



Introduction

H. Schachlbauer
IRT

In this series of five articles, prominent members of the EBU/SMPTE Task Force describe the work carried out by the Task Force in pursuit of “Harmonized Standards for the Exchange of Programme Material as Bitstreams”.

The articles have been derived from presentations given by the Authors at IBC ‘98 in September. Many thanks must go to Roger Miles and Myrienne Jansen of the EBU Technical Department for converting the audio tapes recorded at Amsterdam into word-processor text files.

The work of the EBU/SMPTE Task Force will have far-reaching consequences in the design of future television studios. Yet the subject matter of the Task Force’s work is not really new: in fact it is a billion years old and is magnificently moulded into a painting by Michael Angelo Buonarroti (see Fig. 1) which contains all the essential elements that we are actually dealing with.

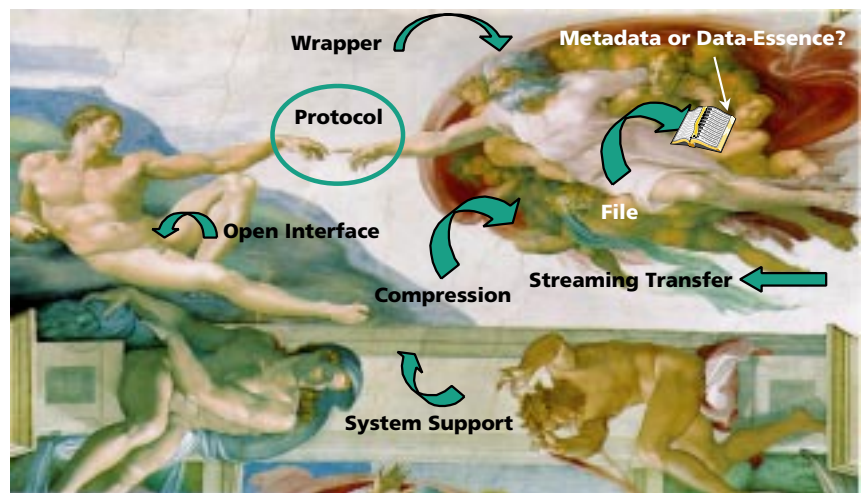


Figure 1
The first call for Open Standards and agreed Interfaces.

Of course when the Lord decided to create a new system all those years ago, He had to think about the essential elements that would be required. As you can see from Fig 1, He and his staff arrived by means of a *streaming transfer*, so at least He knew about streaming. He delivered the draft version of the operating instructions in the form of “ten commandments”, using a file format whose closing code is “amen”. He was also very aware that whenever you assemble things in a *wrapper* where you keep everything together, some people will suffer from *compression*. Furthermore, his draft operating instructions already asked the basic question *is this really metadata or is it data essence?* – this is something we are desperately trying to sort out today.

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Abbreviations

ANSI	Americal National Standards Institute	ITU-R	International Telecommunication Union, Radiocommunication Sector
ATM	Asynchronous transfer mode	ITU-T	International Telecommunication Union, Telecommunication Standardization Sector
ETSI	European Telecommunication Standards Institute	JPEG	(ISO/IEC) Joint Photographic Experts Group
IBC	International Broadcasting Convention	MPEG	(ISO/IEC) Moving Picture Experts Group
IEC	International Electrotechnical Commission	NAB	National Association of Broadcasters (USA)
ISO	International Organization for Standardization	SMPTE	(US) Society of Motion Picture and Television Engineers

In the painting you can also see that the Lord is trying to "ping" an object and is attempting to establish a *protocol* for the liaison. You can further see in this painting that He has given very deep thought to the need for an *open interface* – for which we are very grateful as we are basically concerned with the same issue today, but of course with a different reach!

The work of the Task Force has been concerned with the collision of two worlds: the world of *Television* and the the world of *Information Technology* (IT), both of which operate on very different paradigms.

In the TV world, we have been heavily involved for some while in the process of *digitizing* – mainly trying to improve our assets in terms of maintaining the integrity and quality of the audio and video, and maintaining an adequate post-production headroom to carry a coded signal through a long and lengthy post-processing process. This has all been set in concrete by a range of standards from the EBU, SMPTE, ISO, ANSI, ETSI and ITU-R. As broadcasters, we have really taken digital technology on-board – but with almost the sole focus of maintaining the quality of our products (of course by maintaining the quality, we are also opening new horizons for those people who want to do something creative with their content).

There is now another world coming towards us and there is great risk of an imminent collision. We certainly do not want it to collide with our TV world; rather we want to have a “controlled crash” – as pilots describe the landing of an aircraft.

The IT world has very different rules. Nothing (or very little) is set in concrete, there are different operating platforms (not really interoperable) and few things are palpable, although some work is going on in the ITU-T in terms of standard interconnections. The great plus of the IT world is that it provides *functionality* that we must take on-board. In the future, it is most likely that we will have to run our TV operations in a fully-networked environment, where it is not only a question of maintaining the quality but also a question of:

- ⇒ improving the functionality of our systems;
- ⇒ maintaining our assets;
- ⇒ getting right the administration of our assets;



⇒ opening new business models to make money.

There are also a number of elements which are common to both worlds (see Fig. 2); for example, MPEG, ATM, DV and Motion JPEG. These all need to be carefully defined and settled to really make things click. This was realized two or three years ago when the EBU and the SMPTE set up working groups within their respective bodies to discuss these matters, but never got very far with them.

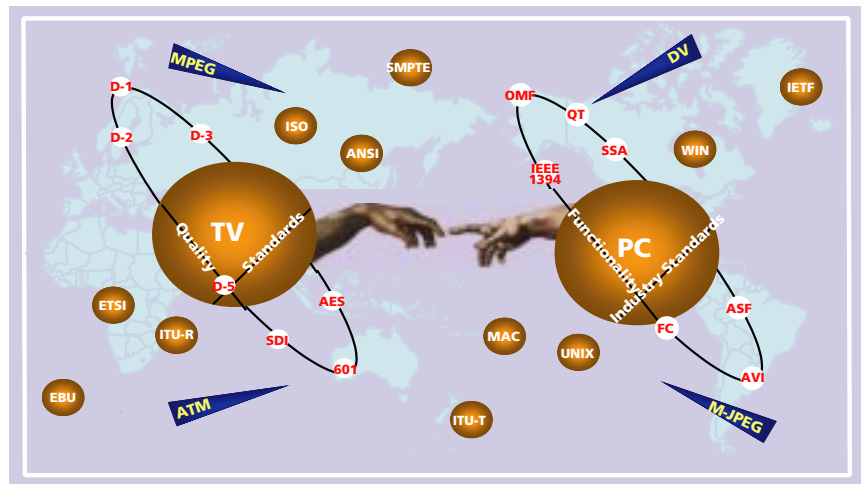


Figure 2
The TV and IT worlds on a collision course.

We soon realized that we would have to assemble a really critical mass at an international level in order to obtain a high public profile and to get the manufacturers and users on our side. In that way, we could determine the path and course of action needed to ensure that this new technology merger ended up not in chaos but in something useful, efficient and economic. Thus, the EBU and the SMPTE¹ got together to define a number of items that needed standardization, or at least needed some directions or recommended practices in order to make a whole networked studio environment become a real possibility. These discussions resulted in the creation of the EBU/SMPTE Task Force for Harmonized Standards for the Exchange of Programme Material as Bitstreams which went on to identify a number of items of great concern to the TV world (see Fig. 3).

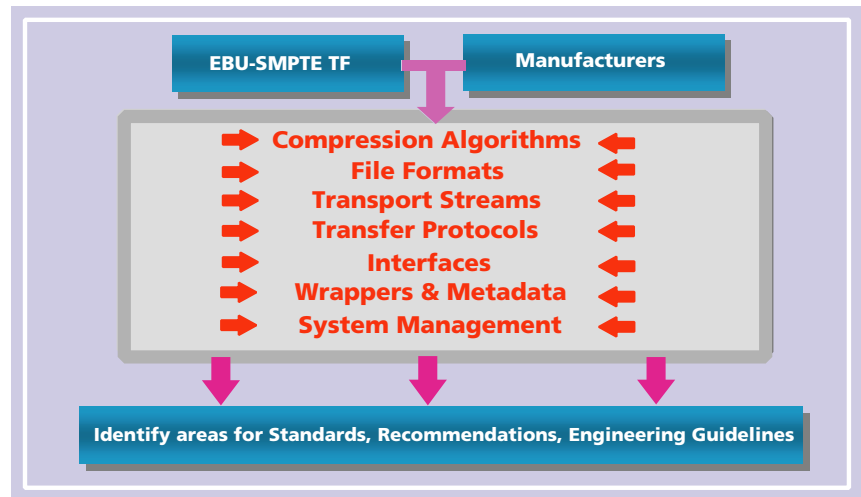


Figure 3
Areas identified for Standards, Recommendations and Engineering Guidelines.

Compression algorithms were one such concern as they were already imminent. It was thus a question of looking at the issue and seeing what we could do in terms of directing future activities. The whole issue of *file formats* is not new to television of course. In some areas such as graphics, we've been using file transfers for some time, but not in a way that it could be spread ubiquitously over the whole studio environment. New *transport streams* and *transport protocols* would have to be defined, and *interfaces* would have to be defined to interconnect sig-

1. The EBU purely as a user group; the SMPTE also as a user group but with very strong connections with the manufacturers who use the SMPTE as a platform to define standards for themselves, in the knowledge that it is important to have standardized products if they are to operate successfully in the marketplace.

nals seamlessly from A to B with equipment from different manufacturers at either end. Of course there was this new thing called *Wrappers & Metadata*.

Wrappers are not very familiar – in Europe they used to be called “containers”. A wrapper is where you put something in, but we are not wrapping just the remains. Rather, it is the valuable assets that we are wrapping. Metadata is mainly the administrative information that we need to select material if it is going to be used in a multiplicity of different outputs. Of course the most difficult thing of all, and we've unfortunately realized this very late in the day, is to tie all these things together and to mould them into a system approach which does not require specific skills from an operator. Rather, it should have an inconspicuous layer – *System Management* – which does it all and leaves more freedom to those creative people who want to use the system in a creative way.

We started the Task Force activity at IBC in Amsterdam two years ago (1996) at a press conference where we set the goals. We were very ambitious in thinking that we could settle everything by the next NAB conference (1997) in Las Vegas (see Fig. 4). That was an illusion – we painfully became aware of this as we approached the date of the NAB conference.

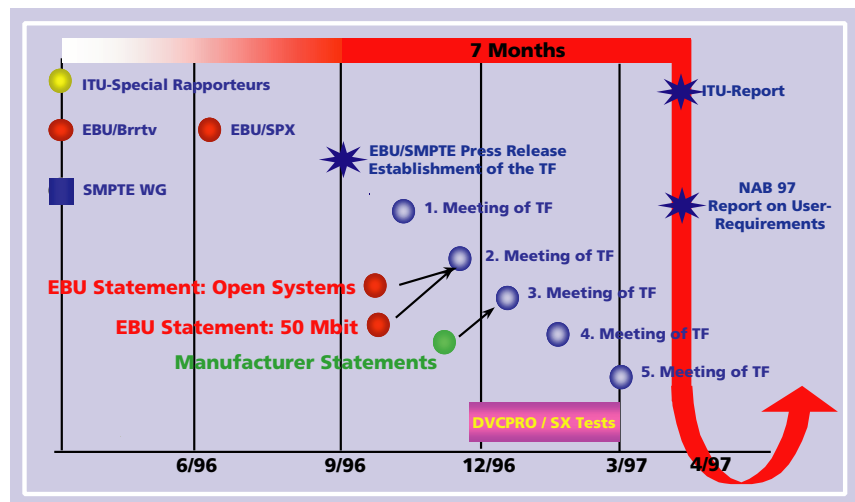


Figure 4 Achievements during the first round.

The only thing that we could provide was a first report of a tutorial nature, where we analyzed what the issues actually were and presented some user requirements that we had assembled, but nothing else. That had a value in itself, but it was not so very productive because it did not tell people where they had to go. It just stated what a mess there was and what we actually wanted, but it did not provide a clear vision of the direction where manufacturers and users would have to go. So, we had to carry this overspill into a second round which was much more productive.

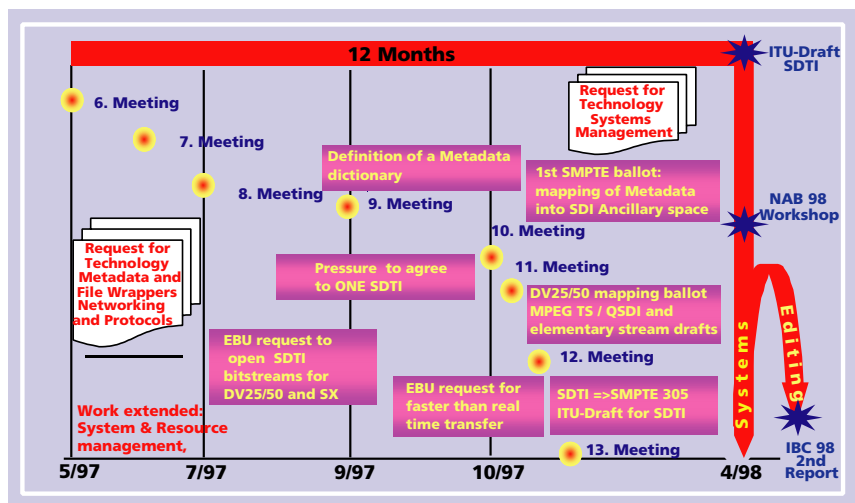


Figure 5 Achievements during the second round.

In this second round, we set about issuing requests for technology to the outer world where we knew there were already a good number of solutions. We just had to pick the right ones which could be adapted appropriately to the specific needs of the television community. These specific needs were mainly in the areas of (i) gross data rates, which you normally don't

encounter in office applications, (ii) the question of latency and (iii) the question of deterministic control of all these things. So we had a range of requests for technology coming and going between the Task Force and the proponents of the various technologies. The responses were duly analyzed and we came to some conclusions.

Fig. 5 shows the milestones where we reached some agreement with the manufacturers over things needing to be done to make things work. One of the key user requirements was that any system accepted for use in a broadcast environment would have to be laid open in all its properties and it would have to be standardized officially within a body such as the EBU, the SMPTE or any other recognized standards body; it could not be proprietary. A second issue was to generate quality guidelines for manufacturers on how we think that compression should evolve.

The Task Force's work was a truly collaborative venture between the users and manufacturers. Fig. 6 shows a list, which is not exhaustive, of the major players in Europe and North America who participated in the work. We all realized, the users and the manufacturers, that we were working to achieve the same goals. As users, we knew that we would only install new systems on the premise that all the components would be interoperable, even if these components were installed on a piecemeal basis. We were not going to promote any "turnkey" solutions.

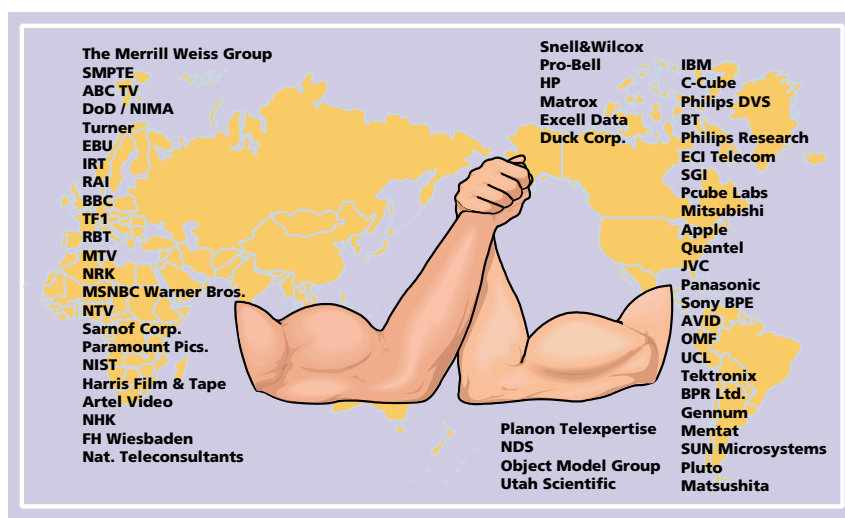


Figure 6
List of members of the EBU/SMPTE Task Force.

We knew that we would have to guide broadcasters from different starting points carefully into this future environment which we can only vaguely see; the technology is moving so fast that we don't have a total vision of where we are going to end up.



Horst Schachlbauer graduated in Telecommunications from the University of Munich in 1967 and has since worked for the IRT, the central Research Laboratory of German, Austrian and Swiss public broadcasters.

Mr Schachlbauer been very involved in the development of standards for digital television on national as well as international platforms, e.g. ITG, EBU, CCIR and ETSI. In particular he was involved in the specification of CCIR Rec. 601, the D-1 recording format, the **Serial Digital Interface** and PALplus.

Currently, Horst Schachlbauer heads the EBU MAGNUM committee which closely liaises with manufacturers in the area of recording technology for television. He also chairs a number of national and international Project Groups dealing with digital television production technology and archiving. He served as the European co-chairman of the EBU/SMPTE Joint Task Force and has recently been elected a Fellow of the SMPTE.

EBU/SMPTE TASK FORCE – FINAL REPORT

To sum up, the Task Force's work was a collaborative effort involving more than 200 people, costing an estimated 2,000,000 US dollars. It has taken that much to achieve what is now printed in two books – the Final Report of the Task Force which has simultaneously been published by the EBU and the SMPTE. (*The EBU version was distributed as a Special Supplement to the Summer 1998 issue of EBU Technical Review.*)

The work of the Task Force is not finished yet. There is still a great deal of standardization work to be carried out and this will be done mainly through the SMPTE which has initiated a new organizational structure for its standards development activities, in order to be reflective of the Task Force's work.

