ALLEGRIA SOFTWARE, INC.

A Technical White Paper

by Koushik Dutta

Vice President, Research & Development

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Integrating View & Mark-up Into Your PDM Strategy

Introduction

Allegria Software, Inc. (Allegria) has been a leader in the graphics software industry for over a decade and is extending its leadership position now into the electronic documentation and imaging marketplace. Allegria offers a family of imaging products; its leading edge product being a comprehensive view and mark-up system to meet the growing corporate need to share documents, images and technical drawings between diverse organizational units.

Many corporations are now addressing this need through implementing Product Data Management (PDM), Electronic Data Management (EDM) or Technical Data Management (TDM) systems where view and mark-up play a key role. This paper will only refer to PDM systems throughout, although it's references could easily be replaced by the others. The distinction is becoming more and more blurred as the technologies all begin to take on similar aspects.

These technologies are currently being implemented in organizations around the world and across multiple industries. For example, PDM is an enabling technology that is used to support implementation of management programs such as business process re-engineering, CALS, ISO certification, etc. PDM is becoming an essential component for successful industrial organizations.

The purpose of this white paper is to examine the role that view and mark-up play within a PDM system with the focus on the different strategies for integrating view and mark-up into a PDM system.

Solving the Enterprise Wide Concurrent Engineering Dilemma

PDM technology enables concurrent engineering strategies and implementations by offering an information infrastructure to the enterprise. This infrastructure provides a common mechanism to control and manage all product related data (data, documents, drawings, specifications, requirements, programs, etc.) and processes (ECO, change control, approval, sign-offs, release, etc.) throughout its life cycle.

An important capability of PDM technology is to facilitate communication and exchange of product data between product team members as well as within the enterprise. Managing in-process data; routing data to be reviewed, distributed and approved; providing access to the correct or latest version of data; capturing feedback from the product team; and managing the creation and distribution of change request; are examples of how this technology facilitates the communication and exchange of product data.

Furthermore, once product information is accessible, the user can use either the native application to review the data or a common set of tools to allow review of many types of electronic data. During the review process, feedback is captured and cycled through the life cycle along with the action resulting from the review, e.g., change requested, design approved, part rejected, etc.

However, even though the communication, exchange and review processes are the backbone that facilitates the success of these systems, one of the areas that has received little direct development or real integration from PDM suppliers is the ability to view and mark-up data and documents managed by these systems. It appears that the PDM vendors, for lack of time and resources, have really left this important task to other third parties. This is where companies like Allegria come in. Allegria a few years ago recognized that there was a need for an enterprise wide view and mark-up solution. It quickly adopted the following two strategies: (1) Develop the 'best in class' view and mark-up solution in the marketplace; and (2) Develop the expertise to help companies successfully integrate this technology into its data management applications.

Since then Allegria has introduced *ForReview* - its family of view and mark-up solutions. Since they were developed as enterprise wide view and mark-up tools, they were designed to easily install in a network configuration with an extensive On-line Help System coupled with a feature-rich Application Programming Interface (API) to facilitate integration into PDM systems.

Allegria complements its products by providing specialized services to the end user, system integrator or PDM supplier for the specification, design, and integration of view and mark-up into a PDM system. Recognizing that PDM vendors were not developing their own in-house expertise for view and mark-up, Allegria has dedicated in-house resources to studying and understanding PDM technology. This provides Allegria, not only with the expertise to perform or assist in integration, but insights on the features required for tight integration. These features are now part of its view and mark-up product. By becoming an expert in this technology, Allegria is able to offer the best overall cost-effective solution for a company's integration and product needs.

To better understand Allegria's capabilities and how they can assist in providing a complete solution, it is important to understand what view and mark-up is and the different methods for integrating it into an overall system.

What is a View and Mark-up Application

Ensuring that to review product data all product team members (or the enterprise at large) have access and can run the appropriate native application on their computer platforms (e.g. a CAD application) is neither practical nor cost effective. The hardware incompatibilities (workstation versus PC) as well as the training issues make this approach only feasible within small homogeneous product teams.

View and Mark-up application tools provide the ability to review various native data types (files created by different applications such as DXF, DWG, and DOC) and standard neutral data formats (TIFF, CGM and HPGL) and obtain feedback in the form of graphical mark-ups or redlines to the information being reviewed.

These applications are part of PDM technology that facilitate the communication and exchange of information. Most of these technology suppliers have over the last two years

started to offer third party view and mark-up applications with their products. These view and mark-up products are generally loosely provided with their offerings, i.e., encapsulated - provided as an application that is registered within the offering to be launched when the user requests to modify or view a pre-defined data format. This is essentially a stop-gap measure and not appropriate for real production
use. Integrating view and mark-up applications within a PDM implementation is vital to the realization of the goals to enable concurrent engineering by facilitating the communication and exchange of product data between product team members and within the enterprise.

Requirements for an Enterprise Wide View and Mark-up Product

Following is a partial list of features that are required in a view and mark-up product for successful integration into an enterprise wide solution. There are many products on the market but very few with the breath and required functionality to perform as a company wide standard.

- Access vector (CAD like pictures using intelligent entities such as lines, circles, and polygons), raster (images created from pixel or display information) and textual data (word processing, spread sheets, databases).
- Support for the view and mark-up tools across multiple platforms in a heterogeneous environment (such as personal computers and UNIX based workstations). Mark-ups must be transferable between environments.
- Customization of the view and mark-up tool through API's (application programming interfaces) and the graphical user interface to tailor versions for the individual user or departments.
- User level customization and configurability of the graphical user interface (GUI) including layout, toolbars, and menus.
- Accessibility of data intelligence within a drawing. For example, AutoCAD drawings contain views, layers and blocks. By providing the user access to these, the drawing can be viewed and marked up intelligently. Many products provide just a default view and thus limit the accessibility to and the understanding of the data.
- An open and versatile way of generating and managing mark-ups. An unlimited number of mark-up layers and files should be easily created.
- Mark-ups should be able to be transferred between layers and/or files.
- Grouping of related drawings into lists or folders for easy viewing, printing or managing. Multiple files should be able to be printed on a single sheet of paper.
- Usage of the type of 'tools' that a user is familiar with. The product should be rich enough to provide multiple methods of performing view and mark-up tasks - allowing a user to select the one that he or she is most familiar with.

Data and Document Formats

Following is a list of the most common data types that a view and mark-up solution should support:

- ASCII (ASCII text file format)
- BMP (Bit Mapped Images)
- CALCOMP (CALCOMP Plotting Language File)
- CALS Type 1 G3/G4 (Raster file format using G3/G4 compression - used by fax machines)
- CGM (Computer Graphics Metafile - CALS standard)
- DOC (Word for Windows)
- DGN (Microstation native format)
- DXF and DWG (AutoCAD's formats)
- EPS (Encapsulated postscript file)
- GIF (Graphical image file - largely used on the Internet and other on-line services)
- HPGL - HPGL2 (Hewlett-Packard graphics language file - used by all plotters and many printers)
- PCX (Paintbrush native format)
- PICT (Macintosh picture file)
- TIFF (Tagged image file format)
- WPD (WordPerfect for Windows)
- WMF (Windows meta file)

In addition, a product should provide support for word processing, spread sheet and database application files such as MS-Word, WordPerfect, MS-Excel, Lotus 1-2-3, and DBASE IV. Support can also include the ability to search for key word(s) or alphanumeric strings within these application files.

Strategies for Integration

As PDM technology is implemented in many different industries and organizations, different strategies and methodologies are required for implementing the view and mark-up tools within the solution depending on the specific needs and requirements of the customer.

In general terms, integration's can be defined by three levels of interaction between the specific system and the view and mark-up tools: Encapsulation, integration, and incorporation.

The word integration is used very loosely in the computer industry (especially during the sales process) and so these three definitions are offered in order of degree of interaction from loosest (simple) to tightest (complex).

Encapsulation

This type of interaction is the simplest and most commonly offered by the PDM vendors as off-the-self functionality.

The view and mark-up tools are registered with the system administration function as applications with associated data formats that are supported. Usually, a menu pick is defined to allow the user to execute the tool and pass it a file to be opened.

This approach is similar to the function within MS-Windows to associate a file type (file extension, e.g., ".PCX") with a specific application (Paintbrush). The application executes a process using a command line string with the appropriate syntax to launch the application and concatenates the requested filename to open to the end of this string.

Mark-up tasks can be initiated using the encapsulation method, however, the system can not automatically control the user's ability to mark-up or redline the information, manage multiple authors for the mark-ups nor capture the mark-up file and place it under version and change control without additional integration work.

This type of interaction is best suited for simple operation of view tools and we believe is inefficient for a successful PDM environment. Unfortunately, most offerings available today fall into this category.

Integration

Integration of view and mark-up tools into a PDM solution provides more sophisticated interaction. The tools become more closely linked to the solution and allow them to communicate at a lower level and automate more of the interaction. The tools and the system are tailored and programmed to communicate at command line and/or API level depending on the required capability.

Integration can be performed by the PDM vendor, system integrator, or customers but the most effective integration can be performed by a company that has expertise both in the PDM system and in the view and mark-up tool.

Through integration the PDM system, for example, can automatically control the user's ability to mark-up or redline the information depending on their access rights, manage multiple authors for the mark-ups and capture the mark-up file and place it under version and change control with little or no user interaction required.

Integration is best suited when users require the full capabilities of the specific PDM and view and mark-up tools to fulfill their goals to enable concurrent engineering and build an information infrastructure within the enterprise. We believe that this should be the minimum acceptable level of integration if an enterprise wishes to achieve the real benefits of the PDM system.

Incorporation

Incorporation is the most complex interaction between PDM and view and mark-up tools. It is the inclusion of the components of the view and mark-up tools into the system's architecture and system's functions. Incorporation is best suited when very specific custom functions and solutions are required.

It is envisioned that as the market demands increase for these view and mark-up tools incorporated into PDM systems, the PDM vendors will begin to offer view and mark-up solutions as an integral component of their product offering.

Summary

Integrating view and mark-up applications within a PDM implementation is vital to the realization of the goals of PDM to enable concurrent engineering by facilitating the communication and exchange of product data between product team members and others within the enterprise.

As a leader in this industry, Allegria provides both the view and mark-up tools and the services to effectively integrate these tools into leading PDM environments. This can help any company realize the many benefits offered by implementing a PDM solution.