Managing Content Throughout the Product Lifecycle

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EXECUTIVE OVERVIEW

Manufacturers have developed many system processes, such as Lean manufacturing and just-in-time processes, to help their organizations develop high-quality products with reproducible results across many generations of a product family. This systematic approach has led to individual products being characterized as having a lifecycle with the following phases: survey, design, build, quality assurance (QA), sell, support, and, ultimately, end of life.

During a product lifecycle, a great deal of business information related to the product is generated, from meeting notes and marketing requirements to computer-aided design (CAD) drawings, test results, repair instructions, and sales reports. Because of its inherent worth, organizations seek to derive the maximum business value from this content. This white paper summarizes how manufacturing companies have successfully leveraged Oracle content management technology within the product lifecycle to help achieve this goal.

PEOPLE AND PROCESSES IN PRODUCT LIFECYCLE MANAGEMENT

The product lifecycle is necessarily cyclic. That is, once a product has been developed and sold, the feedback from the marketplace drives the next product review/design process. In fact, these processes overlap, in that the next-generation products will be developed concurrently with the manufacture and sale of the current-generation products. From a content perspective, this means that all participants in the product lifecycle must provide access to their own content, and also access to the content of other related products.

Content reuse is also an important requirement in a product lifecycle. Subsequent steps in a product lifecycle must refer to and, preferably, reuse content created in previous steps, as well as content related to previous versions of the product and content from related products.

There is a broad range of active participants, both internal and external to manufacturers, in the product lifecycle process. Internal groups include

- Product design
- Manufacturing management
- Manufacturing documentation/QA
• Product marketing  
• Sales management  
• Marketing  
• Customer support  
• Manufacturer executives  

Many different external groups also require access to select product information:  
• Manufacturing partners and build-to-order subassembly vendors  
• Dealers and distributors (both sales and support organizations)  
• Key customers  
• Translation and localization agencies  
• Marketing and public relations (PR) partners worldwide  

ABOUT ORACLE UNIVERSAL CONTENT MANAGEMENT  
Oracle Universal Content Management, formerly Stellent Universal Content Management, is a flexible, robust, and scalable content management solution that allows employees, customers, and partners to collaborate, contribute, and access business content worldwide. The system is built on a single, unified architecture that allows organizations to deploy Web content management, document management, collaboration management, imaging and process management, records and retention management, and digital asset management applications on one platform.  

Oracle content server, the repository and core services foundation of Oracle Universal Content Management, is an enterprise content management solution highly suited to the requirements of product lifecycle management. Features that are specifically useful to product management include the following:  

• **Document Management**—Allows organizations to manage multiple document types (such as CAD drawings, Microsoft Word documents, spreadsheets, and digital assets), with full revision tracking to maintain access to all previous versions of product documents  
• **Web-Based Access for All Users**—Allows any authorized user to submit and access content, without having to install additional software applications on their computers  
• **Search/Index Capability**—Allows users to conduct a full-text index content search, regardless of content type; plus searching by metadata means correct, relevant content easily locatable  
• **Flexible and Powerful Metadata**—Supports the ability to tag content with metadata specific to each product, including product attributes, its location within a product hierarchy, and product or content statuses
• **Security**—Ensures only authorized users can either access or access and change content

• **Workflow**—Manages the review and approval processes, including tracking comments and related revisions

• **Notification**—Provides the ability to proactively notify relevant users of content changes

• **Conversion**—Provides dynamic conversion (conversion to an appropriate display format on content delivery) and inbound conversion (typically conversion to PDF format when content is initially created or modified); both equally effective in delivering the correct content, in the correct format, to the right user

• **Dynamic Delivery**—Delivers content dynamically and securely, in the correct context, to both internal and external users; ability to repurpose content and preserve corporate branding are relevant here

• **Collaboration**—Offers additional functionality to further enhance the product lifecycle process

• **Records Management**—Offers functionality relevant for information and products subject to regulatory compliance

### CONTENT MANAGEMENT THROUGHOUT THE PRODUCT LIFECYCLE

The product lifecycle describes the continuous process of product development, manufacture, and sales. Although there are many ways to segment this process, the following phases illustrate a typical product lifecycle:

**Survey**

The survey phase establishes the required features of the new product. Product management reviews information from sales reports, partner intelligence, and customer interviews to create a final product specification document.

**Participants**

- Product design
- Product manufacturing
- Product sales and sales management
- Dealers/distributors
- Product marketing
- Key customers
Content Created
- Meeting notes
- Survey results
- Correspondence
- Feature lists
- Marketing specifications
- Research reports
- Competitive information
- Sales data

Value of Oracle’s Content Management Solution
The Oracle content server within Oracle Universal Content Management manages all generated content and provides a collaboration environment for geographically dispersed teams. Authors use familiar tools (such as Microsoft Word or Excel) and save their content directly to the Oracle content server. Approval and notification workflows are automatically initiated, and content is converted to a Web-viewable format (users with appropriate permissions can edit originating content). Content is delivered to internal and external users, controlled by content security settings.

Figure 1: Oracle content server manages the content flow throughout the product lifecycle.
Design
The design phase involves creating specifications, designs, and prototypes of new products, based on information gathered in the survey phase.

Participants
- Product design
- Product manufacturing
- Product sales management
- Product marketing
- External manufacturing partners

Content Created
- Product specification documents
- CAD drawings
- Visualizations
- Subassembly specifications
- Meeting notes
- Feedback/survey results

Value of Oracle’s Content Management Solution
Oracle Universal Content Management manages all generated content and provides access to content from the survey phase for collaborative design. Authors use familiar tools (such as Microsoft Word, Excel, and CAD tools) and save their content to the Oracle content server. Approval and notification workflows are automatically initiated, and content is converted to a Web-viewable format (users with appropriate permissions can edit originating content). Content, controlled by content security settings, is delivered to both internal and external users.

CAD drawings are managed by Oracle Universal Content Management and can be either converted to PDF format or delivered to Web-based CAD viewers.

Build
The build phase includes decomposing the new product design into subassemblies, developing manufacturing processes to build each of the subassemblies as well as the final product assembly, and coordinating product manufacturing with both internal and external manufacturing plants. To ensure product quality, all manufacturing units coordinate product changes using engineering change orders or notices (ECO/ECN), allowing product management to access a structured chronology of product manufacturing. In addition, International Organization for Standardization (IOS) 9000 and other quality documents, plus other work
instructions, need to be created. And as manufacturing ramps up, numerous reports will need to be distributed to both internal and external working groups.

Participants
- Product manufacturing
- Operations management
- QA team
- Product marketing
- External manufacturing partners

Content Created
- Product specifications
- CAD and computer-aided manufacturing drawings
- Manufacturing instructions
- ECOs
- ISO 9000 and other quality documents
- Preliminary product manuals
- Production manuals
- Meeting notes
- Manufacturing reports
- Supply chain management reports

Value of Oracle’s Content Management Solution
Oracle Universal Content Management manages all generated content and provides access to the content created during the design phase, making it available to manufacturing partners and internal manufacturing plants around the world. Security settings determine which content is available to internal and external users, based upon authorization rights.

ECOs are managed and delivered through the same content management process as all other manufacturing content, ensuring consistency and accuracy across the product manufacturing groups. Quality processes and work instructions (part of ISO 9000 or other quality systems) are also managed within Oracle Universal Content Management. All participants in the build phase may access this information, with each quality process or work instruction converted to HTML/PDF for online viewing or printing.

Dynamic delivery of work instructions allows manufacturing employees to search and display instructions by product, task, or other metadata value. Integrated links
to related content (such as material safety data sheets) support access to all relevant work information.

Manufacturing reports (such as inventory reports and parts breakdowns) are typically generated by enterprise resource planning (ERP) systems. These reports are also managed by Oracle Universal Content Management, including “bursting,” or splitting, larger reports into multiple smaller reports based on report data (such as product number), conversion to PDF format, e-mail notification, and secure delivery to approved internal and external users.

**Review/QA**

Concurrent with the build phase of the product lifecycle is a continuous review of the product being developed and its ability to address the identified product requirements and conform to QA programs. As a result of product review, product changes might need to be made, which would entail ECOs and coordinated revisions to work instructions, quality manuals, and preliminary product manuals.

**Participants**

- Product manufacturing
- Operations management
- QA
- Product marketing
- External manufacturing partners

**Content Created**

- CAD drawings and other design documents
- ECOs and work instructions
- Manufacturing reports
- Meeting notes
- Quality reports
- Preliminary product manuals
- Production manuals

**Value of Oracle’s Content Management Solution**

As in the other phases, Oracle Universal Content Management manages all content generated during the review/QA phase and allows authors to use their favorite tools for contributing new documents into the system. All necessary information from the build and design phases is made available to authorized users.

Work instructions for this phase remain available throughout the process, accessible by anyone authorized to view them. Manufacturing reports (such as
inventory reports and parts breakdowns) are typically generated by ERP systems. Oracle’s report management capabilities burst these long reports into manageable pieces and distribute them to users around the world as needed, in PDF or HTML format, whichever is preferred.

Because many documents created during this phase could have both internal-only information as well as shareable information, Oracle’s redaction capabilities provide great benefit. These capabilities allow companies to manage a single document that could have different levels of secure information within it, and then show a viewer only the portions of that document he or she is authorized to see. This capability, used for intelligence reports by one of the world’s leading intelligence agencies, prevents the need to create, maintain, and synchronize separate internal and external versions of test data and other product documents.

Sell

The selling phase consists of creating customer-focused product manuals and support and repair manuals; selling strategies (product positioning and how-to-sell guides); marketing collateral (including product brochures, digital assets, and white papers); product warranties (including warranties for each marketplace); product manufacturing reports (for complex, highly configurable products); and sales reports. All this content needs to be distributed to the correct groups within the selling and support organizations.

Participants

- Sales management
- Customer support
- Product management
- Product marketing
- External dealers
- Marketing
- External distributors
- External marketing/PR

Content Created

- The documentation team creates product manuals and collateral, as well as other product documentation, such as installation guides.
- The product marketing team creates strategic selling documents, including positioning documents, how-to-sell guides, and competitive information.
- The marketing team creates customer-facing marketing collateral, including product brochures, other digital assets (such as product images and video), feature/benefit documents, and white papers.
• The legal department creates applicable product warranties and related warranties if localization is required for different selling areas.

• The sales management team uses sales operations reports and product manufacturing reports to manage product sales and distribution. As products are sold, customer contracts and installation reports are accumulated.

Value of Oracle’s Content Management Solution
Oracle Universal Content Management manages all generated content and provides a collaboration environment for documents that require input from multiple teams. Approval and notification workflows are automatically initiated, ensuring public-facing content is reviewed by all the appropriate groups. The ability to create both an HTML view and a PDF rendition of submitted content means that information is consistently delivered to the sales force, regardless of their viewing paradigm.

Report management and distribution remain key here, because sales reports must be imported, segmented, and distributed worldwide.

Oracle’s document management functionality also facilitates the translation and localization of sales, marketing, repair, and instruction documents, extending workflow to internal translators or external localization agencies, and then delivering content in the appropriate language to the appropriate audience.

Oracle’s digital asset management capabilities are also involved at this stage, managing marketing and training videos, and other rich media files. Oracle accepts digital assets in any format and can render these assets in multiple resolutions, for the effective viewing of Web and print-based content.

Support
As new products are sold, customer service organizations need access to all the support and service manuals and other relevant content created throughout the product development process. In addition, support groups author their own content, for either themselves or customers, including product support articles, service bulletins, and service difficulty reports.

In rare cases, the support organization documents product deficiencies identified by customer use over time. These product deficiencies are passed on to the product design and manufacturing teams for resolution. The result is typically a product manufacturing or subassembly change, with the requisite change to all the product content (ECOs, product documents, manuals, information for suppliers, and so forth).

Participants
• Product management
• Key customers
• Customer support
Dealers/distributors
Sales management

Content Created
- Product support and service manuals
- Customer marketing collateral
- Installation manuals
- CAD drawings
- Manufacturing reports
- Product support articles
- Service bulletins
- Service difficulty reports

Value of Oracle’s Content Management Solution
Oracle’s document management capabilities provide key benefits in this phase, as does Oracle Universal Content Management’s ability to electronically deliver content in appropriate formats to internal users, partners, and customers. For example, technical information such as troubleshooting, warranty, and repair information can be delivered internally to a call center knowledgebase, externally to a dealer and repair extranet, and publicly on a customer Web site or portal.

Because many repair documents are lengthy and updated frequently, Oracle’s document management capabilities can deliver these documents electronically for access through dealer and repair extranet portals, providing significant cost savings for the printing and distribution of these materials. Companies have reported verifiable savings of hundreds of thousands, and in some cases even millions, of dollars in printing and distribution costs. The same is true of sales and marketing materials, which can be frequently updated. By distributing this information electronically via Oracle’s multisite Web content management solution and allowing printing at local facilities, companies save printing and distribution costs, while also ensuring that the latest information is always available to facilities around the world.

The search capabilities within Oracle Universal Content Management allow links to related content, related products, and related recall, warranty, and service bulletin content to be displayed together with product data. Also, customer support can access content in a number of paradigms concurrently—by browsing by hierarchy (product family and product) or content type, or by means of a metadata/full-text search (or a combination thereof).

CONCLUSION
Manufacturers are adopting multiple formal and informal methods to better manage their product lifecycles. In doing so, a number of themes have emerged:
that all business and product content is both used and reused across all phases of
these processes; that content authors are most productive when using familiar tools
to create and edit content; that content needs to be securely shared with both
internal and external groups; and that content, regardless of its source format,
needs to be dynamically converted to multiple formats for consistent and easy
consumption by all users.

Oracle Universal Content Management is unique in its ability to meet all of a
manufacturer’s needs. In addition, its extensive out-of-the-box functionality and
ease of implementation provide a reasonable total cost of ownership.
Manufacturers can quickly obtain tangible results that drive consistent and
repeatable return on investment.