1. MXF within a BBC Production Infrastructure **Peter Brightwell** **Context** In recent years, the BBC has been addressing many of the issues that will become critical to ensure its long-term future as a provider of high-quality	1.MXF trong Kết Cấu Hạ Tầng Sản Xuất BBC Bối cảnh Trong những năm gần đây, BBC đã giải quyết được nhiều vấn đề trọng yếu để đảm bảo trong tương lai sẽ trở thành một nhà cung cấp dịch vụ truyền thông

content to the British public and to external customers. Rapid advances in digital technology offer great potential for providing audiences with much more content accessed on a wide range of platforms, provided that material can be produced efficiently and cost effectively.	chất lượng cao cho công chúng Anh cũng như các khách hàng bên ngoài nước Anh. Những bước tiến gần đây trong công nghệ số đã mở ra tiềm năng lớn trong việc cung cấp cho khán giả nội dung phong phú hơn trên nhiều platform (nền tảng) khác nhau, với điều kiện là những nội dung này phải được sản xuất có hiệu quả và tiết kiệm chi phí.
As part of this work, the BBC is addressing a number of key technical areas: • There will be a significant move away from the present dependence on physical media, especially tapes. Storage, duplication, transportation, and management of tapes currently form a significant proportion of the BBC's costs. Staff will soon use desktop and handheld tools to replace VHS tapes for viewing, logging, and approval. It is anticipated that all production will be tapeless by 2010. • A strategy for identifying, tracking, describing, reusing, and delivering content in a systematic way is being developed. This includes defining corporate standards for creation and management of metadata, and development of a distributed asset-management architecture. • Closer working relationships with external organizations are being fostered, including secure remote viewing and electronic delivery of content.	[redacted]

• The BBC's network, storage, and security infrastructure is being significantly enhanced to support wide-scale working with electronic audiovisual content, including HD.
• The current rapidly changing nature of the business means that the BBC recognizes the crucial and timely need to adopt open standards. This is particularly true for archive content formats, where wrong decisions taken now may have repercussions for years to come. MXF will be a key standard in this area.

"OneVision" Project within the BBC

OneVision was an important project to inform the BBC's strategic deployment of tapeless production services. It reached a successful completion in early 2005. OneVision has included pilots and studies with technical, business, and process elements. Its most high-profile activity was to pilot the use of desktop production tools to support the Natural History Unit's Planet Earthproduction in Bristol. This was complemented by a set of trials and workshops at the BBC's Information and Archive (I&A) department in west London. This included development of a system—Atlas—to test I&A processes supporting the transition to tapeless production. Atlas provided a centrally managed archive with cataloguing, storage, and content management functions. It used products from several vendors, and has implemented an interoperability solution, summarized in Figure 15.2.

A transaction server routed XML messages between the different systems to achieve functions such as requesting new content to be ingested and registering content in the archive. The broadcast quality content took the form of long-GOP MPEG-2 422P@ML video and uncompressed stereo audio. These were wrapped within MXF OP1a files with video and audio interleaved on a frame basis. The files were generated and used by the ingest system (TMD Mediaflex and Snell & Wilcox MPEG Mastering Unit) and the OneVision desktop production tool (Siemens Colledia for Production, as used for the Natural History Unit pilot).

Future Architecture

The OneVision project also studied longer-term interoperability requirements of digital production systems. This involved modeling the business and IT context and requirements and deriving a logical architecture to support interoperability, as summarized in Figure 15.3. Although content may be physically held in a wide range of locations and on a variety of types of storage, all content will be

registered, located, and accessed by means of a set of services that are common across the enterprise.

[redacted]

The use of standard formats, in particular MXF and AAF, features prominently in this architecture. Rushes and work-in-progress (WIP) material will often be accessed directly by production tools, and so where possible the audio and video will be held as separate MXF OP-Atom files. For example, an OP1a file captured on a Sony XDCAM camera would be "decomposed" into its individual video and audio elements. AAF Edit Protocol files will be used as the basis for edit interchange between desktop production tools and craft/finishing tools, ranging from simple cuts-only compositions, as produced by a basic assembly operation, to a fine-cut including some effects. The AAF files will reference the OP-Atom files using UMIDs. The use of AAF files to carry logging metadata is also being considered.

[redacted]

For delivery of finished programs, use of regular MXF operating patterns is more appropriate. At the time of writing, the BBC envisages the use of OP1a as this is most widely supported by manufacturers. However, as the specifications are refined—e.g., for delivery to playout

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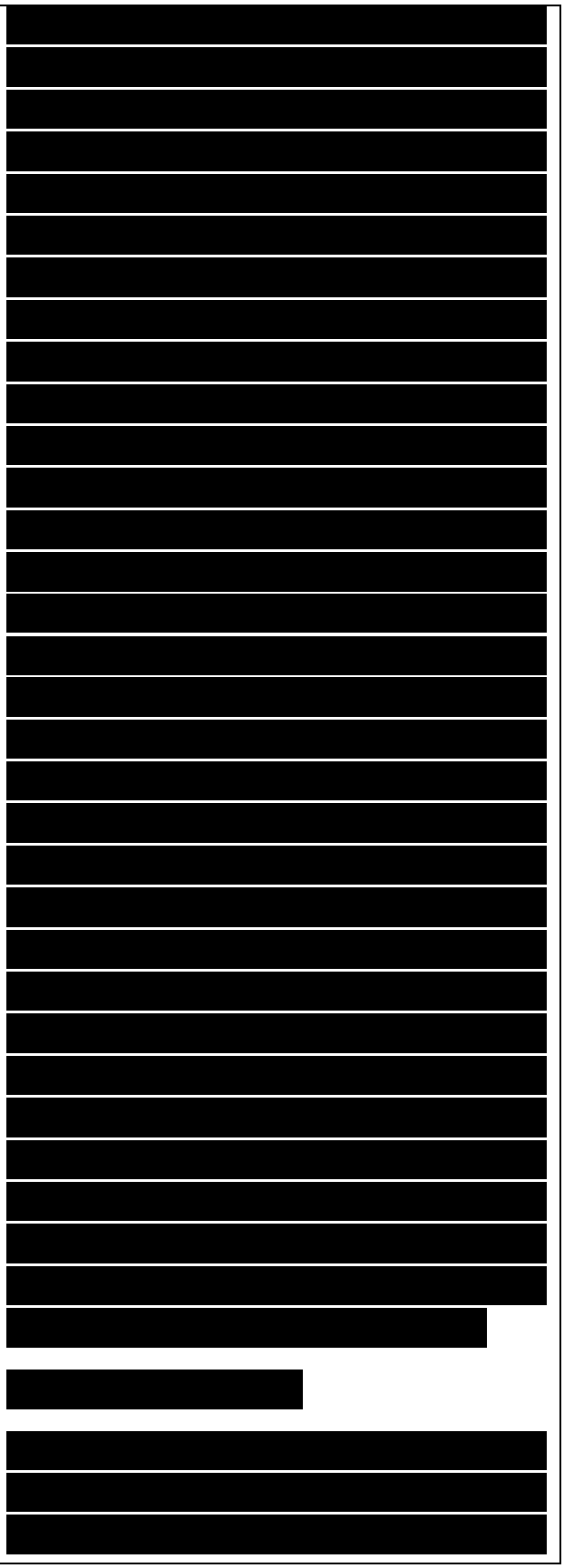
areas, adoption of higher patterns may be required. Transformation services will be needed to perform any required wrapping and unwrapping of MXF files and conversion between different operating patterns. These services may also perform essence format transcoding; for example a) to support delivery of a finished program in MPEG-2 where rushes are in a mixture of DV and MPEG, and b) manipulation of metadata such as TV Anytime metadata (to support home storage), which may be derived from the production metadata. AAF/MXF will provide a suitable standard interface format for such services. Another service, the Production Gateway, will provide a standard interface for secure delivery of content between the BBC and its external customers and providers. Although this service will support multiple formats, MXF and AAF will be preferred, as the service will be able to make use of the metadata contained within them. Trials of some technical aspects of the Production Gateway are already in progress, as are trials of delivery of MXF OP1a files to playout areas.

Next Steps

At the time of writing, the BBC and its



technology services provider (Siemens Business Systems) are defining a reference architecture for the future deployment of digital production services. This will build upon the work of the OneVision project, and the use of MXF and AAF is expected to form an important part of the long-term success of this service. It will be informed by ongoing research and specification of how these formats can best support the BBC's changing requirements for content creation. The future definition of requirements for the generation and management of metadata and unique identifiers will further aid progress, as will user trials and technical assessment of MXF/AAF-capable hardware and software. This needs to be supported by the development of easy-to-use compliance-testing tools.	[redacted]