

Redacting PHI in Neurological Images using XNAT

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The Problem

- Large-scale studies have huge amounts of data (1PB/3Yrs)
- Data shared must ensure privacy of subject (HIPAA)
- Inter-organizational collaboration must be easy
- PHI exists as multiple abstractions, and simply removing it from a single layer is insufficient
- Tool is needed to specifically redact entire data stack of PHI and share data

Why redact?

Compliance (HIPAA)	Funding
Patient Health Information	
Subject trust	Separation of duties

XNAT Background

- Neuroimaging data management platform www.xnat.org
- Combination relational database and file data store
- Remote data processing/execution pipeline
- Jakarta Turbine Web Application Framework / REST Interface
- Java with XML configuration files
- PostgreSQL database and Unix filesystem file store

```

    graph LR
    A[Capture] --> B[Quarantine]
    B --> C[Local Use]
    C --> D[Collaboration]
    D --> E[Public Access]
    
```

Data Stack

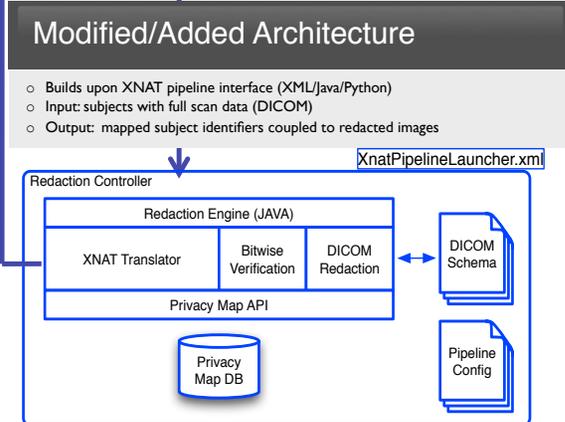
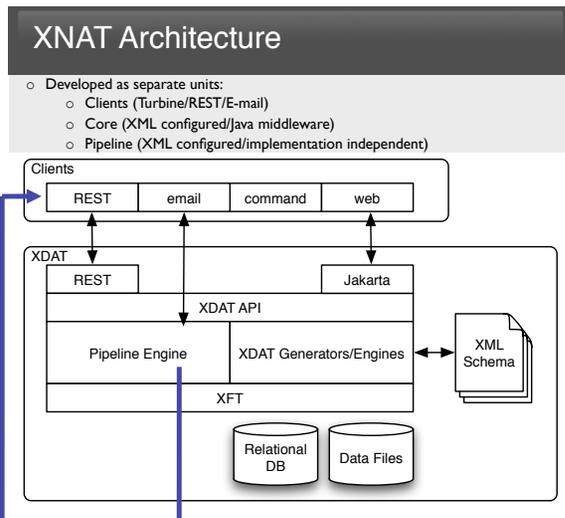
- Logical (not architectural or physical) break down of different storage and display components
- Bottom up approach to understand what contains PHI

Logical Image	Brain Picture
Image Byte stream	Data to render
File Metadata	ge.mri750 mrn:alex
File	a.dicom .a.dicom
File System Metadata	name,size, atime, ctime, mtime, xattr, acl
File System	hfs+ btrees
Storage Media	Hard Disk

Issues

- Neuroscience
- Operating Sys
- Forensics

Facial Reconstruction
Embedded information
DICOM - Self describing data
No single entity
"Open information"
Create/delete file
Transfer

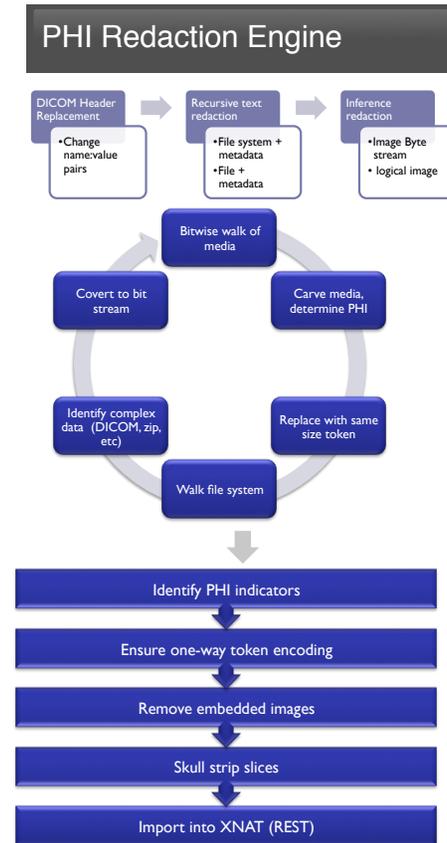


Discussion + Future Work

- Architecture and implementation of issues presented in poster at USENIX Security 09
- Comprehensive redaction is combination of recursive redaction at the block and file layer, with additional techniques to find and reduce inferred data such as DICOM
- Based upon body of work and code for legal production
- Project is started with goal to finish by August 2011

References:

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Acknowledgments:

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