in multiple languages to review or perform translations.

Business process collaboration

Enabling collaboration in the creation and maintenance of the product information is a key function of a PIM system. IBM Product Master provides a comprehensive, out-of-the-box workflow capability that is highly scalable and configurable.

Comprehensive workflow platform

When configuring a workflow, different types of steps can be created; some require human action or attention (such as approval or edit steps) and some are automatic, triggering internal or external system actions. Using the IBM Product Master platform's comprehensive workflow capability, it is possible to publish state or data to external systems and provide visibility into an end-to-end intersystem process.

Data model flexibility is preserved and enhanced with the capability to alter business processes as the organizational needs or implementation footprint grows. Tightly integrating the workflow engine inside the PIM system allows it to accommodate the growth of the business into a new product type: new data requirements can be modeled, a role or workflow step can be introduced to manage new data requirements and the workflow can be linked to the data model for the new product type. Finally, users can be mapped to new roles, enabling them to create and manage the data for the new product type. All the capabilities described above for products exist for categories as well.

New product introduction and item maintenance

In addition to a 360-degree view of the product, IBM Product Master enables 360-degree collaboration on the product—bringing all parts of the organization into a single system with the needed checks and balances to help ensure speed, quality and accountability. Administrators can define as many workflows as necessary to represent the different business processes the system must support (see Figure 10).

The workflow engine goes beyond a state engine or a task manager, to enforce data quality and routing that is based on business rules and product authoring rules.

Alerts can be used to drive users to the system, notifying them when a task awaits their attention. The system can also

escalate tasks or warn the user if a task is not dealt with in a timely manner. Escalation can be configured as a step-level duration or deadline, one relative to the deadline for the process or a trigger for a "fast track" process managed by a team lead. When time is short or deadlines change, IBM Product Master allows a structured implementation of exception processes.

A core feature of the workflow is the parallel processing capability, which allows multiple users to work on different parts of the product at the same time. Working on the product in parallel can dramatically shorten product creation and update processes. For example, a marketing manager can work on marketing attributes while a technician updates the technical information about the product. As shown in figure 10, user can define a six step workflow where step 5 is a parallel step where action be performed by 2 different users at same time and later on the data changes will be merged and sent to next step for approval.

In addition, with IBM Product Master, a product can participate in multiple workflows at the same time. There can be as many workflows as there are independent functional areas; for example, an imaging update can happen while the product is being introduced into a new country.

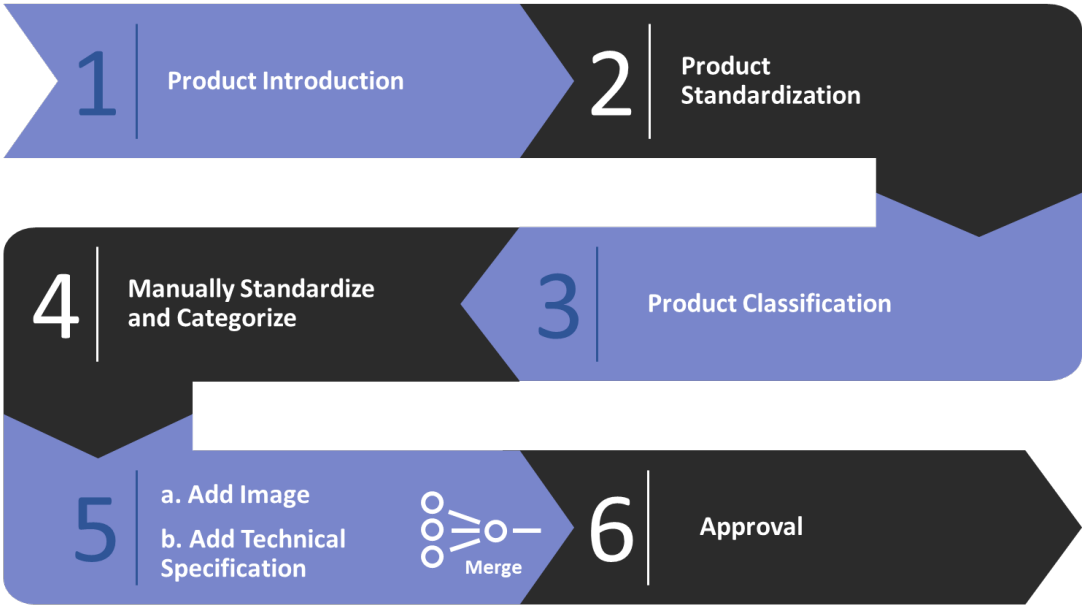

Figure 10

Teaming collaboration

True 360-degree collaboration on a product requires additional teaming capabilities. IBM Product Master users can take ownership of a task—an essential capability when a team shares a common task list (see Figure 11).

Users can also approve or reject a portion of the work and send it for revision with comments. Data that is being authored and reviewed is restricted to the collaboration workspace until all approvals are complete—only then is it released to affect published, live product data.

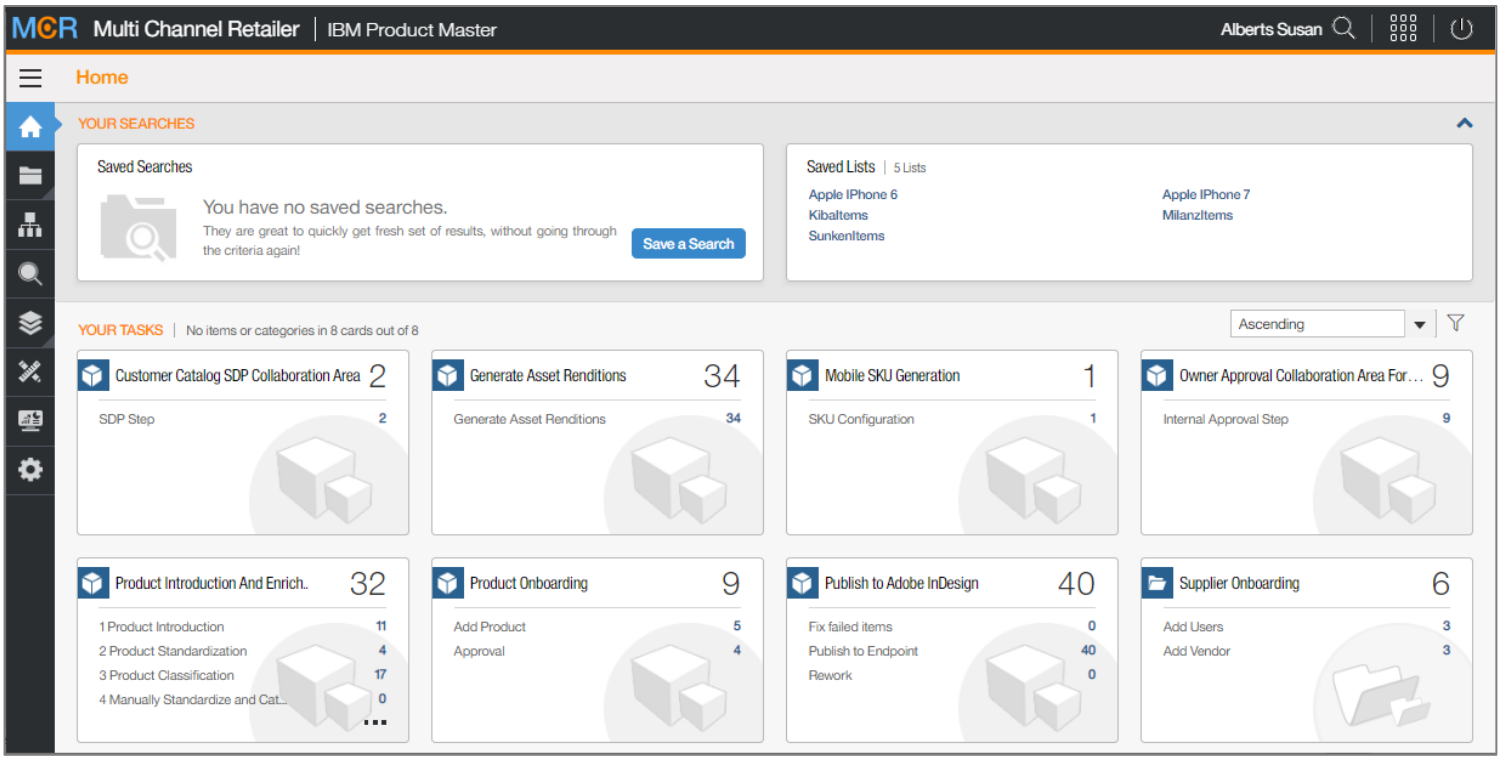

Figure 11

Two other features necessary for effective teaming are auditing and visibility. Auditing provides accountability of who changed what, when and with what comments. The UI highlights the differences and how they were made.

Visibility features track where the product is in the process, who has taken ownership of it and how long it has been there. For both features, IBM Product Master provides out-of-the-box functionality from a platform and end-user perspective.

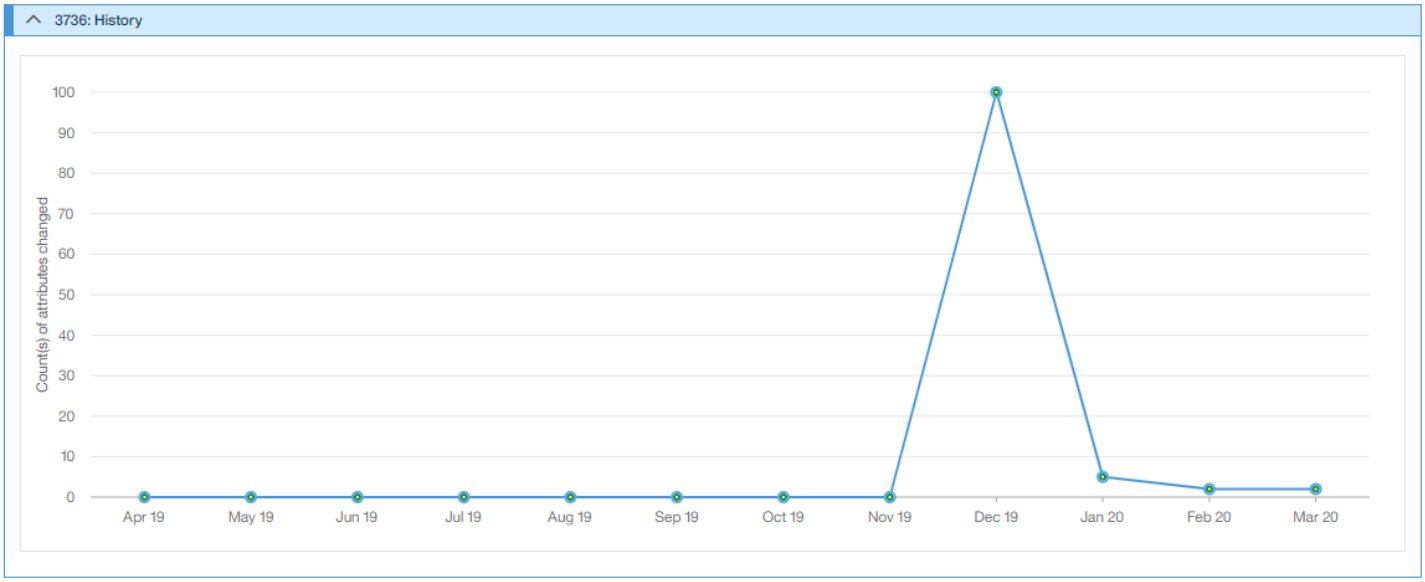

Figure 13

Search
Export to Excel
Drag column headers here to create groups

Date	Container	Attribute Path	Attribute Old Value	Attribute New Value	User
1/15/20 2:36 AM	Product Offerings	Product Specification/UPC	879865432345	879865432344	Admin
1/15/20 2:34 AM	Product Offerings	Product Specification/Display Image Description		Apple iPad Air	FullAdmin
1/15/20 2:34 AM	Product Offerings	Product Specification/Descriptions		Apple iPad Air	FullAdmin
1/15/20 2:34 AM	Product Offerings	Product Specification/Completion		90%	FullAdmin
1/15/20 2:34 AM	Product Offerings	Product Specification/UPC		879865432345	FullAdmin
12/31/19 11:52 PM	Product Offerings	Product Specification/Product Name	Apple iPad 5	Apple iPad Air	Admin
12/31/19 11:50 PM	Product Offerings	Product Specification/Product Name		Apple iPad 5	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/General#0/Memory Slot		MP3,AAC,eAAC,WAV,M4A	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/Approval Details#0/Modified Date		2019-08-13-18.00.00	Admin
12/18/19 7:24 AM	Product Offerings	Product Specification/Product Type		Tablet	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/Design#0/Keyboard		Screen	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/General#0/Platform Version		7.0.2	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/Media#0/Video Capture		Yes	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/Design#0/Side Keys		Volume	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/Media#0/Other		Internal	Admin
12/18/19 7:24 AM	Product Offerings	Mobile Specifications/General#0/Connectors		3.5mm Audio,USB 2.0,TV Out	Admin

Figure 12

Rules Engine & Data quality

The Rules console feature in IBM Product Master provides an opportunity to business users, to create/ manage business rules from an intuitive user interface. It also provides data governance functions that enable companies to define clear rules for handling their data, processes, and exceptions.

Business rules allows you to enrich the product information automatically, according to actions based on conditions.

Individual data quality/ validation rules can be defined for products during the onboarding and enrichment process, which can also be combined to provide a channel-specific product quality. Workflows in IBM Product Master are highly integrated with its flexible and extensive data model, helping to ensure that users enter the correct data. Available business rules, including data types, validations, drop-down menus, units of measure, currencies and precisions, can be applied during the workflow process.

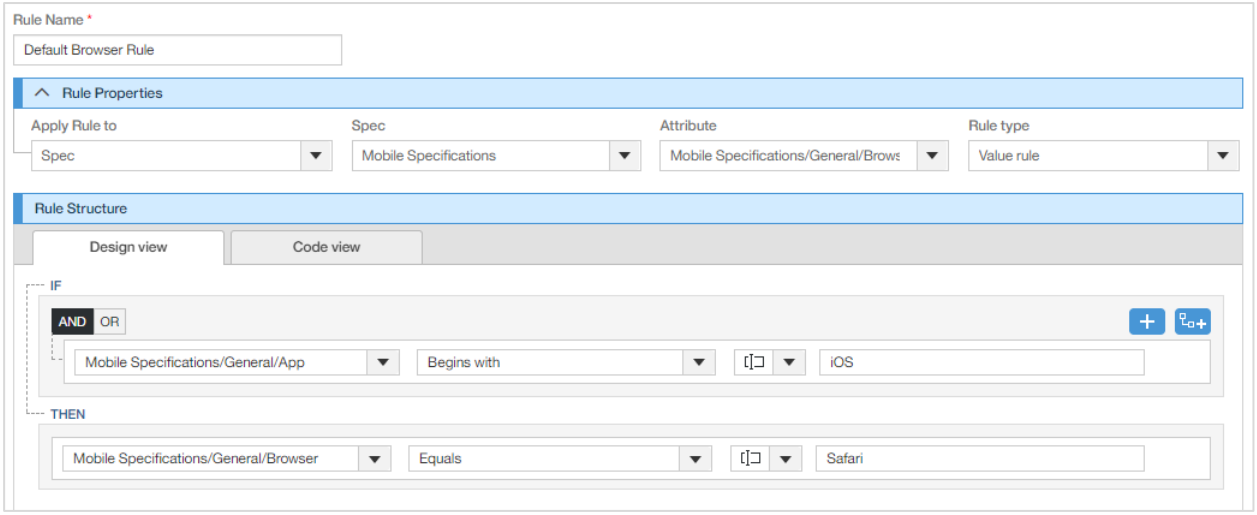

Figure 14

Not only are users restricted to what they need to see and how they need to see the data to do their job, but they are further restricted to what they need to do. Data can be organized to suit each job, while the validation rules can be configured to help ensure that a minimum data set is acquired and that it meets the business validations .

IBM Product Master can also be easily integrated with data quality tools such as those available through IBM InfoSphere Information Server.

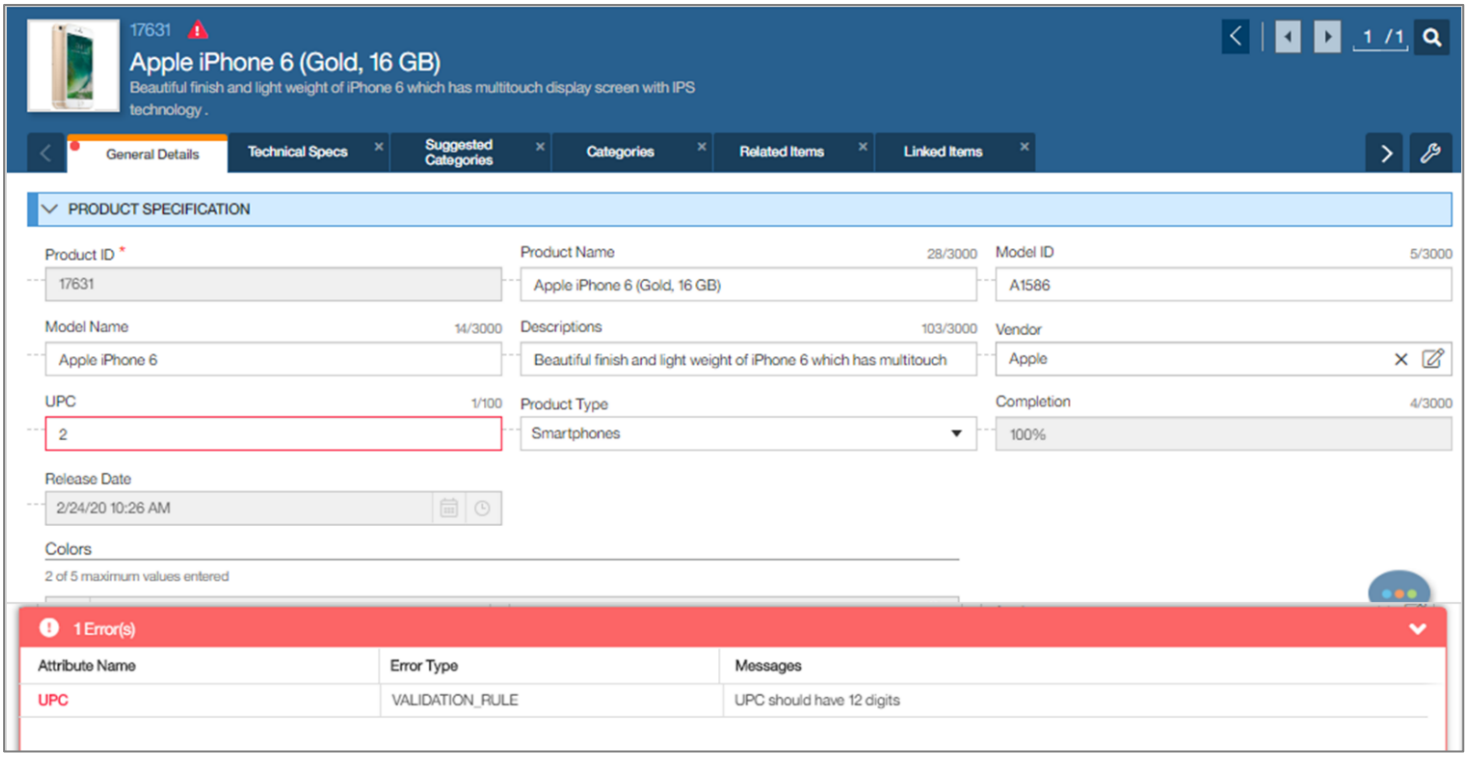

Figure 15

Integrated dashboards

The integrated dashboard feature enables you to view various metrics across several aspects of the product. Depending upon user privileges, various reporting dashboards can be viewed.

These dashboards are designed to visualize key metrics for each user persona. From the summary level dashboards (top level), you can drill down to the detailed level dashboards or to go into next level details for easier data analysis. The out-of-the-box feature integrates dashboard engine with the IBM Product Master. By default, the feature is enabled, and no further configuration is required. With rich interactive widgets to visualize key metrics along with the ability to export the data to PDF, Excel, or CSV file formats.

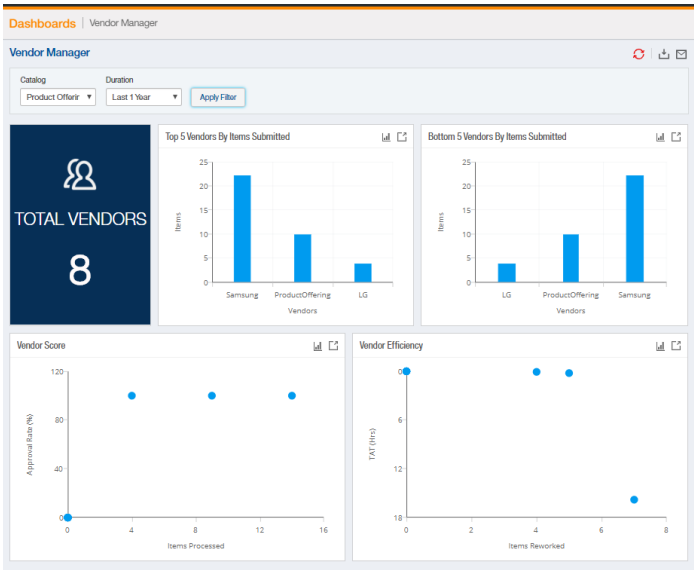

Figure 17

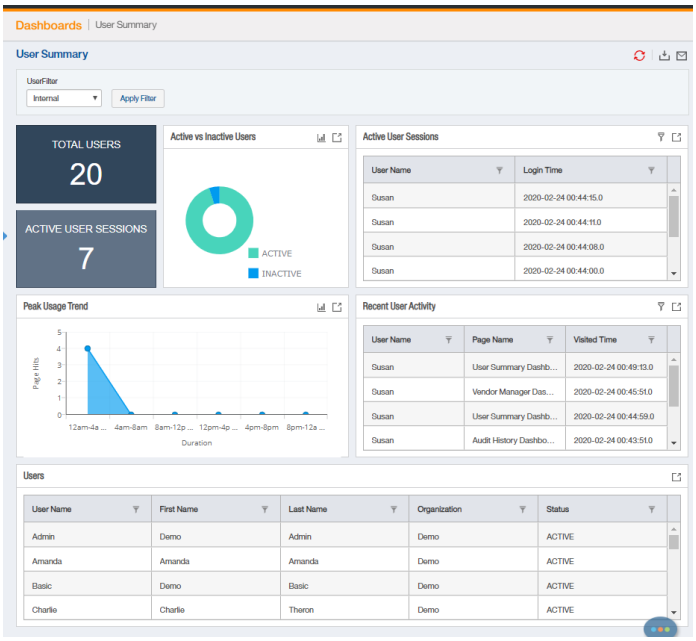

Figure 16

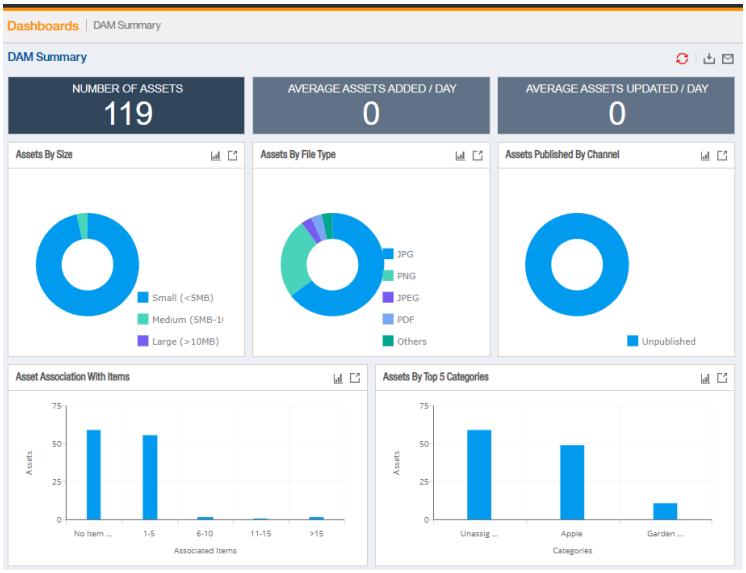

Figure 18

Free text search

Free text feature allows users to search for any item or categories in an unstructured manner. It works like google like search where you can give any search string which part of the item or category attributes is.

You can search attribute names, which are an exact match or a substring of the actual attribute name. The results are achieved through attributes in the spec and associated attribute paths in the spec. The search terms should be in the Key = Value format, for example, "color = red" where color is used as the key to match against set of attributes and red is used as the value to search for in the matching records. Similarly, multiple search attributes can be specified in the following format by using semicolon (;) as a separator:

Name=Apple iPhone ; Color=White;

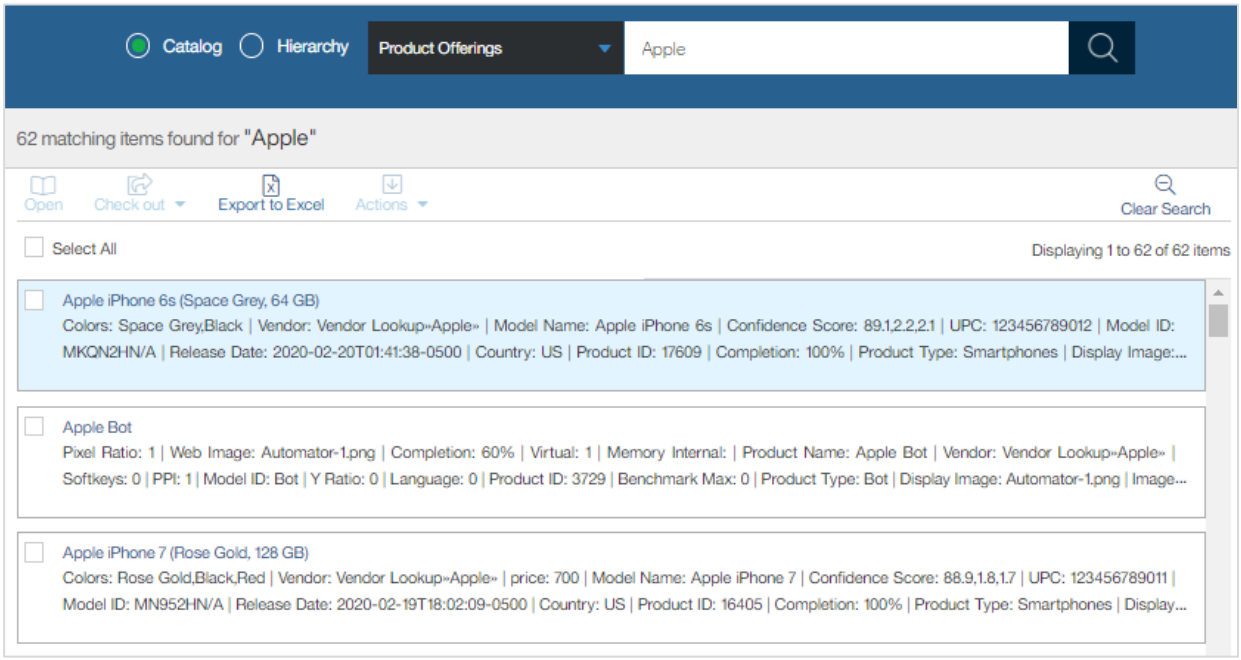

Figure 19

Global Data Synchronization

The GDS interface gets to the core of organizations' business objectives—maximizing the effectiveness of trading partner relationships and improving overall supply chain efficiency to increase revenues.

Key benefits of GDS include:

- The ability to enrich product information to increase accuracy of attributes
- Compliance with global standards and data pool standards
- Enterprise-class robustness, scalability and performance capabilities that help address immediate GDS needs and can grow with the business over time
- Sophisticated integration capabilities that help companies leverage existing product information throughout their technology infrastructure
- Detailed insight into GDS activities, which can drive process improvements both internally and with trading partners
- A foundation for collaborative activities among supply chain partners, such as radio frequency identification (RFID), collaborative planning forecasting and

replenishment (CPFR) and other business-to-business (B2B) initiatives

User interfaces

Native user interface

IBM Product Master offers a Persona based UI based developed in Angular that enables quick user access from anywhere in the world and helps businesses avoid the deployment pains of specialized clients and upgrades. Within its small footprint, IBM Product Master uses the latest web technologies to deliver a sophisticated and rich user experience.

The out-of-the-box native UI is dynamic, adapting to the configurations in the data model, access controls and workflow, and incorporates user settings and preferences to help users reduce implementation time.

Multiple productivity tools are available for the users, including mass update capabilities, Excel based import export, etc. allowing the maintenance of hundreds of items or categories simultaneously.

The UI represents the configuration of the business process, data model and validations specific to your enterprise.

The ability to extensively configure IBM Product Master helps accelerate the time-to-value of the PIM implementation.

Custom screens

The IBM Product Master UI can be extended to adapt to an organization's business needs. All native business objects (Catalogs, Items and so on) that are exposed through the standard UI are also exposed through application programming interfaces (APIs). This allows administrators to build custom UI screens step-by-step using process wizards and utilities.

Access privileges and security

The IBM Product Master security model is many-to-many, allowing for very granular control as well as maximum reuse of access rights. Roles define system-level access for business or administrative functions and users can belong to multiple roles. This helps make it easy to define very specific user roles, such as complete authoring of product data, lightweight searching-only usage or advanced solution administration.

Objects (Catalogs, Hierarchies and so on) that require different access for different user groups are divided into Access Control Groups (ACGs). The intersection of the ACG and the role defines the access privileges for that role. These are permissions such as the ability to view products, search products and perform an import of data. Because a user can belong to multiple roles, it is possible for a single user to derive view access to a set of products from a "view only" role, but gain access to initiate business processes, such as New Product Introduction, on another set of products.

Integration

Data aggregation and syndication

A master data repository's value lies in its ability to integrate with other enterprise systems. IBM Product Master is architected to be easy to deploy in heterogeneous environments. It supports commonly used communication protocols, including IBM WebSphere® MQ, Java Message Service (JMS), HTTP, FTP and SOAP, as well as multiple data formats including XML, CSV and Microsoft Excel.

While supporting future requirements, its flexibility also helps ensure that IBM Product Master has minimal impact on existing systems and, in most cases, will work with files already available.

In addition to integrating point-to-point with inbound and outbound source systems, IBM Product Master can integrate with middleware technologies from IBM and a variety of providers, such as Microsoft BizTalk, SAP Exchange Infrastructure (SAP XI), TIBCO and Software AG webMethods.

IBM Product Master natively supports deltas for aggregation as well as syndication. It supports inbound and outbound deltas for items and categories, both at an entity level (that is, receiving or sending data for only products that have changed) and at an attribute level (that is, receiving or sending data for only the field that has changed within a product).

Many organizations require aggregations to initiate or perform part of a business process, and IBM Product Master accomplishes this for full or delta incoming data. It can also syndicate data as part of the business process to interact with target systems.

As with the other administration functionality, data aggregations and syndications can be configured via the administration UI. The consoles give an at-a-glance view of

current activity, while wizards help to configure a new aggregation or syndication by guiding the administrator through tasks ranging from file transfer and field mappings to setting up a schedule.

Scheduler

Administrators can use the IBM Product Master platform's built-in scheduler to easily schedule recurring jobs. IBM Product Master also works with external schedulers that manage enterprise-wide job choreography. The scheduler console provides information on both ongoing and past activity, and allows users to inspect performance characteristics and logs.

SOA for real time

IBM Product Master supports an SOA environment via inbound and outbound web services. Different business functions can be offered as services to accept and respond to requests across a network or via the web. These web services can be written in the IBM Product Master scripting language or in Java.

Solution accelerators

Several solution accelerators are included with IBM Product Master. These accelerators enable integration with various supporting programs or other systems to help increase value. These accelerators are fully extendable and can be customized to meet organizations' specific needs.

Advanced catalog management

IBM Product Master includes a solution designed specifically to support e-commerce initiatives. The Advanced Catalog Management (ACM) solution provides an out-of-the-box data model, sample workflows and a ready- to-use integration framework specifically designed for IBM

WebSphere Commerce. This solution can be customized and extended based on need and provides WebSphere Commerce customers with more sophisticated catalog management capabilities to support their e-commerce initiatives.

Advanced business rules

This IBM Product Master solution acts as a single interface for product collaboration and advanced rules authoring through direct integration into IBM Operational Decision Management (ODM). Utilizing rule templates in ODM, business users can take advantage of a complete set of UIs from within IBM Product Master to add, edit and associate advanced business rules. Like the ACM and Portal solutions, this solution can be customized to meet the specific needs of each client.

Apache Camel based out of box Connectors

IBM Product Master is natively integrated with Apache Camel which is an Enterprise Application Integration framework based on known Enterprise Integration Patterns. The developed framework enables faster integration of third-party systems with MDM CE given the availability of numerous OOTB data formats (JSON, XML, CSV, etc.) as well as support for numerous transport models (JMS, HTTP etc.)

Any successful PIM implementation needs to integrate with multiple upstream/downstream systems. Typical integration with other enterprise systems can take weeks, thereby significantly increasing the overall implementation cycle.

In addition, the integration may not be developed in most optimized way and as per PIM best practices. IBM Product Master has built several OOTB connectors which helps reduce the overall implementation cycles from few months to few days.

Figure 20

Some of the important connectors released so far are Amazon Marketplace, Google Merchant Center, Magento eCommerce platform, eBay Commerce Center Network Merchant, SAP Material Management and Oracle JD Edwards and Adobe inDesign. The connectors help customers in getting data that is synced to various downstream channels or systems without needing any major customizations.

Digital Asset Management

Digital Asset Management(DAM) is a process, which can be used to upload, organize, store, and retrieve digital media

according to the organizational need. DAM provides access to the assets anytime and anywhere and is useful for fast and easy integration. Thus ensures a faster turnaround time, speed, consistency, agility, control, and flexibility to the assets.

You can upload assets from FTP or from local computer. You can also opt for bulk upload and conveniently upload multiple assets. The same asset can be linked with multiple items making it easier to manage assets and avoid asset duplication. DAM also provides a way in which the media can be easily linked and de-linked to the item.

Digital Assets Manager Role can view all the assets and perform different operations on the assets. A user with Merchandise Manager role can link and delink the assets to the items and perform various other transformations on the assets. The metadata information for the assets provides details like size of the assets and modified date of the assets (version control) and helps in managing the assets.

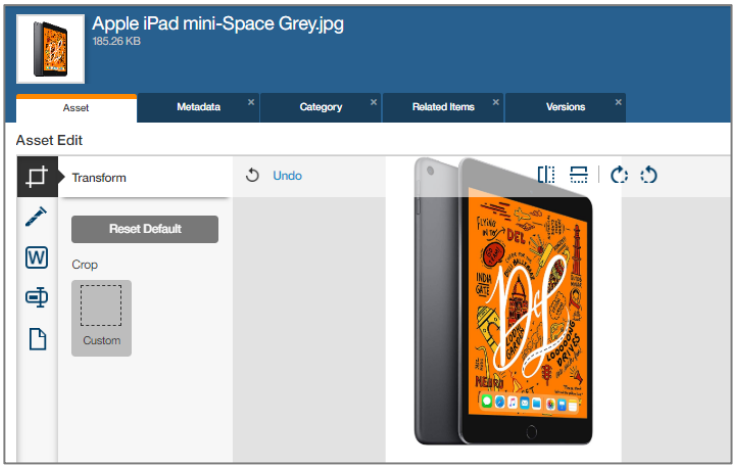

Figure 21

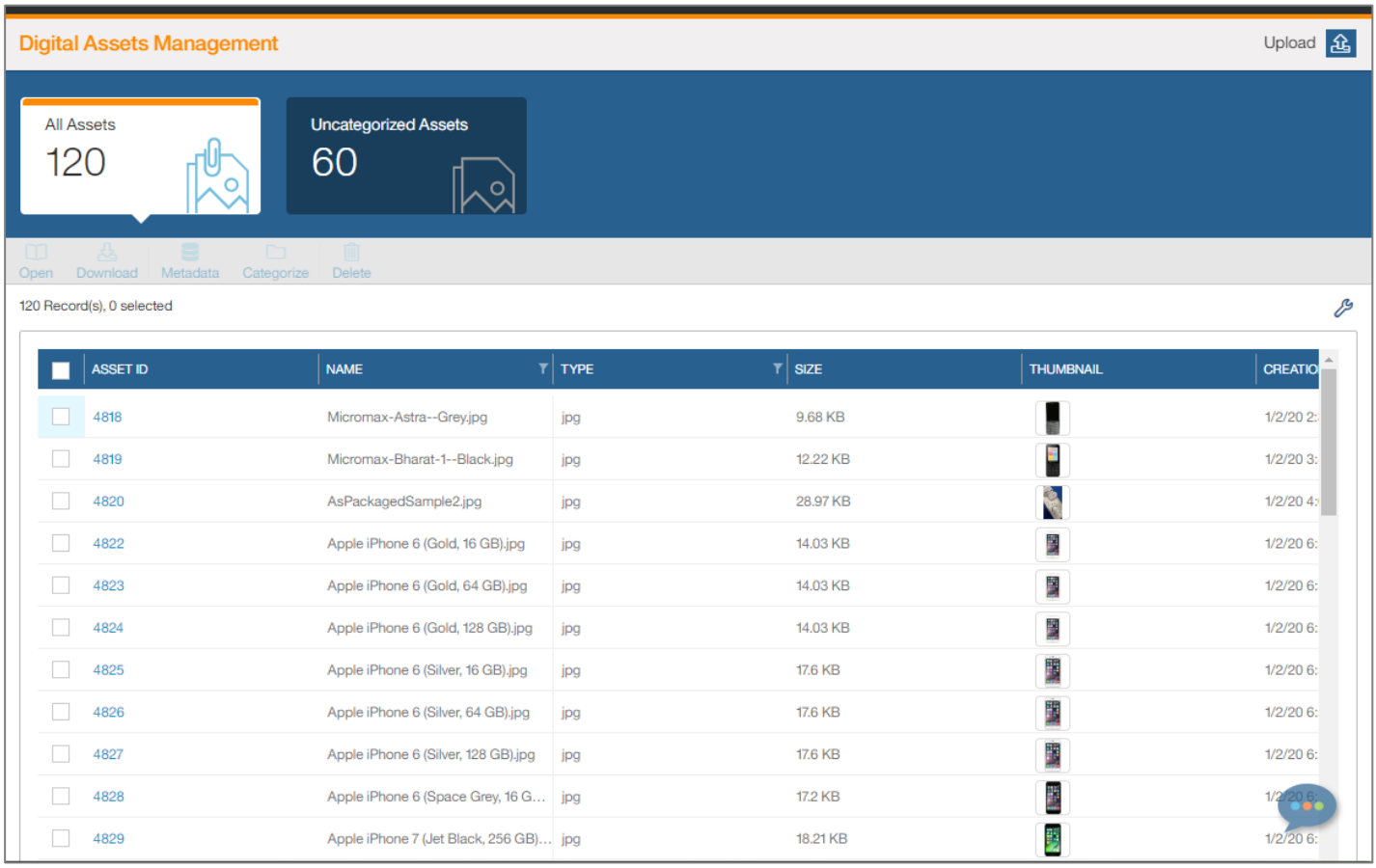

Figure 22

Vendor Portal

The Vendor Persona of IBM Product Master enables an external user as a Vendor user. The Vendor user can add or

update items from the Vendor specific collaboration area but can view items through the Search option only.

Vendors can access the system through the internet thus there is a security model in place to restrict the user to only specific data pertaining to organization.

Each vendor has own collaboration area, which can be created on demand. All users who are listed under the vendor in the organization hierarchies are administrators of this collaboration area

The approval workflow, which can be handled by the manager or the administrator of the owner organization. All items from the vendor workflow are moved here for approval. *The items that are created by any vendor move to the Catalog only when the administrator approves the items.*

Suspect Duplicate Processing (SDP)

As different data stewards create entities (products/suppliers/customers) over time, or the new entities are added automatically during migration, some entities may be represented in the system under more than one name.

Using this new feature, business users get the opportunity to compare the suggested matches, choose the right one or merge the possible duplicates into master entity, thereby assisting in improving the overall data quality by reducing duplicates in system.

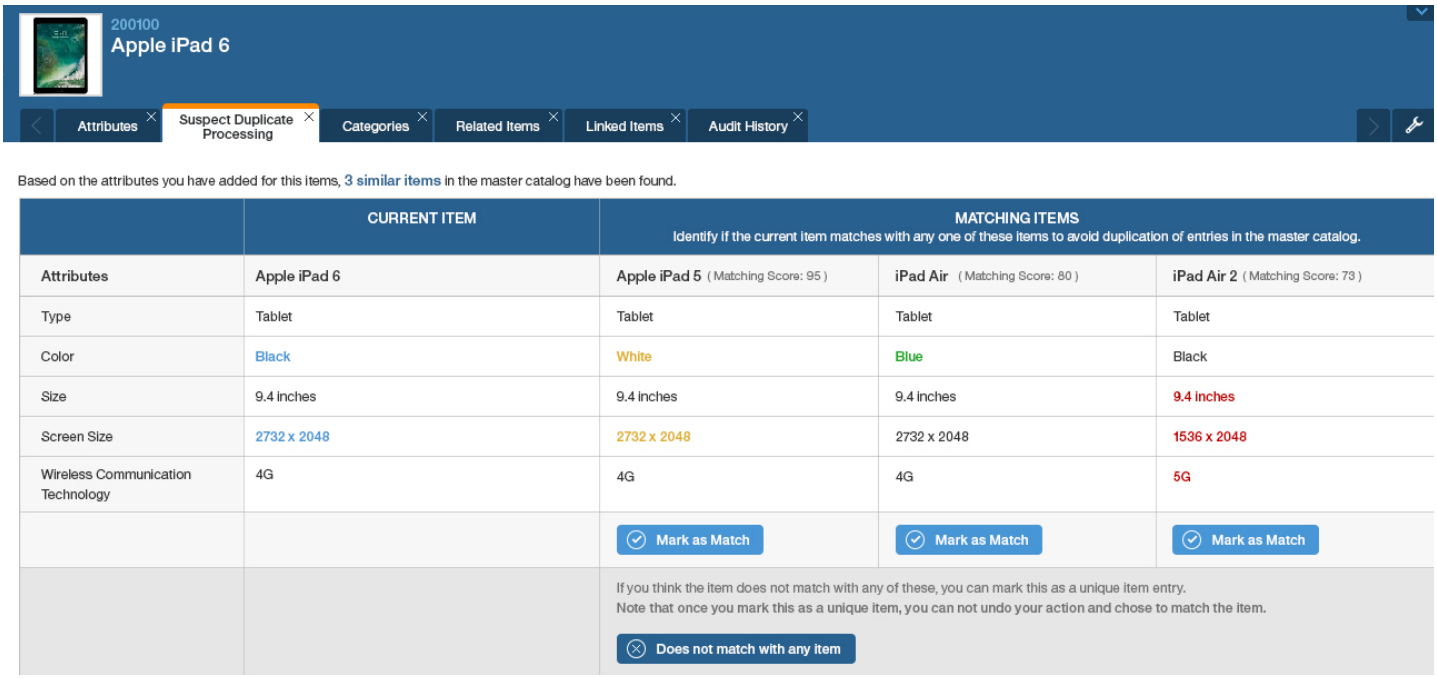

Figure 23

Programming logic

IBM Product Master can be extensively configured through programming, from business rules and validation rules to import, export or completely create new screens and business features. Administrators can also present IBM Product Master functionality as web services, making it easy to integrate the solution as part of an enterprise-wide SOA.

REST API

IBM Product Master has published set of REST APIs to access various product entities. These REST APIs follow the security model based on the user roles and ACGs and require the same set of access permissions as the Persona-based UI interface of the product.

These APIs are very useful for customers in building their own custom implementations. The detailed explanation of each API such as URLs, parameters, descriptions, sample input, and output data are well documented on the Knowledge Center portal using Swagger. Swagger based documentation provides clear insight into how the API responds to parameters and options.

Java API

IBM Product Master offers a comprehensive library of Java APIs that exceed the capabilities available via scripting. The Java APIs are composed of more than 1,000 operations and over 230 interfaces in 30 components or modules. Developers can access all underlying objects via Java APIs, so business logic can be implemented in Java and any standard Java integrated development environment (IDE) can be used for its development and testing. Additionally, this allows for reuse of any existing Java business logic.

New features developed with scripting or Java programming are set up as extensions of the solution and do not affect the core code of the product. This means that product extensions can usually be redeployed "as-is" when a new version of the product is available.

Scripting language

The IBM Product Master scripting language is very similar to JavaScript, making it quick to configure the solution. With a comprehensive library of more than 900 operations that provides access to all IBM Product Master objects, the scripting language is ideally suited for fast implementations.

Performance and scalability

Key features that power the high performance, scalability and reliability of IBM Product Master include:

- Standards-based application composed of Java Platform, Java Enterprise Edition (Java EE) and Java Platform, Standard Edition (Java SE) components
- Support for application server clustering
- High user concurrency
- Large data and batch processing capacity
- Graphical user interface (GUI) optimized for the power user

IBM Product Master supports both vertical and horizontal clustering. Because it is standards- based, it also enables deployment of various database optimizations and technologies.

Docker Containers

Applying agile DevOps methodologies is becoming a necessity to increase efficiency and time-to-value. An important cornerstone of a modern DevOps process is having flexible and fast deployment options. One such deployment option is to use container technology such as Docker.

IBM Product Master includes the option to deploy the solution by using a Docker-based container. These images are built on a CentOS base Docker image that runs on all Docker supported hosts. It supports containerized deployment on Docker as well as Kubernetes.

During an accelerated deployment, IBM Product Master can be installed from Docker images, which ensures a simple and consistent installation experience. IBM Product Master provides docker images of various product services which can be scaled as much as you want. Users get flexibility and control with Docker containers in terms of setting policies, managing resources, and security. For example: Before the start of the sale season, a company may have to add higher volume of new products and during that stage, they can scale up the workflow service on demand, so as to process more number of products.

Machine Learning

Data stewardship often involves several tedious and time-consuming tasks which are can be Easily automated so that stewards can focus on more productive and intelligent work.

Machine learning involves reviewing large volumes of data to discover specific trends and patterns that would most often not be apparent to humans. For example, machine

learning can be very useful for standardization or categorization of products by understanding history and good sample data for model training.

IBM Product Master offers the benefits of Machine learning which is based on open source lightweight python libraries having no additional licensing overhead. Machine learning assisted data stewardship provides multi-fold benefits like accelerating manual tasks, shortening review cycles and improving data quality. Machine learning-based product categorization or standardization feature helps the data stewards in improving the data quality and utilizing their time on more meaningful activities than thinking about the right category for the products.

Conclusion

Collaboration between enterprise departments, systems and employees has never been more important in this age of real-time, always-on communications and commerce. Without

a single source of trusted data about products, services and customers, decision makers cannot be sure that the information they are using is the most up-to-date, accurate version.

IBM Product Master offers several features that help organizations manage ever-changing enterprise data. Its comprehensive workflow capability helps accelerate the process of creating a new data model and business process, linking the two and mapping users to their roles in the process.

IBM Product Master provides users with a 360-degree view of products, services and hierarchies, and supports enterprise-wide collaboration on them. The security model provides role-based, granular access with multiple dimensions of control. The user experience and all other managed information can be configured for both the user type and the target market—an especially valuable feature for companies operating in global markets.

Together, these capabilities help make IBM Product Master a highly scalable and reliable product information management platform. It can be quickly adapted to the business, allowing organizations to represent, organize and manage business objects and deliver trusted information to all systems.

For more information

For more information about IBM Product Master, please contact your IBM representative or visit: ibm.com/software/data/master-data-management

Additionally, IBM Global Financing can tailor financing solutions to your specific IT needs. For more information on great rates, flexible payment plans and loans and asset buyback and disposal, visit: ibm.com/financing.