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Oxford Update

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Introduction to SERS/OULS

- Bodleian one of ~110 libraries
- 32 OULS Libraries
- 29 Non-OULS Libraries
- 46 College Libraries
- And a few others!

OULS

- 750 Staff
- £25M budget
- 11 million items
- 156 shelf miles (250 km)
- SERS provides all electronic services

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Digital Library

- Digital Asset Management System (DAMS)
  - Common infrastructure for DL applications
  - Digitised “book- like” materials
    - Legacy projects – Greenstone, Luna, Custom Apps (~20TB)
    - 1M digital surrogates from imaging service – HFS (~10TB)
    - “1M” Google Library Project (?TB)
    - Digitised maps data (100-300TB+)
    - Current digitisation programmes (10's of TB)
  - Born-digital materials
    - Institutional Archives, Data, Web Servers, Personal Digital Effects, Digital Legal Deposit, Knowledge Management

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What are the Challenges?

- Flexibility - We don't know what's coming
- Scalability - ...but it's going to be big...
- Longevity - ...and it's not going to go away...
- Availability - ...and people will want it...
- Sustainability - ...so we've got to deal with it...
- Interoperability - ...and work with everyone else.

"Big bang system implementations are lossy - we really, really don't want to have to do them - ever"

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Flexibility

- The FEDORA Object Model
  - Object composed of multiple data & metadata streams
  - RDF used to describe structure and relationships
    - Semantic Web/Linked-data ideas are crucial
- Don't make unnecessary/premature decisions
  - Formats not proscribed (besides RDF)
- Componentised Web Services approach
  - Organic system growth and evolution
- Favour Open Interfaces/Standards and Tools
  - De facto standards matter – availability of tools

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Scalability

- Volume Scaling “Billion file problem'
  - Object store technolgies
  - Distributed Systems – Scale through replication
- Resilience of Large Scale Systems
  - Live Replicas rather than backup
    - Versioning instead of overwriting.deletion
  - Self-healing systems
  - Safety-critical systems approach - heterogeneity
- Scalability of Access/Discovery

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Longevity

- Content and Principles persist
  - People and Technologies will change
- Principles of System Design for Longevity
  - Decoupling of Functions
    - Components can be replaced without impact on the rest of the system
    - Simple Interfaces & well-define functions - easy to reimplement/shim
    - Minimise dependencies – open source, alternate implementations
  - Support Heterogeneity at all levels
    - Manage evolution and obsolescence
    - Resolvers/Abstraction layers

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Availability

- Basic IT availability (Access)
  - Network, Power, Physical Environment
- Archival recoverability (Content)
  - In the long term, unlikely events become significant
  - Preservation more important than availability
  - Recovery from bare storage – everything is an object
- Digital Preservation (Usability)
  - Bit-level, Conversion, Emulation
  - Meta-Preservation – Collections, Archive, Contextual Data

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Sustainability

- Budget and cost as a conventional library
  - Human costs remain – cataloguing, curation…
- Proactive involvement with projects/research
  - Data management and preservation are costed at the outset
    - Deposit and publication no longer distinct
- Leverage content to generate income
- Communities survive
  - Do not develop in isolation (minimise custom code)
  - Migrate and disseminate skills

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Interoperability

- Interoperability is an ongoing process
  - Support for emerging and established standards
  - The Web/Semantic Web will persist
- Persistent, stable, well-defined interfaces
  - Dependencies beyond the organisation
- Ideally implement interfaces bidirectionally
- Abstraction is vital
  - The system can evolve without compromising interoperability
  - Low-level access limited to specific, time-bound cases

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The DAMS

- The DAMS is an infrastructural component
  - Storage, Object Management and Tools layers
  - Provides the framework for Application development
- The DAMS is not visible to end-users
  - Applications: ORA, FMO etc. are
  - As the DAMS evolves the visible applications do not need to
  - Application development is decoupled
- The DAMS is primarily constructed from off-the-shelf components

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In Practice

- Physical system (Hardware)
  - Virtual machine environment for scalability, resilience
    - On demand deployement too
  - Segregated networks for security
  - Duplication functions for resilience
    - Multi-site for disaster recovery
- Logical system (Software)
  - “Cloud” approach for tools and services
    - Load balancing and failover
  - MDICS

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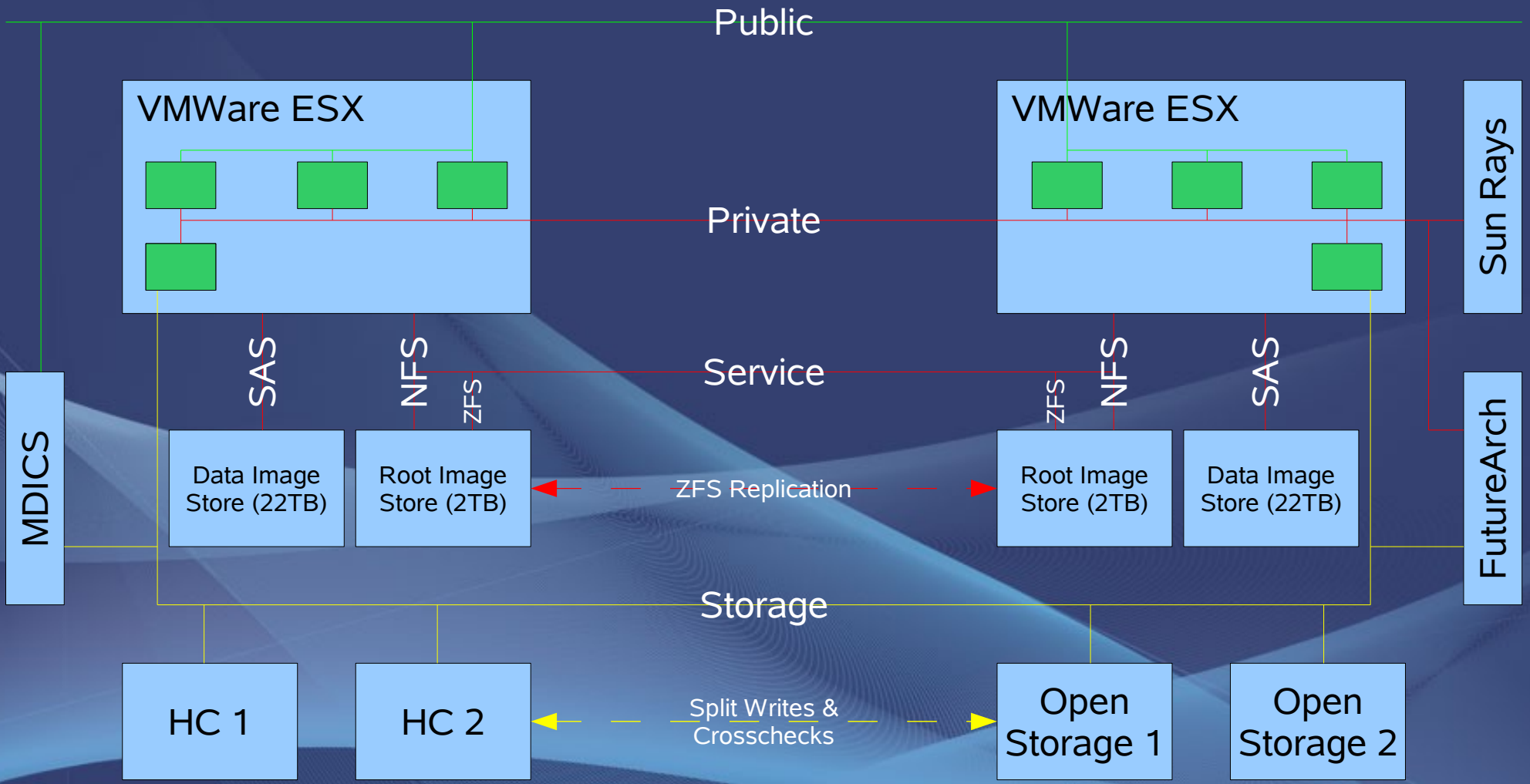
DAMS (Physcial)



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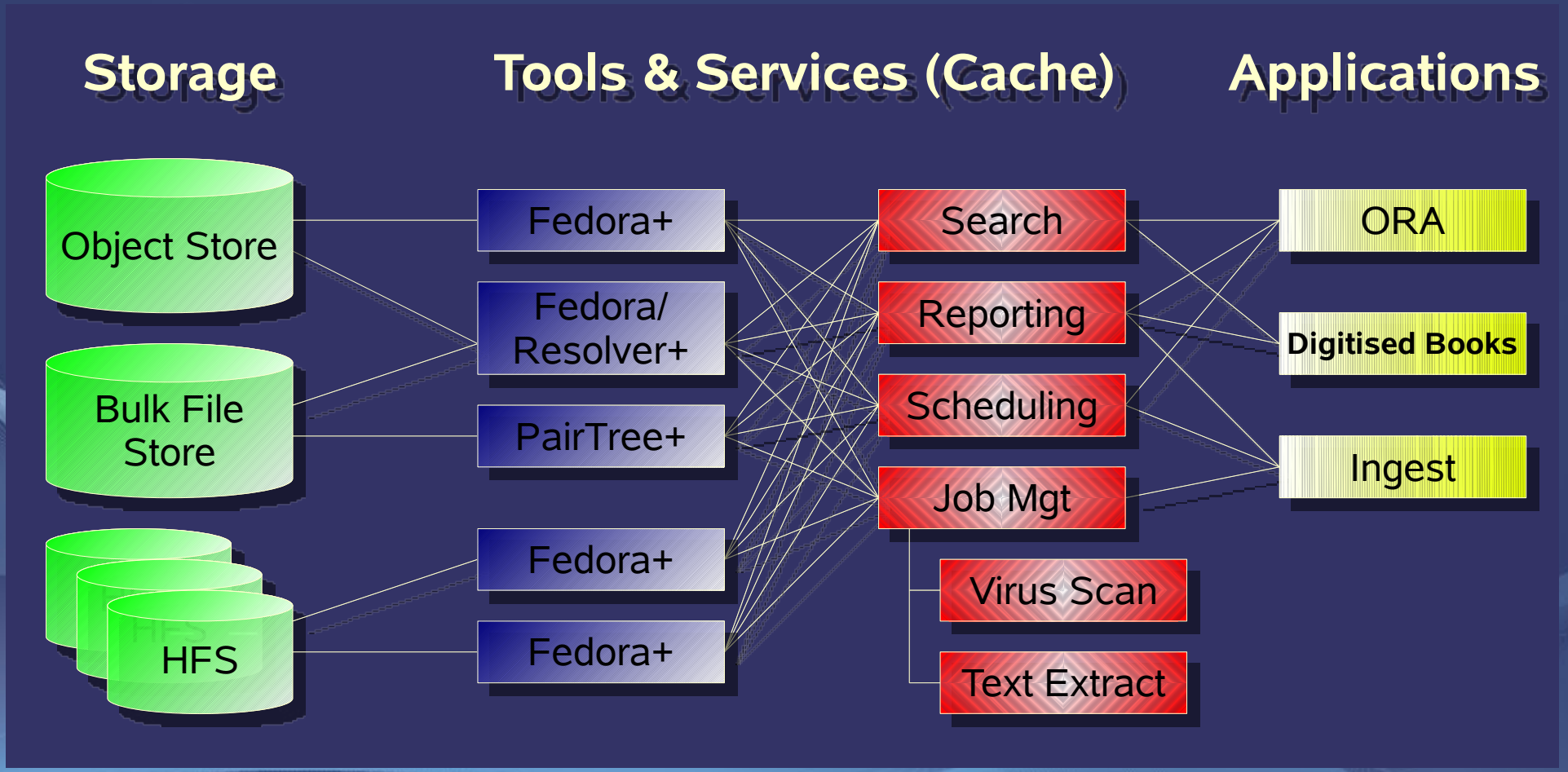
DAMS (Logical)



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Projects and Applications

That's all very nice but what happens in reality?

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Basic Services

- Oxford University Research Archive (ora.ouls.ox.ac.uk)
  - "Institutional Repository" of Research Outputs
  - Where it all started...
- Managed EPrints Service (not DAMS!)
  - Provides departments with their own repositories
    - Allows devolved control and collection policies
    - Content can be selectively harvested into ORA
- vocab.ox.ac.uk
  - Publishes vocabularies/ontologies supporting University Semantic applications

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Content Expansion

- Current Digitisation Programmes
  - Electronic Ephemera - www.bodley.ox.ac.uk/eejjc/
  - Blockbooks - www.bodley.ox.ac.uk/csb/blockbooks.html
    - image library vs formal presentation
  - Google Libraries Project – volume bypass (MDICS)
- Digital Migration
  - Oxford Digital Library collections - www.odl.ox.ac.uk
- On-Demand Digitisation
  - Imaging Studio – external service
  - Option to replace delivery from remote storage

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Interoperability

- BRII (JISC) - brii.ouls.ox.acuk
  - Building a Research Information Infrastructure
  - Add Research Information as context/metadata for ORA
  - Becoming a resource in its own right
    - Provides a logical route for holding long-tail data
- DART Europe, NEEO, ETHOS
  - Etheses with different scopes and projects
- EIDCSR (JISC) - eidcsr.oucs.ox.ac.uk
  - Embedding Institutional Data Curation Services in Research
  - DAMS provides metadata registry for externally held data

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Preservation

- Accessioning Web Servers
  - Material received as whole servers or even clusters
  - Initial action is to host/virtualise
  - Extraction and preservation of content is an “interesting” problem
- P2N
  - Oxford/Southampton collaboration
  - Distributed storage/preservation network appliance
  - Pure storage focus – works with standard repository software
  - More later

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Extension

- FutureArch (Mellon) - futurearchives.blogspot.com/
  - Complex objects, personal digital archives
    - Whole disk images
    - Security and longevity are key
- Cultures of Knowledge (Mellon) - www.history.ox.ac.uk/cofk/
  - Enhanced catalogue of C17 letters, people, locations, dates
    - Direct capture of knowledge semantically
- Medieval Libraries of Great Britain 3 (Mellon)
  - Traces extant manuscripts back to original libraries
    - Adds evidence-qualified links to semantic model -

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Things we have learnt

- The transition to digital is very rapid
  - Digitised book-like > Born-digital book-like > Data > Server/Machine images > Semantic Content
- We need to preserve before curation
  - The “Bit-Bucket” preservation store
- There is an emergent model…
  - People, places, events/activities, artefacts
- There is no single route for service delivery
- How do we run the system operationally?
  - DAMS combines operations and development, no exit

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“Convergent evolution”

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PASIG

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Questions

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Oxford Research Archive

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Developer's Blog

oxfordrepo.wordpress.com

Google Code

look for: python fedora-commons