9   Multimedia Content Production and Management

9.1   Media Asset Management

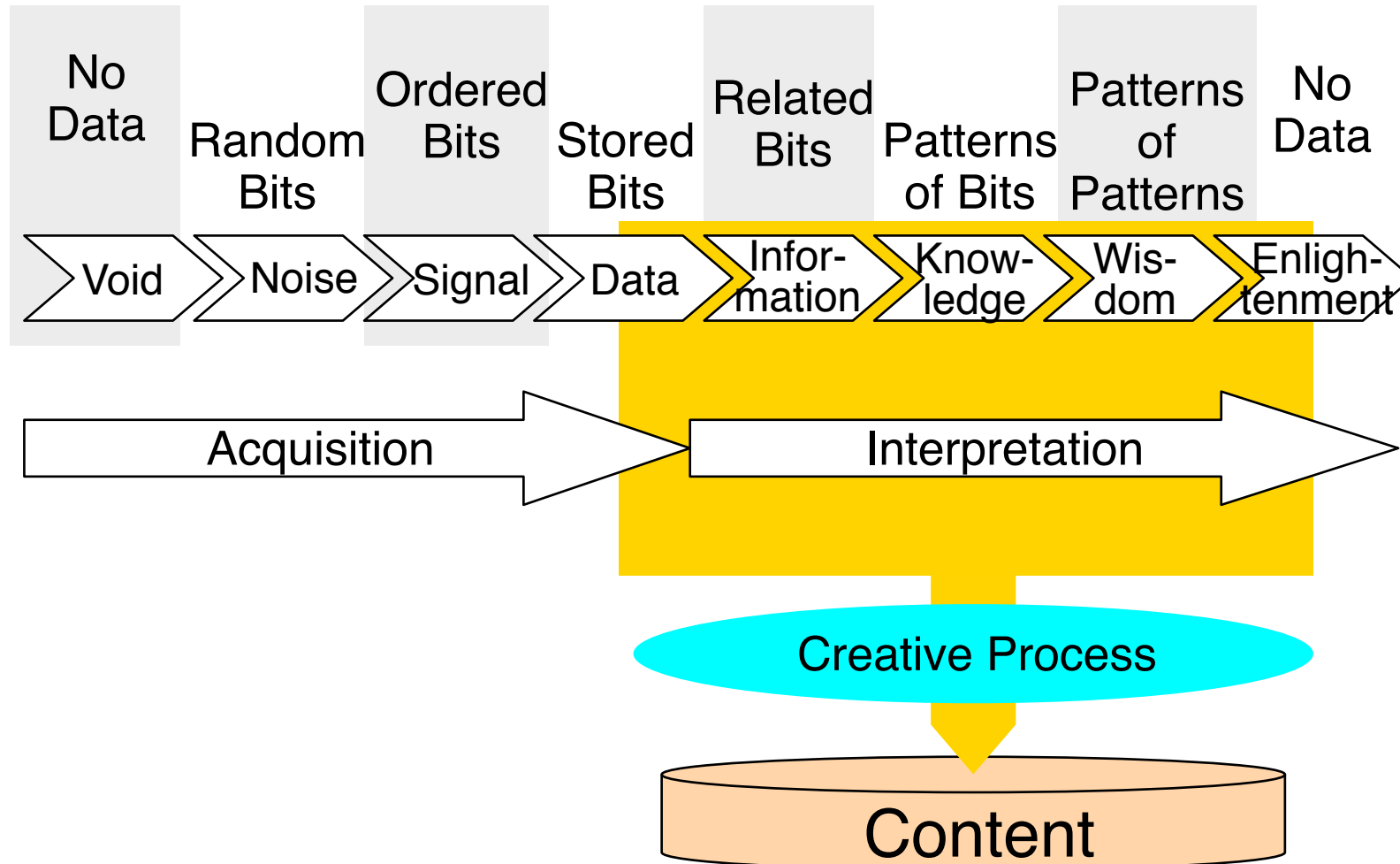## 9.2   Media Production Chains

Literature:

Gregory C. Demetriades: Streaming Media, Wiley 2003
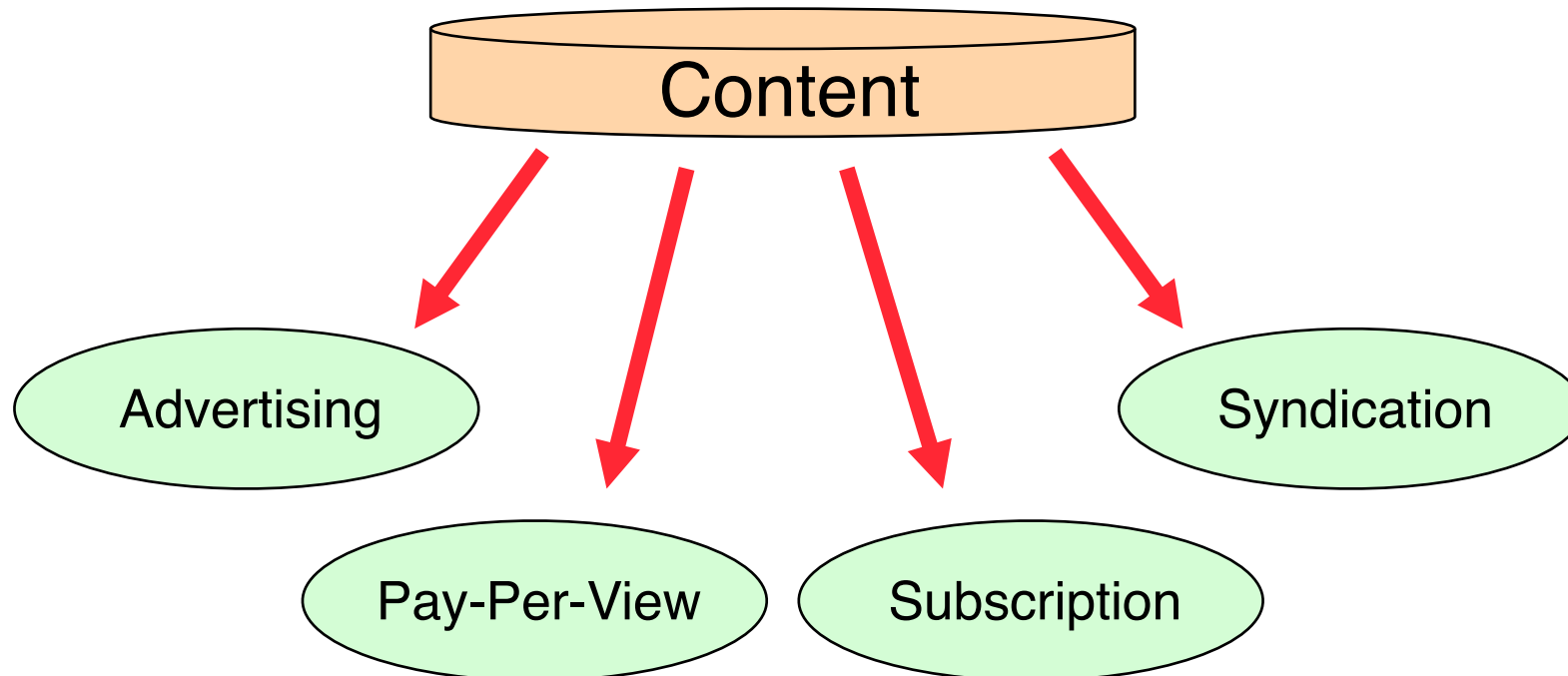
Rosenblatt et al., Chapter 10

Information Progression and Content

- A holistic view according to Demetriades (p. 189) and Virage Inc.:

No Data		Ordered Bits		Related Bits		Patterns of Patterns	No Data
	Random Bits		Stored Bits		Patterns of Bits		
Void	Noise	Signal	Data	Infor-mation	Know-ledge	Wis-dom	Enligh-tenment

Acquisition → Interpretation →

Creative Process

Content

Content Monetization

- There are several traditional models for gaining a return on investment on content
  - Network-based media enable the integration of all models

Digital Asset Management

- Very similar acronyms:
  - Digital Asset Management DAM
  - Media Asset Management MAM
    - » Rich Media Asset Management RMAM
  - Digital Media Management DMM
- Basic idea:
  - To make the right media material *(media assets)* available for each specific use, in the right version and the right format
- Integration technology:
  - Workflow integration
  - Integration with various media processing tools
  - Integration with content management and syndication solutions
- Broad range of product offerings
  - From large IT companies (IBM, EMC) to niche vendors

Example: OpenText Media Management

- Digital Asset Management product, see www.opentext.com
- Media ingestion:
  – Various import tools, e.g. hot folders, email
- Media file storage, access and delivery
- Complete workflow coverage:
  – Individual activities of team members
  – Group projects
- Individual view:
  – "Inbox" – What are the tasks I am assigned to, which dates, which assets
- Project view:
  – Participants, status, associated assets, events (milestones, new versions)
- Asset management view:
  – Asset-centric, navigation to various projects
  – History: "where used", "who used", "how used"

9 Multimedia Content Production and Management

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Jürgen Mayer (Hrsg.): streaming media - Internet bewegter, bunter, lauter. Markt&Technik 2001

Tobias Künkel: Streaming Media – Technologien, Standards, Anwendungen, Addison-Wesley 2001
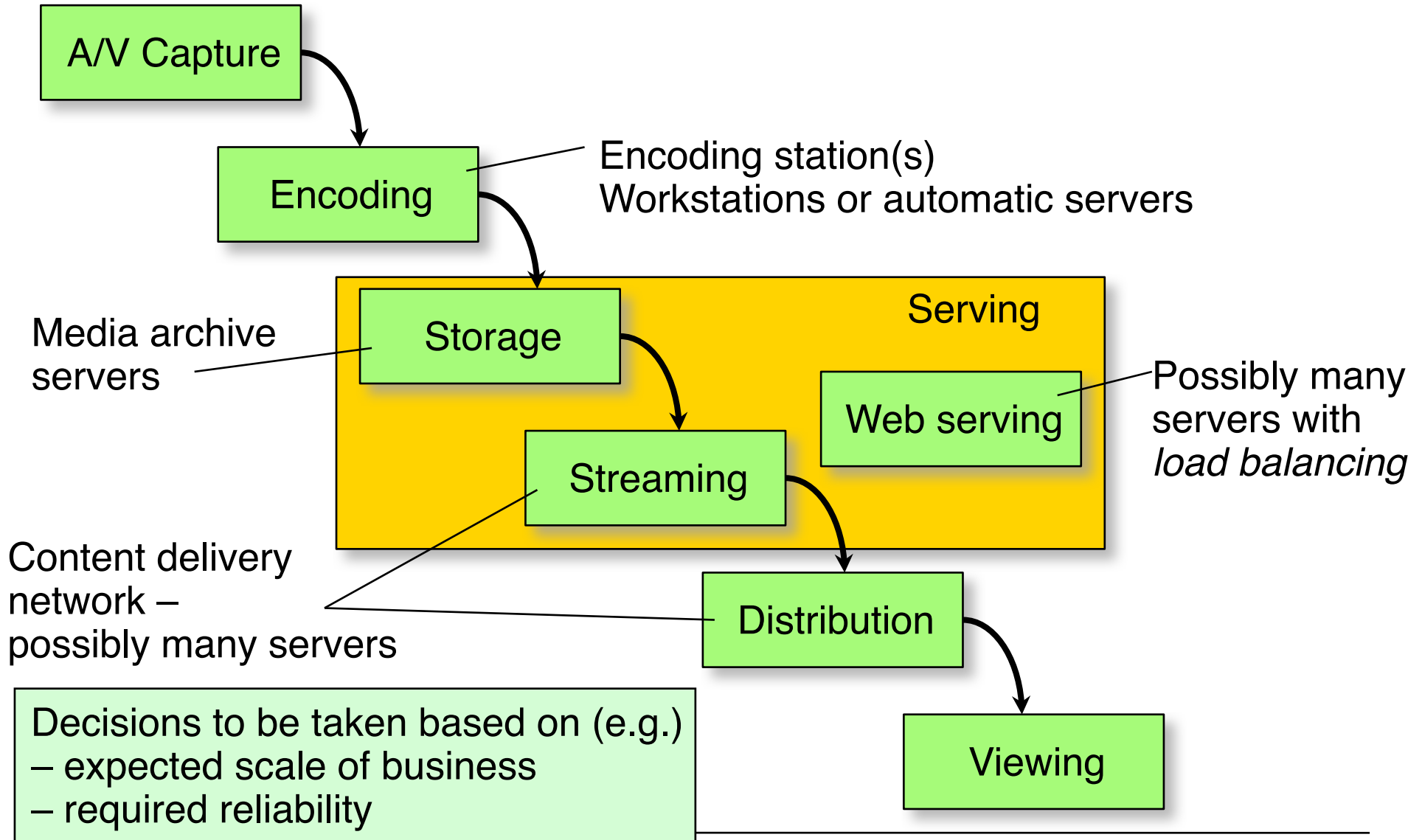
High-Level View of A/V Media Production

- Premeditate

- Capture

- Archive

- Annotate

- Query

- Message Construction

- Organize

- Publish

- Distribute

Lynda Hardman: Canonical Processes of Media Production, CWI Amsterdam, REPORT INS-E0512 SEPTEMBER 2005

Production process of books is significantly different – but not for (online) magazines

Hardware in the Streaming Delivery Chain

A/V Capture

Encoding — Encoding station(s)
Workstations or automatic servers

Media archive servers — Storage

Serving

Web serving — Possibly many servers with *load balancing*

Streaming

Content delivery network – possibly many servers — Distribution

Viewing

Decisions to be taken based on (e.g.)
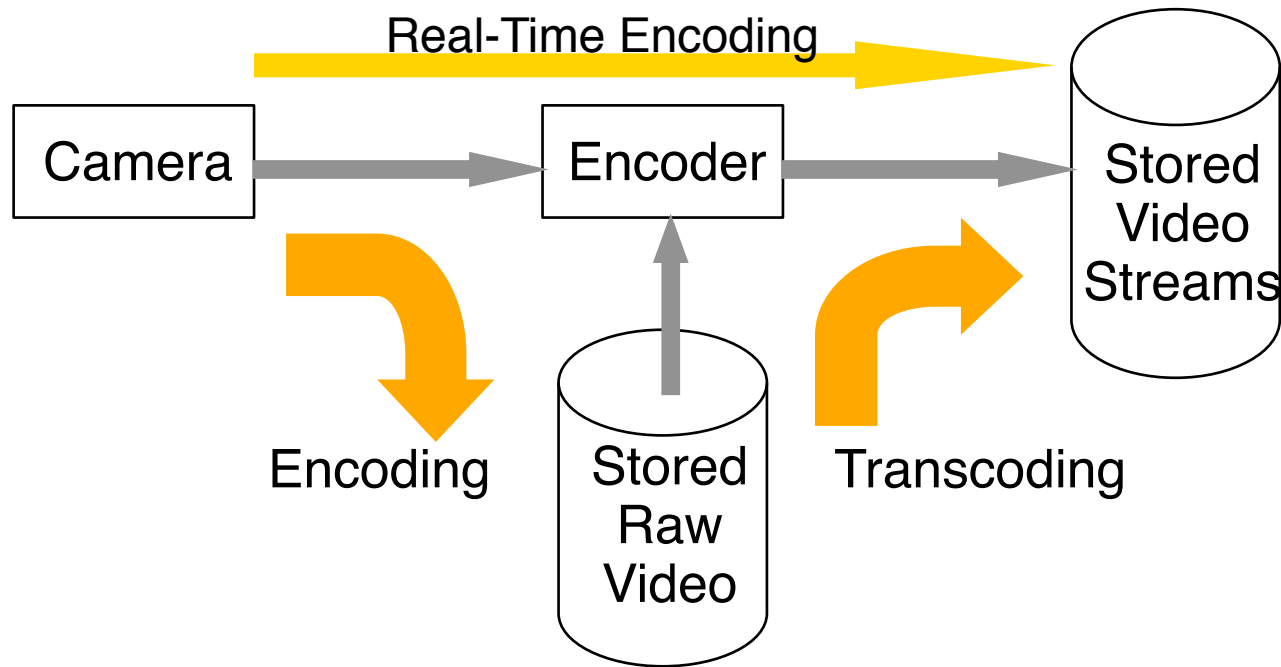– expected scale of business
– required reliability

Organisations in the Streaming Delivery Chain

Encoding and Transcoding

- Audio and video needs to be converted for streaming delivery
  - Compression, proprietary formats
- *Transcoding*: Conversion of media files from one format to another
- *Repurposing:* Using existing content for new purposes
  - e.g. using TV ads as streaming content

Factors Determining Video Bandwidth

- Physical resolution (number of pixels)
  - Determines picture size in standard rendering resolution (e.g. 72 dpi)
  - Dependent on playback device
    - » "Set Top Box" for TV set requires full-screen TV signal
    - » Video window on PC can be adjusted in size
- Frame rate
  - Desirable: 25 fps
  - Over low-bandwidth links often only smaller rates possible (e.g. 10 fps)
- Color (sub)sampling
- Audio quality
  - Sampling rate, resolution (e.g. speech vs. CD quality)
  - Mono, stereo, multi-channel
- Degree of compression
  - Determines appearance of compression artefacts

Network Limitations

- Bandwidth towards receiver is limited:
- Effective bandwidths for various access network technologies:
    - 28.8 modem: 20 – 23 Kbps
    - 56.6 modem: 32 – 35 Kbps
    - ISDN: 45 – 55 Kbps
    - Dual-ISDN: 80 – 100 Kbps
    - DSL: 1000 Kbps and more
    - VDSL: 25 Mbps and more
    - Cable modem: 4 – 36 Mbps
    - LAN: 10 – 100 Mbps
- Compromise between bandwidth limitations and quality:
    - Picture format
        - » E.g. for 28.8 modem picture format 176 x 144 pixel (QCIF)
        - » E.g. for DSL picture format 360 x 288 pixel (CIF)
    - Plus other factors

Multiple Bit Rate Encoding

- In general, the same content has to be encoded in several qualities/ bit rates

- File allocation:
    - One file multiplexing several qualities, or
    - Several files

- Selection of appropriate quality/bit rate:
    - Dependent on network access technology and dynamic network load
    - Manual selection: Through different alternatives on Web page, or
    - Automatic selection:
        » Using streaming server software and adequate client
        » Often access network type stored in user preferences for client software
    - Adaptive modification (see next chapter)

Example: Multiple Bit Rate Encodings

	Video source	Broadcast (DVB)	DSL/ cable	Modem
Target data rate	(270 Mbit/s)	4 Mbit/s	500 kbit/s	35 kbit/s
Required data reduction		40:1	330:1	4700:1
Frame size	720 x 480 (CCIR 601)	720 x 480	192 x 144	160 x 120
Frame rate	30	30	15	5
Colour sampling	4:2:2	4:2:0	YUV12	YUV12
Uncompressed data rate (Mbit/s)	166	124	5	1.15
Fraction of original data rate		1:1.33	1:33	1:144
Required compression		30:1	10:1	30:1

From: D. Austerberry

Combining Media Elements to Compound Media

- Combining video streams, audio streams, text captions, graphics, links to Web locations
  - In space on the screen (e.g. video with banner advertisement)
  - Temporally (e.g. "pre-roll advertisement" with video streams)
- Enhancing interactivity and flexibility
  - E.g. free navigation
  - E.g. language options
- Technological basis:
  - Spatio-temporally structured compound multimedia documents
  - with high degree of interactivity
  - Example technologies:
    » SMIL in RealPlayer
    » MPEG-4
    » Proprietary players e.g. in Flash

Automated Transcoding

- Example 1: Multiple Formats
  – TV Broadcaster
  – Repurposing into streaming media for Web-based Video-on-Demand
  – Live capturing, encoding (e.g. MPEG)
  – After program end: transcoding to different bit rates, delivery to streaming server
- Example 2: Flipping on Demand
  – Media archive for a cable channel to be made available through Web
  – Media kept in single, high-quality format
  – On demand (request), files are transcoded, watermarked, streamed
- Example 3: Collaboration Distribution
  – Large company working on marketing materials
  – One rough cut of a new commercial to be distributed to 100 clients with varying quality expectations and platforms
  – *Content distribution service* transcodes according to client requirements
- Example product: Telestream FlipFactory (www.telestream.net)