



# From videotape to digital file - planning, realizing and managing a migration project: The SVT case

Lasse Nilsson

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Dear Colleagues, Ladies & Gentlemen,

My name is Lasse Nilsson and I work at the Sveriges Television (SVT) in Stockholm. At this moment I have been more than 30 years at the "factory", mainly in different positions in the audiovisual archiving business.

I'd like to start out with my own organization to give you some background, before we dig into the migration business.

Let's peek into the "Tevearkivet" – the SVT Television Archives!

# The Value of Archives

- **Competitive device**
- Re-runs
- Re-use on new platforms
- Stock shots
- Reference tool
- Sales
- Research
- Follow-up

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Now I claim that Broadcaster managements during the last few years has finally begun to realize the value of archives.

Not only - but especially - as a means of competition. I think they are ready to endorse all the items on this list.

To give you a hint of the level of use of the SVT archives collections, we have about 70.000 annual loans of videotapes and films, not to mention tens of thousands of digital files from our servers.

## Try to imagine any of these productions without archives...

- Världens modernaste land
- Bolibompa
- Diggiloo, Doobidoo
- Minnenas television
- Ordförande Persson
- K-special, Babel, Kobra
- Humor i Public Service
- Musikministeriet
- Wallenbergs
- Rapport/Aktuellt/Regionalnyheter



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These are a selection of recent SVT productions, but I think you can transfer it to your own media landscape...

The freeze frame is from the recent three part hour long documentary on Göran Persson and his ten years in office as the Swedish prime minister...

## SVT Archive Assets...

- 50.000 hrs of film & magnetic sound
- 100.000 hrs on videotape
- 150.000 hrs on VHS cassettes
- 55.000 hrs of digital files
- 5.000.000 stills



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...Besides unpublished material, acquired programmes, raw material, local archives etc.

And of course several hundreds of Terabytes of digital files.

Also add stills & freeze frames from current productions to the still collections.

Then you also realize these figures are necessarily "dynamic", old before you get time to feed them into your computer...

- **Moving images since 1896**
- **Broadcast material since 1956**
- **Purchased stills collections (international pressph.)**
- **Inhouse stills**



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SVT has collected, documented and preserved the majority of the Swedish short films and newsreels collections such as SF, Kino-centralen, Svenska Paramount, SJ, Europafilm, Sandellfilm, private and corporate films since the sixties. Today a unique collection of great national – and international interest, accessible to academic and journalistic research through the National Archives (SLBA)

- **Moving images since 1896**
- **Broadcast material since 1956**
- **Purchased stills collections (international pressph.)**
- **Inhouse stills**



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Who could imagine this young lady playing the piano under the guidance of the famous Estonian-Swedish pianist Käbi Laretei in a childrens programme 1965 becoming the present CEO of Sveriges Television! I guess we also have the future SVT CEOs in the early ages in our archive!

- Moving images since 1896
- Broadcast material since 1956
- Purchased stills collections (international pressph.)
- Inhouse stills




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Our huge stills archive also includes a unique historical pressphoto collection of several million pictures. Like this one from Tallinn in the 1950s.



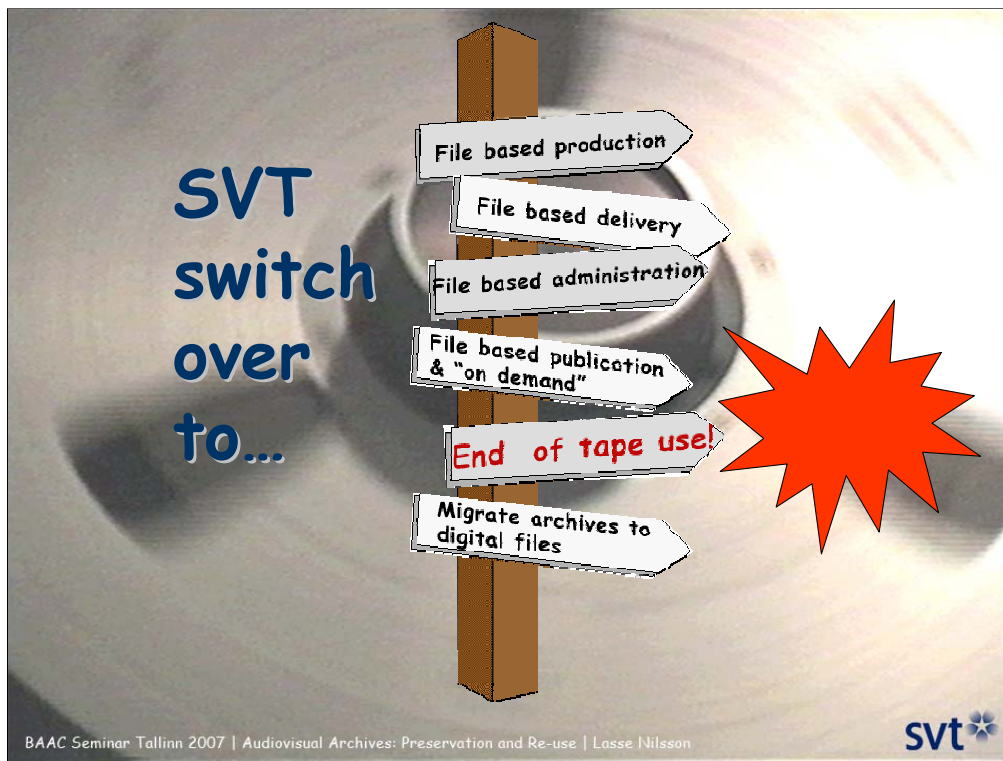
- Moving images since 1896
- Broadcast material since 1956
- Purchased stills collections (international pressph.)
- Inhouse stills



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The stills archive of course also includes in-house material such as newsroom and programme promotion stills and documentation. I guess this person still is very familiar with you!



Now the entire SVT goes digital...

Some Digital Milestones:

- 2000 SVT24 (24 hour news)
- 2001 News Archives
- 2003 Childres Channel
- 2005 Start of digitized general programming

Development in progress.

All use of videotapes to be discontinued in a few years time means videotapes in our archives and all over the of the organization has to be migrated to digital files if we want to preserve the content.

And thats leads us to the core of the heading of this presentation!




- **Physical degradation**
- **Obsolete formats**
- **Lack of spares**
- **Loss of competence**

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Clogging of heads, oxide shedding...

Regardless of the state of digitization of processes at the SVT our videotapes are ageing and will in the end be impossible to replay.




- Physical degradation
- Obsolete formats
- Lack of spares
- Loss of competence

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Old formats will be out of production...

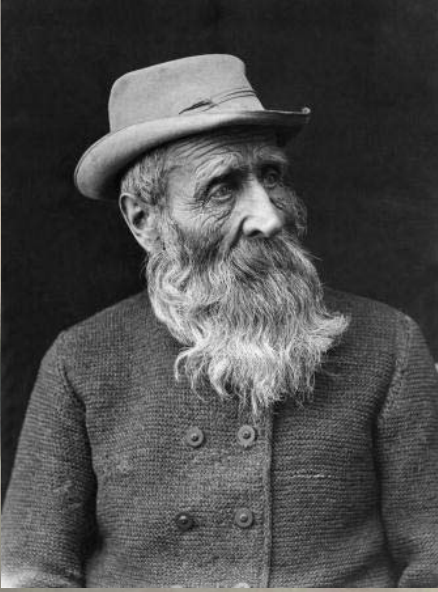


- **Physical degradation**
- **Obsolete formats**
- **Lack of spares**
- **Loss of competence**

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That also goes for replay equipment and spare parts... Like VTR heads...



- Physical degradation
- Obsolete formats
- Lack of spares
- Loss of competence

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And ourselves, we don't get younger either...

### 3 Critical Management Decisions 2005:

- Retain everything broadcast with SVT rights (archive policy)  
Selection  
Dispose of originals after migration
- 3 priority levels for migration
- Set up a migration factory in cooperation with UR & SLBA

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Selection means primarily disposal of all raw material and parallel copies for other use than broadcast.

The priority level decided to each tape corresponds to a number of measures to take and time at disposal for digitization. Three different levels was decided:

P1: Estimated to be attached to roughly 10% of the collections. "Unique" SVT productions, high re-use value, SVT hold all rights, are guiding elements in the.

"All" possible measures should be taken to ensure a digital file of high quality, like repeated cleaning and baking if necessary.

On average approximately 4x the duration time of these tapes will be assigned for these measures.

P2: The major part (approximately 80%) of the SVT tape collection will get this priority level. An average of 2x duration time for digitization measures of these tapes. When digitization fails to be 100%, "we take what get" over a certain percentage of the tape duration.

Examples of genres for this priority level: News, topical and life style magazines.

P3: Programming of repetitive kind, like game shows and quizzes.

Material where we hold a lower level of rights.

Estimated to be approximately 10% of the collections.

The project partners apart from the SVT are UR - the Educational Television and SLBA – the National Audiovisual Archives.



No one has done anything like this before within the SVT and I'm bold enough to maintain that no one has done it anywhere else either – at least not on this level at this scale. Besides, not within such a fixed budget and project time limit.

How to find solutions on the practical level then?

The optimal situation – without the stern limits of the management decision – had been to retain it all! But since we don't live in "the land of milk and honey" it means clear measures of selection and prioritizing to squeeze the project within the limits. It means measures to be taken that might stir up some dust in the archivist world. But maybe 30 years in the audiovisual archiving business has provided me with thick skin, sensibility and common sense in just right proportions to find reasonable solutions?



- Resources?
- Make inventory
- Procedures
- Accessibility?



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Practical level solutions?

### # Resources

State funds granted especially for making archive collections accessible in combination with giving priority to the project within the ordinary archive activities of the organization.

- Resources?
- Make inventory
- Procedures
- Accessibility?

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Practical level solutions?

### # Make inventory

– The management decision was based on what we knew about the scope of the collection at the time, but we felt we had to know in *detail* about archive holdings of the regional organization. We located additional 90.000 tapes, also of obsolete formats! And tapes believed lost...



- Resources?
- Make inventory
- Procedures
- Accessibility?

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Practical level solutions?

### # Procedures

– We established detailed routines and standards for selection and prioritization.

Meaning we had to decide, what is a copy? May a film original serve as an acceptable back-up? How to empty the videotape storage robot system?

What constitutes a P1, P2 programme content etc. Lists of examples in all genres to guide the staff.

- Resources?
- Make inventory
- Procedures
- Accessibility?

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Practical level solutions?

### # Accessibility?

What do we do to serve the News rooms and other productions when a “Breaking News” situation happens and a large portion of the tapes are hauled to the migration factory way up north? When Mr. Jeltsin died the main part of our News Beta SP’s 1991-2000 had just left on a truck for the migration factory!

We have worked out different types of routines for the access of tapes in the migration process, like part digitization of a certain tape and FTP file transport to the editing rooms in Stockholm to changing the order of tapes in the workflow and even re-loan the actual tape.

There are also considerations to be made for the transfer of finished files from storage server to file areas within the SVT. This process is for the time being a narrow resource due to the available number of client computers managing it.

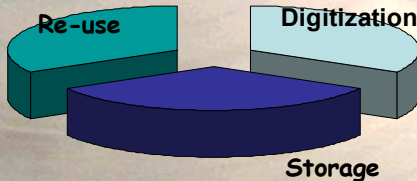


Not to forget about our 50 million meters collection of films and magnetic tapes that need to be digitized!


We anticipate a coming project of cooperation between the SVT, the SLBA and various University institutions on that. And we anticipate funding problems as well.

# Project Framework

- Content preservation
- Largest in Europe
- 3 interested parties
  - SVT/UR/SLBA
- Contractor: SRF
- Migrate to digital file



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I have tried to give you some input on the philosophy behind content migration and decisions leading to the actual start of the project.

Now on to a more technical and logistical side of it.

The project framework – again:

- This project is the largest of the kind in Europe
- Interested parties are the Sveriges Television, the Utbildningsradion (Educational Channel - UR) and the Nation Audiovisual Archives (SLBA).
- Contractor from November 1 2005: SRF, a service company jointly owned by the three public service broadcasters in Sweden.
- Mission: To preserve the main part of the Swedish audiovisual heritage on videotape for posterity
- The internationally recommended method to preserve contents of audiovisual archives is digitization. It is regarded as the most cost-effective method in a long view.

The preservation generates work in three workingfields:

- Digitization – transfer of content to digital files
- Storage
- Re-use – search, find and re-use material for future programming (SVT & UR) or scientific research (SLBA).

## Funding - M€ 11

- 7 M€: Deposits by interested parties
- 1,2 M€: Equipment etc by interested parties
- 1,1 M€: EU structure funds
- 0,8 M€: County funds Västernorrland
- 0,6 M€: Regional funds
- 0,2 M€: Employment office Ånge

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Funding totals converted in euros...

## Project scope 2006-2009

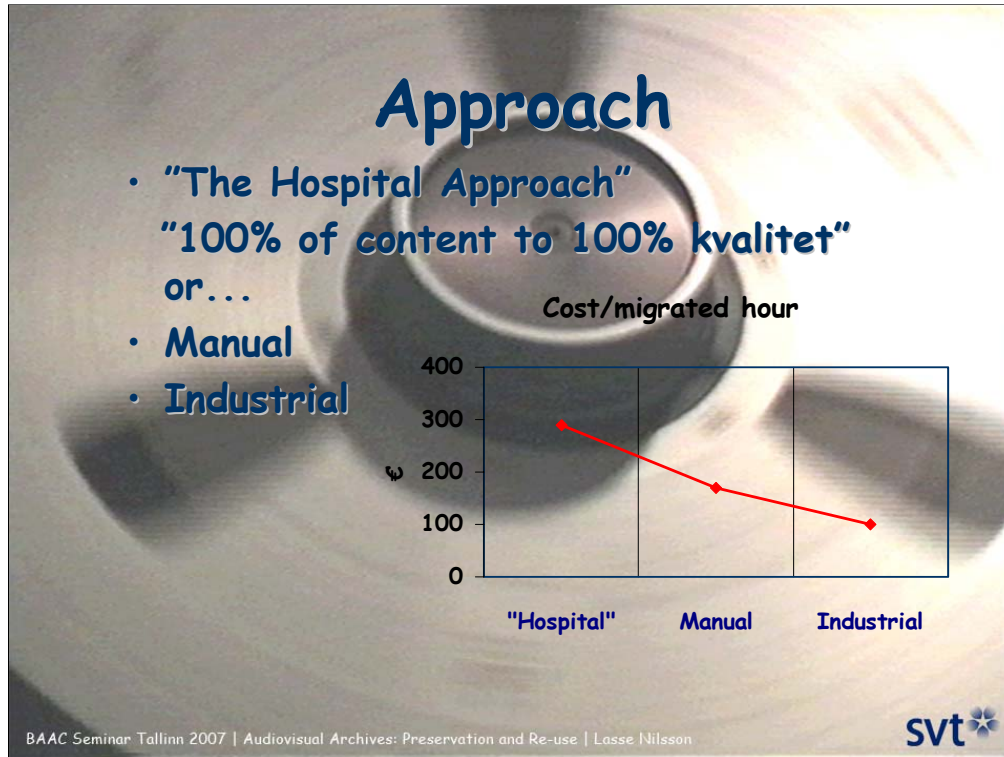
| Format               | Antal band     | Programtid, tim |
|----------------------|----------------|-----------------|
| 1" B-format          | 27 533         | 19 600          |
| 1" B-format LP       | 5 300          | 21 200          |
| U-matic HB           | 4 400          | 4 400           |
| U-matic LB           | 6 800          | 6 500           |
| Digital Betacam      | 22 500         | 22 500          |
| Betacam SP           | 50 125         | 35 063          |
| <b>Totalt i Ånge</b> | <b>116 658</b> | <b>109 263</b>  |
|                      |                |                 |
| 2" (Stockholm)       | 7 000          | 7 000           |

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Planned production figures till the end of 2009 estimated to equals 70 man years.





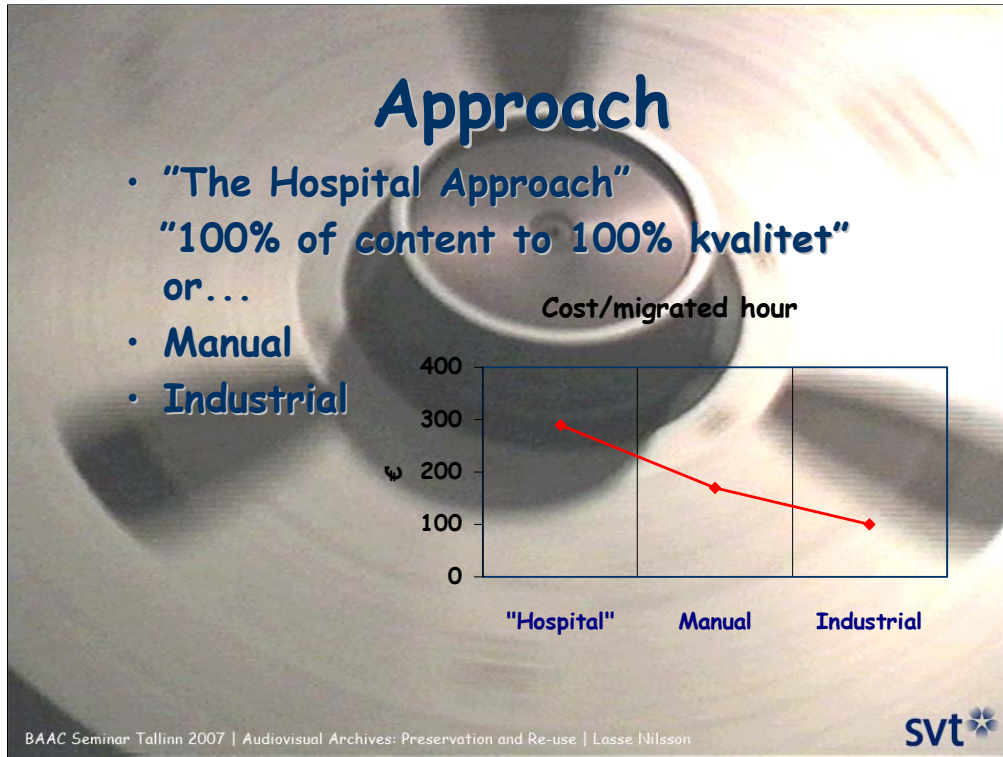
The European experience on migration of this scale is limited. The collected experience you find at the larger European broadcasting companies and the international audiovisual archive organizations like IASA, FIAT och the EU-projects Presto/Presto Space.

One approach in describing migration work is to sort out the work methods into three levels:

- The "hospital" approach – transfer of content to best possible quality of all material. No computer support of the workprocess. Work performed entirely by expert staff.
- The manual approach – Still a minute work process, but with a certain demand for productivity and computer support of the work process. Also links to catalogue data and mass storage of the result. Requires skilled video engineers
- The industrial approach – As much as possible of the work process is automatized. Computerized monitoring of work flow is a core element. Automatized quality check throughout the process. Semi-skilled videooperators. Automatized links to catalogue data and mass storage.

Att precisera en kostanden för en migrering är både svår och vanskligt eftersom de drivande faktorerna i väsentlig grad skiljer från fall till fall. I Ångeprojektet skall vi under 3 år överföra ca 120.000 timmar. Under denna period skall vi också garantera access till materialet. Eftersom lagringen är en av de största enskilda kostnaderna kommer den att ha en stor inverkan på den totala kostandsnivån. För migreringen vi nu utför åt SVT, SLBA och UR, ingår bara en lagring över projektiden. Vad som händer med detta data sedan är under planering hos SVT.

Men oavsett de faktiska kronorna, är det utom allt tvivel att priset per migrerad timme video sjunker drastiskt när den industriella metod används för denna mängd material.



It is difficult to specify in detail the costs for a migration project of this size adopting either method since the decisive elements differs from case to case.

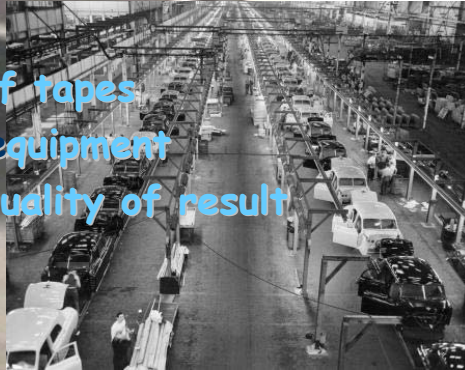
In our project we shall transfer approximately 120.000 hrs of video during three years. During this process we shall also guarantee access to the material.

Storage is one of the single greatest costs and will also have a great impact on the total level of costs. And the final post-project solution on the SVT part is still a matter of consideration.

Part from the actual costs, it is no doubt the most cost-effective method -looking at costs per migrated hour - using this industrial approach for such a huge number videotapes to be migrated

# Industrial operation

- Analysis of prerequisites
  - Quantities and formats
  - Durations
  - Condition of tapes
  - Supply of equipment
  - Expected quality of result



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To achieve an industrial process you have to make a minute analysis of the factors influencing it. We started out with inventories of collections and selections. That part of the process gives you necessary input on how to choose the right approach to the task.

Our migration factory was constructed on one hand through very clear definitions of what to do and how to do it, on the other hand to use computer support for as much as possible of the process.

- **Results**

- Limitations of the scope
- Strict time-limits for handling (priority levels)
- Problem tapes handled separately
- Introduction of support for operators to monitor transfer quality
  - Leads to introduction of parallel transfer process and simplified QC
- Introduction of computerized work flow monitoring
- Use of automatized playback

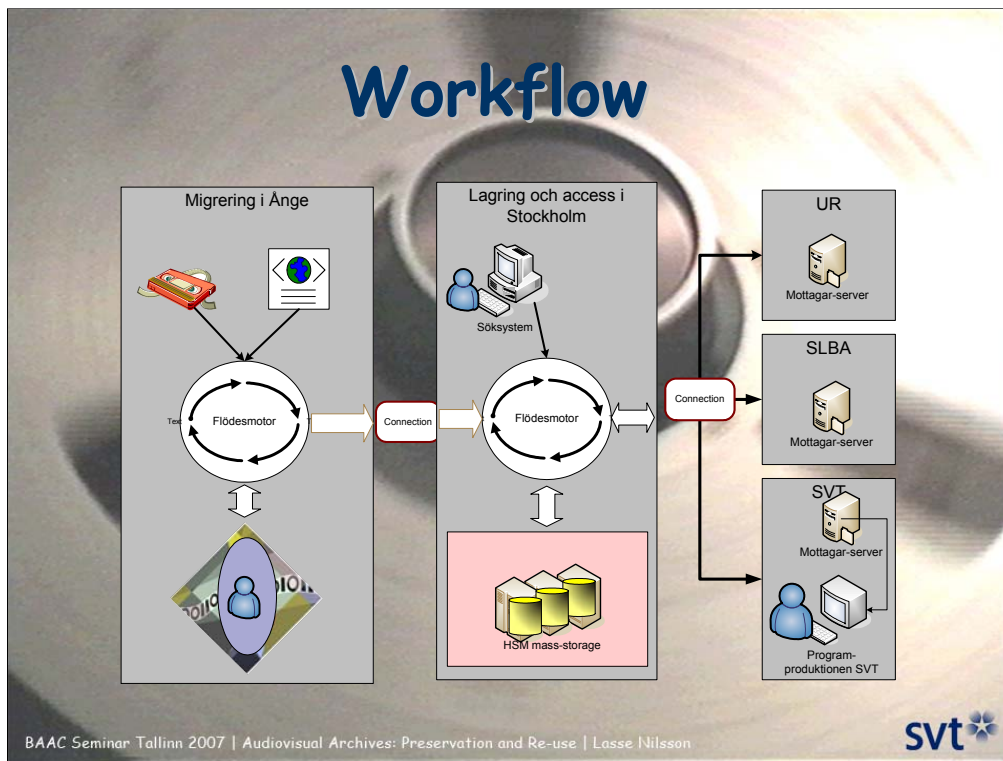


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That does not mean we have solutions for all the problems ...

But to summarize the results of the planning and mapping part of the process...



The economical and political decisions ended in broad outline to these solutions:

- Digitization located to Ånge.
- Tapes including metadata are shipped
- Scalable Mass-storage i Stockholm, growing by 1 Pb/year.
- Distribution of files from the mass-storage to clients in Stockholm.

More about the process later, but first a peek behind the curtains in Ånge to check out the actual migration work...



→ Tapes arrive by truck from Stockholm every sixth week to our warehouse.

Every single tape is registered at arrival and gets its unique local identity including a bar-code label. We need to know the actual position of the tape during the whole workflow, since our clients might need access to it in short notice.

The production manager feeds about 160 hrs of taped material into the process per day.

Many tapes need "baking" in an oven and cleaning before playback.



This is the digitization production area:

12 one inch machines are located to this "glass cage", since they produce both heat and need forced ventilation and noise harmful to the staff.

The operator feeds the tape into machine and calibrate it to optimize the replay conditions.



Upper left:

The operator is monitoring four parallel replays. There are four manual replay suites. During the replay, data for the next step in the process – the quality check – is collected.

Upper right:

Problem tapes are separated from the process and handled in two special "problems solving room". It is our client who decides how much resources are spent on each tape.

Lower left:

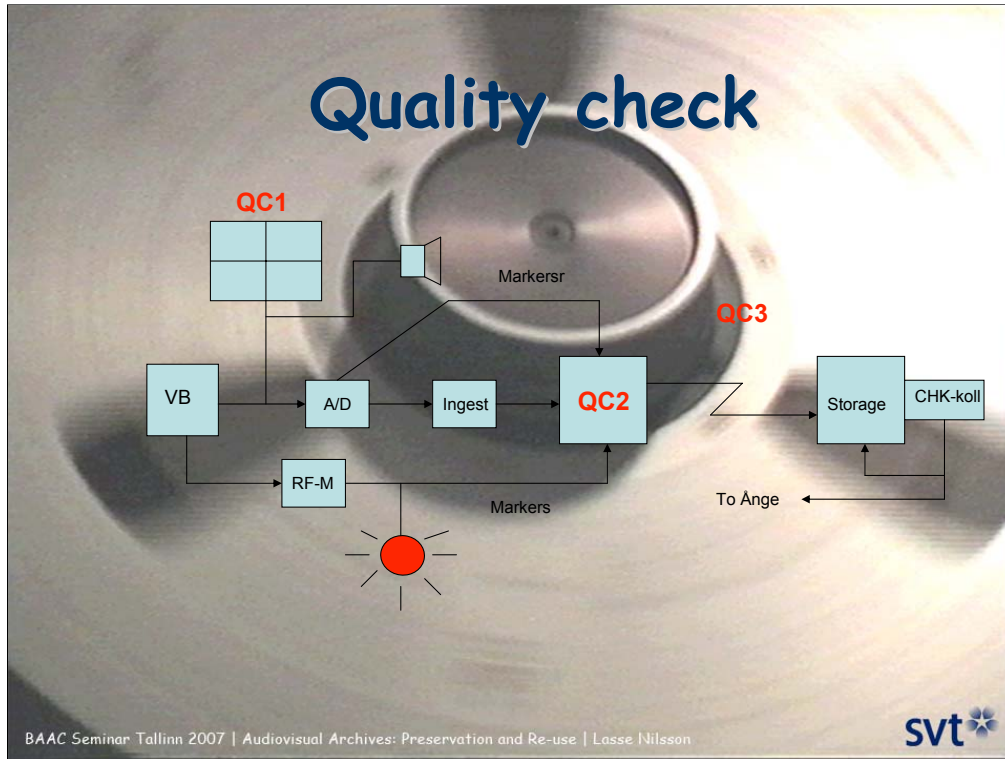
A tape replay robot system automatically digitizes six tapes in parallel, 20 hours per day. This equipment is still under installation.

Lower right:

The quality control is made in three steps: the operator monitored replay, check of every individual file before delivery and a check sum calculation by transfer to storage in Stockholm.

Tapes are either returned to client or disposed of under environmentally safe





To summarize the quality check process...

## Production support

- **Flow Motor**
  - Support of operators and machines in process
  - Gives opportunity to develop and refine working methods
- **Control of process**
  - Physically, logically
  - Statistics (process elements and results)
- **A scalable system**

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The Ånge factory will handle several hundreds of tapes each day and each tape may result in a number of digital files.

To keep track of those files and deliver support throughout the entire process a so called flow motor is needed. Its task is to monitor individual features, manual or automatized, so that the process is maintained in the right order and in the right part of the system.

The flow motor supports both equipment and staff. The finalization of this process support we haven't seen yet, since we need to adjust it all different needs that may appear and we haven't been in production long enough for that yet.

Apart from that a process flow system also helps keep track of the physical tapes and the files, it can produce statistics of different kinds and is relatively easy to scale to adapt to new needs.

# Facts & Figures



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Finally – for you keen on figures...

When the factory is in full production about 200 tapes/day will be migrated.  
That means about six Terabytes of data (equals about the content of 1500 DVD`s).

When the project is finished the mass storage will contain about three Pb of data,  
probably one of the greatest collections of data in Europe.

To produce these huge amounts of data about 50 servers are involved.

The material is delivered in at least one archive format and one low resolution  
browse format.

## Our solution...

- 50 servers...
  - 24 videoingests
  - 15-tal format converterskonverterare
  - 10-tal flow components
- 14 TB disc storage - state-of-the-art
- Handling of 20 TB data/day
- Final storage capacity -> 3PB increases by 5 TB/day

## How to technically dimension a migration factory?

- Analysis of
  - Volumes, elements and work flows
  - Estimates of data flows - sizes of files, capacity of equipment
  - Balancing - choice of optimal equipment in relation to price/performance (and other requisities)

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Difficult afterwards to estimate, since the task included both implementation of existing products and techniques and development of processes and equipment in parallel. Not to mention a number of rearranged priorities



Where to find me and how to contact me...

Thanks for your attention!