1 Introduction

Currently in the media industry, users are implementing service-based systems using proprietary systems with bespoke software ‘glue’ holding it all together. They are doing this without an open, agreed framework and without standardized interfaces. While several organizations have identified a number of common processes such as capture which are performed essentially the same way throughout the industry, users are implementing these processes as services in different ways. At the same time, technology vendors are responding to demand for services-based products, but interoperability between different implementations is non-existent. This is because there is a lack of an agreed framework and publically developed service definitions in the media industry.

The AMWA-EBU FIMS (Framework for Interoperable Media Services) Task Force was established in December 2009. FIMS is a framework of service definitions for implementing media related operations using a Service-Oriented Architecture (SOA) approach. Media companies deploying this framework can expect that doing so will promote interoperability and reusability of services. FIMS defines service models with associated management, error handling, communication, and time awareness.

To properly exploit this technology the Task Force has developed a common framework which will help ensure integration interoperability, interchangeability and reusability of services. This will drastically reduce integration costs, allow users to more freely choose the most appropriate products on the market at any given time, improve maintainability, and aid in the adoption of new technologies.

FIMS also has begun the process of defining open services that are loosely coupled thereby enabling multivendor services to be integrated and creating “best-in-class” media systems. The services can span a wide domain of operations and permit integration of FIMS into business and management systems. The bottom line is that implementing FIMS will move facilities to an agile environment that is more easily configured, modified, managed and governed compared to non SOA systems.
2 What problems are we trying to solve?

2.1 Current Situation

Figure 1 shows an example of typical system in a media facility. Functions are tightly coupled and are optimized to the specific facility. Usually this kind of system has a good cost/performance ratio, compact size, and high efficiency. However this architecture has several potential problems:

**Difficult to replace or update of parts of system**

When trying to change parts of system, knowledge of the entire system is required. Also, modifications in one area may require modification of whole system.

**Difficult to transplant parts of system to other system**

Functions have been designed specifically for this facility; as a result, it takes a great amount of both time and money to build a new system or make significant modifications.

You can think of the current system as an elaborate multi-tool as shown in Figure 2. This multi-tool is compact and high efficiency, but it is tremendously difficult to add a new part or to change out an existing one.

![Figure 1 Typical current system](image1.png) ![Figure 2 Illustrative image of the current system](image2.png)

In the past, tightly coupled architectures such as the one illustrated above have served our industry well. However, in the last few years, the pace of change keeps increasing. In some cases, we have to make major alterations to our facilities every few months. The conventional architectural approach has become unwieldy and, more importantly, it does not allow media companies to respond to the changing business environment in a timely fashion.

SOA (Service Oriented Architecture) provides a solution to this problem.

2.2 SOA (Service Oriented Architecture)

SOA is an architecture which isolates the functions within a facility, and offers them as services on a network. This allows designers to build new systems by combining different services. Figure 3 illustrates the situation before SOA and after SOA. A common interface is defined for each service and access to the service is permitted only via the interface.

SOA has several potential advantages:

- **Flexibility:** Easy to replace or update of parts of the system
- **Reusability:** Easy to reuse a service
- **Agility:** Easy to implement workflow changes
- **Visibility:** Easy to monitor the status of the system in real time
Compared to the multi-tool example above, Figure 4 below shows that individual services in a SOA system are easy to replace. Integrating the services into a complete ‘tool box’ allows re-use of services, combining them to perform a number of different functions.

In order to maximize the potential of SOA, standardization of Industry common interfaces is essential.

### 2.3 FIMS (Framework for Interoperable Media Services)

A key purpose of FIMS is to promote standardization of common interfaces between Orchestration Systems and Media Services. Orchestration Systems control media services based on the desired user workflow and Media Services provide functionalities such as Capture, Transform and Transfer. These three services are defined in FIMS 1.0; others will be added in our next phase of FIMS activity.

**Support for legacy services**

An important consideration for any media company is how they will migrate from existing systems to the FIMS framework. Figure 5 shows how an Orchestration system interacts with media services through standardized FIMS interfaces. However, if an existing device does not support FIMS, the manufacturer or an outside developer can create adaptors which convert FIMS into messages that the legacy device understands.
Figure 5 Orchestration System and Media Services

Figure 6 illustrates the migration solution of the FIMS compliant media service. The Orchestration System uses Media Services via FIMS interfaces over the IT network using a web services protocol such as SOAP, or accessing RESTful HTTP resources. The vendor specific interfaces of each service are converted to FIMS interfaces by an adaptor performing **Service Abstraction**.

![Orchestration System and Media Services](image)

Of course, over time, manufacturers will produce products that speak FIMS natively. Figure 7 illustrates the long-term solution for a FIMS-compliant media service. Each Media Service can “speak FIMS” without the need for a FIMS adaptor.

![Media Service with FIMS Adaptor](image)

![FIMS-Native Media Service](image)
3 IBC 2011 FIMS Demonstration

Figure 8 shows the IBC 2011 FIMS demonstration configuration, and Figure 9 shows the IBC demonstration workflow. The demonstration consists of two Orchestration Systems and five Media Services. The FIMS demonstration was developed within weeks following agreement of the preliminary specification. This illustrates how open interface specifications enable rapid integration.

The demonstration system was built around the services offered by volunteer FIMS participants. A demonstration workflow was created using these services.

The following is the demonstration workflow:

1. The two Orchestration Systems use the same workflow and share the same Media Services.
2. One Orchestration System begins a capture, transform and transfer operation, followed by the other Orchestration System. The second orchestration starts its workflow before the first is complete.
3. If the first Orchestration System chooses the Cinegy Capture Service, the second Orchestration System then chooses the Sony Capture Service as the Cinegy Service is not available. This demonstrates the ability of SOA systems to employ services from different manufacturers, and also illustrates the concept of conflict resolution in orchestration systems.
4. The RadiantGrid service transforms the "MPEG-2 long GOP/OP1a" output of the Sony Capture Service to the "VC-3" format.
5. The Cube-Tec service optimizes audio loudness of the files created by either the Cinegy Capture Service or the RadiantGrid Transform Service.
6. The Avid service transfers files created by Cube-Tec to the Media Composer.
7. The Avid Media Composer plays back the files manually for confirmation.
Figure 9 IBC 2011 FIMS Demonstration Workflow
4 FIMS, a little deeper view

4.1 FIMS is a SOA framework applied to Media

Figure 10 shows the FIMS Framework reference model, including areas not covered in FIMS 1.0. The FIMS Task Force intends to cover these areas in future releases.

Media services differ from IT services in several significant ways. One of the most critical aspects of the FIMS work is that this is the media industry’s effort to quantify those differences, and to take them into account when developing media services. Some of the differences accounted for in FIMS are as follows:

1. Asynchronous communication to properly handle the very large amounts of data associated with AV media in a timely manner.
2. Media container/Media descriptor to associate AV metadata with AV essence types.
3. Media Infrastructure Service such as Resource Manager for appropriate media handling.
4. Media bus for AV data exchange in addition to the conventional ESB for XML message exchange.
5. Media bus M-SLA (Media-Service Level Agreement), in addition to the conventional SLA in ESB.
As mentioned above, the scope of the Framework addressed by FIMS Phase 1 is constrained. Figure 11 illustrates the areas covered.

4.2 **FIMS specifies the interfaces between media services**

In FIMS 1.0 the following media service interfaces have been defined:

4.2.1 **Transfer Service**

The Transfer service copies or, optionally, moves one or more files to another place (or to several places). Five different transfer protocols are permitted. These are: HTTP, HTTPS, FTP, SFTP and FILE. A Transfer Service may implement one or more of these protocols.

4.2.2 **Transform Service**

The Transform Service defines alteration of essence and container formats. The interface builds on the Transfer Service interface, and adds element of transformation to the input.

4.2.3 **Capture Service**

The Capture Service converts a stream-based real-time input such as a HD-SDI or RTP stream to one or multiple files. The interface builds on the Transform Service interface, and is able to transform to the appropriate format(s) according to the application requirements.
4.3 **FIMS has support across the industry**

FIMS has been designed to appeal to a broad range of possible stakeholders; from vendors and system integrators, to end users. Depending upon who you are, FIMS offers a range of benefits:

**Vendors**
- Improve reusability of services
- Speed up market introduction

**System Integrators**
- Take advantage of agility as a basic characteristic of SOA
- Easy upgrades, maintenance
- Freedom of choice of media services

**End users**
- Integrate media workflows more easily with the business workflow
- Reduce dependency on the specific vendors
- Reduce risks
5 FIMS in the Future

The following items are being delivered by the FIMS Task Force at IBC 2011, as a result of Phase 1 of our project:

**FIMS Phase 1 Specification – ready for review by AMWA and EBU**
- FIMS Framework
- Three basic Media Services (Capture, Transform and Transfer)

**Media Service WSDLs and XML Schemas**
- baseMediaService.xsd
- captureMedia.xsd
- transformMedia.xsd
- transferMedia.xsd
- transferMedia.wsdl
- transformMedia.wsdl
- captureMedia.wsdl

**FIMS White Paper (this document)**

At IBC 2011 we are also publishing a Request for Technology (RFT). Through this RFT, we are seeking the input of a broad range of stakeholders, as the FIMS Task Force identifies areas where we can expand the number of well-defined media service interfaces.

*We welcome your participation in FIMS. All FIMS information, including how to become a participant, can be obtained from following web site:*

http://wiki.amwa.tv/ebu