

Introduction to Workflow Advancements

BY ADAM SCHADLE

A workflow is generally defined as “a system for managing repetitive processes and tasks that occur in a particular order.” I tend to conceptualize workflows with a diagram showing applied products and signal flows and then describe the processes and action steps in a list as a first concept that, when put into practice, is modified with additional customizations according to the implementer’s needs or even personal preferences. Each one may be different in concept versus in implementation. First concepts are bound to be modified, although the initial designs of workflows are particularly important so that collaboration can begin to form into a working template that will likely continue to develop throughout its implementation.

The group of papers in this issue provides a great sampling of new workflow ideas in the media production and distribution landscape. Some contain changes taking place in one aspect of a media workflow, while others present a development for an end-to-end media workflow. Several apply currently available standards to create new features or improvements and meet new requirements.

Our first subject dissects a significant problem for an audio-only production and delivery service and describes how metadata creation and delivery have become significantly important. “Standing on the Shoulders of Giants: Innovative Metadata Applications without Legacy Burdens” first describes the legacy structures of metadata for media workflows, then investigates several potential standardized techniques that pose significant problems, and finally describes the formation of a modern-day working solution for a highly scaled audio-only service.

Next, we have an in-depth look at improvements made to the DNx family of codecs based on the SMPTE VC-3 standards and RDD50 documents for media post-production and archive. The authors start by describing the recent release history of the VC-3 technology and delve deeply into techniques used to improve image quality with compelling visual examples of how artifacts are minimized using a new “tunable bitrates” encoding technique. Further depth is found in the discussion of the design approach for VC-3 as a software codec that can take advantage of the latest CPU multithreading technologies. The authors describe how VC-3 was defined from the ground up with multithreading in mind to provide as much computational speed as required via the VC-3’s software implementation, built for general-purpose computing platforms without any specific hardware platform lock-in.

Moving to distribution topics of media workflows, we first have a seminal paper discussing advances in applied artificial intelligence to analyze video content quality across multiple modalities—combining visual, audio, and textual information—to understand content complexity comprehensively. This paper introduces a novel framework that utilizes Large Multimodal Models (LMMs) for video encoding optimization, aiming to overcome the potential shortcomings

of traditional per-title optimization methods. The authors state that LMMs have emerged as a transformative force in video understanding, harnessing the power of integrating multiple data modalities to achieve a comprehensive analysis of video content.

Continuing with content distribution, the next paper outlines a unique and technologically advanced method of distributed program advertising insertion titled “Dynamic Ad Insertion Using a Data Distribution as a Service Platform and MPEG Media Transport.” By taking advantage of the ATSC 3.0 framework to perform insertion of advertising content previously loaded to the receiver device, this new method may perform geographically localized and scheduled insertion without the use of an internet connection. The method described also takes advantage of MPEG Media Transport, which is a standard for transporting multimedia data developed by the Moving Picture Experts Group.

We then have a paper describing the history and attributes of digital cinema titled “Implementation of NMOS AMWA Open Specifications for Discovery, Registration, and Management Connections of Digital Cinemas,” starting from the time of inception and taking us through the features applied, the significant number of standards created, and the current state of digital cinema architecture and distribution features. The new ideas presented give a perspective on what is missing from current standards and offer a feature list that is proposed to be fulfilled by the new AMWA IS-04 and IS-05 application interface specifications, which provide a framework for applying new internal and external network connectivity with device control and registration to also facilitate database management features. As in any new workflow, adaptations need to be proposed and discussed, which are deftly described by the author with flow diagrams relating how the proposed NMOS specifications can map direct-

ly to existing workflows in a digital cinema facility.

Our last paper is an important general topic evaluating the energy impact of the UHD standard. It starts with the UHD format’s feature timeline as it moved from HD to UHD and then applies a description of specific features that may create additional energy impact, such as resolution, framerate, color gamut, dynamic range, bit depth, and coding. This is followed by a discussion of several parameter scenarios for delivery that then segues to the methodology of its energy consumption calculations for data centers, delivery networks, and the display devices while in use and as applied in manufacturing. The paper then provides an estimated energy consumption analysis with a detailed set of examples. The data leads to some interesting conclusions that one may not have expected.

With this collection of papers, it becomes clear that we continue to live in an era of rapid development and change. Innovative technologies and techniques are quickly developed and deployed, and it is encouraging to see that existing standards bodies’ work is used in several of these new workflow advancement ideas. Overall, we see efficiencies being created with the demand for new features, such as UHD, when new digital processing technologies are combined with better and better manufacturing techniques.

It was a great honor for me to be the guest editor of this issue of the SMPTE Journal, and I hope you enjoy the excellent workflow advancements discussed in the following pages.

About the Author



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