

SVT

Understanding the repercussions of technology development

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■ 1. Introduction

I have been in the business of R&D in broadcasting for some ten years now. During this period, I have been involved in some of the major discussions on standardization within our industry. Some of these discussions have led to the implementation of new systems or services, such as NICAM stereo sound and 34 Mbit/s digital video contribution links. Other discussions have led to nothing other than heat. In fact, the truth of the matter is that I have spent most of my time fighting for ideas that never came through; nor did those ideas that I was fighting against.

The history of broadcasting indicates that, in the past, the international standardization process has been a fairly conventional procedure, with few exceptional difficulties being encountered. However, in the last ten years or so, the rapid develop-

As one of the smaller EBU members, SVT – the Swedish public service broadcaster – has found it particularly difficult to maintain a viable R&D operation in recent years.

Here, the Author offers his poignant views on where broadcasting R&D has gone wrong in the past, and puts forward his ideas on what the future holds for the traditional broadcaster in the rapidly-changing media landscape.

ment of electronic components, and the broad implementation of satellite technology in broadcasting, have escalated the number of standards being introduced. The rather cumbersome standardization procedure that was previously developed – for a slower rate of technological progress than we have today (and probably will see in the future) – seems to be in need of major reshaping. If not, the broadcasting industry risks losing ground to other competing industries when we enter the age of multimedia.

The development of systems for the broadcasting industry has moved away from joint projects coordinated by the EBU and largely financed by EBU members, towards European collaborative R&D programmes which, to a considerable extent, are financed by the European Commission (EC). This shift in emphasis seems to have stimulated the growth of R&D administration!

Sweden is a new member of the European Union (EU) and we have found that an important new skill required by an R&D manager – within a company, inside the EU – is to master the procedure of getting one's share of the EC funds. It has caused a major effect on the EBU's role in creating new broadcasting standards; the reason for the recent restructuring of the EBU's technical department may be seen in this perspective. The EC-financed projects have, of course, weakened the role of many EBU members in the standardization process. To a large extent this has been self-inflicted because of internal R&D budget cuts by some of the leading EBU member organizations, thus forcing their R&D departments to look for external funding. This process cannot be reversed.

Another trend is that our sector of the industry must be prepared to incorporate standards developed by other sectors of the industry. The broader co-operative base within the EC research programmes is thus beneficial in this respect.

2. The MAC debacle

My first job as an R&D manager was to protect C-MAC against D-MAC, but most of all against D2-MAC.

C-MAC, we thought, was better than D-MAC because the signal-to-noise ratio for the digital part of the signal was improved by 1.5 dB. D2-MAC was just as bad as D-MAC in this respect but what was worse; it carried only half the data capacity. This extra data capacity was needed in Scandinavia so that a programme broadcast over Nordsat (a satellite that was never launched) could be delivered over all the Nordic countries in four different languages.

In Scandinavia, we have never used dubbing, for cost reasons, except for children's programmes. Over the years, no solutions have been found to lower the costs of dubbing, and we have never received extra money from our Governments to provide for dubbing – except perhaps in Norway where money from North Sea oil has been used. This fact did not disturb us unduly when we fought for the extra capacity provided by C-MAC.



Our French and German colleagues fiercely promoted D2-MAC. They claimed that, in order to preserve the signal from the satellite through their cable networks without having to change the signal format, it was necessary to keep its base bandwidth within 8 MHz. From an engineering point of view, that was right. From a business point of view, it was not well considered. The business idea behind cable TV is for it to serve as an "adaptor" between the signal formats and geostationary positions of different satellites. You connect to a cable network in order to avoid the trouble of buying different decoder boxes and having to set up parabolic antennas pointing in different directions.

It has been explained to me that the reason for developing MAC in the first place, back in 1981, was that – besides the need for further sound channels – the triangular noise inherent in FM demodulation was expected to cause high levels of noise on the PAL sub-carrier and possibly unacceptable noise levels in the region of the audio sub-carriers. Furthermore, with the move from PAL to MAC, we had a chance to get rid of cross-colour and cross-luminance interference.

What happened then? SES of Luxembourg started in the mid-eighties to broadcast in PAL from its Astra satellite. It worked perfectly! Today, over ten years later, C-MAC has not survived as a broadcasting standard. There is just one satellite channel which is broadcast in D-MAC and that is NRK1 in Norway. D-MAC was also tried in the UK by British Satellite Broadcasting (BSB) for a short period but it failed in the marketplace due to the competition from Sky's PAL broadcasts from the Astra satellite. There are no

Figure 1
Shooting of a scene in the old town of Stockholm for the first complete HDTV production in Sweden. The programme was shown at a big consumer fair in Stockholm, during the autumn of 1990, to promote HDTV.

D2-MAC broadcasts available in Germany or France, not even on cable networks, nor in any other European country except in Scandinavia where close to 1 million D2-MAC decoders have been sold to date! And the final twist to this bizarre tale is that there are no multilingual services available in Scandinavia (because that would require the extra sound capacity offered by the C-MAC and D-MAC systems).

D2-MAC became successful in Scandinavia as a means to convey pay-TV services. This is because it was capable of linking up with a much more powerful encryption system than could be achieved with PAL. In effect, *we* – the traditional broadcasters – spent our hard-earned money on developing a standard that we had no use for, while *they* – the new entrants to the market – exploited the opportunities offered by our newly-developed technology. We thought it was all about quality improvements and extended functionality of a kind that our audience had never asked for. What we did not recognize was that the business had changed: what was important in the new broadcasting environment was very different from that in the old days.

3. In search of excellence

We then concentrated our efforts on how HDTV should be produced and delivered. Picture quality was again at the top of our agenda. HD-MAC was not good enough as a delivery system, we thought in Sweden, and SVT therefore proposed *digital broadcasting*. Suddenly, digital TV broadcasting was mainstream, HD-MAC was thrown into the dustbin, and we focused upon whether it should be HTDV only, or a hierarchical approach so that a

household at the fringe of the coverage area could at least receive a standard-quality picture. The European Launching Group (ELG) for digital TV at that time had one sub-group, the so-called WGD TB, where most of these discussions took place. After a year or so of discussions, the *hierarchical terrestrial* approach won the arguments and, its final report, WGD TB proposed a system with those features.

In the meantime, our satellite competitors demanded to become members of the ELG; otherwise, they said, they would develop their own system. They were finally allowed to join the ELG and an additional meeting of the newly-enlarged WGD TB sub-group was held, just a month after publication of the report on the hierarchical terrestrial HDTV system. At this new meeting, it was decided that a *satellite system* with *standard resolution* from now on should be the top priority of the group! Thus, the earlier conclusions reached by WGD TB had a lifetime of just one month! This was the preamble to the DVB group which later became the big standard setter for digital TV broadcasting in Europe.

4. A success story

DVB has been very successful in developing the standards for digital TV broadcasting. There are several commercial projects going on all over Europe, using the DVB standards. Up till now, the statistics on the number of households connected to a DVB service are nothing to get excited about: the figures are low in all the European countries. But that is surely what one could have expected, as it takes a considerable time to introduce a new TV format. We must be more patient before we can say anything about the long-term prospects of digital television. The difficulty for digital television in Europe, irrespective if it is delivered by satellite, terrestrial or cable means, is that it will “ride on top of” analogue terrestrial, satellite and cable services; services that are very well established in many European countries. In countries with close to 100% penetration of analogue terrestrial services and around 60% penetration of satellite/cable services (e.g. Germany, Sweden, Norway and Denmark), it will be a tough job to introduce digital television since it will deliver services similar to those of analogue satellite and cable television.

There is also the risk that digital TV will be over-engineered. This will drive up the prices of decoders to unreachable levels for most consumers. We must be alert and make a distinction between *nice to have* and *need to have*. It is very different to launch a new broadcasting standard in today’s environment, compared with the old monopoly

Figure 2
HD-DIVINE at IBC '92 in Amsterdam. This was the first live demonstration of HDTV pictures transmitted over a terrestrial 8 MHz broadcasting channel.



days when the audience had to accept whatever we served them with.

5. A sleeping bear

Why have we – the representatives of the traditional TV industry – turned out to be so poor at keeping pace with time? In many cases we seem to have applied the latest technology to the industry's old ideas, without recognizing that the rules of the game had changed. Could this be because we were engineers who possessed top-quality resources but a sleeping strategic management? Or could it be that creativity in strategic management required a hunger, and a lack of means, that only the new entrants possessed?

I think the answer partly lies in the complexity of the issue. It seems that every time somebody tries to reduce the complexity by disregarding some aspects of the matter, it leads to a dead end. The strategic management of the international standards-setting process is not inside any single company, except in cases where de facto standards have been established. If the electronics industry decides to disregard the broadcasters' aspects of a new standard (to make life easier as in the case of HD-MAC), or if the broadcasters do the same with the manufacturers (as in the case of the D1 tape format), then the process runs smoother but it leads to unusable results. Now we have an even more complex situation with new industries taking part in the standards-setting process. I am referring to the computer industry – both software and hardware – and the telecoms industry.

However, our failings have also been due to an element of mis-management in the sense that technology standardization has not been regarded as strategic by many broadcasting companies. Instead, programme-related issues have filled the agendas of strategic management. It is not difficult to understand why this is so. A broadcaster



needs to master such a diverse range of skills that it is almost out of human reach to cover them all.

As to my own company, SVT, I think there has been a gap between the programme side and the engineering side for a long time, and it still remains. The standards-setting procedure has not been properly integrated into the strategic management of the company. There has also been repeated political interference in the strategic management – not always in the best interests of the company.

6. The efficiency trap

Maybe the most relevant question for me to answer is: *is there a way of limiting the number of unfruitful issues that are addressed by us in the years to come?* Or rather: *how can we separate the good ideas from the bad ones in a less expensive manner than was the case for those research projects discussed in Sections 2 and 3?*

Of course, in R&D you must have the right to fail. It is not a good idea to try to make the creative process more efficient by requiring less failures. I

Figure 3
The IDUN project was intended to stimulate broadcasters in general and programme-makers in particular to start thinking about multimedia instead of just radio or television.

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think that, in the future, we need to be even more tolerant of failures in our R&D efforts. Rather, we should focus our attention on the process of bringing ideas from our labs into the standardization process. It seems that a lot of noise is added along that path. I think at least one lesson can be learned from the European television standards experience; protectionism seldom leads to the best solution.

In the past, the pure engineering aspects of developing a new technology were good enough for us, as long as we stuck to just one concept; e.g. conventional television. For some while, however, we have been addressing the matter of changing the concept itself. A broadcast programme can now be accompanied by software code to be processed in real time at the receiving end, and it can interact with a local storage device and an on-line data service to form an integrated service to the viewer. From a technical viewpoint, this is fully viable. Any engineer can propose that. The problem is that no one yet has understood how a fruitful combination of these elements should be assembled. This requires a completely different approach. A recipe for success might be interdisciplinary R&D projects. It is not enough to study just the engineering aspects. We must first of all understand the human factors; what our audience might be interested in, how they spend their time, etc. Probably the answers will lead to a combination of hardware, software and firmware solutions, harmonized into integrated services.

The most hopeful sign for the future of R&D in broadcasting seems to be: *there is not very much to be sure about*. This will hopefully curb the desire of people to do battle with others who have widely different opinions: to some extent, diverse opinions are proven to be irrelevant after the battle is over. The difficulty in foreseeing the future of R&D will also probably give us a more humble spirit.

There is of course the risk that we will all be redundant by then. The tendency in the business today seems to be that R&D is something to be cut

to somewhere close to zero. All mishaps of the public service broadcasters are blamed upon the R&D departments.

7. Conclusions

Our broadcasting industry has made dramatic changes over the last ten years. During this period we have travelled from a well-controlled, heavily-regulated, national-based universe with few actors . . . into an uncontrolled, unregulated, international universe with many actors. The transformation is not yet complete and we do not know if it ever will be, or if it will be overtaken by another transformation which will lead us to yet another scenario. The forces that led us to where we are today were not fully understood inside our companies. Today, we can conclude that the driving forces were technology developments, such as satellite-based broadcasting systems, and electronic developments which made consumer equipment steadily more capable and less expensive. The effects of these forces working upon us can be seen today, and they have not always worked in our best interest.

Technology development that will move the very foundations of our business is still going on. If we are to remain in business, we must understand not just the development in itself; we must understand how it will influence the system of which we form a part. It also requires that we can adapt to the new roles that will be given to us.

The standardization of the technology we are using will remain paramount to the success of our industry. Ahead of us we will probably experience an escalated pressure to produce a continuous flow of new usable standards. A smooth process to help us in this direction is thus very desirable. In the future we will experience a more diverse standards landscape, and the standards used in broadcasting will not be exclusive to our industry. Instead, we must – to a large extent – share our standards with other industries and – to an even larger extent – adopt their standards in our operations.

EBU Website

The EBU Website has recently been given a new look and you can find it on the Internet at:

<http://www.ebu.ch>

Links to the Websites of EBU member organizations can be found by directly calling up:

<http://www.ebu.ch/membership.html>