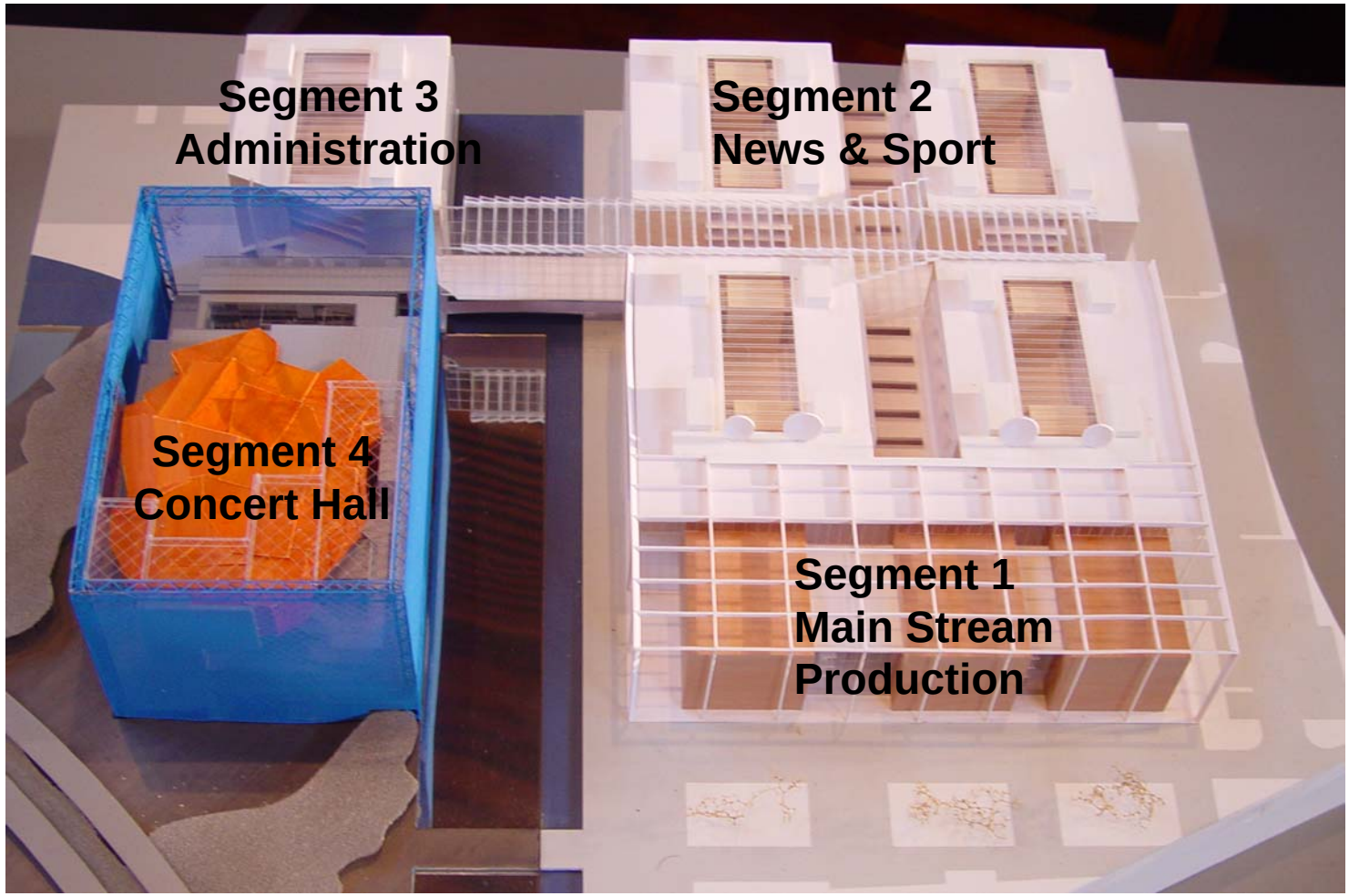
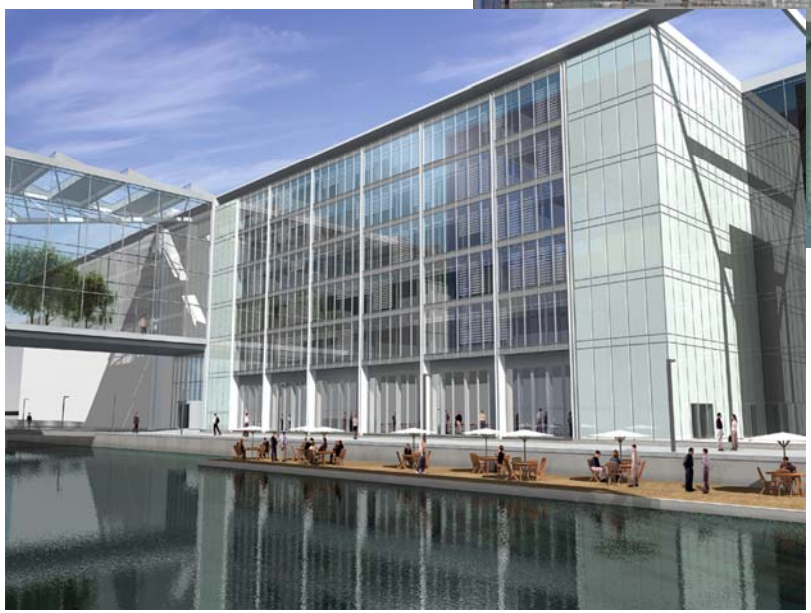
Video and Audio in HDTV Studios

Principles and Choices in The new facilities for Danish Broadcasting in Copenhagen

Model of the new DR facilities in Copenhagen



Segment 2 with main studios for TV production



TV studios (ST 5,6 and 9)

What it looks like today

TV studios with control rooms

Facilities for <u>Main Stream Production</u> in segment 1

ST 5, Audience studio 720 m2
ST 6, Radio/TV studi0 300 m2
ST 9A & 9B, Tandem Studio 2 each 140m2

Facilities for <u>News and Sport</u> in segment 2

ST 13, Newsroom studio 120m2
ST 14, Magazine studio 290m2

The HD evolution in Danish Broadcasting

- HD was not on the agenda when detailed planning of the new DR Green field site started in 2000
- But Test reports from SVT/IRT in 2002 revealed that introduction of flat panel displays in the home
  - might force broadcasters to deliver pictures with improved resolution to the audience.
- DR decided in 2003 to add HD as an option in the tenders for studio equipment
  - and partly equip the SDI infrastructure for HD-SDI.
- DR decided in 2005 to use the HD option
  - for as many TV studios as possible within the budget limitations
- Today, no one doubts
  - that this choice was necessary

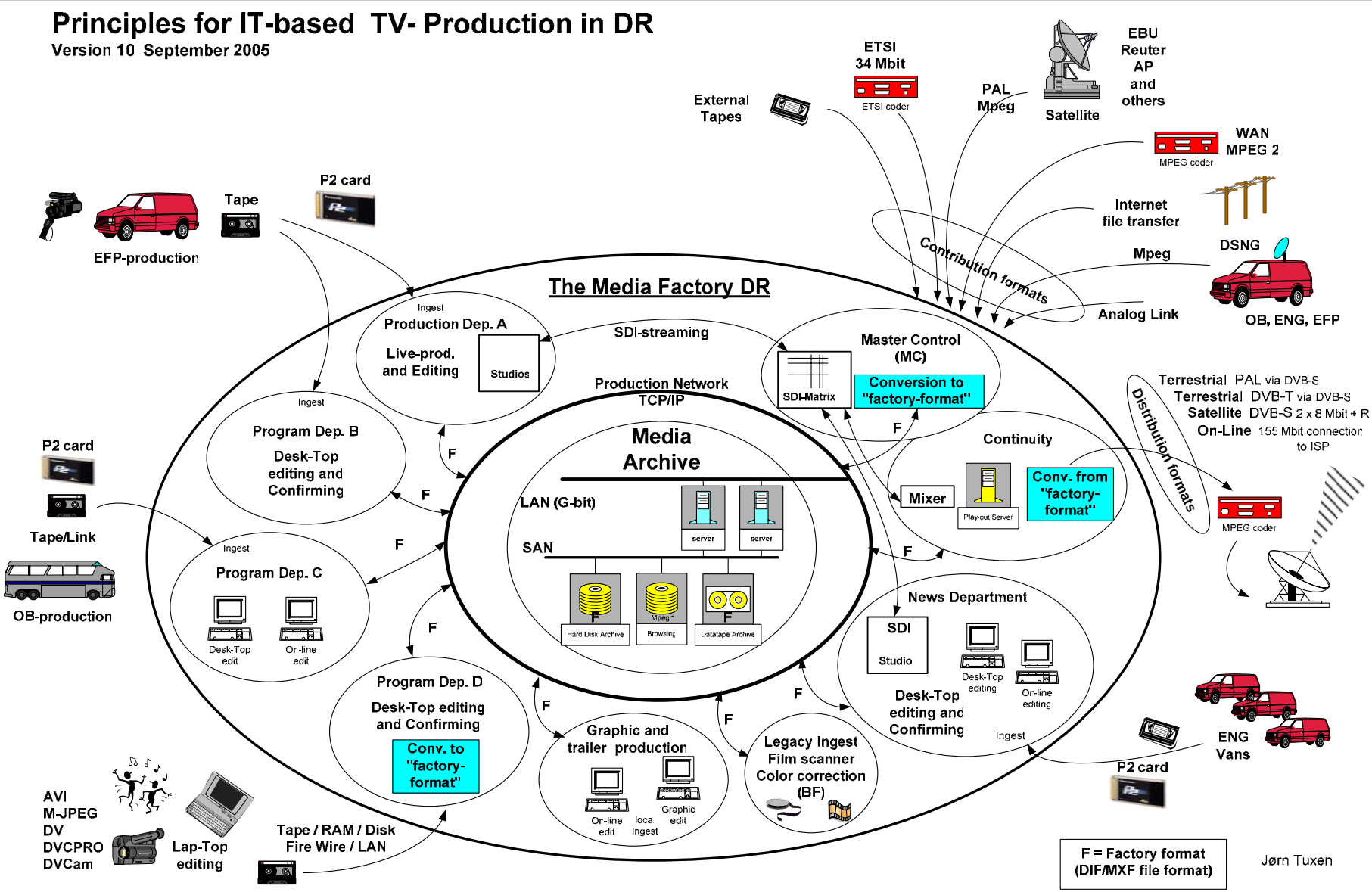
The most important Tasks today

- To Finish
  - Integration of server based main stream production with Media Archive
  - metadata introduction from Ingest to distribution

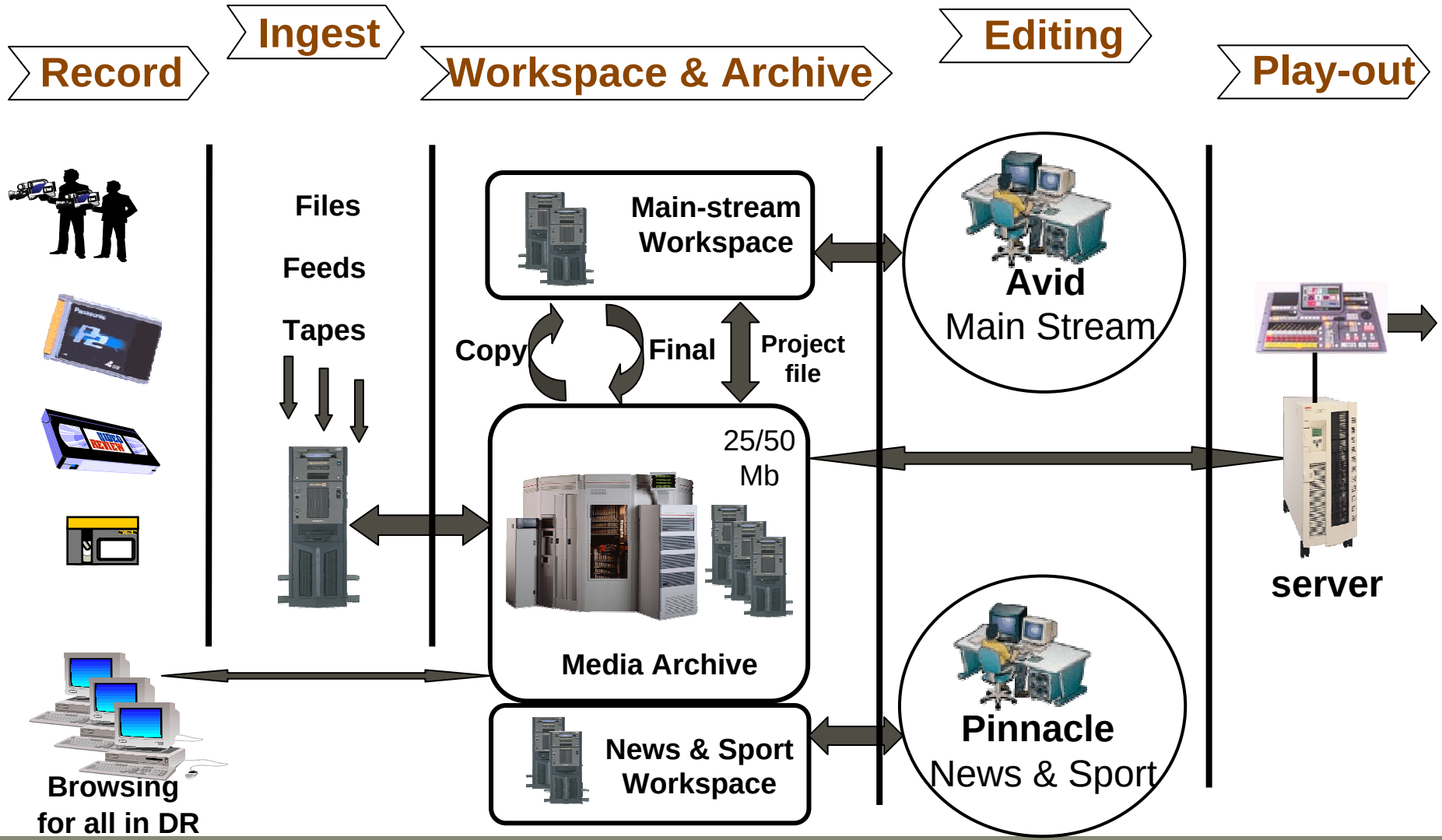
- But also
  - Prepare new Studio installations for HD production
  - Establish SDI infra structure for HD
    - To gain experience with studio HD production

- And later on to
  - extend the IT based production system to handle HD also

In due time --this will also handle HD



The target is: Same Work-Flow for SD and HD

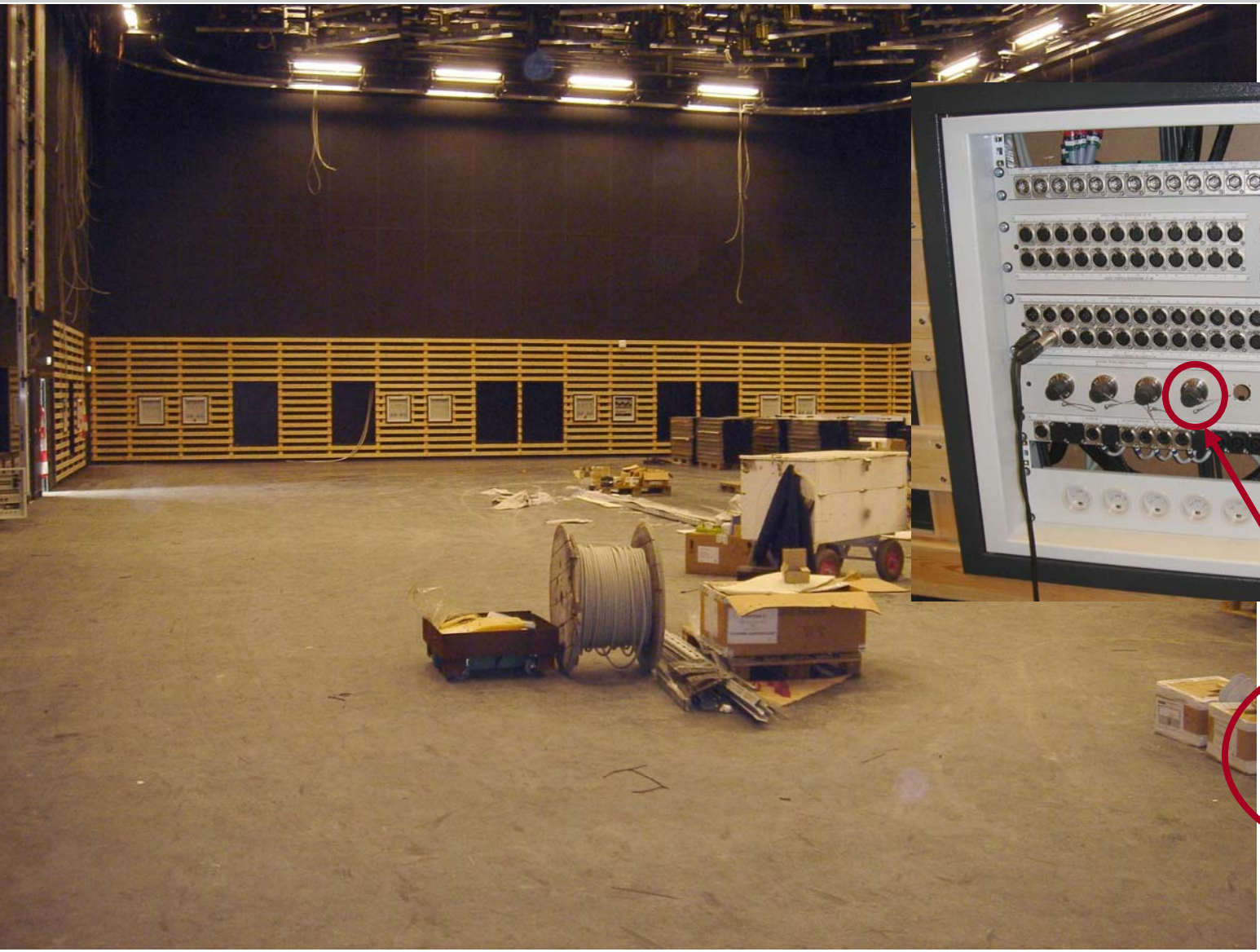


The choices in the studio installations

with

focus on HD equipment

ST 5 week 43 The 720m2 --- not quite ready

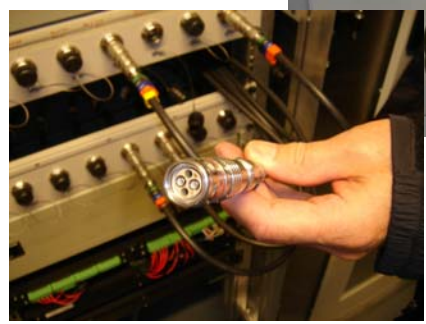


Camera cables with 2 optical fibers

HD Cameras

- Cameras: 17 HD/SD cameras (Sony HDC-1500) has been purchased
  - 8 big studio HD lenses and 11 ENG type (Canon)

- Camera cables: according to SMPTE 311 M with 2 optical fibers and wires for power supply ect.



- Viewfinders:
  - Only a few pieces in color

Initial experience from HD Camera tests

- All 17 HD cameras has been tested and accepted in Copenhagen
- Some CCU units are still missing
- Lenses are important.
  - the first tests with a borrowed EFP type lens limited the HD resolution
  - later delivery of a new generation lenses were ok
- HD Test charts are difficult to get.
  - We finally received one from DSC Laboratories in Canada
- Manuals are still missing

The production control room ST5

Equipment in Production Control Room for ST 5

- Video mixer: Software upgradeable for HD, and same brand in all TV studios (S&W)
  - > 48 inputs and 40 outputs
  - > 4 DVE (3D - 2channels)

- Monitoring: based on 3 pc of 70” rear projection units (Barco).
  - > A few inputs are for HD

- CGN is Viz-Trio
- Video Recording equipment ?

One of the Monitor Units

Size:
70 inch

Format:
4:3

Resolution:
1280x1024

Delay:
1+1/2 frame

CCU Control Room for ST5

Equipment for CCU Control room ST5

- Monitor wall with 4:3 CRT's
  - Underscan for 16:9 production
- Only one multi-format monitor for HD
- CCU equipment for 8 camera channels
  - extension to 12 is possible
  - SD and HD output
  - HD selectable 720p or 1080i
- Lightning control

The Audio Control Room ST5

Equipment in the Audio Control Room ST5

- Audio desk (SSL C200) with
  - 64 channel strips
  - 128 DSP channels
- All picture monitors are flat panels for SD
- Speakers are Dynaudio AIR series
- Production tool is Avid Pro Tools for 64 channels
  - PC based ! (not MAC)
- Multichannel 5.1 audio can be produced simultaneous with stereo
- Finished production will be stored in the Media Archive as separate 24bit linear PCM files
- Multichannel audio will be distributed as Dolby Digital in DTT network (for SD and HD)
- Lip sync obtained by delay unit system

HD makes no difference !

Equipment Racks

- Special coax cables and patch panels for HD

- Video measuring equipment for SD/HD (Tektr. WVR 7100)

- Video router, Xenon
  - > partly for HD
- Tri-level sync system for HD and black burst for SD

The choices for the SDI and HD-SDI Infra structure

with

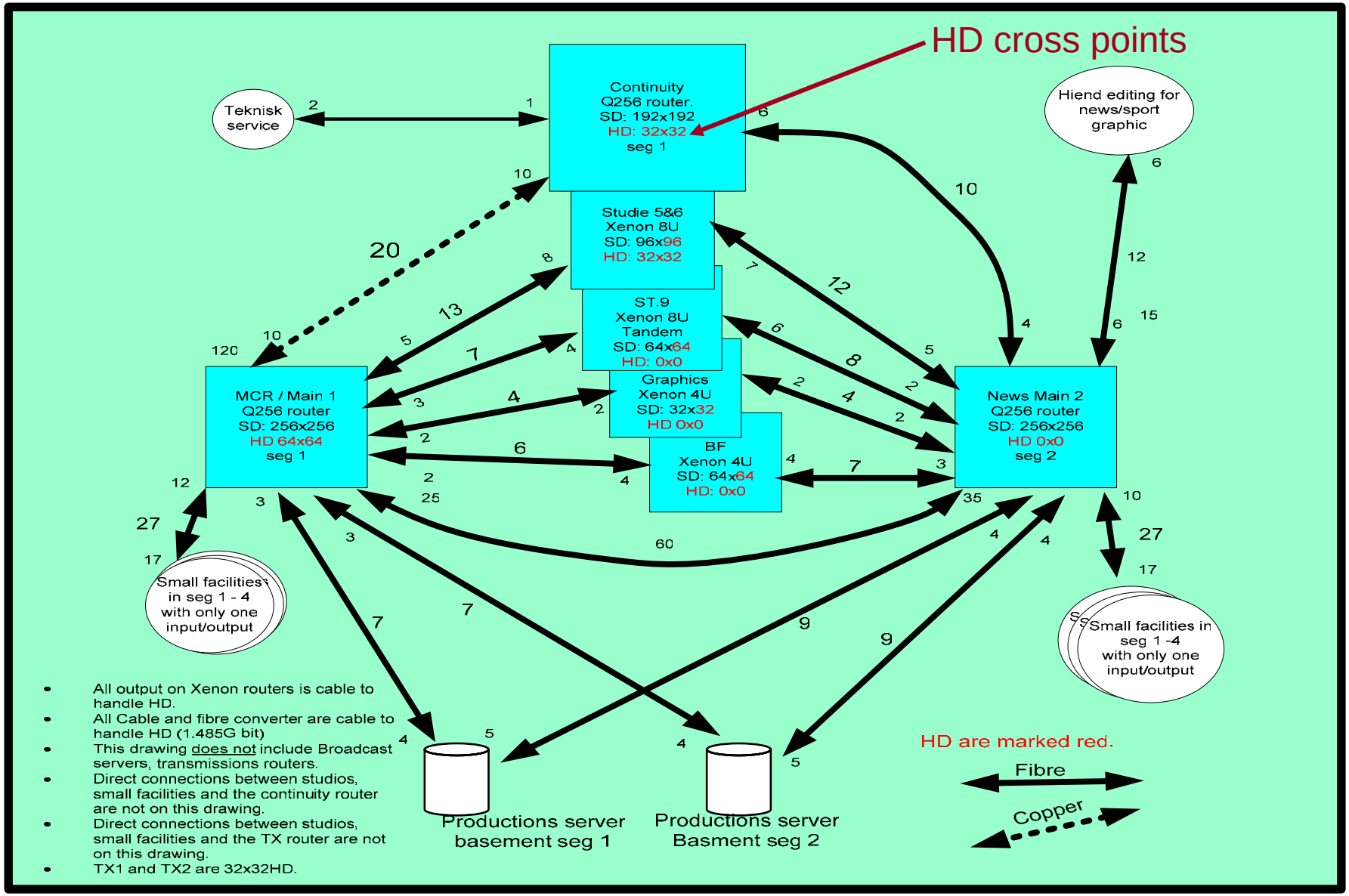
focus on HD equipment

SDI and HD-SDI Infrastructure

- All Audio "embed and de-embed" equipment are for SDI and HD-SDI, and with 8 audio channels
- All transmitters and receivers for optical fibers are for SD and HD
- Coax cables are made special for HD and can run 100 meters
  More than 200 km has been installed

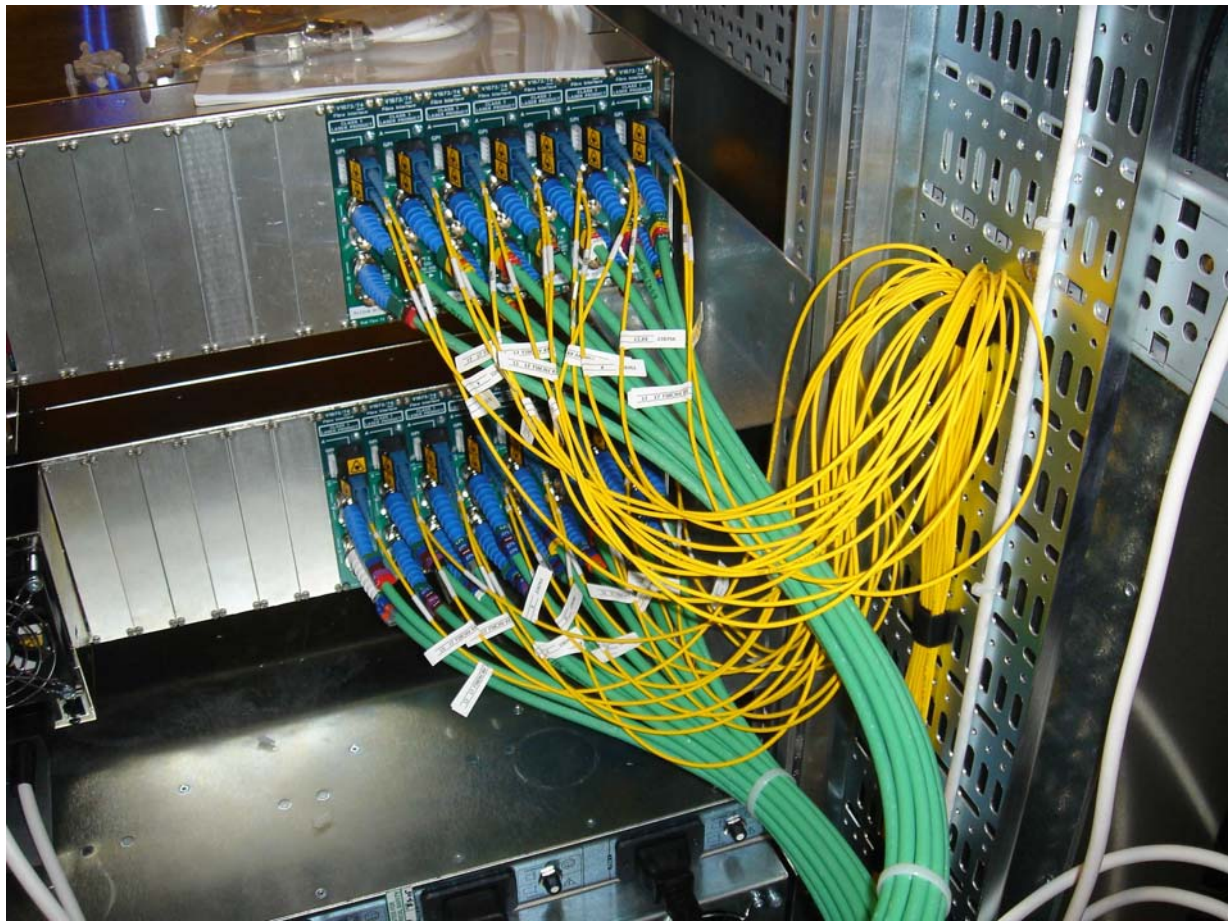
- BNC 75 ohm connectors are special for HD
- Routers are partially equipped with cross points for HD
- TX routers (32x32) are for HD

Principles for SDI and HD-SDI infrastructure



Long haul optical connections for SD/HD

- Optical tie-lines with RX/TX units between Studio routers

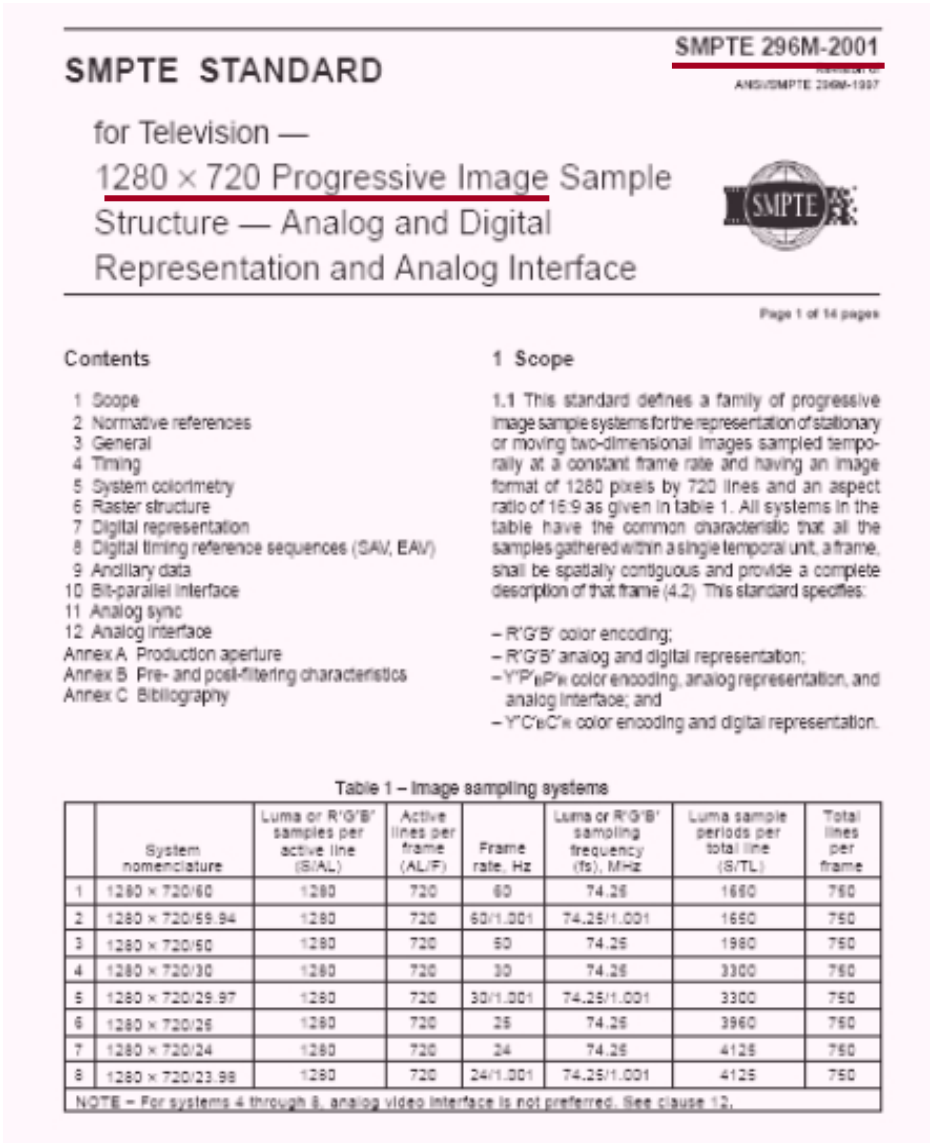


The choices for HD production standard

The choice for Production standards

- The HDTV production standard will be 720p/50 according to SMPTE 296M-2001 (This will also be the DTT distribution standard)

- HD film-style drama production may be in the 1080p/25 standard according to SMPTE 274-1998



SMPTE 296M-2001

SMPTE STANDARD

for Television —
1280 × 720 Progressive Image Sample Structure — Analog and Digital Representation and Analog Interface

Page 1 of 14 pages

Contents

1 Scope

1.1 This standard defines a family of progressive image sample systems for the representation of stationary or moving two-dimensional images sampled temporally at a constant frame rate and having an image format of 1280 pixels by 720 lines and an aspect ratio of 16:9 as given in table 1. All systems in the table have the common characteristic that all the samples gathered within a single temporal unit, a frame, shall be spatially contiguous and provide a complete description of that frame (4.2). This standard specifies:

– R'G'B' color encoding;
– R'G'B' analog and digital representation;
– Y'P'$_B$P'$_R$ color encoding, analog representation, and analog interface; and
– Y'C'$_B$C'$_R$ color encoding and digital representation.

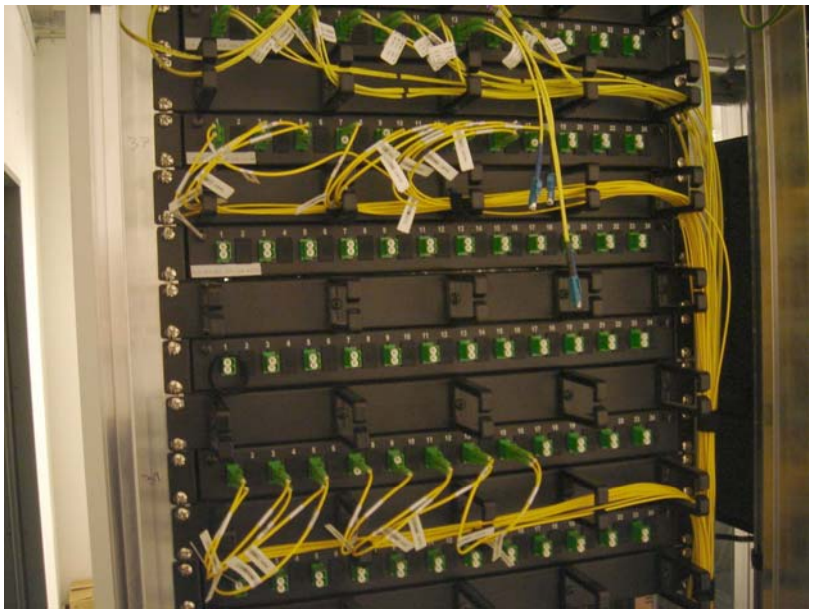
Table 1 – Image sampling systems

	System nomenclature	Luma or R'G'B' samples per active line (S/AL)	Active lines per frame (AL/F)	Frame rate, Hz	Luma or R'G'B' sampling frequency (fs), MHz	Luma sample periods per total line (S/TL)	Total lines per frame
1	1280 × 720/60	1280	720	60	74.25	1650	750
2	1280 × 720/59.94	1280	720	60/1.001	74.25/1.001	1650	750
3	1280 × 720/50	1280	720	50	74.25	1980	750
4	1280 × 720/30	1280	720	30	74.25	3300	750
5	1280 × 720/29.97	1280	720	30/1.001	74.25/1.001	3300	750
6	1280 × 720/25	1280	720	25	74.25	3960	750
7	1280 × 720/24	1280	720	24	74.25	4125	750
8	1280 × 720/23.98	1280	720	24/1.001	74.25/1.001	4125	750

NOTE – For systems 4 through 8, analog video interface is not preferred. See clause 12.

Installation of the IT system in parallel

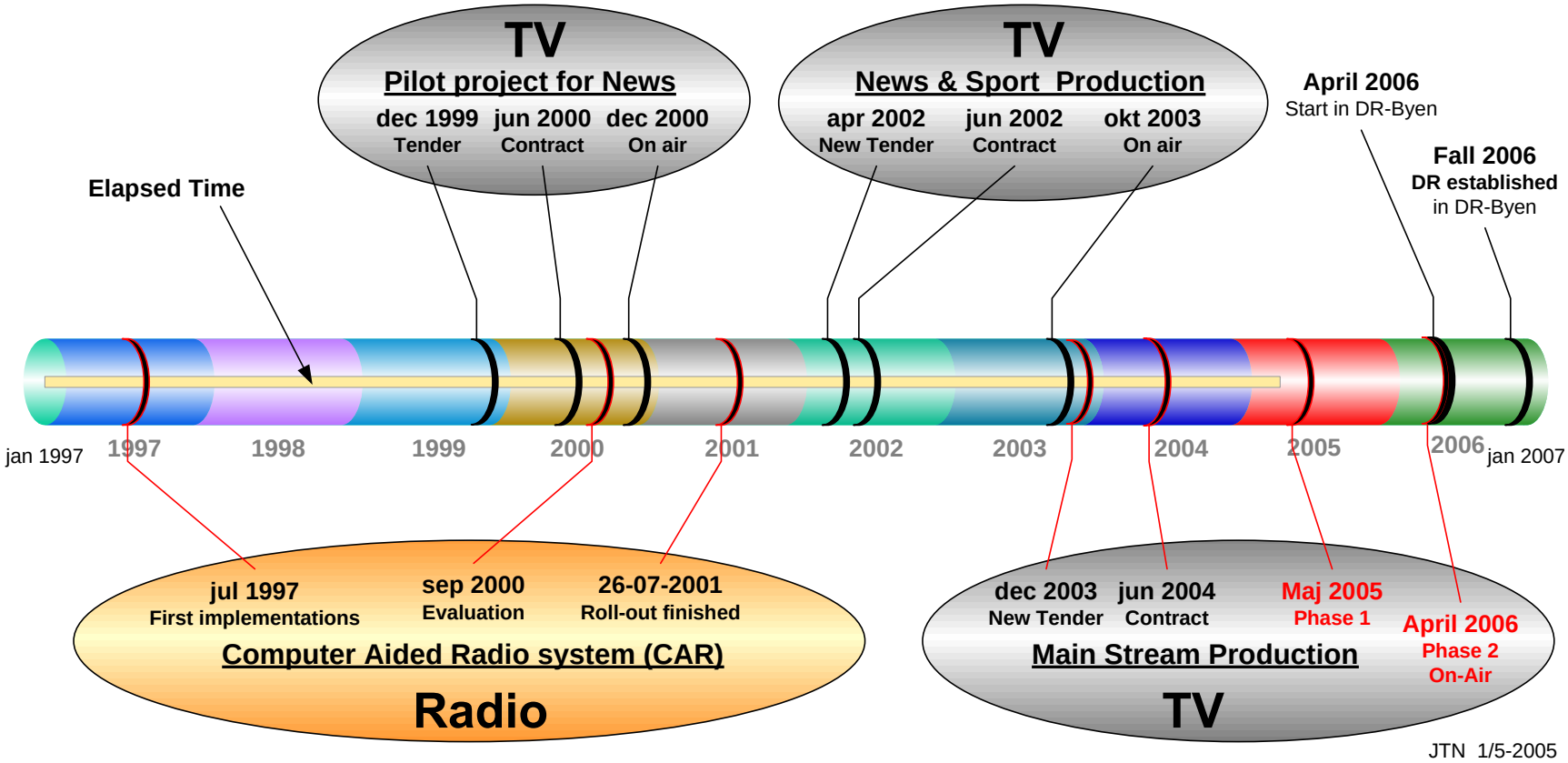
- Remember the IT based (SD) production environment



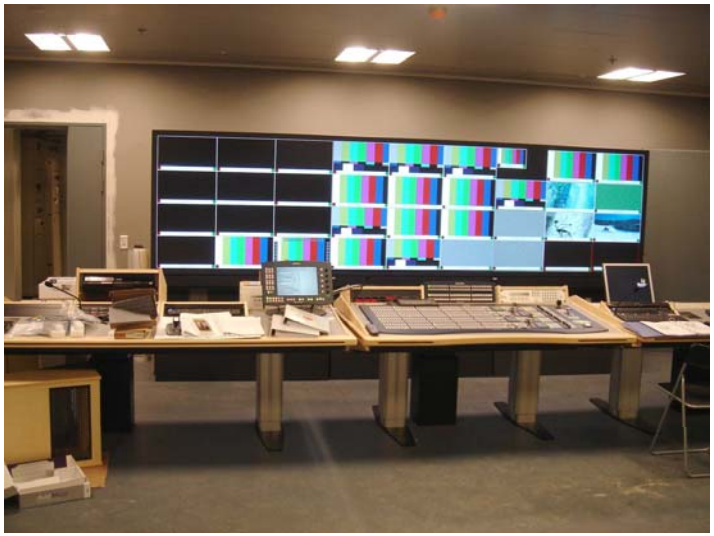
CAT 6 data cabling

Storage area for equipment

The digital evolution at DR



Production plans



Show-time

for the first SD production

in the big studio 5 will be

21. of January 2006

All production studios running with SD from week 07-2006 !

Production plans

Show-time

for the first HD production

in the big studio 5

is not yet decided

Buildings in ”DR Byen” summer 2005

Thank you for the attention