The SHARE & DMP-SS Projects: secure private cloud for health research

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With funding from:

JISC

Technology Strategy Board
Driving Innovation

Cloud computing

- Deliver computing as a set of services
- Shared networked resources
- Utility-based computing
- Flexible, scalable environment
- Information governance concerns
- ‘Private-clouds’

Information Security

Protection of **information** and **information systems** from unauthorised:

access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction.

- Confidentiality
- Integrity
- Availability

Information Security Management Systems

- International standard for information security
  - ISO-27001:2005
    - Describes requirements (i.e. what you 'shall' do)
    - Independently audited
- Associated code of practice
  - ISO-27002:2005
    - Provides guidance (i.e. what you 'should' do)
- An ISMS is dynamic

Context

- MRC Centre of Epidemiology for Child Health
  - 80 staff & students
  - Wide range of data management issues
  - Dedicated computer service (epiLab) since 2009
- epiLab
  - Virtual desktop (VDI) environment
    - SunRay (with smartcards)
    - Secure Global Desktop (browser-based)
  - VMware desktop/server virtualisation
  - Logical separation from UCL network services (ASA)

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The SHARE Project

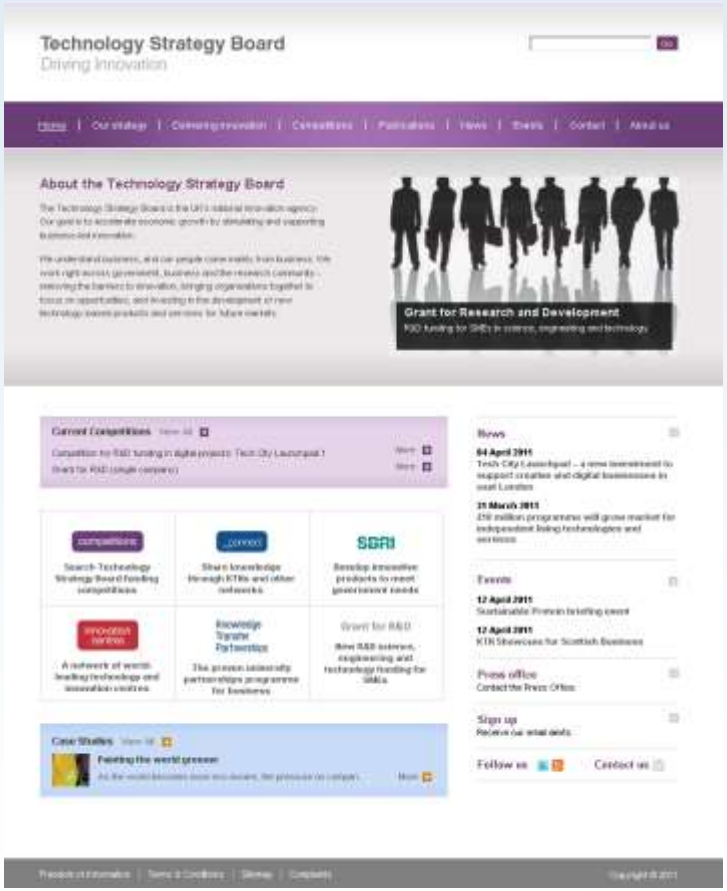
ja.net

JANET CSIRT Conference,
November 2011
London

AIMES GRID SERVICES

SHARE Project Background

- **Funded by the TSB**
  - UK national innovation agency
  - “Trusted Services” call
- **Uptake of digital services in areas**
  - trust a critical component of adoption
- **Fast-track projects funded over 12 months**
  - to create demonstrator
- **Adoption of cloud services in health care**
  - national priority area



SHARE Project Overview

- Funded in Sept 2010 for 12 months
- A collaboration between AIMES Grid Services and MRC Centre of Epidemiology for Child Health
- Total project value of 150k with 75k grant
- Methodology:
  - identify relevant use cases and to deploy these on SHARE

Project deliverables

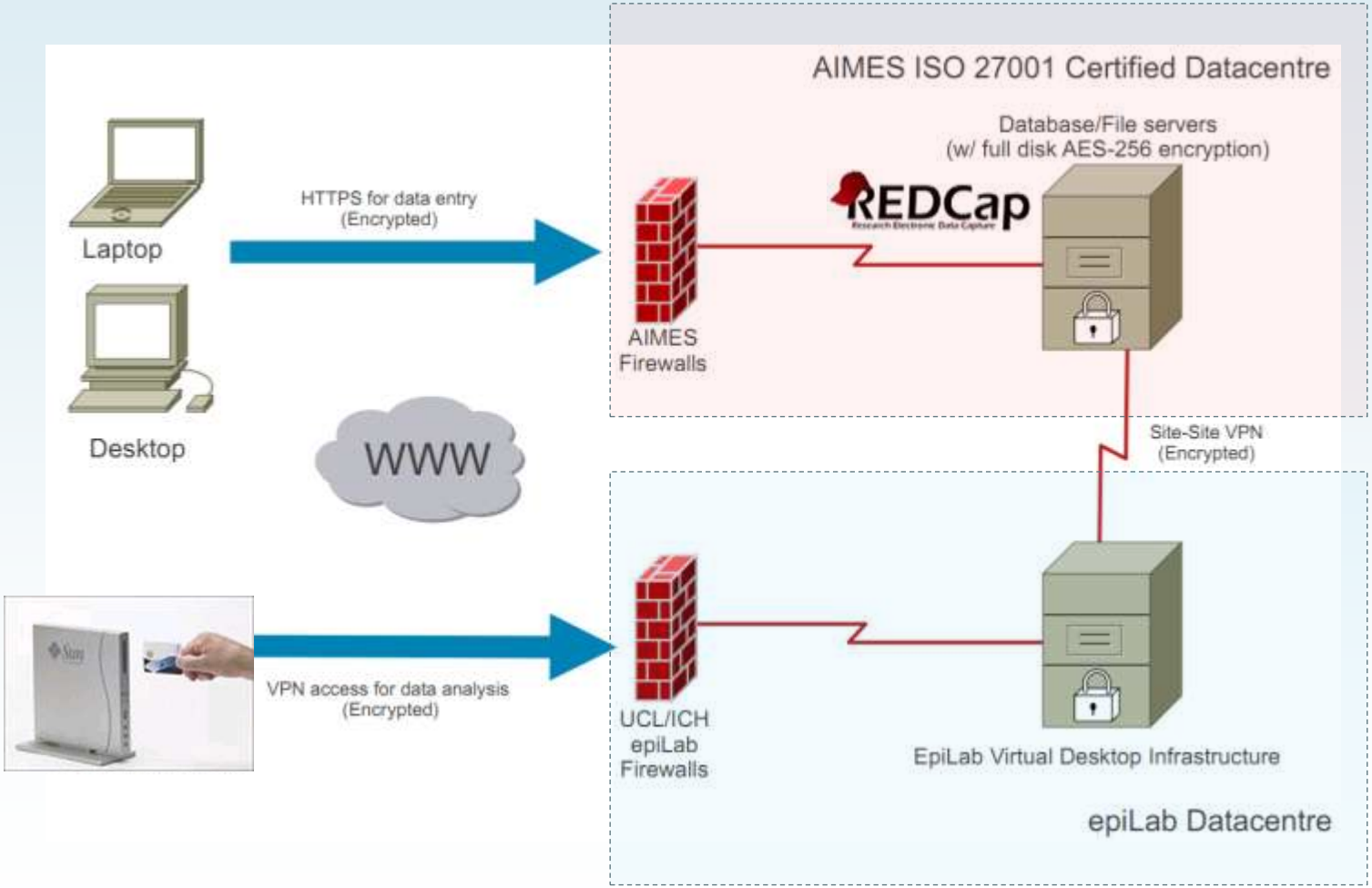
- **Infrastructure**
  - Secure VPN
  - Virtualised desktop/server/storage
  - N3 connection (NHS secure file transfer & email)
  - Full ISO-27001 system / service audit / Penetration testing
- **Contractual framework**
  - Template contractual document for provision of cloud services for healthcare
  - Literature review, historical / jurisdictional perspective (US-UK-EU)
- **Authentication**
  - 2 factor authentication (NHS compatible smartcards)
  - Incident management / Monitoring (Issue tracking & Delivery portals)
- **Case study**
  - UK surveillance study of congenital hypothyroidism in children

Outcomes: Infrastructure

AIMES

- Virtualisation using vCentre Server
  - Initial proof of concept
    - Windows 7 desktops (user authentication)
    - Encrypted file & database Storage
- **MRC Centre**
  - Virtual Desktop ‘broker’
    - Sun Ray server (smart card authentication)

Outcomes: Infrastructure Schematic



Outcomes: Contractual framework

- Main areas of concern often overlooked:
  - **Compliance with DPA and FOI Act**
    - ISO 27001 UK based hosting,
  - **Criminal investigation relating to data holdings**
    - Legal Investigative access and appropriate user permissions and monitoring (ISO 27001)
  - **Demarcation of networks:**
    - Clear contract that identifies obligation and right of both parties;
  - **Supplier falls below agreed service level**
    - Robust SLA that provides a high uptime and quality of service standard that incentivises supplier to rectify problems.
  - **Ownership of data and access rights**
    - Ownership and responsibility for content should remain with the user
    - Any processing or manipulation would be done by license.

Outcomes: Authentication

- Use of two factor authentication
  - Password plus smartcard
    - Something you know and something you have
  - Oracle Sun Ray thin clients
  - Compatible with NHS smartcards
  - Independent of desktop operating system

Outcomes: case study

- UK surveillance study of congenital hypothyroidism in children
  - June 2011 - June 2014
  - Paediatricians provide information about children newly diagnosed with hypothyroidism
  - Secure data collection (within SHARE environment) using online questionnaire

- Information governance
  - Research Ethics Committee (REC) approval
    - Prerequisite for research studies involving NHS patients
  - National Information Governance Board (NIGB) Section 251 approval
    - Approval to collect patient data without seeking individual consent (NHS Act 2006)
    - Minimal identifiers collected to allow matching of duplicate cases by paediatricians
    - System Level Security Policy: clarifying researcher responsibilities for data handling, archiving and eventual anonymisation within the secure environment

Outcomes: research data

- Data entry
  - Primary route: REDCap (Vanderbilt University)
    - Online questionnaires for individual records
  - Secondary route: NHS Secure File Transfer Service
    - Specialist centres requirement for bulk upload of multiple patient records
    - Requires N3 connection

- Data analysis
  - Virtual Desktop Infrastructure (VDI)
    - Oracle SunRay ultra-thin clients (Smartcards + password)
    - VPN connection to ISO-27001 environment
    - No data held locally

Issues

- Information governance of patient research data
  - Identifiable data
  - Individual patient consent
  - Researcher responsibilities for secure data processes
- N3 sponsorship arrangements
  - Delays in NHS organisations approval process
- Local ISO-27001 certification
  - Define small-scope ISMS
  - Include domain-specific risk treatment plan
- Software license considerations
  - Some software licensing models not suited to the cloud
- Service demarcation
  - Domain-specific vs Domain-neutral

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The DMP-SS Project

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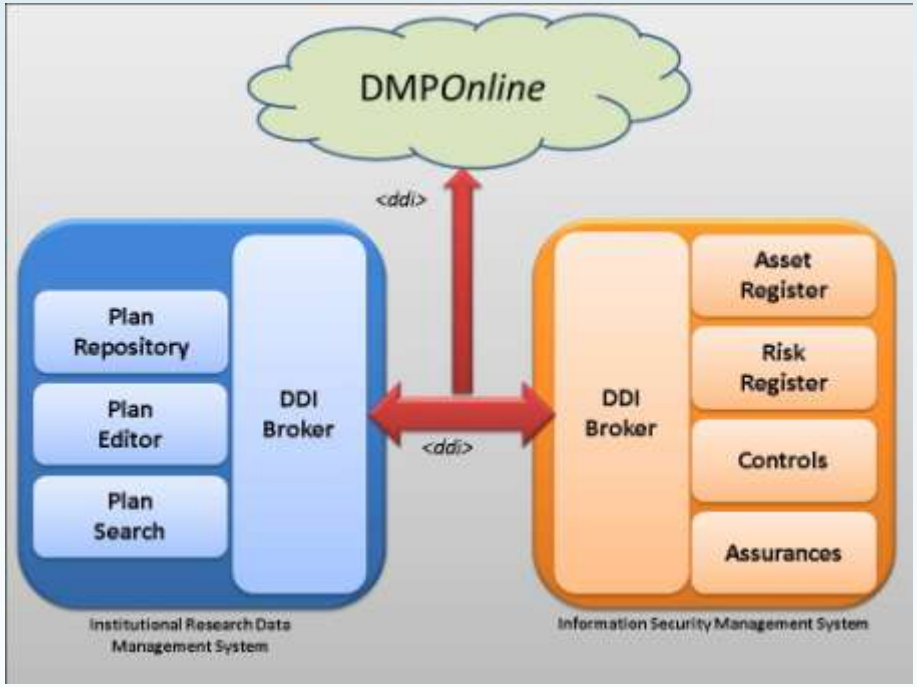
AIMES GRID SERVICES

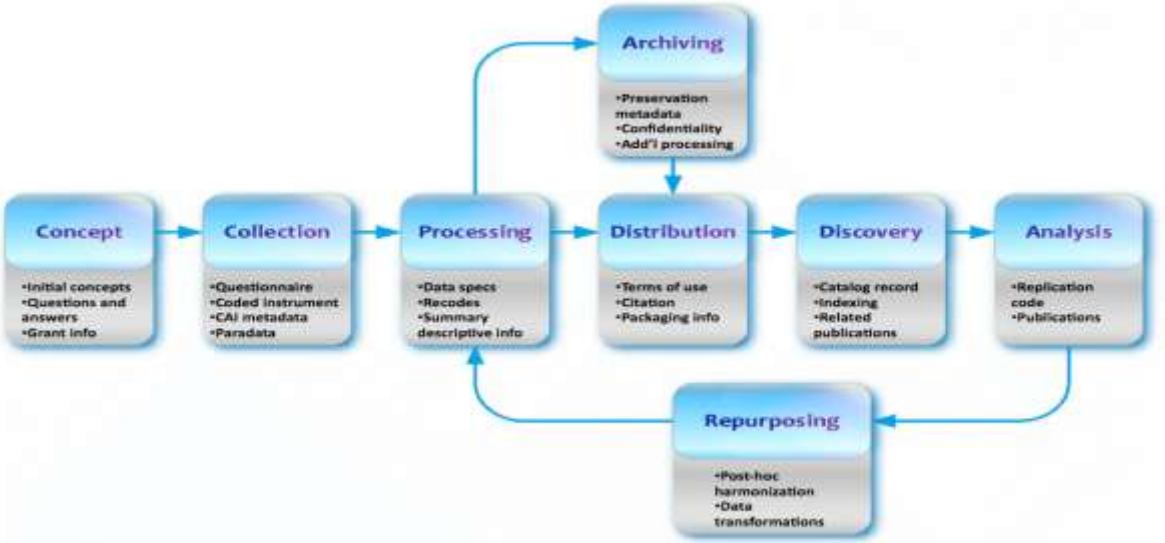
DMP-SS Project Background

Data Management Planning for Secure Services

- **Funded by the JISC**
  - Managing Research Data programme
  - Collaboration with Digital Curation Centre
- **Objective**
  - Build central metadata registry of data management plans (DMP)
  - Link Data Management Plans with an ISMS
- **Question**
  - Can Data Management Plans be integrated into an ISO-27001 certified ISMS?



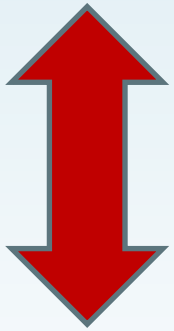
Why DMP-SS?



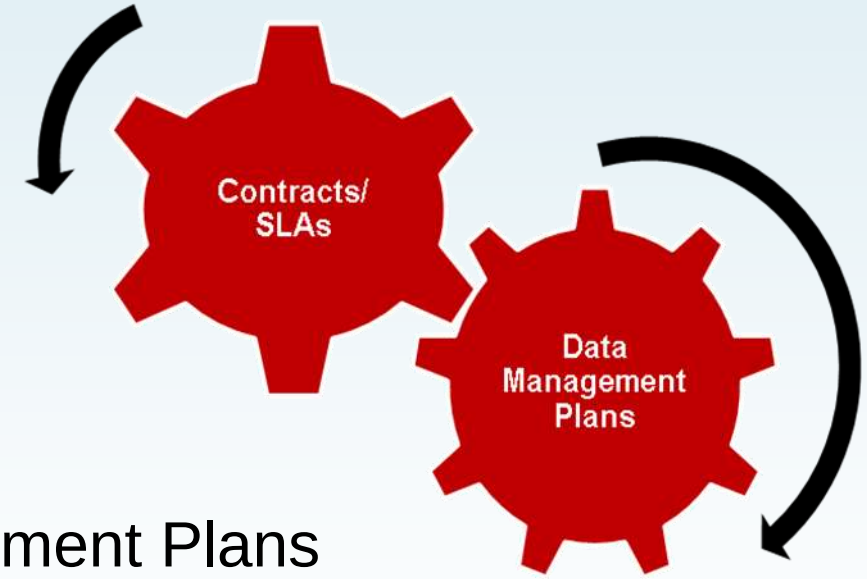
- Need to ‘embed ‘ information security best-practice in research data management
- Research data management planning is already required by major UK funding agencies
- Reduce administrative burden
- Use a language that researchers can understand

Man-in-the-middle service model

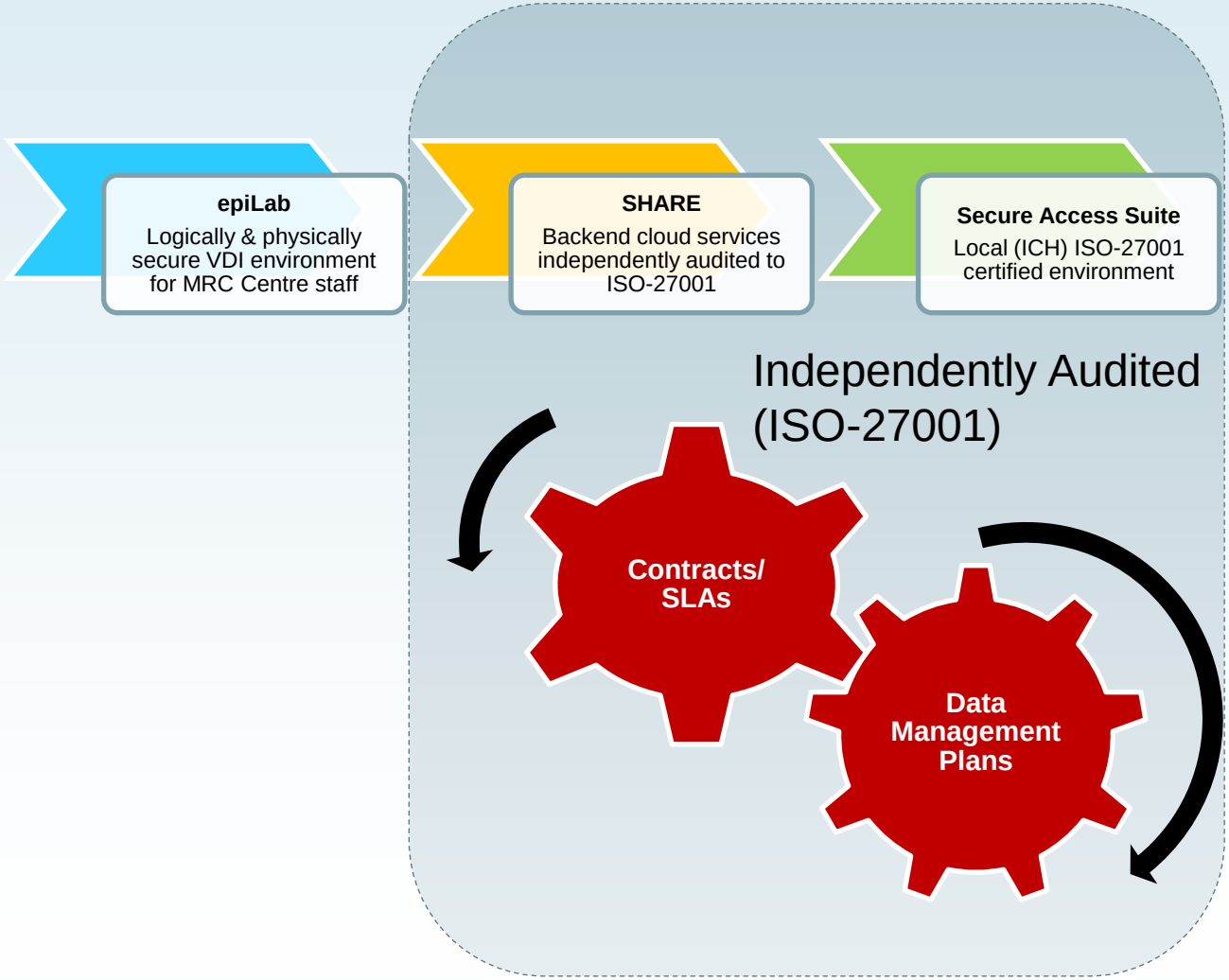
- Cloud provider
  - Contracts & SLAs



- Researcher
  - Approved Data Management Plans



Security Maturity Chronology



Conclusions

- User engagement is critically important
- Cloud doesn't mean
  - large-scale
  - international
- Work out lines of demarcation (takes time)
- Need agile approach to contracts/SLAs