A distributed programme making environment using IT-based technology

Peter Brightwell & Phil Tudor, BBC R&D

IBC Amsterdam, 11 September 2000

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Research & Development

Mass-market IT infrastructure

- IT market much larger than broadcast market
  - global PC sales now exceed 100 million / year

- Lower infrastructure costs
  - IDE storage now €6 / GB (& CD-RW storage now €2 / GB)
  - Fast Ethernet switches now €25 / port

- DV cameras & PC editing increasingly used for production

- Re-authoring for Internet simplified

- Reuse of material aided by easy metadata handling
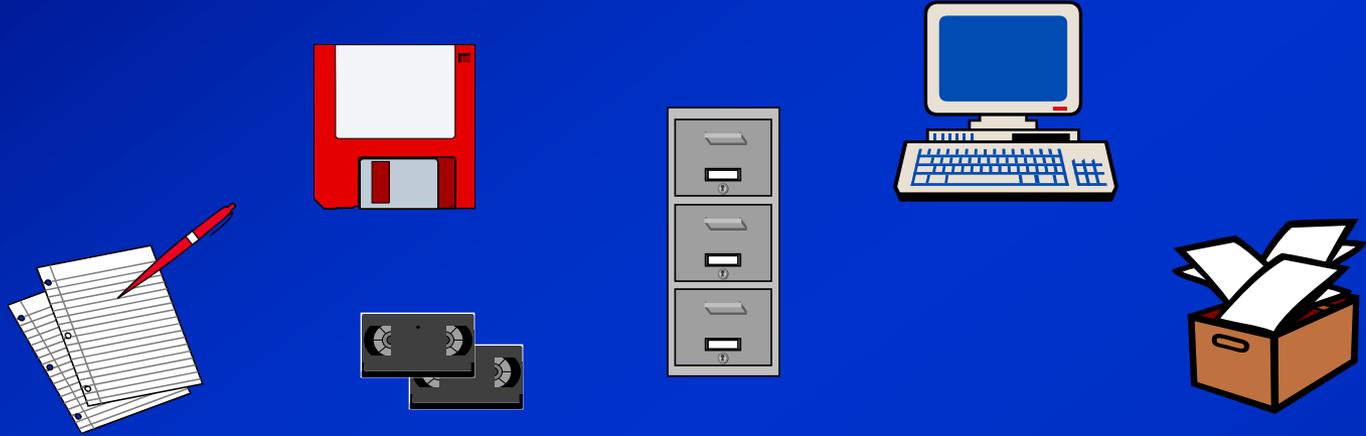
A distributed programme making environment using IT-based technology

- Infrastructure re-engineering

- The ORBIT project

- Architectures

- Distributed components & services
    - Example of content access

- Content formats

- Technologies

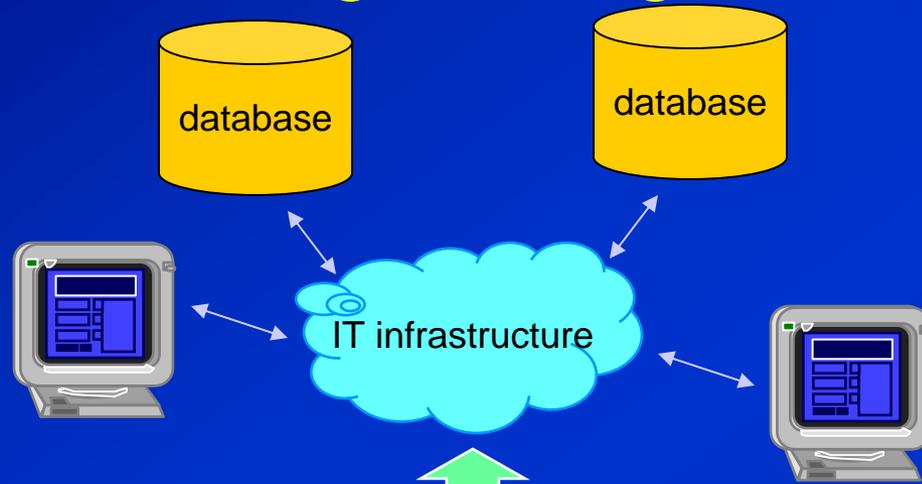- Standards

Infrastructure re-engineering

Metadata

Essence

VHS, SP, DI, D3, DigiBeta, DVC, DVC Pro, DVCAM…
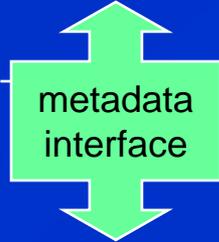PAL, Rec. 656, SMPTE 270M, AES/EBU...
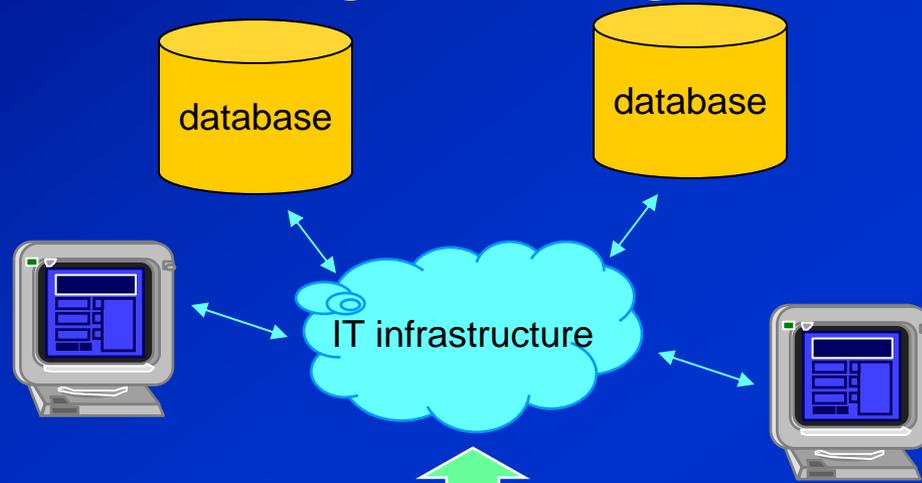
Infrastructure re-engineering

Metadata

database

database

IT infrastructure

metadata interface

Essence

process

process

VHS, SP, DI, D3, DigiBeta, DVC, DVC Pro, DVCAM…
PAL, Rec. 656, SMPTE 270M, AES/EBU...

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Infrastructure re-engineering
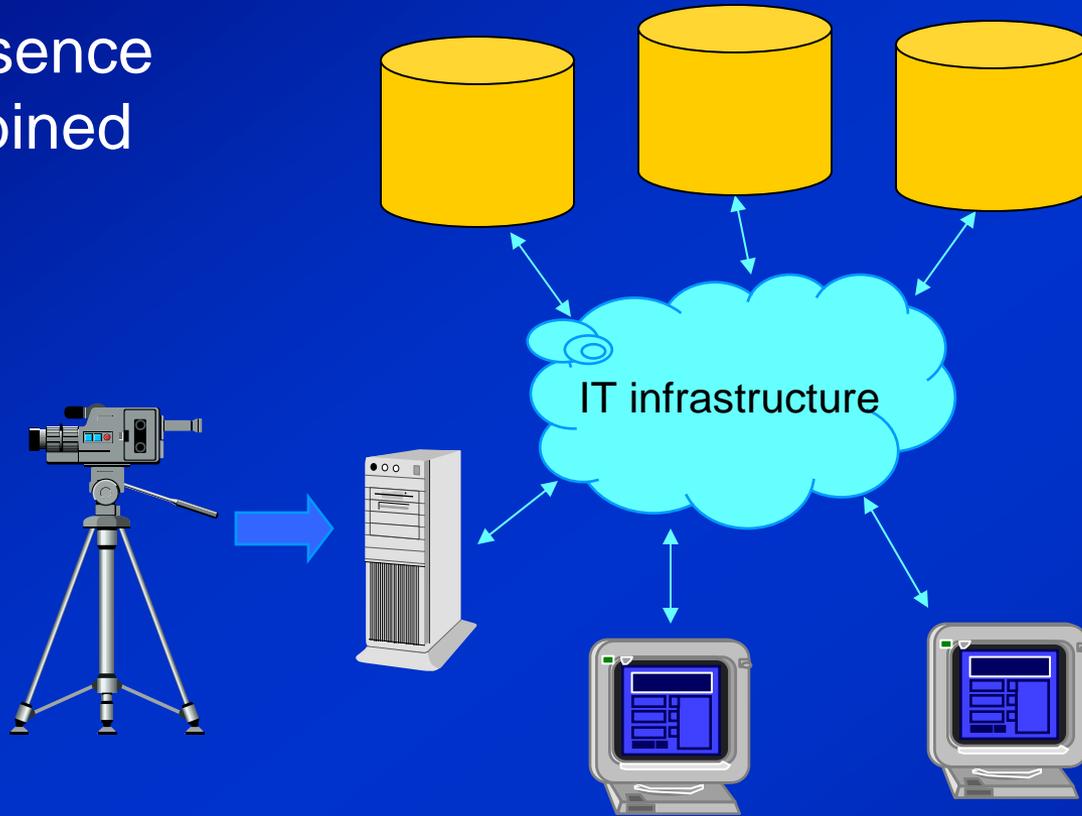
Metadata

Essence

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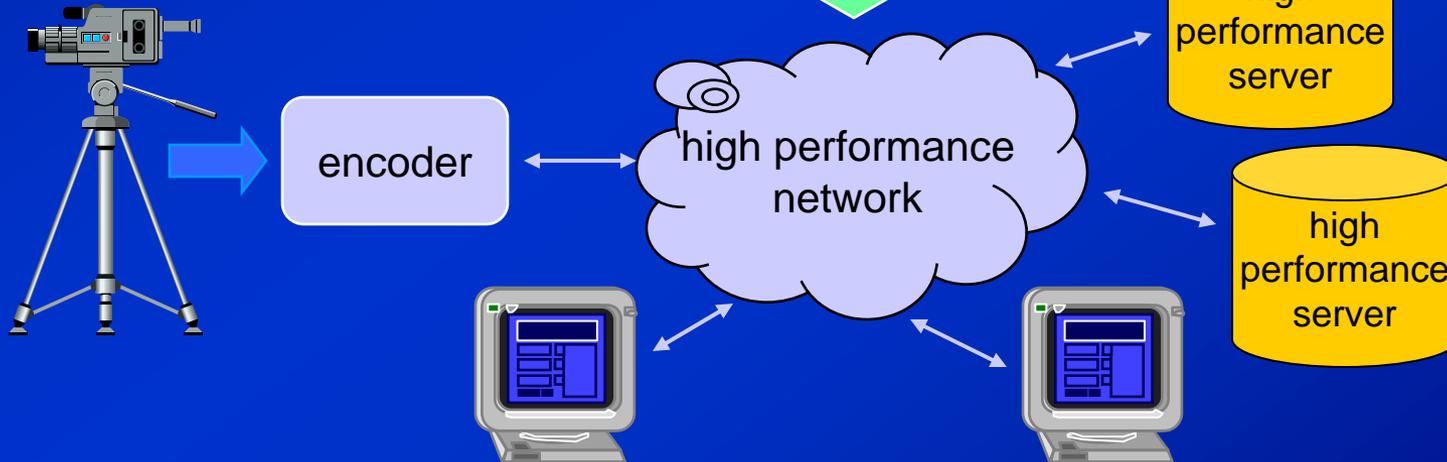
Infrastructure re-engineering

Metadata
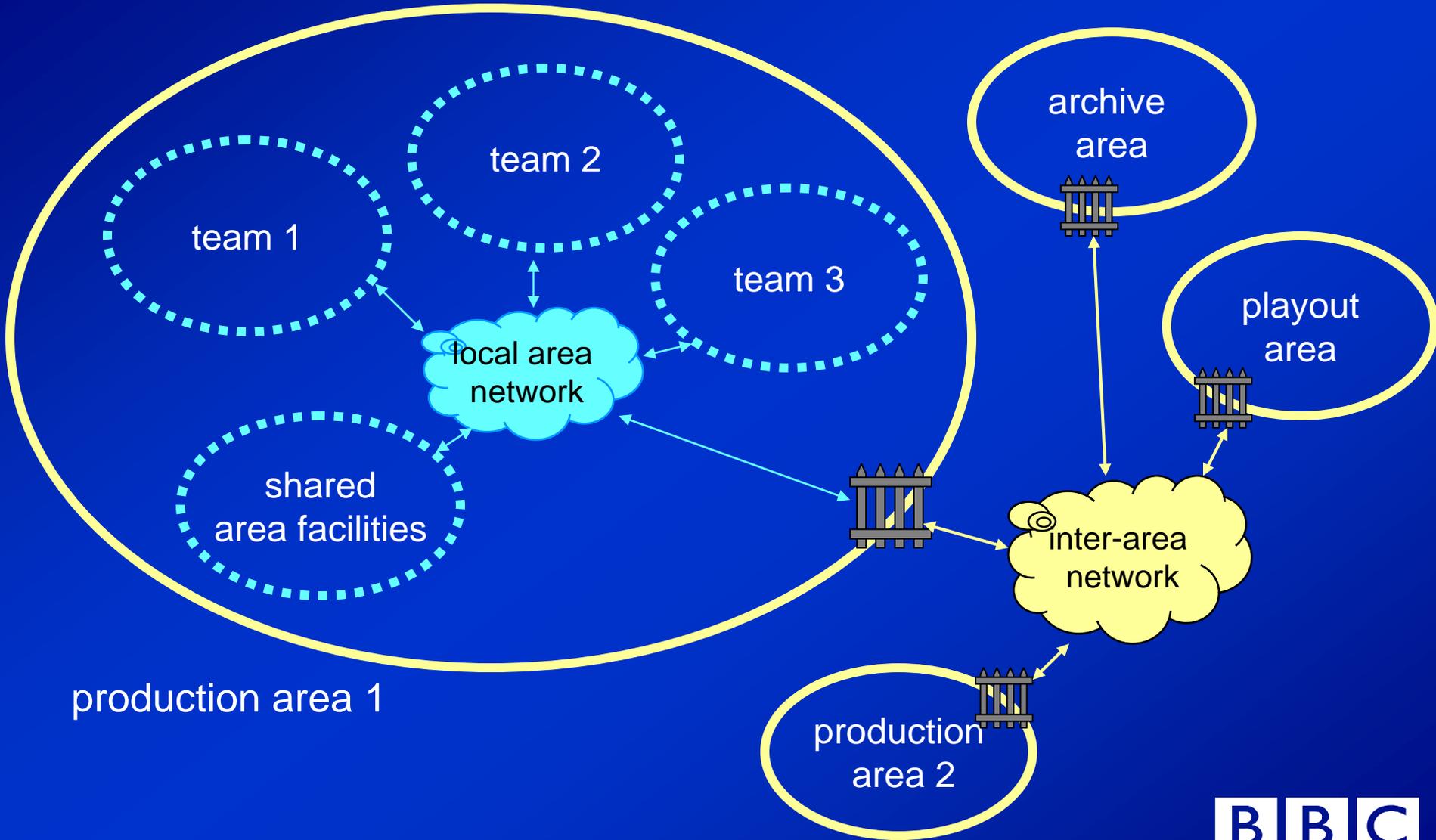& essence
combined

IT infrastructure

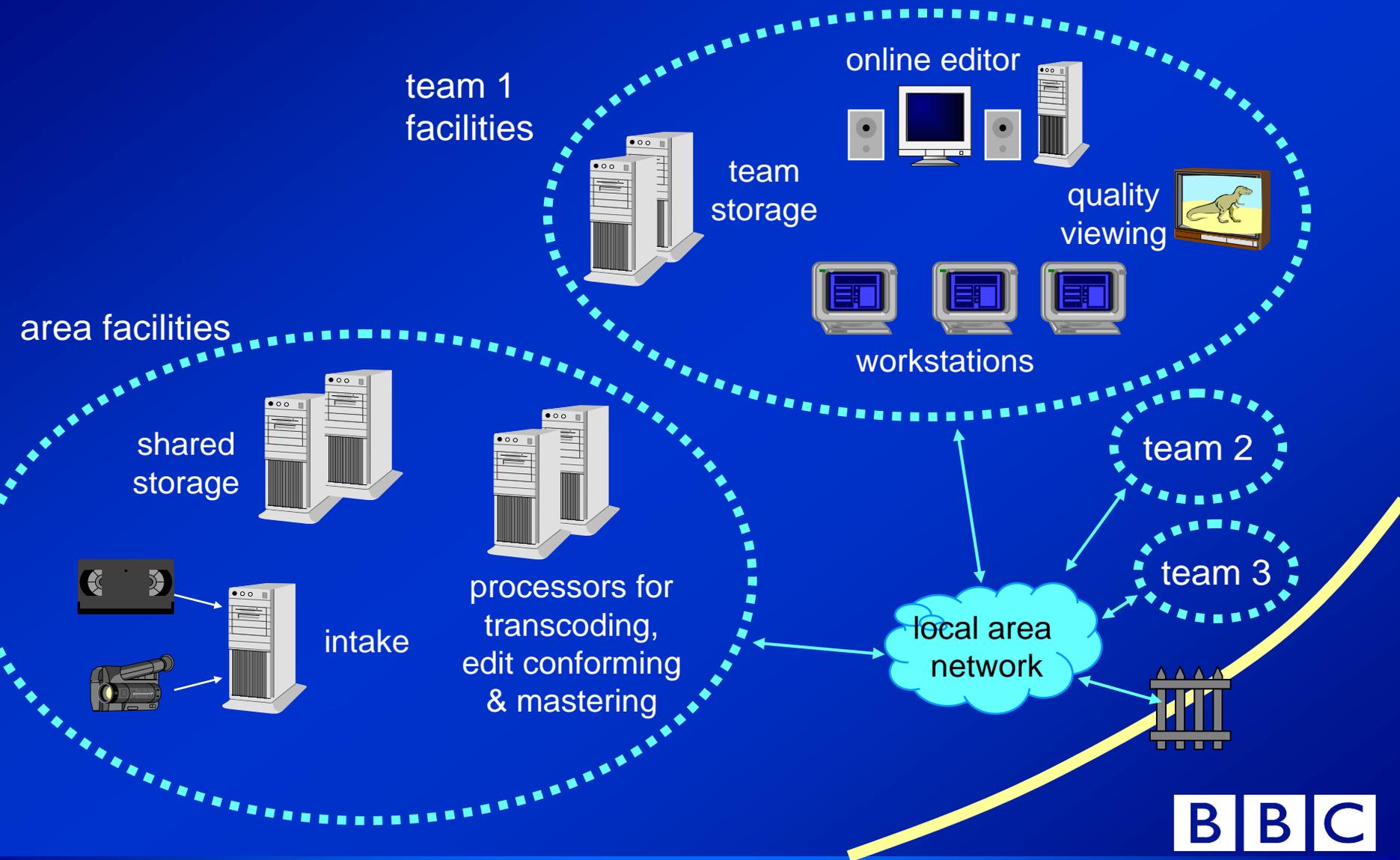# ORBIT - Object Reconfigurable Broadcast Infrastructure Trial

- Identify best practice for distributed IT-based programme-making infrastructure
  - content handling & desktop access to material
  - linkage of media asset management and content handling
  - suitability for use on corporate-wide scale
  - reconfigurability
    - for different types of production process
    - for different content formats
  - recommendations on suitable content formats

- Develop set of interconnected networks
  - production, playout & archiving
  - enable controlled access between areas while allowing users ownership of their own material

orbit

ORBIT architecture

archive area

playout area

team 2

team 1

team 3

local area network

shared area facilities

inter-area network

production area 1

production area 2

ORBIT architecture - production area

team 1
facilities

online editor

team
storage

quality
viewing

workstations

area facilities

shared
storage

processors for
transcoding,
edit conforming
& mastering

intake

team 2

team 3

local area
network

Distributed components and services

- Functionality distributed across co-operating software components

- Client components on workstations
  - Intake Control, Essence Viewer, Metadata Viewer, Clip List...

- Service components on servers
  - Intake Service, Metadata Service, Content Service, Transcoder, RS-422 Control...

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Search application

Query Entry

Essence Viewer

Clip List

Metadata Viewer

Distributed components and services

- Technological approaches include:
  - Web-based client/server technology
    - HTTP
    - XML …
  - Remote procedure calls
  - Object middleware

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Object middleware
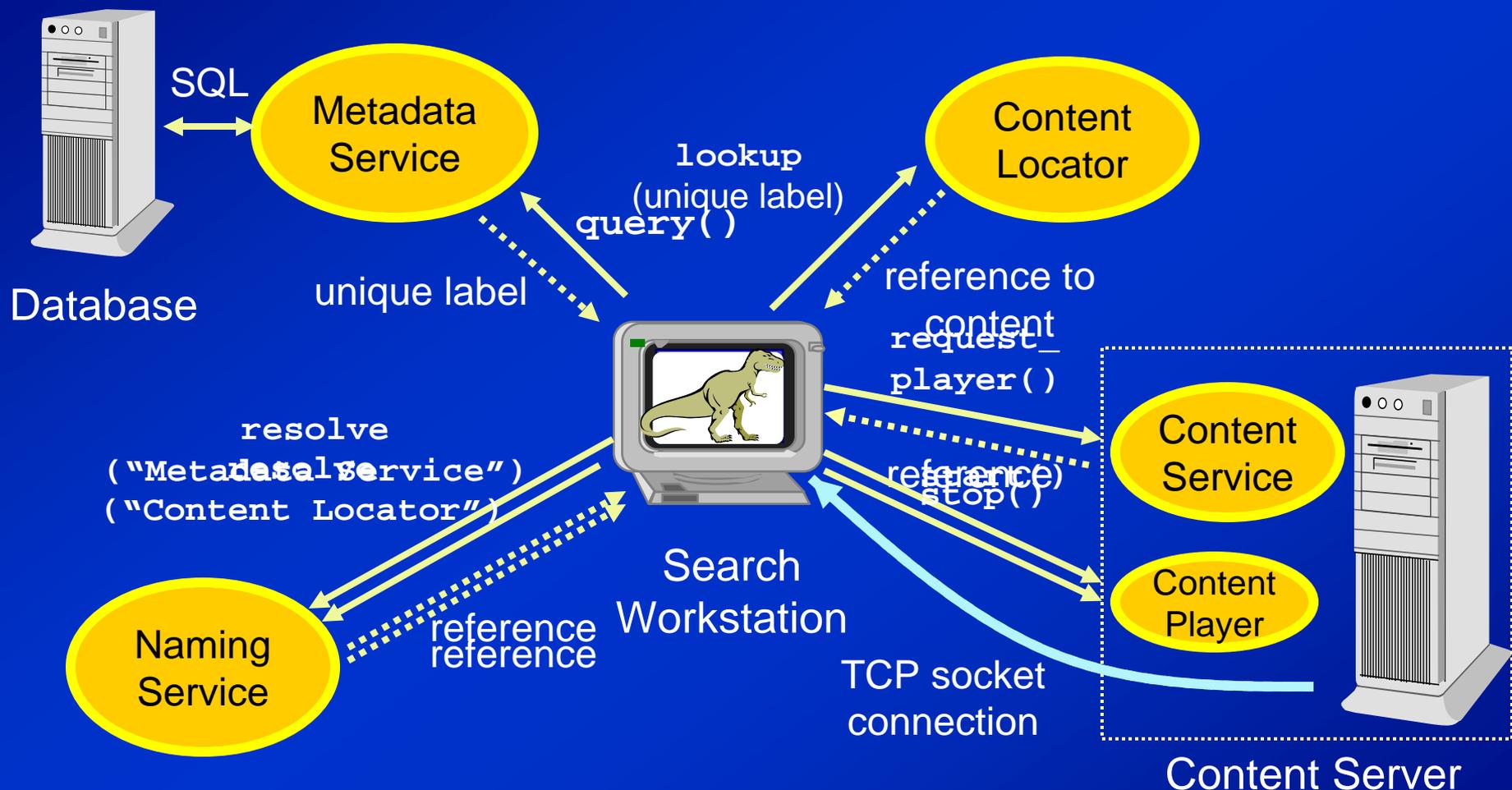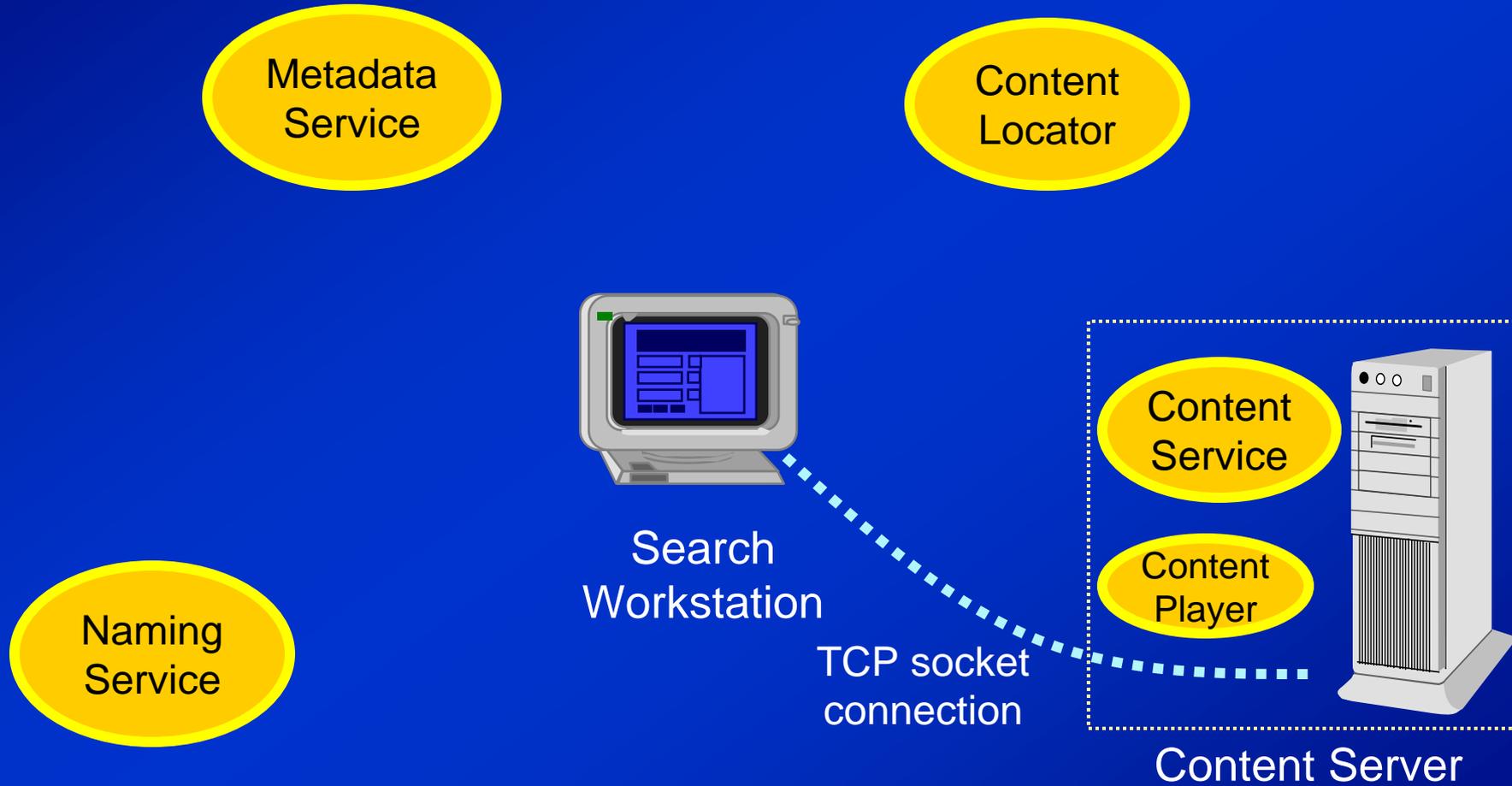
- Interconnects object-oriented components which may be running on different machines
  - clients see "proxies" to server objects

- Major offerings are D-COM, EJB/RMI and CORBA

- ORBIT uses a CORBA middleware layer
  - open
  - multi-platform & multi-language
  - choice of vendors
  - standard services: Naming, Trading, Event, Notification
  - DSM-CC

- Developed by INESC, Portugal

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Content access

Database

SQL

Metadata Service

lookup (unique label) query()

Content Locator

unique label

reference to content request_ player()

resolve ("Metadata Service") resolve ("Content Locator")

reference stop()

Content Service

reference reference

Content Player

Naming Service

Search Workstation

TCP socket connection
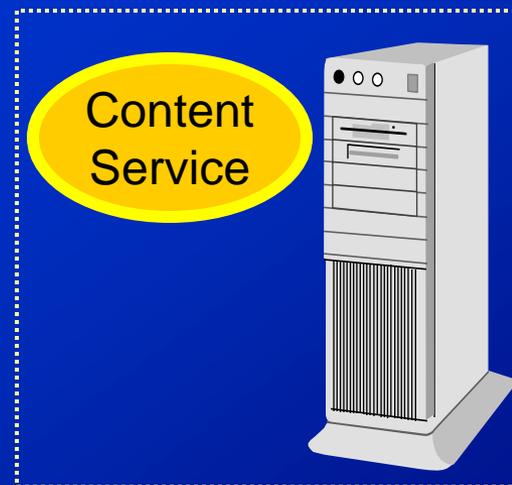
Content Server

Content access

Metadata Service

Content Locator

Search Workstation

TCP socket connection

Content Service

Content Player

Content Server

Naming Service

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Content access

Metadata Service

Content Locator

Search Workstation

Content Service

Naming Service

Content Server

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Content access - multiple tiers

Database

SQL

Metadata Service

query()

unique label
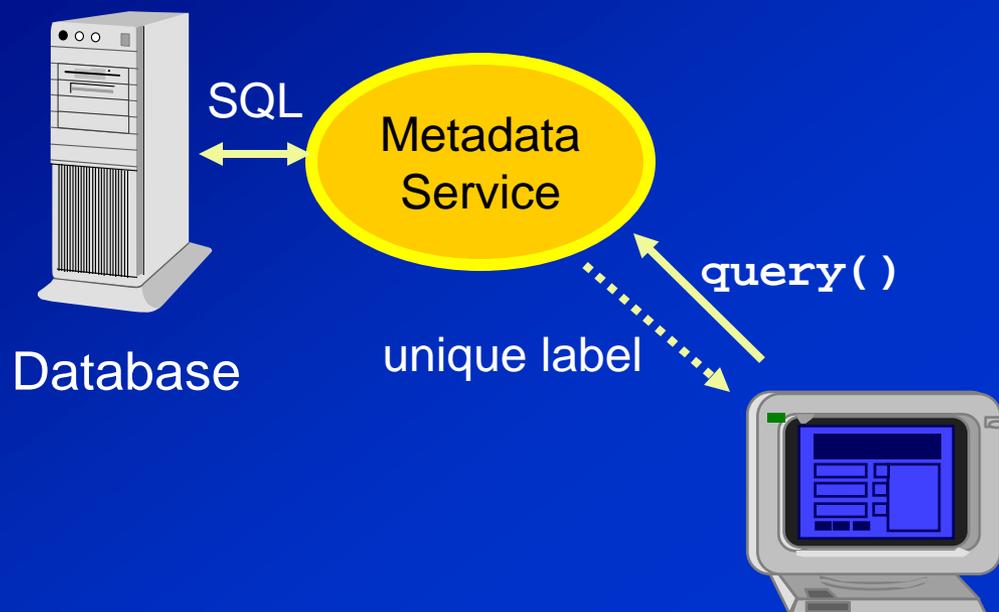
Content formats

- Focus is on MPEG for video essence
  - MPEG-1 for browse, MPEG-2 422P@ML for full quality
  - Long-GOP and I-frame-only MPEG as appropriate
  - ATLANTIC processing techniques preserve quality with long-GOP MPEG

- System extensible to support DV, M-JPEG, etc.

- Wrapper information identifies essence format and synchronises audio, video and metadata
  - Currently ORBIT implements its own wrapper
  - AAF for interchange with online editor
  - MXF for delivery of finished programme to playout

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Storage requirements for production area

- Six teams each working on a 40-minute episode
- 40:1 shooting ratio
- no material destroyed

- 15 days shooting per episode
- 30 days post production per episode
- 20 Mbit/s full quality
- 3 Mbit/s browse quality

Research & Development
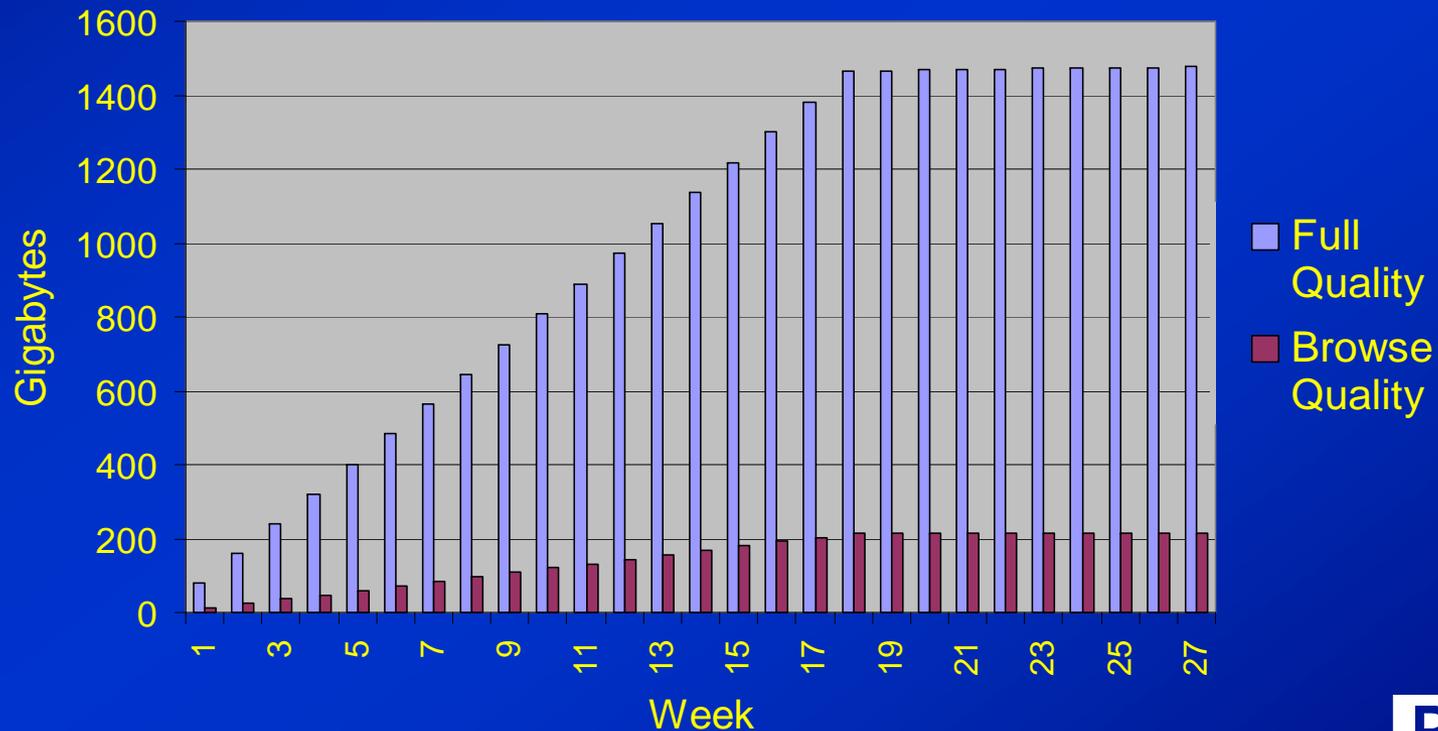
Technologies and platforms

- Pentium-III and Athlon CPUs
- Fast Ethernet and ATM switched networking
- RAIDed and non-RAIDed IDE & SCSI disks
- PCI cards for essence I/O
  - MPEG-1 video & audio capture
  - MPEG-2 video & PCM audio capture
  - MPEG-2 video & PCM audio output
- Software MPEG-2 encoder & decoder in development
- NT & Linux versions of CORBA service components
- NT-based client applications

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Standards

Standards needed for the building blocks, allowing innovation at the application level:

- IT world
  - OMG, IEEE, IETF, etc.

- System control
  - SMPTE WG on Advanced System Control Architecture
  - Pro-MPEG Networking and Control group

- Content formats
  - Advanced Authoring Format
  - Material eXchange Format

- Metadata
  - SMPTE UMID, Dictionary, etc.
  - EBU P/Meta

ORBIT activities

- Initial production demonstrator
  - Intake, search and browse edit applications

- Enhanced software in development
  - Applications
  - Metadata model
  - Middleware layer
  - FTP
  - Essence Cacheing

- Integration with commercial systems
  - BBC desktop applications
  - AAF-based online editor
  - Asset management system
  - Play-to-air servers

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Conclusions

- Use commodity IT hardware for essence
  - Same IT system for essence and metadata
  - Efficient management of media assets
  - Access to programme content at desktop

- ORBIT is developing set of inter-connected networks

- Enabling technologies
  - Object middleware
  - Long-GOP compression
  - Wrappers

- Working with manufacturers and standards bodies

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