

# FUTURE PROGRAM PRODUCTION: TV AND IT - WILL ONE TECHNOLOGY REPLACE THE OTHER?

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## ABSTRACT

Traditional TV programme production technology is not able to meet new requirements such as search and browse, rough-cut for the workplace of the editorial staff, replacement of multiple tape cassette copies and their manual transfer, integration with other information services etc. Broadcasters are presently preparing themselves for the impacts of IT. To study these impacts, the European Broadcasting Union (EBU) initiated the project "Future TV Production" (FTP).

First IT-related projects have shown however, that the available elements of an IT-based production chain have some limitations in terms of interoperability, reliability and scalability. Important economical questions are still to be answered as well.

## INTRODUCTION

For a decade we have talked about the convergence of broadcast and information technologies. Hardware and software modules like hard disks, PCs (workstations), Computer displays, operating systems etc. are found in many, if not most products of the broadcast market. On the other hand we cannot find the products of the broadcast market in the supply of the general IT market since they are tailored by specific interfaces to the needs of our (niches-) market.

Therefore an IT based production platform means more than just the use of such equipment. It means the use of regular IT hardware products in combination with broadcast specific software. IT makes it possible to provide a larger number of persons with the same information at the same time. The connection technology is based on use of networks which transport content in the form of data files.

The handling of Content and Metadata in an IT world symbolizes the main difference to the traditional broadcast environment. In an IT environment Video, Audio, Data and Metadata (Content) will be treated like any other type of "information". This information requires a data management, which enables and supports all services, which are needed in the TV programme production process (e.g. browsing, contribution, archive, editing, metadata generation etc.). The names "Content Management" (CM), "Asset Management", "Media Asset Management" (MAM) and "Digital Media Asset Management" - used for such a system - are in most cases synonyms.

Finding relevant content in time and delivering it to the right person anywhere anytime becomes a core business process of media companies. This is the task of Media Asset Management systems. In traditionally structured businesses archiving is an "end-of-pipe" process. Process re-engineering efforts are necessary to move the archive in the centre of all business processes, i.e. to change the archive from a waste dump to an automated library.

IT-based television production means:

- video, audio and metadata are delivered as a data file
- the transportation of these data files is carried out via IT networks
- the production is based on the generation and use of Metadata and UMIDs (unique material identifiers)
- the administration of video/audio, metadata and rights by means of IT

## **CHANGE OF THE WORK-FLOWS**

Similar to “Enterprise Resource Planning” (ERP) systems (e.g. SAP), which offer a central library for business data, Content Management systems provide a central library for multi-media content to support the collection and provision of "essence" and metadata during the program production. It is quite helpful, to consider a CM-system as a kind of ERP system, which support business processes related to multi-media content.

The introduction of a CM-system definitely means the change of some work-flows. This isn't a trivial venture since most organizations are structured according to functional criteria, the business processes (work-flows) however are going crossways to the function levels. Many (negative) experiences with ERP teach, that - before a media enterprise can be automated or computerized by CM-systems - it must carry out a thorough, logic analysis of all processes and cross-links, which are connected with the activities of its own organization.

In the course of the planning for a digital archive system among others the following related work-flows should be analysed in every detail and described in the form of logical process plans:

- take-over / archiving and pre-documentation
- check and formal documentation
- contents query
- creation of a contribution
- formal data query
- description of a broadcast as regards content
- stock maintenance
- transmission planning at editorial staff for News
- contribution creation at editorial staff for News
- preparation of a moderation or request to speak
- organization of a conversation via transmission link
- design outline
- video-/sound processing

## **THE PRESENT SCENARIO**

Maurizio Ardito, Chairman Production Management Committees of the European Broadcasting Union (EBU) described at an EBU – seminar in January 2003 the present situation as follows:

- The requirements for TV production are very different and more demanding than for other applications where IT has been used before
- Real time, large files, enormous bandwidths, are only some examples of this specificity
- We need a solution properly designed for TV production
- Some IT suppliers have little experience in broadcasting
- Some broadcast manufacturers have little experience in IT
- The market is too small to support many systems

- The users want systems, which are not only very flexible and cost effective, but support very simple operations as well as complex ones. Therefore systems must support very simple operations (the most common jobs) without any unnecessary complexity and extra cost. Complexity may be included optionally but only when really needed to tackle complex operations.

## **STUDIES OF THE EUROPEAN BROADCASTING UNION – USER REQUIREMENTS**

Since 1996, several Project Groups have been established by the EBU Production Technology Management Committee (PMC), to study the most significant aspects of the emerging new production architectures. Recognizing the urgent need for elaborating user requirements of broadcasters' community for IT-based television program production, the PMC set up a new Project Group: the P/FTP (Future Television Production) in November 2001.

P/FTP analysed the experience of several pilot projects run by broadcasters and met a number of manufacturers from both the traditional broadcast industry and the IT-world. A list of questions and user requirements related to fully IT based TV program production were given to the manufacturers. Amongst others the following was asked:

- Many broadcasters have already separated IT systems in place (budgeting, contract planning, programme planning, scheduling, accounting, etc.). What approach should be taken to integrate all services and departments in a most efficient way?
- What are the economical benefits?
- How can it be accomplished that the security and reliability of IT systems will be at least as good as the current digital systems?
- Are there any guidelines that users could follow for workflow optimisation to benefit from the often quoted capabilities of IT?
- IT uses the capability of browsing, search & retrieve functions. How is interoperability between different vendors achieved?
- How should users prepare themselves for the short innovation cycles of IT technology?
- What is your proposed step-by-step approach towards IT in TV programme production?
- What are the prerequisites for a system to be able to support processes and workflows designed and already in use by the broadcaster?
- What are the prerequisites for a system to be at least as good as the previous system with respect to availability and system performance?
- How do you manage the metadata flow through the production chain (Acquisition to Play-out)?
- How do you manage the UMID (Unique Material IDentifier) in the whole production chain (Acquisition to Play-out)?

## **FINANCIAL PROJECT EVALUATION**

Any study of IT based production must not be limited to the technical feasibility but must include the evaluation of the economical impact of such an investment decision. A common method is to determine the Return of Investment compared to traditional broadcast equipment.

Return on Investment (ROI) is the net benefit of the investment divided by initial and ongoing costs over the life of the project. The net benefit is calculated as savings from the selected technology solution, minus initial and ongoing costs for this solution. It is represented by the following formula:

$$\text{ROI} = (\text{Savings} - \text{Investment}) \times 100 / \text{Investment}$$

Please note that ROI is not the only figure that serious financial managers will use as it does not take into account cash flows and the time-value of money.

The calculation of the ROI usually serves as base for the policy of an organization and their strategic planning processes. This calculation forces

- a cost/benefit analyses
- a risk-analysis

and serves therefore as a means for preparing important decisions.

After seeing IT taking greater and greater bites out of corporate budgets, executive management is more inclined than ever to scrutinize technology spending. Since all IT management services (Media Asset Management for example) are an internal function without direct impact on revenue, this means that the cost justification can only rely on a cost-savings argument. A typical way to create a cost-savings business case is to show how the organization can accomplish labour cost savings. But this often translates to reducing the number of those people who are needed to support the planning process - and it goes against human nature to eliminate the own job. As a result, the benefit rationale for justifying investments in IT based production is often couched in generalized statements such as “staff can be redeployed to value-added activities.” These generalized statements are of limited value.

Cost justification also poses a challenge because it forces an organization to measure current costs to effectively determine cost savings. Unfortunately many broadcast organizations do not know what costs to measure in the first place or do not have effective ways to measure them. Once a process has been fully decomposed, the current “As Is” costs minus the future “To Be” costs equals the value or potential savings each time a process is invoked. The next step in developing annual cost savings is to determine how many times in a year a process will be invoked across your organization.

All costs have to be categorized as either start-up or ongoing costs. Examples of each include:

- Capital start-up costs for fixed assets with a life expectancy of more than one year. These include application software, servers, network connections, personal computers and workstations if they are not already available.
- Other start-up costs are up-front investment typically written off in the first year, such as design and development of software and/or content, promotion, and training.
- Capital ongoing costs: regular upgrades to software and hardware.
- Other ongoing costs: such as technical staff salaries, software maintenance fees.

An area of major concern should be the short innovation cycles of IT based equipment, which might require re-investment cycles of only 3 years, where traditional broadcast equipment has an expected lifetime of approximately 8 years! This must be taken into consideration in calculating the ROI for IT based equipment compared to traditional broadcast equipment.

Conventional cost/benefit and return on investment (ROI) methods are rarely sufficient for reaching decisions on strategic investments. Therefore a study of IT based production must not be limited to the technical feasibility but must include the impact to the organizational structure, the effected processes and the mandatory re-engineering (optimising) of the business processes of a broadcast organization.

## MAIN ELEMENTS OF IT IN TV PROGRAMME PRODUCTION

For the purpose of this paper we state that IT based TV production is characterized by the use of specialized software rather than regular IT hardware products, which are applicable for other IT applications outside the broadcast market. This definition excludes components, which are specialized for a broadcast environment, by offering SDI interfaces for example.

### 1. Interfacing via Networks

The main interconnection technology between systems has to be networked based. The method of transporting Content should be in file form, if applicable, and should also permit streaming if required. Detailed information about file formats and the mapping of Essence and Metadata can be found in the work of EBU P/PITV and P/META.

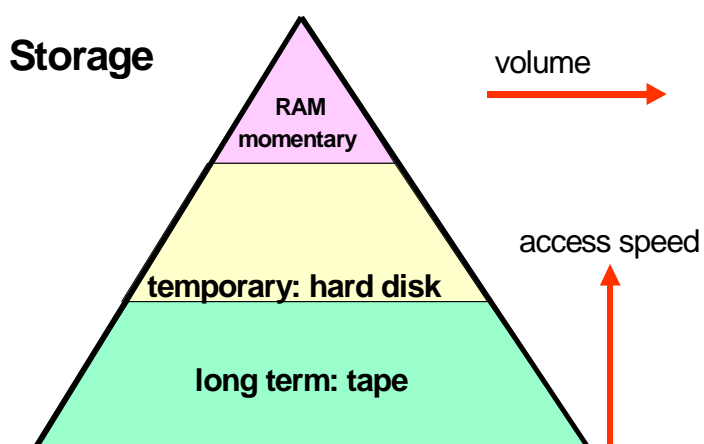
### 2. Editing / Production tools

The hardware of most (non-linear) editing tools already uses standard IT hardware (PCs, workstations) combined with standard operating software. The GUI and the program software are designed for the broadcast market. Production tools like cameras and (video) recorders are products which are highly specialized (and optimised) for a broadcast environment. Mixers (switchers) may be composed of IT modules and may provide IT gateways, but the complete product will never be sold on the general IT market.

### 3. Storage

”Storage” means in the IT world the storage of files. Streams are converted to files before recording and may be streamed during playback. In the IT world storage technology is based on non-linear media and linear data tape technology. This difference cannot be seen by the user from the outside. The difference may become visible in the response times to certain access requests.

The different storage means of the IT world are shown in the so-called “storage pyramid”



Access times are shortest for RAM storage, but RAM has the highest cost. Tape offers the lowest storage cost, but the longest access times. Temporary storage (editing) uses hard disk (server) and the often required cache or buffer storage uses RAM.

In the traditional video world we have been living with incompatible VTR formats for decades. The common IT user is not worried about different data tape formats, because he is exchanging the data,

the files and not the tapes! The IT user makes his format selection based on required data capacity, throughput, access times and costs. His main concern is that future generations of hard- and software must be able to read (and understand) his stored data files.

Some types of removable media will be needed for manual carrying of content files from one place to another. It is strongly recommended to use a type of media, which has wide applications in the IT world. Parameters to be evaluated are:

- functionalities
- ability to handle different file types
- storage capacity
- size
- speed of access
- robustness (wear)
- cost

Due to the fact that the selected type of removable media will not be used for long term storage, the selection can be changed when a more economical technology emerges. Where an optical disk may be candidate for today, a solid state (flash) memory may become the choice of tomorrow.

## **TWO CASE STUDIES OF A DIGITAL ARCHIVE**

At present the ZDF German Television is into the gradual installation of a digital archive system - called DAS - for the program inventory stored in its production and distribution centre in Mainz. However, this archive system isn't a traditional archive of video signals, digitised in DV or MPEG with the corresponding tape formats, but an archive system based on use of modern information technologies (IT). "Due to increasing use of networked systems in program and production areas, the world-wide operating media enterprise ZDF will more and more depend on the functioning resource 'network' ". This was one of the central statements of a study carried out in the year 2000 by ZDF concerning the ZDF data network. Particularly by use of network techniques in the production area for TV and the Web, new requests can be expected, which will be far more difficult and critical than what is known from the commercial data processing.

## **MEDIA ASSET MANAGEMENT AND LEGACY SYSTEMS**

It must be possible to integrate a Media Asset Management system into any available system environment. CM-systems must support the work-flows of users in the best possible way - always considering the economical impact. This requires the use of existing, proven techniques wherever possible. Specific developments should only be used when indispensable, such as for the fulfilment of special user requirements, for the support of special work-flows or for the adaptation to the existing system environment.

Already existing system environment, which consists of IT infrastructure and existing media systems, puts further boundary conditions for a CM system: It is often impossible to mirror user operations without the older systems, or preferences exist with regard to the use of certain hardware, middleware or database management systems. Therefore, a very open, modular system design is needed to fulfil the various user requirements with regard to the imbedding of different computer platforms, the integration of specific solution modules of third parties or the imbedding of legacy systems.

The ZDF case (Figure A) shows that the existing environment of a broadcaster makes customised solutions unavoidable, since the existing Newsroom hardware as well as specific software must be

integrated into a complete system. This for example applied to the existing ZDF program data base, which - in operation since 1992 - contains more than 1.3 million documents.

The Media Asset Management System, established at ProSiebenSAT1 Media AG (Figure B) provides another excellent example, which shows that a CM system must fulfil further requirements.

After the merger of the two broadcast stations SAT.1 and ProSieben/N24 into the ProSiebenSAT.1 Media AG, its management decided to bring the different systems of both stations together. The demand for combining the two previous system environments also concerned the two CM systems of ProSieben/N24 and SAT.1 installed in the context of earlier, separate projects. This required integrating the system environment used by ProSieben/N24 in Munich into the existing infrastructure of SAT.1 Medienzentrums (media centre) in Berlin. An (alien) system environment should on the one hand be integrated in the Medienzentrums Berlin; on the other hand there was the demand to retain certain functionalities of the (old) Berlin system. Of course the ongoing broadcast operation was also not allowed to be impaired.

Both projects proved that a CM system should fulfil the following requirements:

- it must offer an extremely open solution with exactly defined interfaces to make the integration of (legacy-) systems possible
- it must be built up from modular components which are specified clearly with regard to their functionality
- it must be a “distributed” solution, which allows to integrate systems from different physical places. This distribution implies the scalability of the architecture at the same time.

## CONCLUSION

The fully IT based television production facility isn't here yet. But this is no longer a question of “if”, but a question of “when and how”. Both, vendors and users are still on the learning curve.

The hype, that broadcasters may buy (cheap) standard IT equipment from the shop around the corner, remains just hype. Broadcasting has many special requirements and users need the insurance that the equipment will meet them. This need can be fulfilled by traditional broadcasting manufacturers, which will incorporate more and more IT components into their products. But these products are not IT products because they will never be sold in the general IT market. IT vendors on the other hand will have to prove to the users that the offered product really meets the special broadcast needs. The argument, that the product works excellent for a specific insurance company, will not be sufficient.

International standards bodies have to solve remaining interoperability issues and vendors have to give up their proprietary solutions.

## REFERENCES

The Right Tools for the job, EBU PMC Seminar, EBU Geneva, 28-30 January 2003

## ABOUT THE AUTHOR

Dr. Juergen Heitmann ([Heitmann@avmediatec.com](mailto:Heitmann@avmediatec.com)) is founder and owner of **AV Media Technology**. This company provides Management Consulting for users and vendors of broadcast TV equipment. Dr. Heitmann is an expert for archiving, content management and IT based production technologies.

FIGURE A: The 'DAS' project of the German ZDF

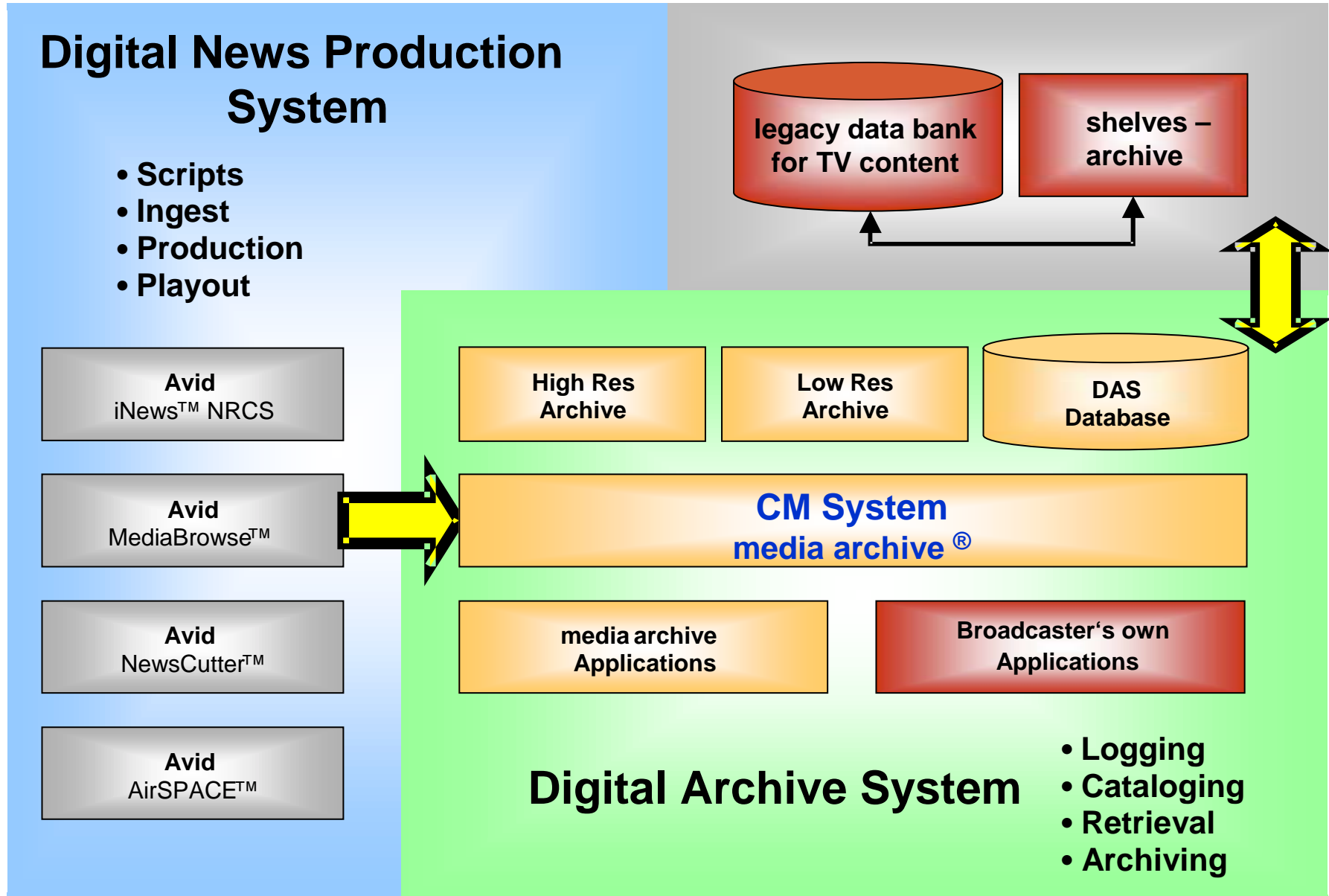


FIGURE B: Media Asset Management System of the German ProSiebenSAT1 Media AG

