



The Swedish National Archive of Recorded Sound and Moving Images
Martin Jacobson & Mikael Johansson
Unlocking Audio Conference, British Library, London, 26 Oct 2007



Mission

As the national archive of audiovisual media, SLBA shall collect, preserve and make accessible the part of the Swedish cultural heritage that is published as recorded sound and moving images

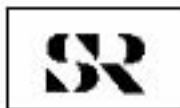


Legal deposit

TV



Radio



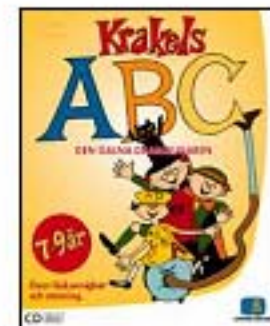
Phonogrammes



Film & Video



Multimedia



The Archive Contains

Approximately 6 million hours of material
...and grows by more than 10% per year

Roughly 2/3 are audio and 1/3 video





Mass Migration System Functions

- Preparation
- Playback
- Preprocessing
- Recording
- Metadata generation
- Logistics
- Monitoring
- Quality Control
- Archiving
- Linkage to house database
- Administration





Establishment Project

- Ran from november 2005 to end of maj 2007, 19 months
- Involved 21 people within SLBA at differing levels of participation
- Total man-hours were 9,800, which equals 6.1 man-years



Why in-house?

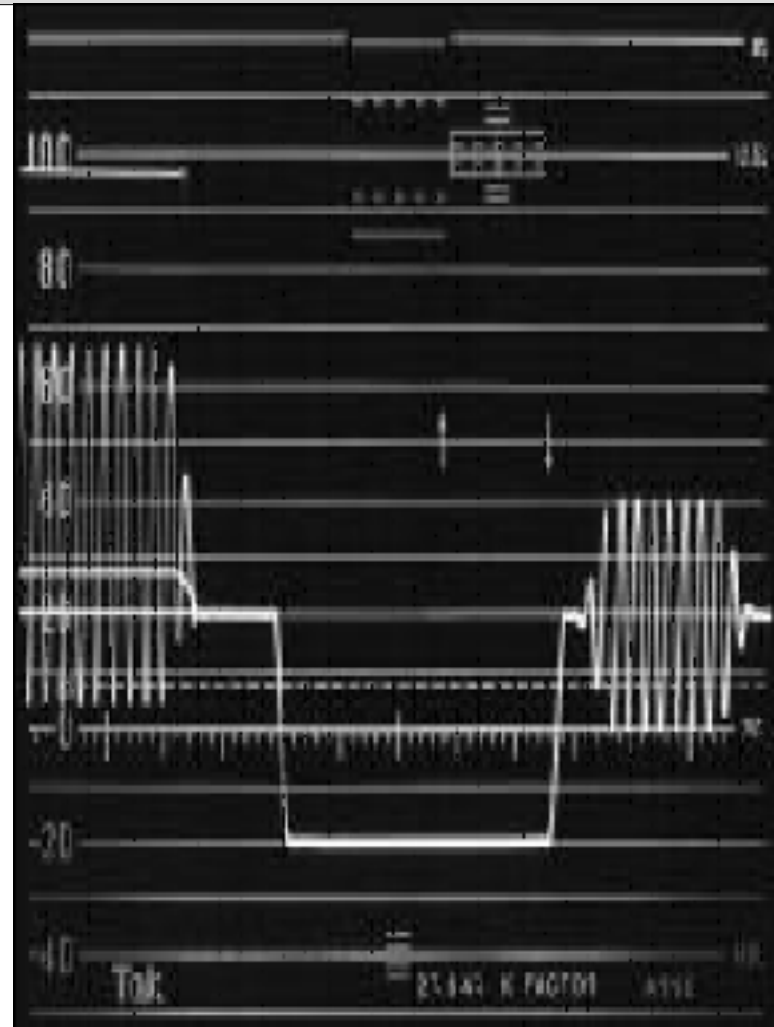
- Because of SLBAs large holdings, felt a need to have control over long-term preservation costs
- Possessed quite a bit of in-house knowledge, resources, and a good infrastructure



Helping Factors

- Materiel is rather homogenous and in good physical condition
- Material is "packed" densely on carriers

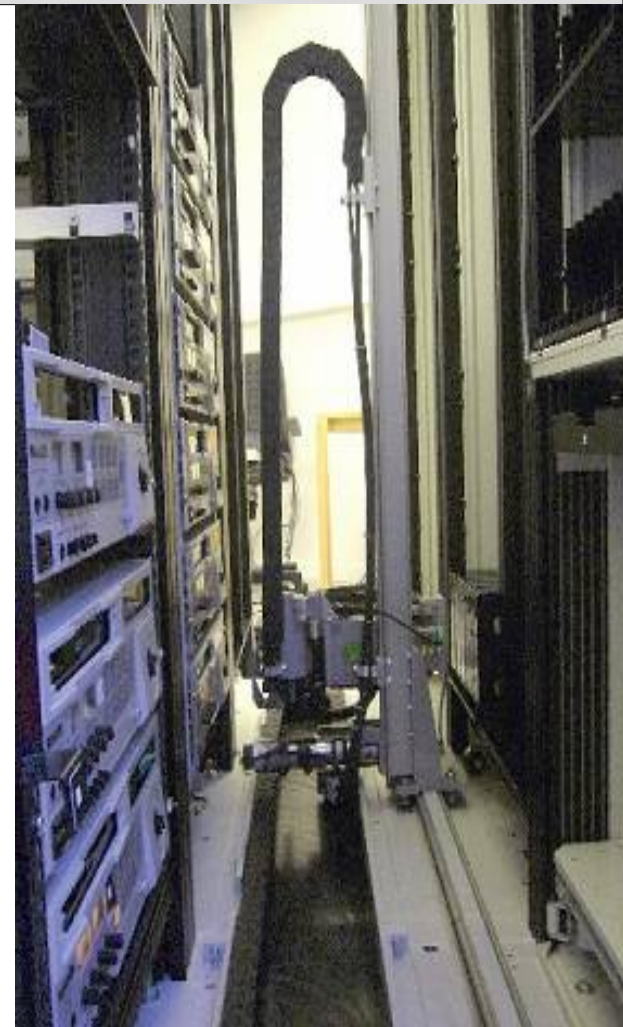
Technology





Video Automation VHS

- First selection is 220,000 hrs
- 12 simultaneous streams
- Target formats:
 - Archive MPEG-2,
6-12 Mbit/s long GOP PS
 - Browsing VC-1
(SMPTE 421M)
- Formats pending
 - Digital Betacam
 - DVC-PRO





Open-Reel Audio

1/4 inch 4ch

- First selection
 - 500,000 hrs
- 4X transfer speed
 - original 4.75 cm/sec (1.87 ips)
- 16 simultaneous players:
 - 64 tracks
 - 8 players per operator
- Target format 48/16 BWF

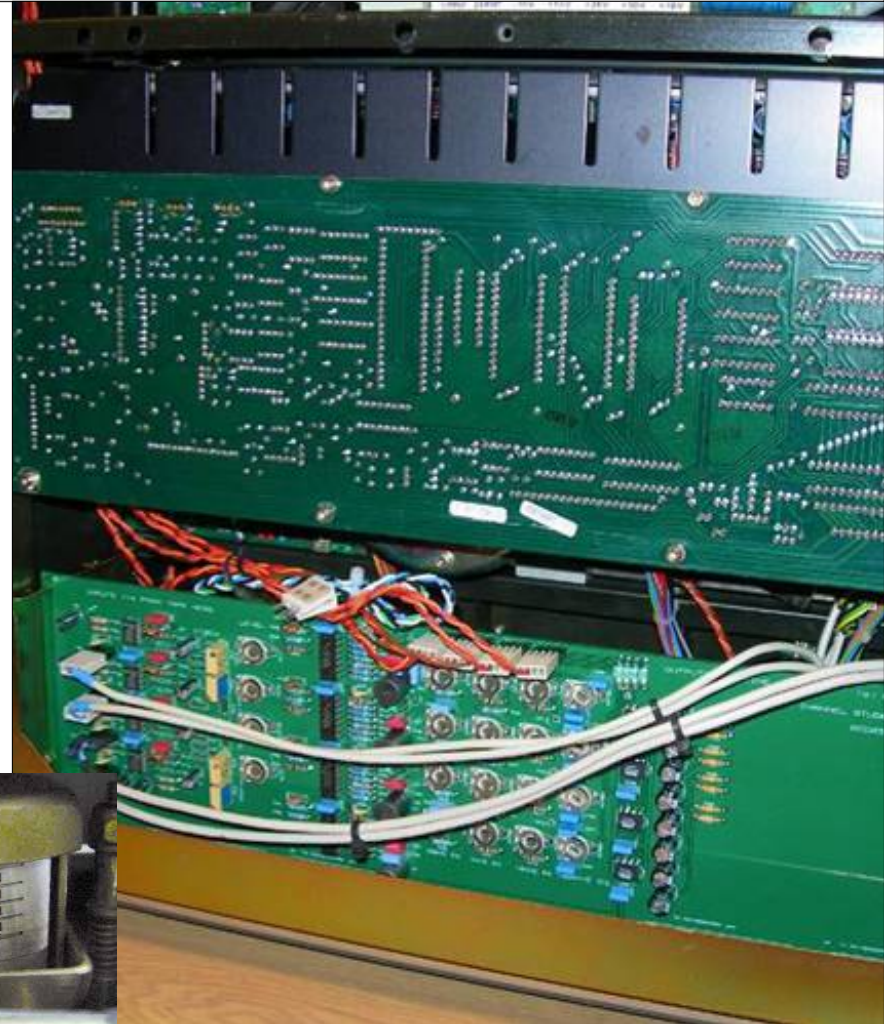




Open-Reel Audio

1/4 inch 4ch

- Modified players
 - specially designed replay heads
 - specially designed EQ and amplifier circuits
- Unix scripting for post-processing





Open-Reel Audio 1/4 inch 7ch

- 25,000 hrs
- New players developed based on Revox B77.
- Real-time transfer speed
 - original 2.37 cm/sec, (15/16 ips)
- 2 simultaneous players:
 - 8 tracks
 - 2 players per operator
- Target format 48/16 BWF



Automated Audio Migration of Quarter Inch Cassette (QIC)

- 700,000 hrs
- Software development (Based on the Norwegian National Library's development)
- Originally MPEG Layer-2 112 kbit/sec
- Target format 48/16 MPEG Layer-3 (MP3) 160 kbit/sec



Hours transferred	Per hour	Per day	Per month	Per year	Total	Required time to transfer (years)
VHS	12	252	6 720	80 640	220 000	2,73
QIC	4	960	18 000	216 000	672 000	3,11
Quarter " 4 track	64	1 536	28 800	345 600	483 168	1,40
Quarter " 7 track	4	48	900	10 800	29 048	2,69
U-Matic	4	24	450	5 400	6 500	1,20
1" B format (BCN)	4	36	660	7 920	21 200	2,68
Digital Betacam	0	0	0	0	0	0,00
DVC-PRO 25	0	0	0	0	0	0,00
All streams	92	2 856	55 530	666 360	1 431 916	3,11

Tapes transferred	Per hour	Per day	Per month	Per year	Total
VHS	4,4	92	2 444	29 324	80 000
QIC	0,2	40	750	9 000	28 000
Quarter " 4 track	2,7	64	1 200	14 400	20 132
Quarter " 7 track	0,1	1	19	225	605
U-Matic	4,2	25	471	5 649	6 800
1" B format (BCN)	1,0	9	165	1 980	5 300
Digital Betacam	0,0	0	0	0	0
DVC-PRO 25	0,0	0	0	0	0
Total, all formats	12,5	231	5 048	60 578	140 837



Du sökte på: "TV1", mpeg-2, KP

Träfföversikt: tv: 606

Visar 1 - 15 av 606 träffar

Träffar per sida:

Sortering:

Rensa markerade (0)

[Visa fullständiga markerade](#)

[Visa kvickrapport markerade](#)

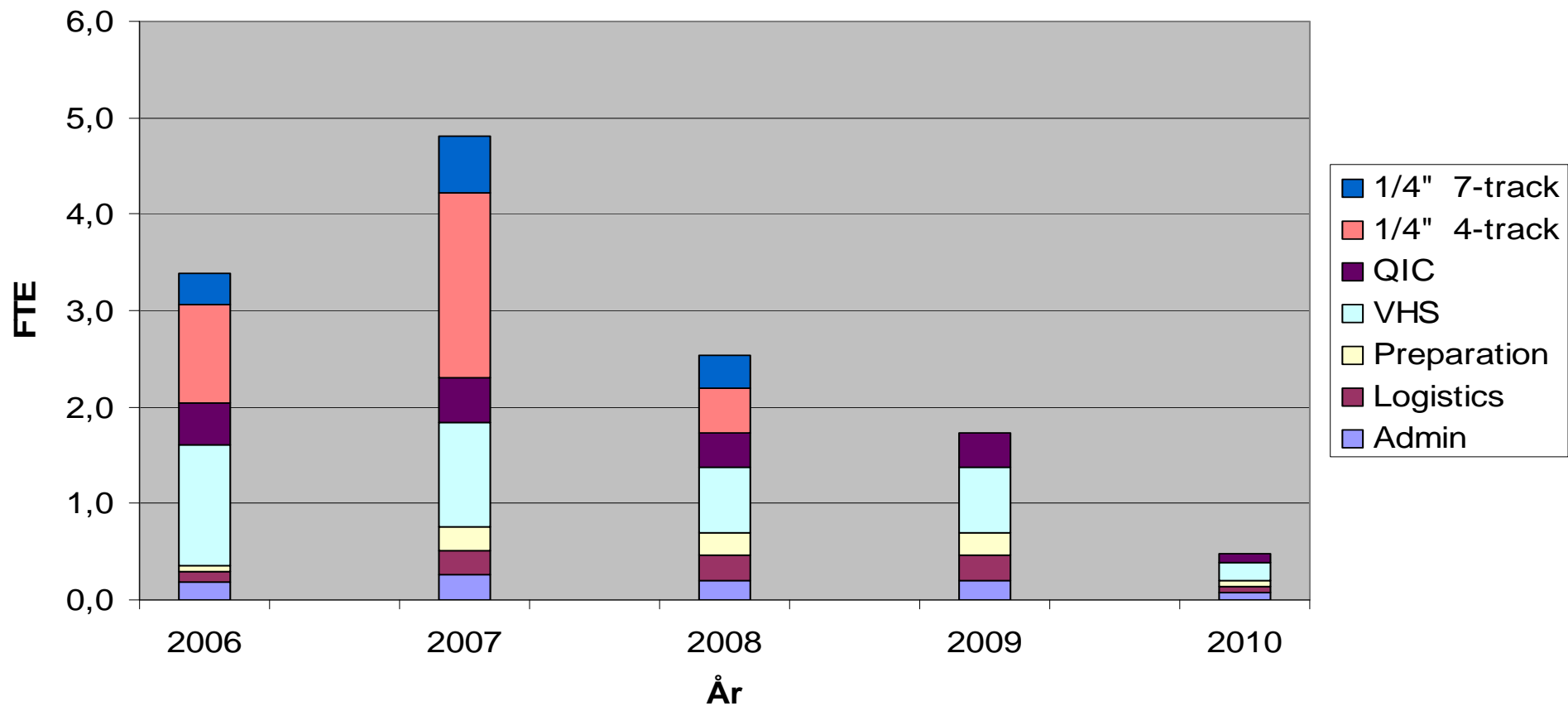
[Visa kvickrapport alla](#)

[Välj fält till kvickrapport](#)

[Extern användare](#)

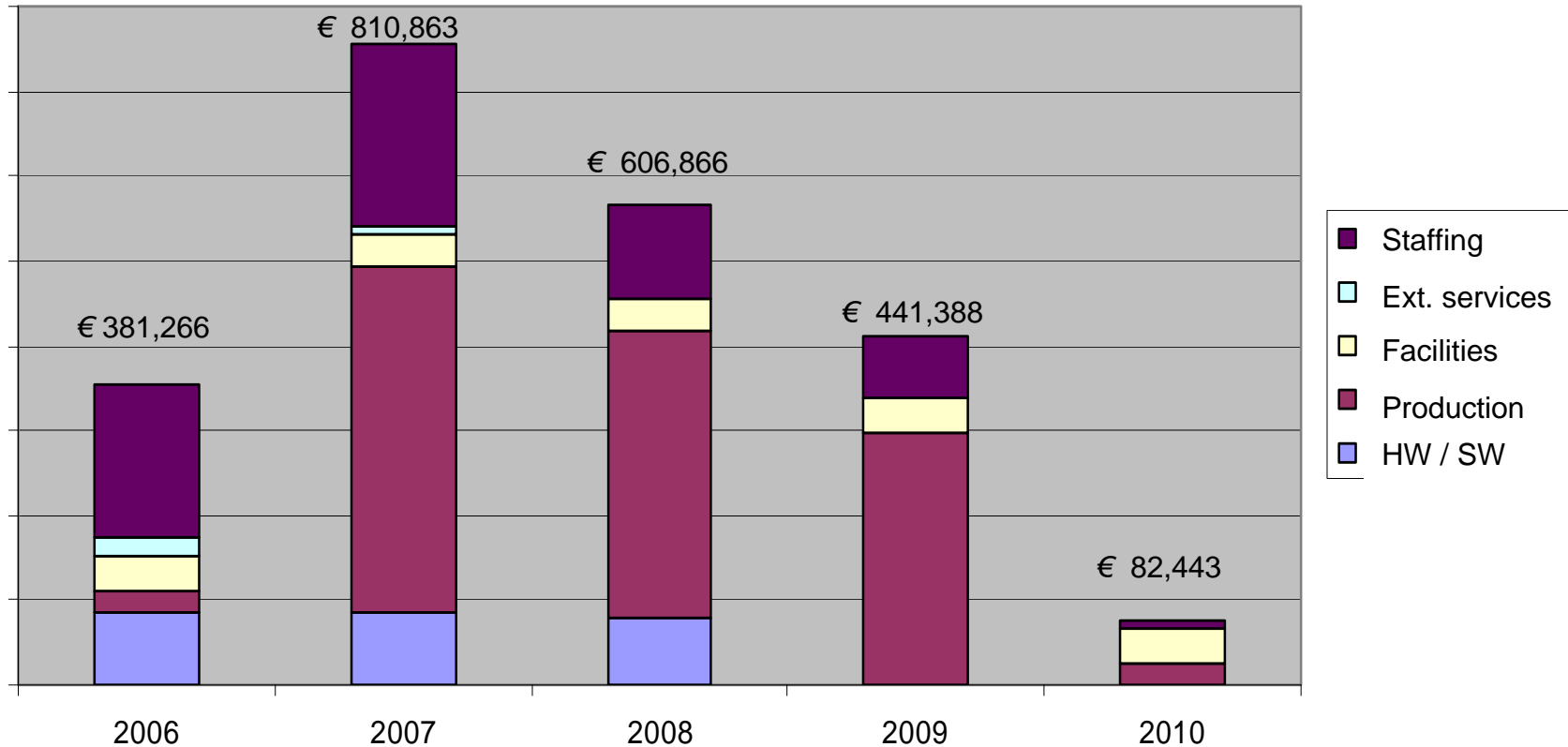
	Titel	Arkivnummer	Utgivare	År/datum	Innehållskod	Format	Upplysning
<input type="checkbox"/>	1. [Stockholm, SVT, TV1, 1983-12-02]	TV184-1407, YA_TV184-1407	SVT, TV1	1983-12-02	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	2. [Stockholm, SVT, TV1, 1983-12-02]	TV184-1408, YA_TV184-1408	SVT, TV1	1983-12-02	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	3. [Stockholm, SVT, TV1, 1983-12-02]	TV184-1409, YA_TV184-1409	SVT, TV1	1983-12-02	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	4. [Stockholm, SVT, TV1, 1983-12-03]	TV184-1410, YA_TV184-1410	SVT, TV1	1983-12-03	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	5. [Stockholm, SVT, TV1, 1983-12-03]	TV184-1411, YA_TV184-1411	SVT, TV1	1983-12-03	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	6. [Stockholm, SVT, TV1, 1983-12-03]	TV184-1412, YA_TV184-1412	SVT, TV1	1983-12-03	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	7. [Stockholm, SVT, TV1, 1983-12-03]	TV184-1413, YA_TV184-1413	SVT, TV1	1983-12-03	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	8. [Stockholm, SVT, TV1, 1983-12-03]	TV184-1414, YA_TV184-1414	SVT, TV1	1983-12-03	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	9. [Stockholm, SVT, TV1, 1983-12-03]	TV184-1415, YA_TV184-1415	SVT, TV1	1983-12-03	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	10. [Stockholm, SVT, TV1, 1983-12-04]	TV184-1416, YA_TV184-1416	SVT, TV1	1983-12-04	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	11. [Stockholm, SVT, TV1, 1983-12-04]	TV184-1417, YA_TV184-1417	SVT, TV1	1983-12-04	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	12. [Stockholm, SVT, TV1, 1983-12-04]	TV184-1418, YA_TV184-1418	SVT, TV1	1983-12-04	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	13. [Stockholm, SVT, TV1, 1983-12-04]	TV184-1419, YA_TV184-1419	SVT, TV1	1983-12-04	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	14. [Stockholm, SVT, TV1, 1983-12-04]	TV184-1420, YA_TV184-1420	SVT, TV1	1983-12-04	TV	VHS, MPEG-2	Fil
<input type="checkbox"/>	15. [Stockholm, SVT, TV1, 1983-12-05]	TV184-1421, YA_TV184-1421	SVT, TV1	1983-12-05	TV	VHS, MPEG-2	Fil

FTE



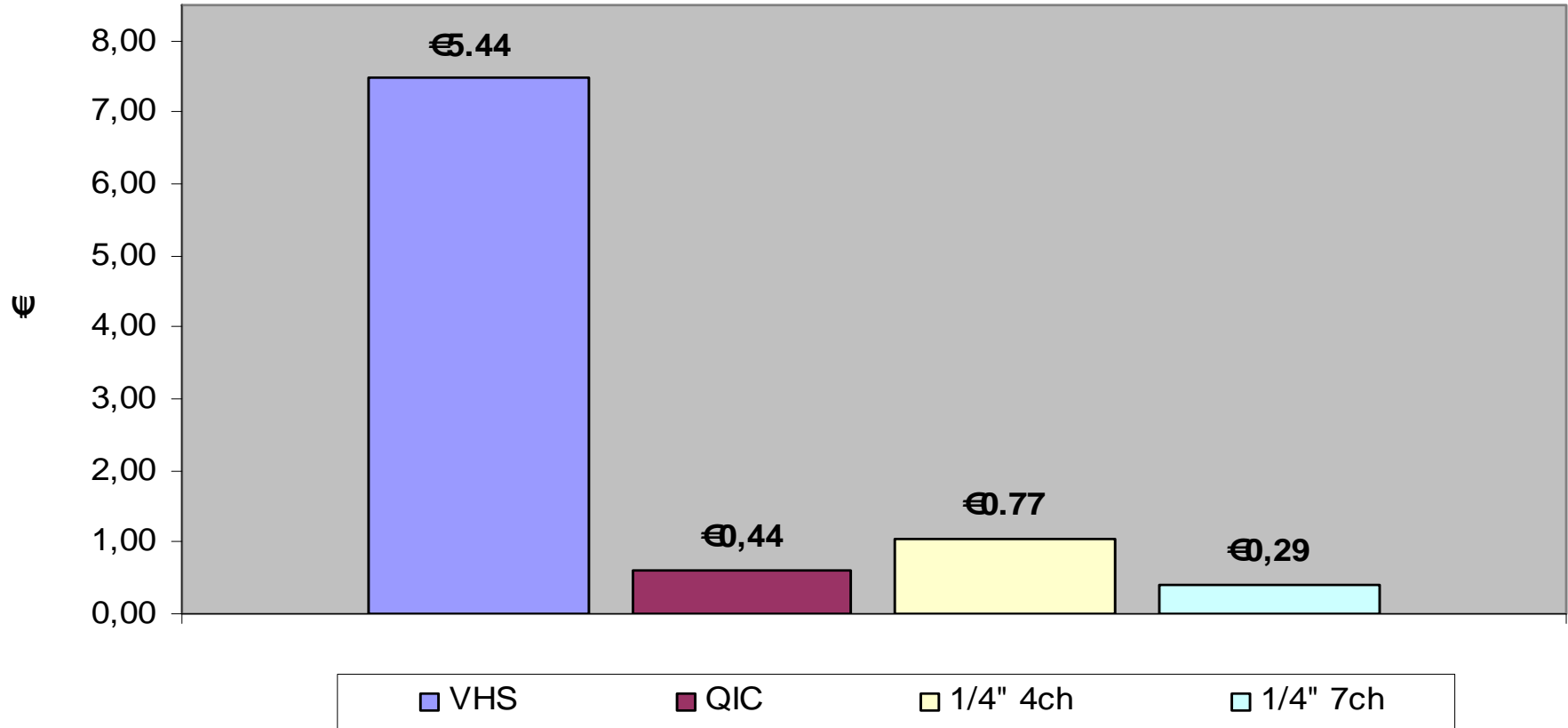
Migration costs 2006 - 2010

Total = € 2,322,826





Cost per digitized hour in Euros





Storage costs

Cost per on-line GB = € 8.80

Cost per near-line GB = € 0.88

Based on:

Staffing Full Time Equivalent (FTE)

- Gross salary
- Other fees payed by employer
- Office and common space allocation
- Utilities incl. furniture, telephones, etc.
- IT, incl. PC, laptop, applications, infrastructure

IT specific expenses

- HW
- SW
- Media
- External service
- External support
- Floor space
- Electricity and other utilities



Keeping track of things

Content Addressed Storage (CAS) principals

- Simple context for objects
- Unique identifier for each file which functions as a "key"
- Verification (incl. receipts) upon transfer of files
- "An object-oriented, location-independant approach to data storage, optimized for long-term storage of large quantities of fixed content" (SNIA)



Long-term Digital Preservation

New focus based on:

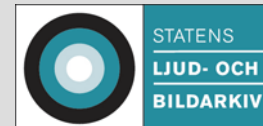
- Long-term Digital Preservation Center (LDB-Center)
(ldb.project.ltu.se)
- PReservation Organizations using Tools in
AGent Environment (PROTAGE)
EU-project proposal
- Open Archival Information System (OAIS)
(ISO 14721:2003)



www.slba.se

LIVET ÄR EN FEST

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Storage

Some HW/SW facts

- - Dual, redundant 4 Gbps SAN fabrics
- - Multipathing with DMP as well as MPXiO
- - Veritas Storage Migrator HSM system
- - Veritas Cluster Server
- - SUNFIRE, Dell, and HP servers
- - Solaris 10 with ZFS
- - IBM RAID storage, DS4800 as well as DS4700
- - Hitachi Thunder 9500/9200
- - IBM tape library, 3584 currently with 1141 storage slots distributed over 3 cabinets
- - 8 IBM LTO-3 fiber attached drives





SLBA´s choice of physical storage today

- LTO-3 (Linear Tape Open) 2 copies of which one is stored in robot and one in a separate archive.
- RAID-5 disc systems with incremental back-up
- Managed by HSM (Hierarchical Storage Management)



Technical metadata:

- Player model and serial number.
- Time, date, and batch for transfer.
- Original ID
- Duration
- Information on pre recording processing, (Filtering, Time base correction, etc)
- Recording HW and serial number
- Recording SW and version
- Recording attributes
- Information on post recording processing (down-sampling, de-interlacing, normalizing, removal of silence, etc.)
- Personal observations (first pull-down menus, then free text)



UMID convention

Two Types based on either:

1) Prefix/archive series/ accession year + incremented number

Example: YA_TV184-1207.mpg

or

2) Prefix/ delivering party/ channel/ broadcast date/ start time/ end time

Example: ZS1_svt_svt2_2003-04-15_2220_2305.mpg

Prefix 1: Z = Internally created file

Y = Migrated file from traditional carrier

X = Legal deposit or acquired file

Prefix 2: A = Archive file

S = Browsing file

Prefix 3: = Version (optional)

Disadvantages of In-house Solution

- Becomes easier to make lower quality demands on:
 - organizational ownership
 - specifications
 - service level agreements
 - change management
 - development
- True costs are not as obvious
- Unique in-house skills create risks
- May be expensive to retain required personnel
- Risk of becoming enveloped in own issues and technology

Advantages of In-house Solution

- Much closer personal communication paths for those involved
- Stronger integration between systems due to synergy from closely knitted in-house groups
- Much more flexibility in making changes
- Have more control over long-term costs, preservation, and functional changes
- Less dependant on external players



Titel	Arkivnummer	Upp	Upp	Upp	Upp
King Åmål : musiken från filmen	CD99-0239				
King Åmål : musiken från filmen	CD03-3002				
King Åmål / manuskrift och regi Lukas Jönsson ; producent Lars Jönsson	F99-0026				
King Åmål / manuskrift och regi Lukas Jönsson ; producent Lars Jönsson	VR00-0765, ZS_VR00-0765				
Branschens trailerkassett nr 95 : okt.-nov. 8	VR98-1734				
King Åmål / manuskrift och regi Lukas Jönsson ; producent Lars Jönsson	VR99-1276				
King Åmål	VR99-1423				
Trailerkassett	F00-0111				
[Svea, TV3, 2005-04-11]	TVS06-11686--11688	TV3			
De glömda barnen (1)					
[Svea, TV8, 2005-12-12--2005-12-13]	TVS06-12068--12074	TV8			
De glömda barnen (1) Svensk dokumentärserie från 2005					
[Svea, TV8, 2005-12-13--2005-12-14]	TVS06-12074--12080	TV8			
De glömda barnen (1) (R) Svensk dokumentärserie från 2005					
krönikan (22:30-23:00)	TV06-06503, TVB-20060156	SVT2	2006-02-02	TV	VHS LP
krönikan (19:30-20:00)	TV06-06674	SVT2	2006-02-06	TV	VHS
krönikan (00:10-00:40)	TV06-06681	SVT2	2006-02-08	TV	VHS
vision -bakom utan (16:55-17:25)	TV06-08590	SVT1 UR	2006-04-23	TV	VHS LP

The SLBA Migration Solution

- Derived from the need to rescue content on traditional carriers and make that content readily accessible
- Primarily created and managed in-house



Some of the actions or questions that we went through.

- Assessment of carriers, both physical and their content.
- Selection of carriers to be transferred.
- What are the technological demands for transferring these selections?
- What quality levels do we need or want?
- Can the transfer be automated?
- Can the transfer be done faster than real time?
- If so, are there any negative consequences such as loss of quality?
- Is equipment available, and if so what shape is it in.
- Can equipment be refurbished or reproduced?
- Are there companies offering migration services? What would that cost?
- Do we have the in-house knowledge and resources to do this ourselves? What would that cost?



Examples of problems detected later but solved:

- Loss of high frequencies in ¼ inch audio transfer
- Cross modulation noise from PAL decoding
- Original labels fall off tapes during loading or ejecting



Some problems still encountered:

- Content does not match catalog description
- Discovering of diverging content composition
- Low RF levels on certain batches of video tapes
- Oil leakage from QIC spindle mechanism
- QIC tapes sticking to case