Introduction

Media enterprises face diverse challenges in adjusting their businesses to today’s market demands. They seek to improve efficiency, time-to-market, and to retain and increase audience share, but the initiatives in implementing solutions to achieve these goals vary in scope. Some are major business transformation initiatives, others address a specific challenge that, when solved, can provide measurable improvement in business efficiency.

Example #1:

A public broadcast organization sought to replace their existing tape-based transmission environment with a fully file-based solution that also allowed them to transmit in HD. Realizing that replacing the transmission systems alone would only provide them with a fraction of the benefits they sought, they considered the entire process of program delivery from planning and scheduling through material reception including QC, versioning, segmentation, language dubbing, subtitling, graphics insert creation, archiving and staging to transmission. They realized that the best way to achieve significant improvement in overall operational efficiency was to introduce overarching business process management, automation of repetitive manual tasks, and integration of the various systems used in the different steps of each workflow.

The result of their initiative was a fully file-based program delivery solution that enabled users to collaborate throughout the process. It eliminated all manual tasks, and allowed users to focus on the creative and business-relevant work. This significantly increased the efficiency of the organization which now delivers programming with less effort, greater predictably, and with more consistent quality.

Example #2:

A company with significant media assets wanted to significantly lower the ongoing cost of manual content archive preservation, primarily copying tapes from older to newer tape formats. They determined that migration of the archived content to a digital file-based library would provide a promising return on investment, especially if prioritizing material scheduled for re-broadcast. This workflow would also require interoperation with transmission servers and business management systems.

Over a few years the company has been able to migrate all relevant content to their digital library, considerably reducing preservation-related costs in human labor, tape stock, and decks. In doing so, they also found that with business process management, workflow automation, and system-to-system integration, considerable additional operational efficiencies were achieved. Consequently a series of smaller follow-up projects expanded the scope of the system to encompass more and more areas of their operations. Prioritized by potential return on investment and increased operational efficiency, they have continually improved their cost base and their ability to flexibly react to market changes.
Example #3:

A multi-platform broadcaster wanted to be able to grant easy access to all kinds of media the company owned. Their principal goal was to eliminate wasteful copying and reacquisition for internal use, caused by the inability to find and easily access media, and to raise efficiency of all their departments by improving information exchange and collaboration. They also recognized that business process management, workflow automation, and system-to-system integration were keys to project success. Starting in areas where they saw the greatest benefits and the largest return on investment, international program acquisition, followed by program production, still and graphics, news, and radio were brought into the solution. As they proceeded, beneficial incremental additions to their platform were identified and implemented between the bigger steps, such as delivery of content to their online Web portal, a language translator portal, and a program review portal for TV critics.

Ultimately a comprehensive solution was built that provided the desired efficiency improvements and seamless interoperability with their program planning system, transmission automation, legacy catalog systems, newsroom computer system, stand-alone and networked production systems, and more. They now run one of the most advanced and efficient integrated cross-enterprise media and business process management systems anywhere – and continue to expand the scope of the platform wherever they identify an area within their operation that can benefit.

All of these companies have one thing in common: The solution that they chose to help them realize their vision is the Avid Interplay Media Asset Manager system.

The Integrated Media Enterprise

Any organization that creates, owns, or distributes rich media as a primary or significant part of its business operation is a media enterprise. This includes broadcast companies, film, video, and music producers, sports leagues, teams, and venues, and government, education, and house of worship institutions that use media for communications and training. Media monetization and audience reach and engagement are fundamental to business success for these organizations.

From experience gained by Avid Technology in a wide range of consulting, solution implementations, and media production workflows, a new operational framework emerges that is based on best industry practices, shown in figure 1 below. A media enterprise can be thought of as having three levels:

- The Production level, concerned with content creation and encompassing creative tools and solutions and the enabling storage and production asset management infrastructure
- The Enterprise Media Management layer provides enterprise-wide intelligence about media, coordinates diverse production operations, and interlinks media and business processes, and is typically enabled by the capabilities of a media asset management system
- The Business Process layer, which includes legal, financial, and marketing information related to media such as rights, licensing data, and audience patterns
In most media enterprises, the enterprise media management layer is the least evolved. Lack of enterprise-wide media intelligence, isolated production groups, and inconsistent or no linkage between businesses and production systems and media between is common. The Avid solution for enterprise media management is based primarily on Interplay MAM (Media Asset Management).

**What is Media Asset Management?**

There are several terms for asset management systems: DAM, MAM, PAM, CMS and others. Simply put, a MAM (media asset management system) is similar to a DAM (digital asset management system) but has many features specialized for the task of managing time-based media (i.e., video and audio) and workflows. Typically, DAMs are focused on the wide range of corporate assets that may be found across large and diverse organizations such as a Fortune 500 company. As a result, they include tools for managing print and web publishing workflows, integrations with toolsets in these areas, and only secondarily functions for handling video clips, usually at a browse level.

The primary tasks of a Media Asset Management System such as Interplay MAM, on the other hand, are focused on rich media, i.e. time-based assets. They include:

- Manage and preserve media assets of a company, independent of their type or format,
  - knowledge about these assets, and extending that knowledge over time
- Enable
  - access to the media assets by authorized users for assessment and re-use
  - enterprise-wide collaboration across potentially globally distributed sites
  - greater efficiency and agility through consistent management of processes and workflows
- Optimize
  - information access and material exchange across a diverse landscape of systems and tools used to perform various tasks (storage, servers, creative applications, business reporting, etc.)

Media Asset Management is applied by media and entertainment companies for knowledge management, business process optimization, workflow automation and cross-system integration in order to be more efficient and be able to better monetize their assets and increase audience share and revenues. It is technology that can address a wide portfolio of challenges, whether large business transformation projects or smaller scale workflow optimization steps.
This also distinguishes MAM systems from solutions such as Web Content Management Systems (Web CMS) or Production Asset Management (PAM) solutions. Web CMS is centered around the aggregation and management of content that is to be presented on the Web. PAM systems tend to be focused primarily on management of real-time production environments. They are highly optimized to support in-process content production and are less flexible outside of this domain. Where MAM systems primarily address the assets a company works with, Web CMS and PAM systems specialize in the assembly of new assets from sources and existing assets.

As a consequence, MAM systems integrate with DAM, Web CMS and PAM systems – as they integrate with other tools that specialize on specific steps of the media lifecycle, such as planning and scheduling systems, rights management systems, transmission automation, etc. A MAM system manages the media lifecycle, interfacing with systems that support specific steps in the lifecycle.

**Using a MAM System: User perspectives**

Obviously there are ample benefits to MAM from the media enterprise viewpoint. But how does it look to the individual contributor? How do they work with it and what does is enable them to do? Let’s consider it from the viewpoint of some key roles in a typical broadcast organization.

**Journalist**

Without the use of a MAM system, journalists search video and still image content in archive catalogs, or would ask the archive department to find material for them. The archive department provides the journalist with preview video tapes for content they may want to consider using. They preview these tapes, take manual notes on what parts could be useful, and return the preview tapes. They may need to repeat that process if not satisfied with the results. After completing the preview session, the journalist asks the archive librarian for delivery of the selected content on high res video tape. They then take these tapes to an edit bay and work with the editor to identify the clips on the selected tapes and arrange them in the desired sequence, after which the editor would edit the story.

By contrast, using a MAM, a journalist can directly search the MAM to find assets the company already owns and can be re-used in a new story. From their desktop they can directly access and preview them, can interactively select suitable assets – or parts of them – and arrange them into a flow that supports the story. They electronically forward their selection to production for creation of the story, where can be used exactly as intended.

The journalist can also access the MAM while working on a team with an editor to finish the story. For example, if they recognize that some content does not support the story, they can use the MAM again to find alternative content as fast as possible and make that content available in the edit bay.

For their general work, journalists can also use the MAM for background searches, or forward searches for new material that could support a story, whether feeds, local news footage, or user generated content – processes that without the MAM would require access to multiple systems and likely access to video tapes.
Editor

An editor will typically work with a producer or journalist to block out the initial story sequence to create the basis for the desired final piece. They have to digitize tapes to bring content into the non-linear edit bay which ties up the edit bay with non-creative work. If they want to improve the story by using different source clips, the new material has to be retrieved from the archive or other source, digitized, and brought into the composition through tight interaction with the producer. Many editors keep popular clips on tapes within easy reach, just to speed that process.

With a MAM, the editor can receive editing tasks assigned to him and see which elements the producer has selected to build a story from. This rough sequence transfers directly to the editing system’s timeline, and the high resolution content is transferred to the edit bay in the background, eliminating non-creative work.

At any time the editor can use collaboration tools to communicate with the producer to clarify questions as well as for review and approval of stories. If the producer decides to change content to be used in the story, the editor can directly retrieve it from the MAM system, or the producer can transfer it to the edit bay. This also means that the editor no longer needs to keep any physical local tape copies – all content needed is instantly available through the MAM.

Archivist

Traditionally an archivist or media librarian performs several tasks. They register content that is assigned to the archive, provide a formal set of metadata that describes the content, create at least one copy on preview tape, assign a shelve space for the tape, and put it to the shelves. They also use the tapes to review the material and create content descriptions. Archivists support production by doing content searches and delivering potentially suitable content to journalists and producers. They create thematic collections such as obituaries through archive searches and tape previewing, and provide long term preservation of content by dubbing from obsolete to modern tape formats.

For an archivist, the MAM completely changes the nature of long term archiving and preservation. Incoming content is automatically registered. Preview copies and key frames are automatically created, and the MAM also takes care of the assigning and management of storage locations in a tiered storage system.

Archivists can instead focus on enriching descriptive information of assets by adding technical and descriptive metadata, including video or audio timeline-based notation, making assets easier to find and search results more accurate. These efforts are supported by proxy previewing and frame-accurate positioning to perfectly align metadata with media.

Archivists may also use the MAM to search and select suitable assets upon request from journalists or producers, or compile and maintain asset collections that contain background material for upcoming features, major events, or obituaries. Preview capabilities and electronic collections – like shopping baskets – make this very easy to do.
In some companies, archivists review original assets used in productions and create reports to track frequency of re-use. The fact that the MAM can interact with production systems and rights management applications makes this process extraordinary efficient.

**Operations or Production Manager**

The operations or production manager primarily needs to oversee the production pipeline and manage projects by review and approval. Without a MAM system, this involves a substantial time commitment and is basically inefficient. It’s difficult to gain an overview of multiple projects through paper trails, and review and approval typically involves visiting an edit bay or having someone create a preview tape. Approvals are often given via e-mail, as part of the paper trail, or in a somewhat disconnected database.

With a MAM, all of this becomes tremendously easier for the manager. Through business process management and a progress and status monitoring UI, she can gain insight into the overall situation and communicate decisions on individual projects. She can delegate tasks that are dedicated to other resources directly from her desktop. She can also review results through the MAM’s web-based, frame-accurate proxy player, and can approve electronically as part of the business process. There is no longer any paper trail – the entire process and the documentation of each step is handled by the MAM.

**Marketing Executive**

In order to optimize sales and licensing revenue for the company, a marketing executive needs to know the availability and value of assets. Without a MAM, the executive relies on various sources to compile the information needed such as reports from the archivist regarding which content on which tapes have been delivered to production. That, however, does not tell them if that content has been re-used, and if so, in what way and what parts of it. This kind of information can only be aggregated by a MAM that manages the overall process, and uses interfaces to all related systems to collect the relevant data.

With a MAM, content usage statistics that make it possible to understand the value of assets can be readily at hand. Simple search and retrieval locates content with potential market interest, and collaboration tools simplify promotional work with the creative department. Through the MAM’s workflow management, the marketing executive could publish content to online marketing platforms, while access to the MAM’s business process management allows him to understand the cost and efforts involved in packaging and delivering content via various forms of distribution. If needed, pricing and content changes can be quickly revisited, and the speed of entire process translates to a faster response to market opportunity and better profit margins.

These examples show why MAM is more than the simple management of assets. It fosters collaboration between users, it links systems together that before where islands, automates repetitive tasks to free up creative resources, and allows companies to improve the way they work through business process management. It is not necessary to immediately embark on a large scale business transformation and innovation project. Many companies have shown that it is entirely possible to start with smaller scale challenges where existing workflows and tools suggest measurable inefficiencies, latencies and costs. In such areas considerable improvements can be achieved at low risk and cost, with a rapid return on investment. Follow-up projects then can build
on the first deployment to address other areas, with cumulative benefits increasing step-by-step.

For any media enterprise, this offers enormous potential. A MAM system allows them to consider business process improvements on all levels of scale. They can decide to start small and focus on critical inefficiencies in certain departments. They can use a compelling event to introduce MAM as part of a technology shift, e.g. transition to HD, introduction of file-based workflows and archiving, or the need to distribute content to a multitude of Internet or mobile distribution platforms. They can decide to apply the technology to integrate system 7 islands or remotely distributed sites. Wherever they begin, it is the first step on a road that transforms them to an efficient, agile, integrated media enterprise.

The Technology of Avid Interplay MAM

Service Oriented Architecture and Web Services

Avid Interplay MAM is a third generation Media Asset Management system that, from ground up, is designed by applying state-of-the-art IT principles, taking into account all the lessons we have learned in earlier versions.

Interplay MAM is entirely built as a service-oriented architecture (SOA). Originally, SOA had been introduced as an architectural paradigm for large scale IT systems to achieve optimal support for business processes for enterprise-class, distributed, IT systems. Avid’s experience proves, however, that this architecture can also be very successfully employed for small-scale systems and hence is an excellent choice for MAM.

Figure 2 – Principle Elements of a Service Oriented Architecture
Services in the context of a SOA are self-contained, re-usable, application functions that are offered by a provider and can be applied to fulfill tasks in business processes. They are loosely coupled, and virtually stateless and autonomous. This means that a service treats each request as an independent transaction that is unrelated to any previous request, and the service does not have to retain session information or status information about each requestor over the duration of multiple requests. In addition, the service interface has to be well-defined, standardized, and platform-independent.

SOA provides dynamic resource detection and allocation using an approach comparable to the yellow pages (see Figure 2). A provider publishes services to a registry. The publication contains a full specification of the service interface and service contract. If a requestor wants to use a service offered by a provider, it first locates the provider by making a request to the registry. The registry compares requests and delivers locations of suitable providers. The requestor selects a provider, requests the service and receives the service result. Of course, a provider can also be a requestor of other services.

Over its interface a service publishes data and application functions — but its implementation details are hidden. This allows changes below the interface and the ability to introduce a new service to an existing system without impacting overall system behavior — as long as the new service obeys the agreed upon service contract. An example would be changing a transcode service in a given system. If both engines support the same service interface, and if they deliver the same results when invoked in the same way, the overall behavior of the system is not impacted by the change.

Interplay MAM services are implemented as Web Services. The primary communication protocol is SOAP, the most commonly used standard for SOA interoperation. In future versions, Avid will, where applicable, also add Representational State Transfer (REST) interfaces. In REST-style architectures requestors send requests to services in order to initiate a transition to a new state. As long as the service does not return the response, the requester is considered to be in transition. This model matches very well to the way Interplay MAM manages orchestration, which is discussed in the next section.

The major concepts of Interplay MAM implementation of SOA are:

- The only API available in the system is what the Web Services expose, there is no hidden internal way of accessing the functionality a service offers.
- Interplay MAM Services have as little internal intelligence as possible; the intelligence is introduced through business processes and workflows which are fully configurable — we call this “orchestration”.
- Awareness of and information about assets allow both users and the orchestration to determine what to do with the assets. To represent the knowledge of assets, Interplay MAM offers an extraordinarily flexible and fully configurable data model that can be adapted and modified—at runtime—allowing adaptation in the way information is managed to support business needs.
Orchestration

Since Interplay MAM is centered on business processes and workflows instead of objects and application functions, organizations can more easily accommodate business changes by modifying the orchestration rather than changing the code of the services.

In Interplay MAM, the business processes are defined via a graphical modeling tool that uses Business Process Modeling Notation (BPMN), a well-established and very popular standard graphical representation that has been specifically designed to model business processes. The modeling tool translates the BPMN diagrams to XPDL (XML Process Definition Language) for execution. An extraordinary convenient side effect of using a notation such as BPMN to graphically describe the process is that it facilitates a consistent communication between users, business analysts and technology experts — it is very easy to understand and all participants can readily understand it, and therefore have a common ground for discussion.

Figure 3 shows a very simple BPMN diagram that contains the major building blocks for modeling processes in Interplay MAM:

- **Process States:** Within Interplay MAM, a state is an activity that is executed by a service called “State Machine” which drives the overall process. When a script task or user task is completed, the State Machine evaluates the information that is available on the process and derives the state the process is in. Based on the state, the State Machine identifies the next tasks that need to be executed and initiates them.
- **Script Tasks:** Script tasks are workflow scripts that are executed by the Interplay MAM Workflow Engine. This is where the individual services are invoked to complete the activity. Workflows are defined using a powerful script language, which the Interplay MAM Workflow Engine internally compiles to BPEL (Business Process Execution Language).
User Tasks: User tasks are delegated to user groups for execution. A user performs the necessary actions to complete the activity and then decides on how to advance the process (Accept, Reject, Delegate, etc). The options that a user has to advance the process are defined in the business model and are presented to the user via buttons in the GUI.

Overall consistency is ensured through a common core data model that defines both the metadata for assets and the metadata for business processes.

In addition to the linear flows in the example, Interplay MAM also supports forks, joins, subprocesses, loops, and timed waits.

Figure 4 shows how all of this ties together. The business process is defined in BPMN and uploaded to State Machine, which orchestrates it. The State Machine invokes User Tasks or Script Tasks as defined in the model. Script tasks are executed by the Workflow Engine. As defined in the script task, the Workflow Engine invokes services to execute the workflow. These services can either be native Interplay MAM platform services, or third party services integrated through Connectors. Connectors are discussed in the next section.

Interplay MAM’s Workflow Engine can also directly call batch scripts or executable programs in order to add even more flexibility for workflow automation.

Data Model

As we have already seen, one of the primary tasks of a MAM system is to manage knowledge and information to make assets easy to find, access, and re-use. The challenge is that a MAM system may have to deal with a very diverse set of assets. On the highest level this could be video, audio, images, and documents. Video could be programs, features, news stories, rushes, etc.; audio could be sound effects, popular music, classical music, voice recordings, and more.
For certain business scenarios it is important to be able to structure asset representations into hierarchies or define relationships between them. For episodic TV this could be a Series / Season / Episode / Version hierarchy. Trailers and promos may be associated to any asset in such a hierarchy.

It is also important to ensure clear semantics and consistency of data, which implies controlled vocabulary, such as legal lists and thesauri.

Interplay MAM offers very rich capabilities for defining and maintaining data models. In the following section we explore those capabilities.

Attributes
Interplay MAM allows you to define a list of attributes that can be used to describe objects of different classes. This ensures that if an attribute is used to describe different objects, it always has the same semantic meaning – a main title is a main title everywhere – and that it has a consistent data type definition.

For single value attributes, Interplay MAM supports Boolean, Date, Datetime, Duration, Float, Integer, Text, Time and Timecode data types. Date and Datetime attributes can be limited to a span of years. The number of supported digits can be defined for Integer attributes, and for Float attributes the number of numerator and denominator digits can be defined. For Text attributes you can define the maximum number of characters.

All attributes besides Boolean can be also be defined as multi-valued, allowing lists of values to be created. In addition, attributes can be multi-value compound, which means that you can define attributes as tables, e.g., for documenting broadcasting events with date, channel, start time, end time, etc.

For all attributes you can define whether they are searchable – which for text attributes means that they are added to the full text search index – sortable, editable, and/or unique.

Attribute definitions can be added, modified and deleted at runtime in order to provide the best business flexibility and agility.

Attribute Groups
When the work on Interplay MAM’s configurable data model began and we were collecting requirements from various customers, one of our customers explained that for the majority of the searches, their existing databases offered a user interface that allowed users to search for “What”, “When”, “Where” and “Production Number”. They argued that, internally, the database would map “What” to a selection of descriptive attributes, “When” would combine various date and time attributes, and “Where” would federate over a set of attributes that hold location information. “Production Number”, however, was a dedicated single attribute.

That led to the introduction of Attribute Groups to Interplay MAM. In the MAM data model you can define an arbitrary number of such attribute groups and assign any attribute to these groups as a member. Within the search forms you can select the available attribute groups and sub-select the attributes belonging to a group, which gives you an easier navigation through the data model. If all attributes in a group share the same data type, you can directly search using the attribute group, which then internally extends the search to find all objects where any of the attributes within the group matches the search criteria provided for the group.
**Object Classes**

In Interplay MAM, Object Classes define the collection of attributes selected to annotate a given kind of object in the MAM. Objects are either Assets (things that you care about because they have business value) or processes (information collections required to successfully run a given business process).

Examples for object classes for assets would be basic classes such as video, audio, image, or document, or more specific classes such as series, season, episode, version, feed, rush, CD, popular music, promo image, contract, and so on.

As for attributes, object classes can be added, modified and deleted at runtime – the data model in Interplay MAM is dynamically configurable.

**Controlled Vocabulary**

As the metadata managed in the MAM data model is a representation of the knowledge the company has about its assets and processes, it is important to ensure that wherever possible, the same annotation is used for the same purpose, ensuring clear semantics and consistency of data.

The most commonly used approach to achieve this is the use controlled vocabulary. A controlled vocabulary means that, instead of allowing free entry of data, for certain attributes you prescribe an allowed set of values from which the user can select. Examples are definitions provided by standardization bodies, for example ISO language codes, or definitions provided by industry organizations such as the EBU Classification Schemes provided by the European Broadcasting Union. Many companies also have in-house definitions for controlled terms.

Interplay MAM supports three kinds of controlled vocabulary:

- Legal Lists, which are flat lists of values (e.g., video frame rates)
- Thesauri, which are hierarchically structured data sets (e.g., locations structured by continent, country, region, city, and so forth)
- Master data, which are structured data collections (e.g., an address comprising of country, state, city, ZIP code, street name and number)

In Interplay MAM, master data sets are defined as object classes, with some limitations, namely that a master data set can only contain basic attributes, i.e., no multi-valued attributes, legal lists, thesauri, or attributes that again are master data (no nesting).

Any number of attributes in the data model can be defined to be controlled by any of these three. The system allows you to define and maintain any number of legal list and thesauri, at runtime.

**Associations**

Interplay MAM uses associations to describe relationships between object classes. They can be used to indicate that an episode is part of a series, or that a given asset is a version of another asset.

Interplay MAM supports three different forms of associations:

- Hierarchical associations, used to define parent-child relationships
- Directional associations, for source and target relationships with no implication of a hierarchy
- Non-directional associations, used to describe relationships between two objects that is just a reference with no implication of hierarchy or source/target pairing
Hierarchical and directional associations can have different icons associated for both directions; non-directional associations just have a single icon.

Associations are primarily used by the orchestration layer and the GUI to navigate between objects. They can also be used by specific plug-ins to the Data Management for automatic data replication and other metadata management tasks. Associations can be added to, modified and deleted from the data model at runtime.

**Stratification**

Stratification – a key concept in Interplay MAM’s metadata management, see Figure 5 – allows annotation of parts of video objects along their timeline, at any segment defined via an in-timecode and an out-timecode. This is similar to Locators, a capability found in editing applications such as Media Composer. The difference is that a locator allows associating an annotation to a frame, whereas in Interplay MAM the annotation is associated to a sequence of frames.

Annotations may vary in their semantic meaning. You may want to provide keywords that specifically describe a part of the material. You may want to name the actors that are visible in the various scenes, or you may want to name the location. You may want to define the rights situation for a given segment. You may want to have the subtitles available for display and search, and so on. To keep these kinds of annotations semantically separated, Interplay MAM allows you to layer any number of such annotations on top of the timeline, where each layer is dedicated to annotations of a specific kind. Within Interplay MAM, these layers are called strata.

Segments in strata can overlap. The segment annotations can contain structured information, defined by a segment object class. In practice, this means that, for example, you can set up a stratum for video rights with a rights indicator to select the display color for the segment in the GUI, as well as a rights description, and other information that you perceive as relevant for the annotation.
As with all other capabilities of Interplay MAM’s data model, you can add strata, modify the definition of a stratum, and even delete some, at runtime. Just like attributes, you can also assign any number of the strata defined in the model to any object class.

The real power of stratification is in search. If you are looking for footage from a G7 summit held in Marseille where the president is visible and you have all rights for re-use, the search engine will return all segments from all your assets where these conditions are true. Instead of having to preview the assets to find the pictures you are looking for, selecting them though mark in/out and adding them to your footage selection, you can simply add the segments you like directly from the hit list - an enormous time saving. Interplay MAM can then deliver the selected footage to your production system via partial restore.

Annotations can be added to strata in different ways:

- Manual segmentation and annotation through a powerful desktop application – the Interplay MAM Cataloger
- Use the orchestration to automatically fill strata, e.g. by parsing subtitle files and adding the text to the related timecode ranges defined in the subtitle file
- Add third party media indexing services to an Interplay MAM system that can, for instance, extract text within images, convert speech to text, perform face recognition, and so on – again by using the orchestration to define the process
- Integrate with other databases to replicate data such as segment-level rights information that may be managed in a dedicated rights management system

The more information is available for your assets in stratification, the more successful users will be in easily and reliably finding exactly the footage they are looking for.

Stratification has successfully been used by our customers in a variety of use cases, such as:

- Manual and automatic annotation of content
- Automatic annotation of stories in archived news shows and creation of story objects associated to the show - driven through the orchestration
- Quality assurance review and documentation
- Creation and publishing of graphic insert IDs to the graphics department, traffic, and automation for successful creation and fulfillment at airtime
- Program segmentation to define commercial breaks for various channels
- Managing and documenting the edit history of an asset - and propagating metadata such as rights information to new assets that re-use the content
- Live import of sports statistics provided by external providers during major sports events such as Olympic games
Internationalization and Localization

Interplay MAM is fully internationalized and can be localized in any language supported by Unicode. The system can support multiple languages for the user interface in the same installation. The language in which a user sees the interface displayed is defined in the user profile. The default language is English.

For the fixed terms in the GUI, resource files are used. For the elements in the data model, the entire localization of display terms is configurable as part of the data model. That means that through configuration, at runtime, you can add or remove languages to be used for defining the display labels of all elements of the data model. Then, for each attribute, object class (including master data classes and segment object classes for strata), stratum, association, legal list entry and thesaurus term, you can define an individual label in each of the configured languages, plus the default label.

All semantics are managed consistently; if you change a label for an attribute, it changes accordingly in all object classes using it.

User Tools

Most Interplay MAM functionality is available through Interplay MAM Desktop, a Web GUI supported by Internet Explorer 9 for Windows and Safari 5 on Mac OS X. For the specific work with stratification, a native Microsoft Windows application called Interplay Cataloger is used.

Interplay MAM Desktop enables two primary capabilities – Retrieval and Workspace Management, which are described in the following two sections.
Interplay MAM Desktop – Retrieval

Retrieval provides access to search forms, hit lists, metadata details, key frames, and browse proxy playback.

For Search the UI offers four search forms by default, selected via tabs. These are:

- Quick Search, a full text search that searches through all text attributes, including those in strata that are configured to be “searchable” in the data model
- Stratum Search, which performs searches on strata and delivers the segments that match the defined search criteria
- Advanced search, which allows the user to select individual attributes and attribute groups
- Combined Search, which offers all of the above in a single search panel

In addition, administrators can configure any number of special search forms and can assign these to individual user groups. Together with the capability to remove any of the default search forms, this allows each user group to have one or more search forms specifically tailored to their needs.

When you search you can select the hit list display format. Templates for hit lists allow control of attributes to be displayed, column width, a thumbnail column, and gallery or list view. Many users prefer the Gallery view for image results – basically a light table-like display of thumbnails and a few key metadata fields in a grid. Also definable are which forms to be used for hit lists and object classes. This is primarily to aid users by reducing the selection to what is relevant for a given search.

To assess search results, Interplay MAM offers different layouts and forms to display details of an object, including:

- Panels for descriptive metadata
- Essence - display of technical metadata managed in Essence Management service
- Segment list panel to display strata without key frames
- Storyboard panel to display strata with key frames for the segments
- Light table panel to view only key frames, for a fast overview of the visual content
- A proxy playback panel that can open on top of display panels for access to video proxies, audio, images, and document formats supported by the browser

All these panels can be selected through tabs.

For the metadata display panels a range of configuration options are available. For each object class and user group an individual panel can be set up so displayed information can be limited to the group’s needs. It is also possible to have multiple templates for an object class and user group, so large amounts of metadata can be more easily browsed on different tabbed pages in the UI.
Within Interplay MAM Desktop, users can be granted ability to directly edit descriptive metadata. Within each template attributes can defined as editable or read-only, allowing restriction of metadata editing to specific attributes on a per user group basis. Editable attributes can be mandatory - requiring a value to be entered – and default values to be used can be defined. It is even possible to create expressions for attributes that evaluate the values of other attributes in order to define whether the attribute is editable or not - typically to allow temporary editing of attributes based on date ranges.

Privileged users can open a dialog that allows fine-grained global metadata search and replace operations. From a global search results hit list, you define which values for which attribute should be changed, preview the changes, and either ask for batch change in the background or do a step-by-step confirmation of the changes.

Rough cut video sequences can also be created in Interplay MAM Desktop using the proxy copy of the asset. Interplay MAM manages a rough cut as an edit decision list (EDL). EDLs are typically used by journalists or producers to prepare a rough version of a story or program before sending it to production for editing. EDLs have a target frame rate that you can select upon creation of the EDL in the folder (see section on Workspace Management below). Within an EDL the source segments may have different television standards and frame rates. If the editing system cannot deal with mixed standard and frame rate sequences, Interplay MAM’s orchestration layer can normalize the media delivered to the production system through a transcoding step when delivering high res media to production.
Interplay MAM Desktop offers various ways to fast and easily add segments or full assets to an EDL:

- From the Hit List you can drag & drop (multi-) selected assets to the EDL
- In Segment List and Storyboard views you can mark entire segments and either drag & drop to the EDL, or use a one-click transfer to EDL button
- In Storyboard and Light table views you can mark an In frame and an Out frame to define a segment and drag & drop or one-click transfer
- From the proxy playback panel you can frame-accurately mark in/out and add the selection to the EDL with one-click

EDLs are managed in Workspace Management, which also includes Web Cut, the Web Interface that allows navigating in and playing back EDLs.

**Interplay MAM Desktop – Workspace Management**

The Workspace is the interface that allows you to carry out many aspects of day-to-day work with ease, mapping tasks to a tree structure. In this structure there are various types of folders, each representing the interface to a certain set of capabilities offered by Interplay MAM. The system offers the following folder types:

- Standard folders to structure the Workspace tree. They contain other folders and are used to create nodes in the tree
- Collection folders to save references to assets managed in Interplay MAM. They are used to manage direct links to assets
- EDL folders to create and manage rough cuts and shot lists
- Query folders to store queries for re-use.
- Filter Folders for forward searches. The query is executed when the folder is opened and the result displayed as the folder contents
- Process Folders, which are the interface to Interplay MAM’s orchestration layer. Each business process has a dedicated process folder through which new processes can be launched, progress of processes can be monitored, and users can access tasks assigned to them
- Device Folders, which provide file-system level navigation to attached devices

All folders support access restriction on user group and owner level. A personal folder structure can be assigned to each user, with both private folders and shared folders for collaboration.

Workspace Management also offers a quick preview window for assets and a display of the associations that an asset has to others. This association view can be used to quickly navigate to any of the associated assets.

Finally, Workspace Management also hosts Web Cut, the user interface used to play back EDLs, browse segments, and re-order an EDL.

**Cataloger**

Interplay Cataloger is an extraordinarily powerful native Windows application designed to optimize creation and modification of metadata. It is the tool of choice for archivists but is also frequently used by other users who work primarily in metadata creation.

The primary focus of Cataloger is entry and editing of metadata strata, though it also supports entry and manipulation of standard descriptive metadata, and the configuration of display and editing access to attributes. Cataloger uses video proxies to allow users to frame-accurately set in and out points in any selected stratum and enter related segment metadata. It offers split and merge capabilities and numerous other options to make working with stratification as easy as possible.
Cataloger even has been successfully used with an embedded playback control interface to a video server for high res QC, where users viewed the signal from the video server on reference SDI monitors and monitored signal measuring equipment, entering the findings frame-accurately to a QC stratum.

Integration

Approaches and Capabilities
To gain desired workflow efficiencies, a MAM system must easily interact with other systems or services, whether they are custom applications or 3rd party products. The two most common approaches for integration are

a) Implementing Connectors (Web Service wrappers) for a system or service to allow Interplay MAM to interact with it through its orchestration layer

b) Using an Enterprise Service Bus (ESB) as a means of communication

Approach a) is most frequently used when integrating services – e.g., a transcoder, a file QC service, or an archive management solution that drives a data tape library – that are not directly compatible with Interplay MAM. A Connector uses the native API of the service and translates the communication to SOAP, which makes the service directly usable by the Workflow Engine. If the service already offers a Web Service interface, it can be used directly.

Approach b) is a good way to integrate with larger scale systems, e.g., program planning systems, rights management systems, existing catalogs, traffic systems, ERP systems – whatever is required to perform the necessary integrations to achieve the desired business goals. While Connectors have been successfully used for such integrations, many customers prefer the somewhat looser coupling that integration through an ESB offers.
Besides these two ways for integration, Interplay MAM also offers a very powerful watch folder service, where each service instance installed can monitor different folders and can invoke different workflows or business processes, depending on the characteristics or the content of a file. By using a watch folder to initiate a process or workflow, the full power and flexibility of the orchestration layer can be invoked to achieve the desired result.

Integration with Interplay Production

Interplay MAM features out-of-the-box integration with Interplay Production, the most popular production asset management in the media and entertainment space. The related module is called MAM-PAM Interop (MPI).

MPI provides a simple and easy transition between the production asset management domain – focused on tracking and managing compositional metadata (clips, sequences, versioning, pre-computed effects) – and the MAM, focused on assets and business processes.

To transfer content from Interplay Production to Interplay MAM, users simply drag finished compositions or clips to a dedicated watch folder. MPI then extracts the metadata, including locators, and creates a new object in MAM. Essence is automatically re-wrapped from MXF OP Atom to MXF OP 1A, transferred to the MAM primary storage, and registered with the MAM’s Essence Management. Standard processes in the MAM are used to create proxies and key frames.

To fully or partially restore clips from the MAM to Interplay Production, users find, select, and create EDLs for partial restore with Interplay MAM Desktop. They drag and drop this to the process folder in Desktop’s Workspace Management which initiates delivery to Interplay Production. MPI takes care of metadata transfer, including stratum to locator mapping, partial delivery and re-wrapping to MXF OP Atom.

This level of integration allows businesses to gain the full, and complementary, advantages of the industry’s most powerful production and media asset management systems.

Multi-Platform Distribution

Multi-platform distribution is the capability of managing and delivering content to multiple different distribution platforms for publishing to Web, mobile, or any other distribution channels.

Versions of media are created for target platforms and delivered to these targets. Creating the packages typically includes transcoding the content to required formats and selecting and packaging required metadata. Optionally, packaging can include quality control or changes to the content, such as audio normalization, watermarking, logo insertion, etc. The process is well understood and fairly constant for a given target – but the target systems have different media and metadata format requirements. This makes it an excellent candidate for automation through MAM orchestration.

Interplay MAM supports multi-platform distribution natively and by integrating a third party solution. The native solution uses suitable transcoders and services that provide the necessary content changes prior to delivery. The delivery process is then set up in the MAM orchestration layer, which provides all necessary capabilities to complete the packaging and delivery process. Avid Professional Services helps customers configure a MAM to optimally meet these business needs.
The second way is to integrate with a third party off-the-shelf solution. In this case, the packaging and delivery process is driven by the third party system, where the MAM orchestration considers the system as a service that is invoked as a task or sub-process of an over-arching process. The integration with such a system is typically delivery of media and metadata to the inbox of the system in formats required by the system and monitoring of overall progress.

This illustrates how the flexibility of the Interplay MAM orchestration allows a solution to be optimized and adaptable to meet special business needs and constraints, rather than prescribed or hard-wired behavior.

**Authentication, Authorization and Multi-Tenancy**

Interplay MAM authenticates users against Microsoft ADS or OpenLDAP external directory services. Internal authentication is also supported should companies not want to connect to one of these services. Interplay MAM User Management can import users and groups from the directory service, and of course groups can be added or removed.

User Management maintains session information for users and services that have logged in. Through the administration interface sessions can be reviewed and terminated manually, and the session time-out interval is configurable.

Interplay MAM features a tethered access control model. On the highest level, the system supports the concept of Tenants. Assets owned by a tenant cannot be seen or accessed in any way by any other tenant. This allows hosting solutions for multiple customers in a single installation.

The second level of access control is the restriction of access to system functionality via access privileges. These privileges as well as their mapping to groups are maintained in User Management. With approximately 150 different privileges, the feature-level access control can be very fine-grained. It is also easy to add privileges if needed, for example, for custom extensions of UIs.

The third level of access control is Content-Based Authorization (CBA). CBA is defined through rules that are associated to tenants and/or user groups. Rules can be global – which means they apply to all object classes in the data model – or restricted to specific object classes. Rules use Boolean expressions to evaluate object metadata or Active Directory Service properties, and for each rule access can be defined to allow or deny read, write, create, or delete.

For instance a broadcaster wants to ensure that certain news footage can only be seen by a group of privileged users called “Senior Journalist”. In order to achieve this, you could do the following:

- Include a metadata attribute for restriction, e.g., a field that holds the values “Free” and “Restricted”
- Create a rule that grants full access if the value of the attribute equals “Free” and associate that rule to all user groups and the object class to describe news footage
- Create a rule that grants full access if the value of the attribute equals “Restricted” and associate that rule to the group “Senior Journalist” and the object class to describe News footage

Now, everyone can see all news footage objects where the value of the attribute “Free”, and “Senior Journalist” can also see all objects where the value is “Restricted”.
A multi-tenancy feature in Interplay MAM is the capability to dynamically localize the data model. In addition to data model elements described above – attributes, object classes, associations, legal list and thesaurus terms, etc., each element of the data model can have labels for language and tenant. This means that, on a system that hold two tenants, an attribute “MAINTITLE” could have a label “Main Title” for English language users of tenant 1, while it could have a label “Primary Title” for English language users of tenant 2.

For legal list terms, not only labels can be set individually per tenant and language, it is even possible to define which subset of terms of a given legal list shall be visible to which tenant.

**Administration and Monitoring**

Interplay MAM provides a comprehensive set of administration and monitoring tools through its Web-based Admin Suite. The Admin Suite presents a start-up page from which the individual management tools can be accessed by a single click. The following sections will provide a short overview of the toolset and its capabilities.

**Service Manager**

Service Manager is the primary interface to monitor the status of each service that is part of an Interplay MAM installation. The interface shows the runtime status as a traffic light for each service, and where the service is installed and running (host name and IP Address) for both the primary and a fail-over installation of each service.

Start-up dependencies configured for each service can be reviewed, as can an installation consistency check for a service. The interface also offers a one-click link to the configuration profile of a service, through access to the Interplay MAM Configuration Service. Services can be started and stopped individually, or a full system shutdown, start-up, or restart can be initiated from the same UI.

When a service is selected, the UI provides a one-glance overview of characteristics, including the host server, access to the service administration interface, service version, start type as configured in Windows Services (automatic, manual, disabled; adjustable within the UI) and also the dependencies on other services for start-up. Log files of all services are viewable as a full set or from the beginning or end of file.

**System Monitor**

The Interplay MAM System Monitor provides access to the administration UI of the individual services and allows self-tests to be executed. Where the Service Manager allows the administrator to see if services are running, the traffic lights in System Monitor indicate whether the service interfaces actually are working as expected.

**System Administrator**

Interplay MAM System Administrator is the interface to the Configuration Service, where all configuration options for services, clients and workflows can be edited.

You can also browse through the system registry and access the individual interfaces of each service. Clicking on an interface launches the online API documentation, from which you can assess the methods available for each interface, drill down to the description of how the method is invoked, and can even manually invoke it.
Finally, the UI provides access to user and system profiles as well as the workflow scripts, allowing these to be downloaded and uploaded.

**Workflow Monitor**

Interplay MAM Workflow Monitor is a dedicated management interface for the MAM Workflow Engine, the service in the orchestration layer that processes script tasks and is responsible for the automation of all tasks that involve interaction with the MAM services backend or third party systems.

In the Workflow Monitor an administrator can search for workflows that have run or are running, using filter criteria such as workflow type, status, and date ranges for the workflow start time. This displays a view of all workflows known to the Workflow Engine’s database, with a selectable set of characteristics such as type, state, startup time, end time, elapsed time, workflow status description, owner, and IDs. From that list the administrator can select any workflow to review details.

Details displayed for workflow include general data like ID, type, state, the number of the script line the workflow is currently processing, and an overview over all variables used in the script and their current value. You can interactively change the value of an attribute if required, and you can delete or restart the workflow.

In addition, you can launch a dialog that displays the entire workflow script and provides trace history of the steps taken in the script. From this history you can directly jump to the related line in the script in order to identify the root cause for possibly incorrect behavior.

Finally, from the UI you can manually start any workflow, upload new workflows or new versions of existing workflows, review the version history for workflows scripts, and configure a clean-up interval that the system will use to remove older versions of workflow scripts.

**User Manager**

Interplay MAM User Manager is the administration interface to the system’s User Management Service. It provides access to various configuration options and settings:

- Configuration of the session timeout and whether empty passwords are allowed
- Setup of the authentication system to be used – LDAP in either Active Directory or Posix schema, and also Windows NT/PDC
- Adding and removing users, groups, tenants and access privileges
- Display and modification of group and tenant information such as ID, name, and description
- Display and modification of user information like ID, name, e-mail address, preferred language, and description
- Display of user account creation date and last user log in
- Assignment of users to/from groups
- Assignment of groups to/from tenants
- Adding and revoking privileges to users, groups and tenants
- Monitoring active sessions and allowing for manually closing individual or all sessions
- Running reports on session activities, detailing per user minimum, average and maximum session duration
Video Analysis Monitor

Interplay MAM Video Analysis Monitor provides an overview over all video analysis processes currently running in the system. Video Analysis is the service in Interplay MAM that is responsible for shot detection, key frame extraction, and generation of technical metadata.

Through the interface, an administrator also can initiate a video analysis process for a video object, and select the key frame extraction strategy (based on image content changes vs. periodic).

Essence Management Administrator

In Interplay MAM, each storage system, be it a disk, a data tape library driven through a 3rd party archive management software, or a video server, is interfaced through a dedicated Web Service. These Web Services are called “Essence Servers”. Interplay MAM Essence Management Administrator allows configuration of the storage pools and carriers on each Essence Server. Pools and carriers are used to abstract from the respective capabilities of the individual storage device.

Transfer Monitor

In Interplay MAM, file transfers are managed by a set of services that together are called Essence Transfer Management. Essence Transfer Management organizes the file transfer between Essence Servers. Transfer Monitor allows searching for and filtering of active and completed transfer processes.

The administrator can select an active transfer to monitor and influence the characteristics of the transfer. This includes:

- Changing the planned delivery time
- Changing the target
- Scheduling, pausing, resuming, restarting and cancelling transfer processes

Legal List Administrator

As part of the management of controlled vocabulary, the Legal List Administrator allows terms to be added to and removed from legal lists, set various language labels, and define the association of each term in the list to one or more tenants. You can also define whether the values are displayed as symbols instead of values and assign icons to be used as symbols, and finally can define a custom sort order index for display, and assign a shortcut to each term.

Lock Manager

Interplay MAM’s Lock Manager is a service that manages lock information to disallow concurrent metadata modifications by different users. For static metadata, only the user that has acquired a lock can modify attributes of an object.

For stratification, the system allows for concurrent access and modification. Here, the Lock Manager manages locks on the segment level – a segment in a stratum can only be modified by a single user, but many other users may modify other segments of the same object, in the same or different strata, at the same time.
With the Lock Manager UI in the Interplay MAM Admin Suite, administrators can review all active locks in the system, use filter criteria to find specific locks, and can – if required – manually release a lock.

**Process Administrator**

Where the Workflow Monitor is the tool to monitor and manage Script Tasks, the Process Administrator is the tool to monitor and manage the overall business processes in Interplay MAM.

With this interface an administrator can search for processes and access the metadata for all process instances. For a process selected from the hit list, the UI shows all tasks that have finished or are active, and all events pending in State Machine’s event queue.

Even more powerful is the ability to display the graphical model of the process, in BPMN (Business Process Modeling Notation), directly in the administration UI. The model will mark the tasks that already have finished with the check mark, and will highlight the task that is currently active. Besides the model, the UI shows properties of the overall process and properties of the task you click on in the BPMN model.

A history function allows you to interactively step backwards and forwards through the process history to follow how the process proceeded along the definition diagram.

Besides the monitoring, process definitions can be manually uploaded and downloaded.

**ICPS Load Balancer**

Within Interplay MAM, Interplay Common Playback Service is the service behind the system’s proxy streaming capabilities. ICPS can be set up as a group of load-balanced services. The ICPS Load Balancer UI provides the administrator with means to set up and manage the load balancing configuration.

**Interplay Process Modeler**

Interplay Process Modeler is an application used to develop the BPMN graphical representations for workflow processes. It can run in-browser, e.g., when called from the Admin Suite, but it also can run as a stand-alone application.

The Process Modeler provides a set of shapes that can be dragged to a process canvas to assemble the BPMN diagram. Those shapes primarily are:

- Start and end event
- User, script, state and error tasks
- Parallel and sequential sub-processes
- Decision, fork, join, and delay event
- Connector

In the diagram, you connect the tasks and events via connectors, thus building out the model. Each shape has a set of properties that govern its behavior in the process. As an example, for connectors, these properties include appearance (the color of the connector), behavior (the condition associated to the connector, or a flag that marks it as the default connector), and identification (name and description). Other shapes have other properties.
Process Modeler can upload and download processes directly to and from the State Machine. This means that you can create models and save them to the State Machine, later re-load them, modify them and save them back again.

**Resilience and Scalability**

**Overview**

With its Service Oriented Architecture, Interplay MAM provides a very reliable and efficient model for resilience and scalability. Business processes that invoke services typically are managed by the State Machine and the Workflow Engine, which themselves are services offering business process and workflow management. Process and workflow related data, including the status, is persistently stored in the database. Hence, an interrupted process and workflow can be resumed at any point in time, just by the related service picking up unmanaged processes or workflows from the database and continuing to process them.

The script tasks processed by the Workflow Engine specify which resources are required to complete the various tasks in the workflow. Accordingly, the Workflow Engine locates resources in the registry and assigns the tasks. This is augmented by the fact that a Workflow Engine also:

- Monitors the progress of each task as it is being completed by a service
- Can revoke an assigned task from a certain service and re-assign the task to another service.

This provides a high level of resilience. In case of failure or underperformance of a service, the Workflow Engine can re-assign work on a service request level. Depending on the task and the underlying data model, tasks may have to be restarted or can be continued. In short, as long as there are spare resources (i.e., services) available, an orchestrated SOA can automatically and gracefully recover from unexpected events.

This allows deployment of a very cost effective n+x redundancy model (instead of 2n for classic mirroring or clustering), where n is the number or resources (i.e., services) required to sustain a given QoS (Quality of Service), and x is the number of services that may fail before the desired QoS can no longer be maintained. In practice, x = 2 often is a good value, allowing one service to be offline for maintenance while allowing that another service can fail without impairing QoS. Thus, zero downtime maintenance can be achieved simply by maintaining one service sequentially after the other and bringing it online again before moving on to the next.

Scalability is achieved by adding more hosts and redistributing the services accordingly when more computing power is required, and more services when more resources are required. The latter is possible at runtime without impairing QoS.
Resiliency

A number of failure modes are anticipated for an Interplay MAM installation:

- **Active-active service protection:** Services are part of a "service group" of identical services. In case of failure of a service, the workflow engine will automatically reassign the task to another service (n+x redundancy). As said above, "x" is at least one, ideally two, thus allowing to perform maintenance on a service while still retaining redundancy to cover a failure of another service during this maintenance;

- **Active-passive service protection:** In case of failure of a service, the administrator can activate a standby service with a single click. Within seconds this service is available. The workflow engine will automatically re-assign the tasks to be performed by the failed service.

- **Failure of the database:** The database is protected by a clustered server. The database will tolerate failure of a server without interruption of service.

- **Failure of storage systems:** All disk storage systems should be RAID protected, so that a disk failure will have no immediate impact on the quality of service. Performance degradations are possible during reconstitution of the disk after replacement, depending on the RAID level used and other factors. Failed data tapes can be recovered from by retrieving on-the-shelf or in-robot back-up copies. Failure of the data tape robot will result in an interruption of service for retrieval of video content from the archive. It is possible to use stand-alone data tape drives and tapes retrieved from the shelf to maintain manual service until the robot is back online.

The level of redundancy for an Interplay MAM system is a customer decision. As services may be freely co-located on servers, installing stand-by services does not necessarily require installing additional hardware. Additional hardware may be required, though, when more performance is needed because more active servers are deployed.

Design and Implementation of a MAM Solution

Trusted Partnership and Domain Expertise

As a business process and asset management platform, a MAM can be – and, with Interplay MAM, has been – very successfully deployed for quite diverse use cases, including, but not limited to, a television and radio library, an umbrella system for distributed production environments, a transmission process management solution, a sports event highlights factory, a cross-enterprise media management solution, a multi-platform distribution system, and many more. Its enormous flexibility with respect to cross-system, cross-enterprise integration and management of knowledge and processes makes the product a great fit for a wide range of challenges that media enterprises face today and tomorrow.
However, to deploy these projects requires optimal application of MAM capabilities to the business problem at hand. This typically includes:

- Review of current business processes and design of improved processes that leverage the MAM to advance efficiency and throughput. This requires an excellent understanding of industry best practices for such processes and working closely with the process owners of the customer to find the balance between best practice and meeting specific needs.
- Design and configuration of data models, which again requires a solid understanding of best practices and the interaction with experts from the customer side to achieve the best possible solution for solving the business challenges at hand.
- Implementation of the business processes, including both modeling processes in BPMN and scripting system automation tasks. The BPMN part derives naturally from the process design step, but may need refinement. Scripting involves a good understanding of the capabilities of the MAM and of integrated systems and tools, and how they can be used through the Web Services APIs.
- Set-up of the security and access control patterns, including content-based authorization rules. To do this, a full understanding of the business goals that are to be achieved through access control are needed.
- Last, but not least, integration work to interconnect the MAM with various other systems and services, either through design and implementation of Web Service wrappers or through interconnection through an Enterprise Service Bus.

Clearly, the vendor who delivers such a solution to a media enterprise has to be a trusted partner with whom the business owners and in-house experts can work to lay out the best possible solution. To deserve this trust the vendor must have an extensive knowledge and domain expertise that is relevant for the business challenges at hand, available in a well-staffed, well-resourced delivery organization that has proven track record regarding their capability to deliver.

Avid’s Professional Services and Training team has more than a decade of experience in delivering MAM projects to a large number of media enterprises, across a large variety of business challenges, all over the world, and definitely is one of the most capable and knowledgeable resource to deliver MAM-based solutions. Based on this experience, Avid PST has defined a general process how to approach and deliver MAM-based solutions.

Delivery Process

Scope Assessment

The first step is to consider the scope of the project and determine whether business goals can be met by breaking the scope into a sequence of smaller projects, where each project targets a specific business challenge. If possible, delivering the individually projects typically involves less risk, shorter delivery time, and quicker ROI. With each following project, another business challenge is addressed, and the return on investment increases. Also, experience and lessons learned can be applied to subsequent projects, making this delivery approach more agile.
One of Avid’s customers wanted to deploy a cross-enterprise media management platform to which all media related departments are connected. The ultimate goal was to improve collaboration, grant shared access to all assets, optimize process efficiency in all areas, and minimize redundancies in media management. Based on an assessment of business value, return on investment, and ease of deployment to departments, they decided to deploy the solution as the following sequence of projects:

- International program acquisition
- Weekly production
- Multi-platform delivery to video on demand, press preview and translator portals
- News production
- Still images, photos and trailers
- Radio archive
- HD support

That was, by the way, not the originally planned sequence. As the program delivered the individual projects, business conditions changed the customer’s priorities and the delivery sequence was re-arranged. Since it was set up as a program, the delivery process was sufficiently agile to accommodate the changes.

**Project Delivery**

The delivery of a project, whether part of a program or an independent single project, follows a certain methodology that combines a waterfall bracket with an agile development approach. The waterfall approach is used to define the scope of the project with as much detail as possible in conjunction with the customer, and define acceptance criteria to measure successful implementation. The agile approach is used in the building and testing phases in order to more easily accommodate differences in perception of what an agreed upon feature or function actually is—sometimes, only when you see it do you know if it really is what you thought it would be.

The project delivery phases are:

- Planning and Assessment
- High Level Design
- Detailed System Design
- Build
- Test
- Deployment
- Support

An Avid Professional Services representative can describe the delivery phases in detail.
Avid Professional Services and Training

The Avid Professional Services and Training organization focuses on the world-wide delivery of projects to customers, with a special experience in MAM solution delivery. Delivery teams can involve a range of experienced experts who are capable of addressing every aspect of implementation and work with you to ensure a smooth and successful implementation, including:

- **Delivery Manager**, responsible for the overall delivery and ensuring the assignment of the required resources to the project
- **Project Manager**, running the business side of the project regarding budget, schedule, scope and risk management
- **Solution Engineer**, the responsible architect for the project and for high level and detailed design. The Solution Engineer also supports testing and is involved in deployment support
- **Development Manager**, responsible for managing the configuration and development aspect for the project, including development and resource planning
- **Workflow Consultants**, responsible for business process and workflow analysis and design, as well as for the documentation and training
- **Project Engineers**, handling deployment and deployment support as well as possible data migration operations. Project Engineers also do the testing and participate in documentation, specifically in the system and deployment documentation
- **Project Software Engineers**, who do the detailed technical design for development tasks, do the actual implementation, and participate in testing and documentation.

Summary

Media Asset Management is a critical enabler for any media enterprise. The challenges faced by such enterprises require faster time to market, more efficient internal processes, and greater throughput to a growing number of distribution channels while reducing media operational costs, and finally, the ability to be very fast in reacting to changing market conditions and new business opportunities – agility.

This is exactly what Interplay MAM has been designed and developed to be – a very agile collaborative business process, asset and knowledge management platform that can be tailored to meet any of the current and future demands of media enterprises regarding managing and distributing their assets. Using Interplay MAM a media enterprise will:

- **Reduce Media Operations Cost** by decreasing operational and carrying cost of the overall media operation, and maximize the ratio of creative output to operational personnel and expense
- **Improve Business Agility** by being able to quickly respond to new business opportunities and optimize workflows for maximum efficiency with minimal cost and time delay
- **Enable Effective Multi-Platform Distribution**, to profitably utilize new, growing and changing channels to maintain brand relevance and enhance revenue opportunities
- **Create Compelling Content** by enabling quick and easy access and utilization of all available media assets and tools within the production cycle to create content that excels by channel and format
- **Be Future-Proof**, because the solution can be easily expanded, changed and modified the solution as business situations
With Interplay MAM, Avid offers the most comprehensive and powerful asset management system for media enterprises in the market. With Avid Professional Services, Avid offers the most experienced delivery team, with a proven track record. With decades of experience as a leader and innovator in digital media, Avid has the most comprehensive domain knowledge present in any single company. This together is why Avid is number one choice for delivery of MAM-based solutions.

**About the Author**

Dr. Peter Thomas Peter received his Ph.D. in aerospace engineering from Munich Technical University in 1996. Since joining Blue Order in 1996, Peter has focused on the application of enterprise media asset management and related business process re-engineering in the media and entertainment industry. As Chief Technology Officer for Blue Order, Peter was responsible for product and technology strategy, product design and product development. Upon the acquisition of Blue Order by Avid Technology in January 2010, Peter headed the MAM Engineering team for Avid. Since January 2011, as the lead architect for Avid’s IME division he has taken responsibility for the definition of the platform architecture of Avid’s Integrated Media Enterprise initiative. Peter is a member of SMPTE and is one of the principle authors of the report of the EBU project group “Future Television Archives”, and has extensively published in the area of media asset management in broadcast. Peter also is coauthor of the book “Professional Content Management - Handling Digital Media Assets.”