Site Administration

Big Picture

In this talk

PIPELINE PROCESSING

XNAT

Pipeline Manager

Web App

XNAT CLIENTS

User 1

User 2

DICOM Server

MR Scan

PREARCHIVE

File Store

ARCHIVE
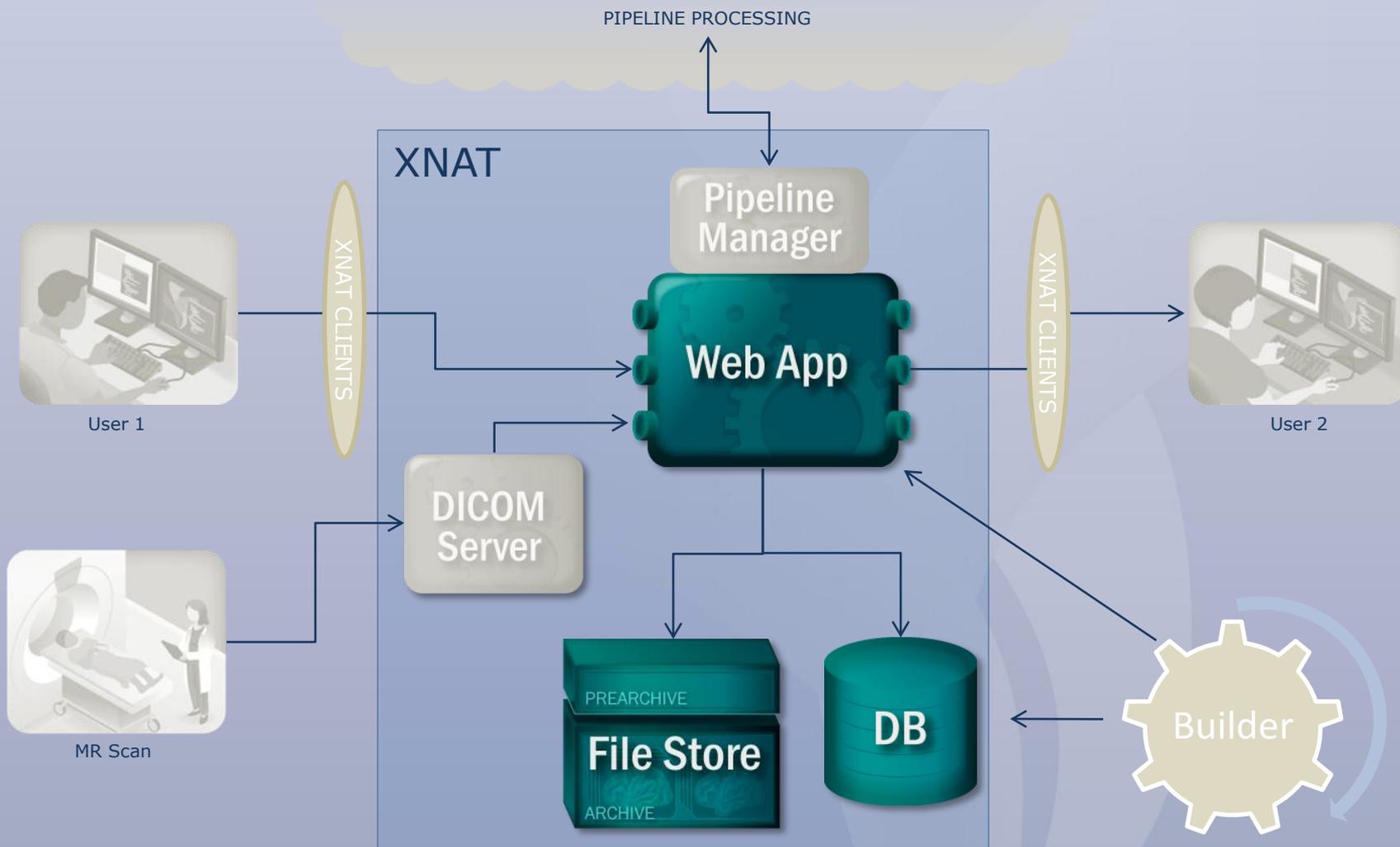
DB

Builder
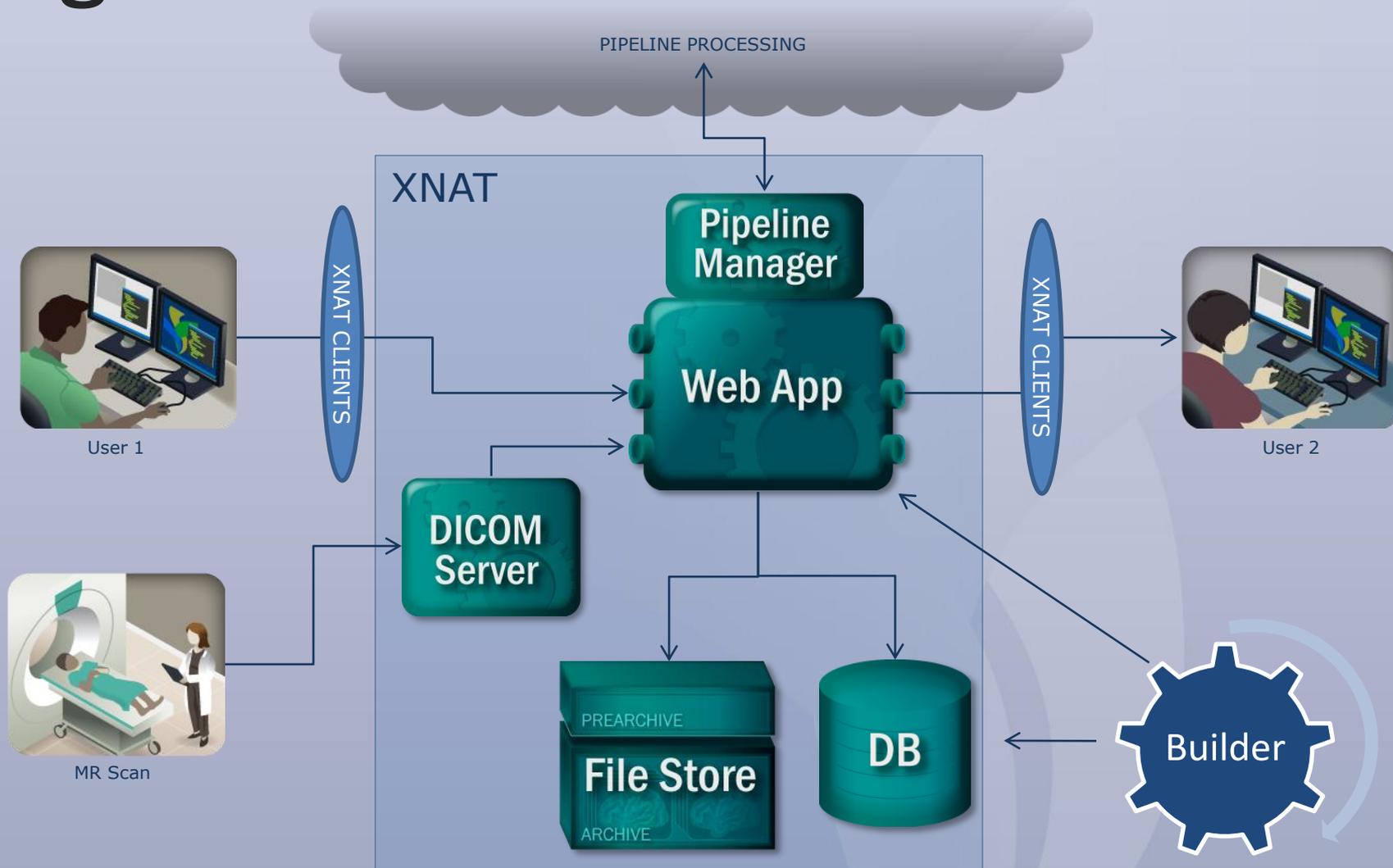
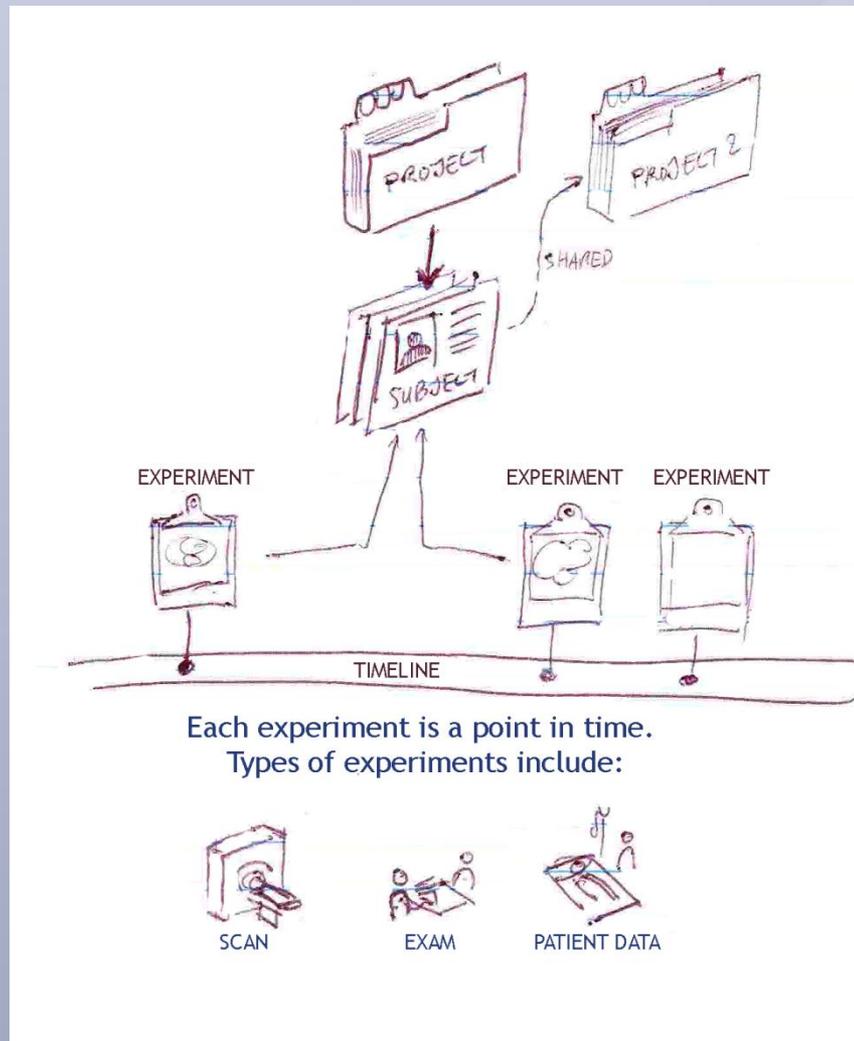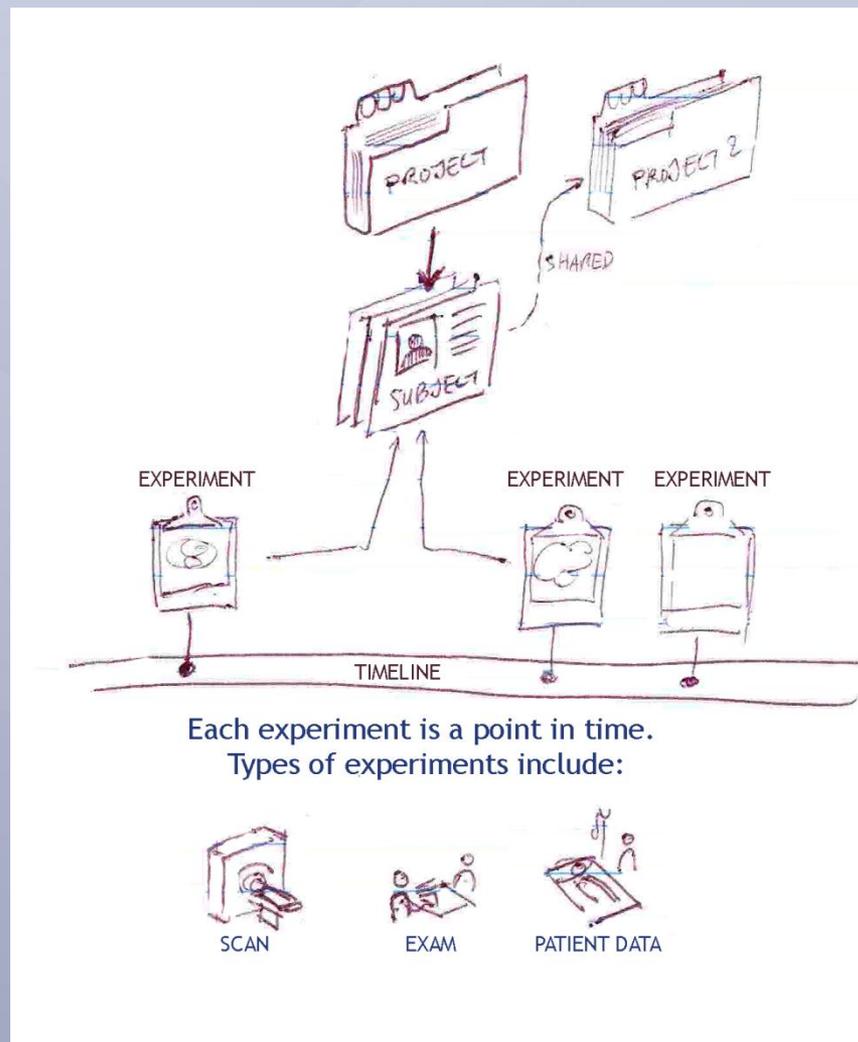XNAT

Plan

- XNAT Data Hierarchy
- Access Control
- User Administration
- Additional Administrative Tasks
- Maintenance How-to
- Troubleshooting How-to

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XNAT Data Hierarchy

Each experiment is a point in time.
Types of experiments include:

SCAN   EXAM   PATIENT DATA

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XNAT Data Hierarchy: Projects

- Projects
    - Used to organize data
    - Often relate to an IRB approved study
    - All subjects and experiments are assigned to a project

Each experiment is a point in time.
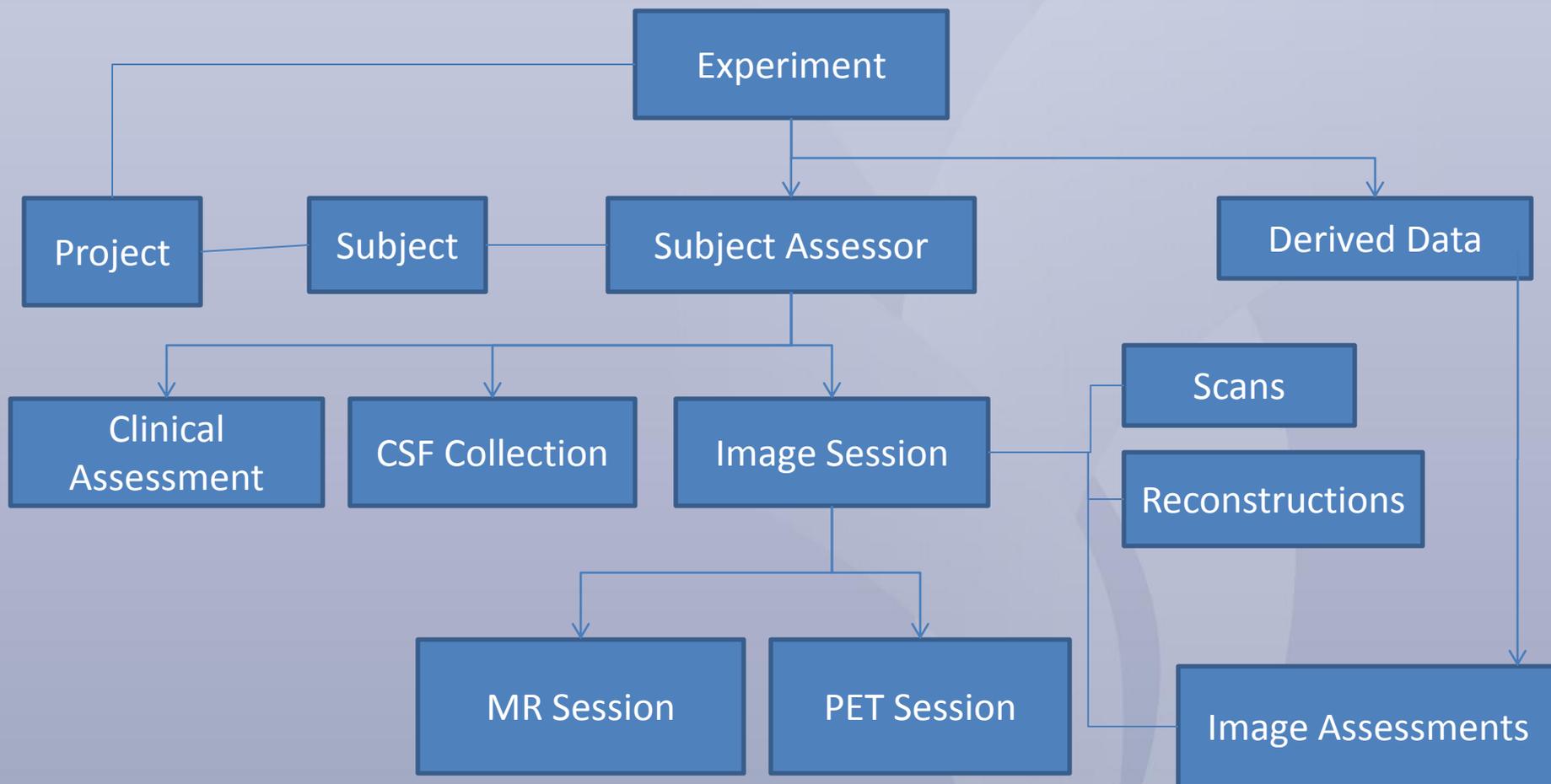Types of experiments include:

XNAT Data Hierarchy: Subjects

- Subjects
  - Define a patient who participates in a research study
  - Can be used in one or more projects
  - Can take part in one or more experiments
  - Optional demographic fields

Each experiment is a point in time.
Types of experiments include:

SCAN   EXAM   PATIENT DATA
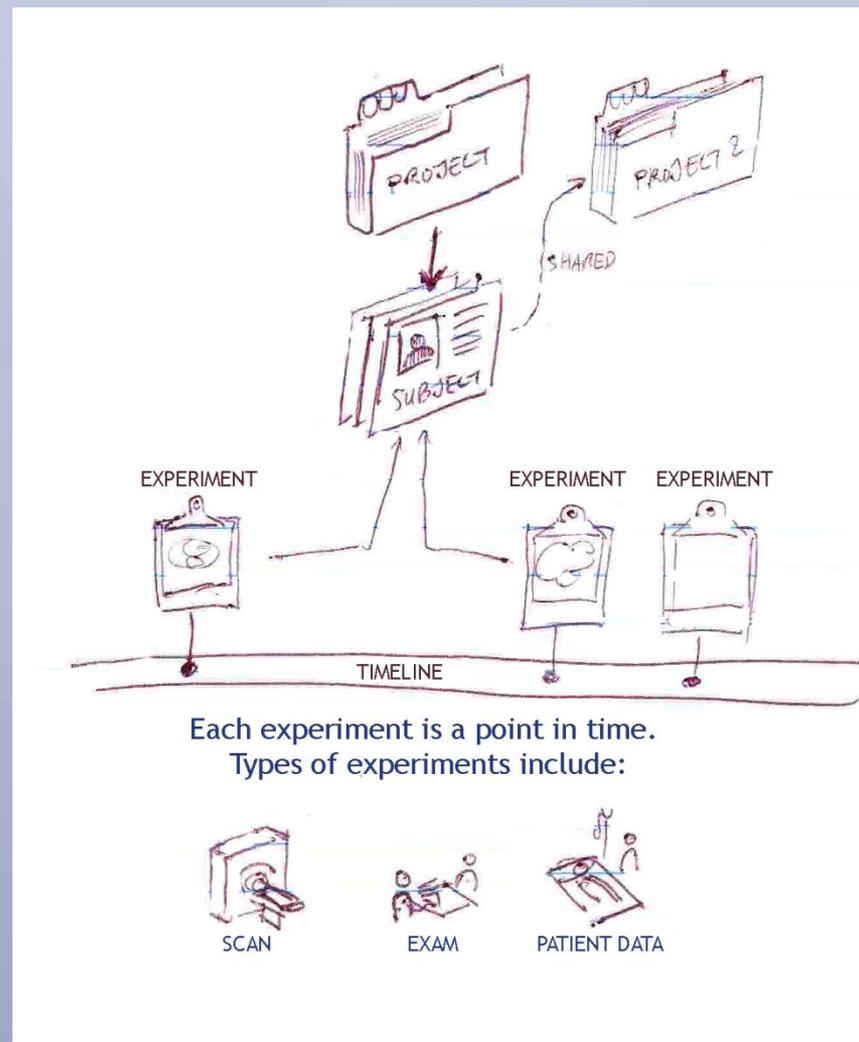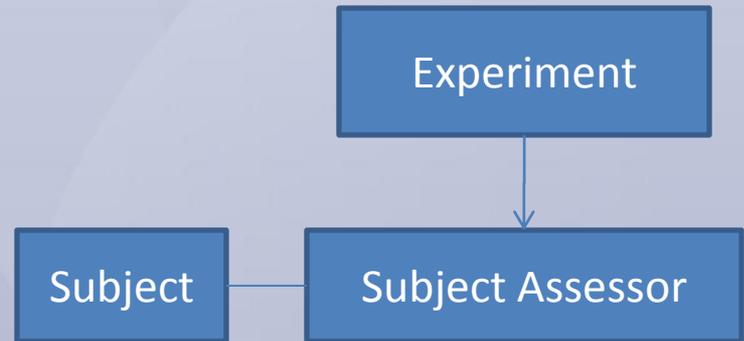
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XNAT Data Hierarchy

XNAT Data Hierarchy: Experiments

- Event where data is acquired
  - Associated with a project
  - Can have files associated with it
  - Date, Time, Notes, etc
  - Extended by subject assessment, image assessment, MR, PET, clinical assessment, etc.
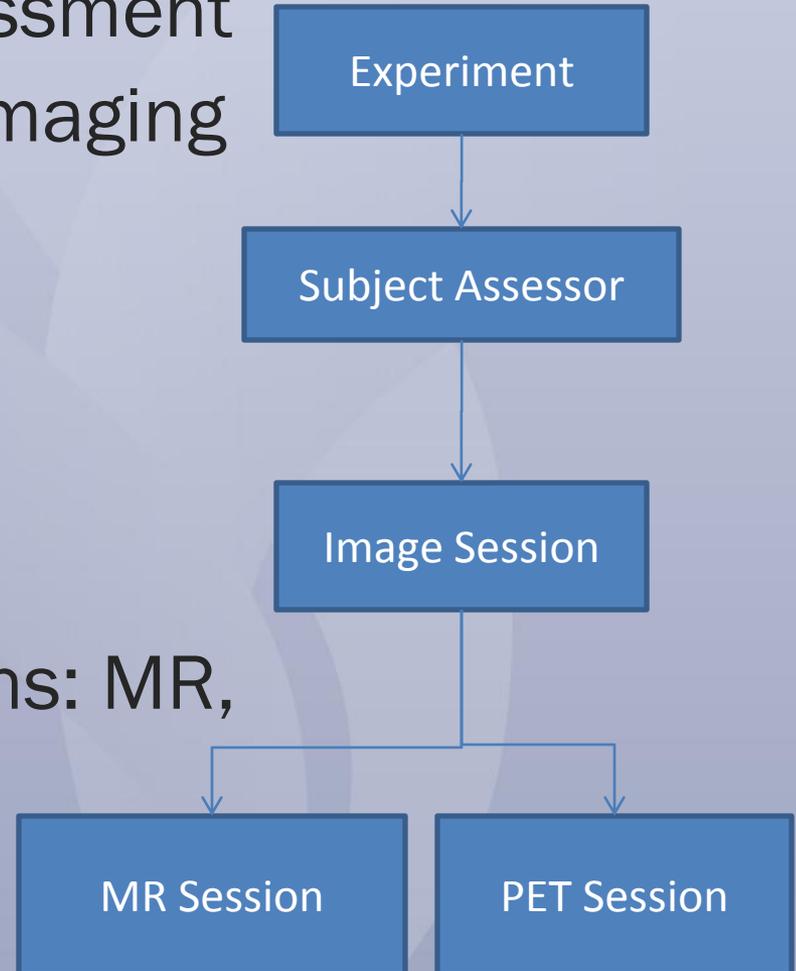
Project	Experiment

XNAT Data Hierarchy: Subject Assessors

- Extension of Experiment
- Events in which subjects participate
- Can be part of one or more projects
- Can be extended to represent custom events, tests, assessments, etc.

Experiment

Subject — Subject Assessor

XNAT Data Hierarchy: Image Sessions

- Extension of Subject Assessment
- References files from an imaging session
- Includes:
  - Scans
  - Reconstructions
  - Assessments
- Modality specific extensions: MR, PET, CT, etc.

```
Experiment
    |
    v
Subject Assessor
    |
    v
Image Session
    |
    +---------+---------+
    v                   v
MR Session          PET Session
```

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XNAT Data Hierarchy: Scans

- Individual series within a scanning session
- Produced from imaging scanner
- Simple reconstructions of individual scan
- Extended by MR Scan, PET Scan, etc.

Image Session — Scans

XNAT DATA Hierarchy: Reconstructions

- Reconstructed versions of multiple scans
  - Examples:
    - Averaged scans

Image Session —— Reconstructions

XNAT Data Hierarchy: Image Assessors

- Assessments of imaging sessions

- Extends Derived data (experiment)

- Models additional variables derived from processing

Experiment → Derived Data → Image Assessments

Image Session → Image Assessments
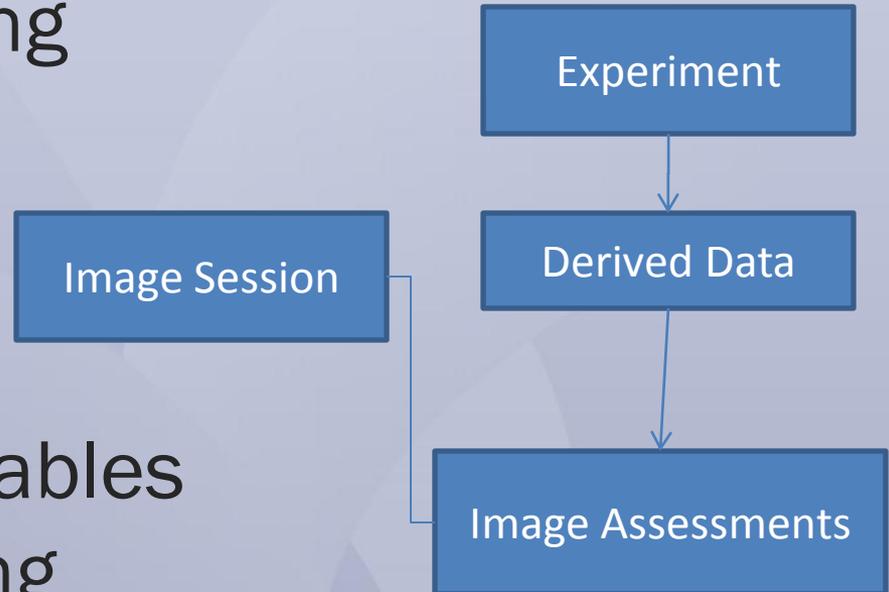
XNAT Data Hierarchy: Files

- Every level can have files associated with it
- Files are mapped to model using resources
- Resources can have multiple files
- Resources should have unique labels (at that level)

Resource	Image File

XNAT Data Hierarchy: Extensibility

- XNAT is built on an extensible data model
  - XNAT is built using extensions:
    - Subject assessor extends experiment
    - Image session extends subject assessor
    - MR session extends image session
  - Administrators can add their own customizations
    - Works best if you extend expected places:
      - Subject assessors
      - Image assessors
    - Reference files using existing resources

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Access Control

- How do we govern access to data?
  - Ownership
  - Project Roles
  - Management interfaces

Access Control: Ownership

- Ownership vs Sharing
  - Subjects and experiments are owned by one project
  - Can be shared into other projects
  - Convenient for modeling multi-site studies or umbrella projects.

Access Control: Projects

- Access controlled by relationship to projects
- Project Roles
  - Owners
  - Members
  - Collaborators

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Access Control: Management

- Project Access Management
  - Admin control
    - Site Admin adds users to projects
    - Comparison to 1.3 system (admin only)
  - Owner control
    - Owner adds users to projects
    - Invitations
      - Site Users
      - Non-site users

Access Control: Management

Security structure

- Users
- User groups
- Registered data-types
  - List of important data-types in your site
  - Navigation structure will dynamically support these.
- Permissions
  - Can be defined on user or user groups.
  - Directly related to registered data-types

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Data types

- ## What is a data type?
  - Format defined in schema which data must correspond to.
- ## Why register data types?
  - Limit available data types
  - Security, Search, Browse
  - Customizing actions
    - reports
    - listings

Data Types

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xdat:element_security element_name="xnat:mrSessionData" secondary_password="0" secure_ip="0" secure="1" browse="1" sequence="1" quarantine="0" pre_load="0" searchable="1
secure_create="1" secure_delete="1" accessible="1" singular="MR Session" plural="MR Sessions" code="MR">
    <xdat:primary_security_fields>
        <xdat:primary_security_field>xnat:mrSessionData/sharing/share/project</xdat:primary_security_field>
        <xdat:primary_security_field>xnat:mrSessionData/project</xdat:primary_security_field>
    </xdat:primary_security_fields>
    <xdat:element_actions>
        <xdat:element_action element_action_name="xml" display_name="View XML" sequence="2" image="r.gif" grouping="View"/>
        <xdat:element_action element_action_name="edit" display_name="Edit" sequence="0" image="e.gif" popup="never" secureAccess="edit"/>
        <xdat:element_action element_action_name="Viewer" display_name="View Images" sequence="3" image="v.gif" popup="always" grouping="View"/>
        <xdat:element_action element_action_name="xml_file" display_name="Download XML" sequence="7" image="save.gif" grouping="Download"/>
        <xdat:element_action element_action_name="email_report" display_name="Email" sequence="8" image="right2.gif" popup="never"/>
        <xdat:element_action element_action_name="download" display_name="Download Images" sequence="10" image="download.gif" popup="always" grouping="Download"/>
    </xdat:element_actions>
</xdat:element_security>
```

XNAT

XDAT: Permissions

- Permissions are mapped between data types and groups/users based on values in xml documents.
  - Primary security fields
  - Element Access elements
    - User and Group
  - Key Values
    - Project IDs

XDAT: Permissions

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xdat:UserGroup ID="TEST_owner" displayName="Owners" tag="TEST">
    <xdat:element_access element_name="xnat:projectData">
        <xdat:permissions>
            <xdat:allow_set method="OR">
                <xdat:allow field="xnat:projectData/ID" field_value="TEST" create_element="1" read_element="1" edit_element="1" delete_element="1" active_element="1" comparison_type="equals"/>
            </xdat:allow_set>
        </xdat:permissions>
    </xdat:element_access>
    <xdat:element_access element_name="xnat:crSessionData">
        <xdat:permissions>
            <xdat:allow_set method="OR">
                <xdat:allow field="xnat:crSessionData/project" field_value="TEST" create_element="1" read_element="1" edit_element="1" delete_element="1" active_element="1" comparison_type="equals"/>
                <xdat:allow field="xnat:crSessionData/sharing/share/project" field_value="TEST" create_element="0" read_element="1" edit_element="0" delete_element="0" active_element="1" comparison_type="equals"/>
            </xdat:allow_set>
        </xdat:permissions>
    </xdat:element_access>
    <xdat:element_access element_name="xnat:mrSessionData">
        <xdat:permissions>
            <xdat:allow_set method="OR">
                <xdat:allow field="xnat:mrSessionData/project" field_value="TEST" create_element="1" read_element="1" edit_element="1" delete_element="1" active_element="1" comparison_type="equals"/>
                <xdat:allow field="xnat:mrSessionData/sharing/share/project" field_value="TEST" create_element="0" read_element="1" edit_element="0" delete_element="0" active_element="1" comparison_type="equals"/>
            </xdat:allow_set>
        </xdat:permissions>
    </xdat:element_access>
    <xdat:element_access element_name="xnat:rfSessionData">
        <xdat:permissions>
            <xdat:allow_set method="OR">
                <xdat:allow field="xnat:rfSessionData/project" field_value="TEST" create_element="1" read_element="1" edit_element="1" delete_element="1" active_element="1" comparison_type="equals"/>
                <xdat:allow field="xnat:rfSessionData/sharing/share/project" field_value="TEST" create_element="0" read_element="1" edit_element="0" delete_element="0" active_element="1" comparison_type="equals"/>
            </xdat:allow_set>
        </xdat:permissions>
    </xdat:element_access>
    <xdat:element_access element_name="xnat:ctSessionData">
        <xdat:permissions>
            <xdat:allow_set method="OR">
                <xdat:allow field="xnat:ctSessionData/project" field_value="TEST" create_element="1" read_element="1" edit_element="1" delete_element="1" active_element="1" comparison_type="equals"/>
                <xdat:allow field="xnat:ctSessionData/sharing/share/project" field_value="TEST" create_element="0" read_element="1" edit_element="0" delete_element="0" active_element="1" comparison_type="equals"/>
            </xdat:allow_set>
        </xdat:permissions>
    </xdat:element_access>
    <xdat:element_access element_name="xnat:megSessionData">
        <xdat:permissions>
            <xdat:allow_set method="OR">
                <xdat:allow field="xnat:megSessionData/project" field_value="TEST" create_element="1" read_element="1" edit_element="1" delete_element="1" active_element="1" comparison_type="equals"/>
```

XNAT

Admin: User management

- Self-registration, Auto-creation vs Admin-creation

- Enabling
  - All users must be enabled for the account to be useable
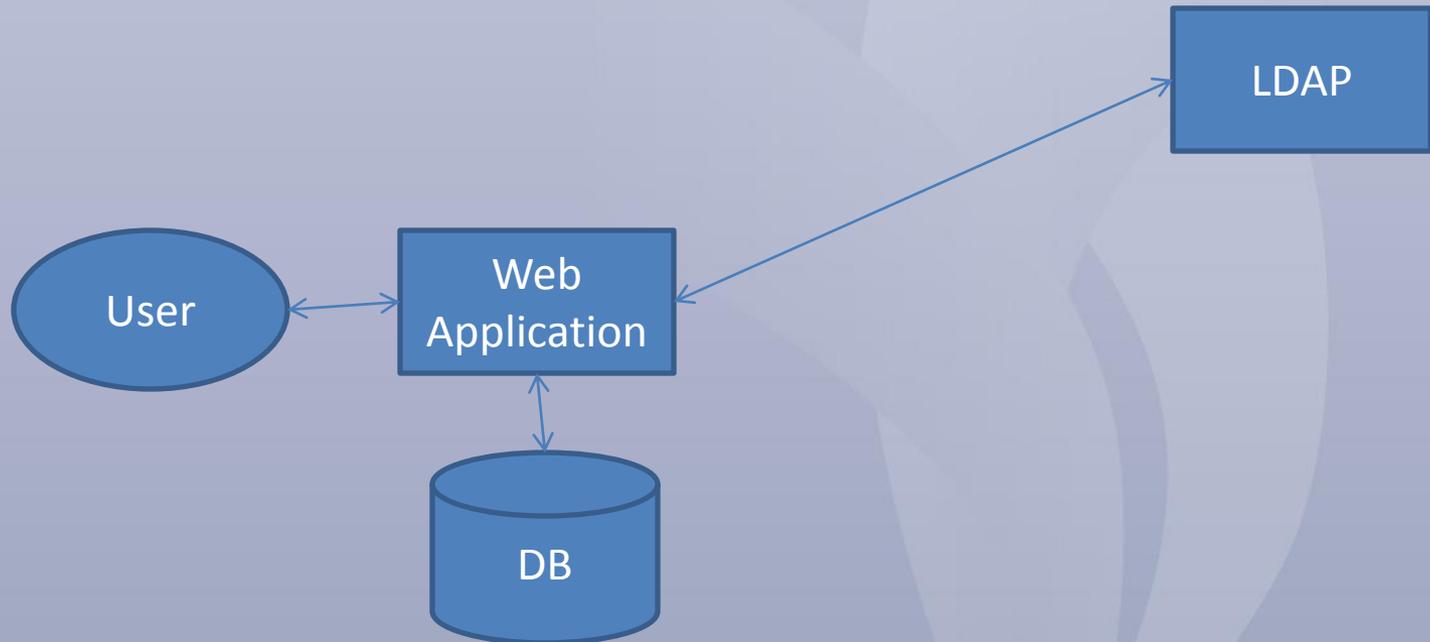 - This can be turned off

- Project access

Authentication

- How standard authentication works
  - User:password validated against internal dbUsers auto-created from data in external server

Authentication: LDAP

- How LDAP authentication works
  - User:password validated against external server

Authentication: Future

- Ideas for new implementations
  - Shibboleth
  - OAuth
  - CaGRID

Admin: More Options

Admin: More Options (2)

- Explain each link

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Maintenance

- Cron jobs
- Backups
  - Database (pg_dump)
  - File system (RSNAPSHOT,RSYNC)
- Clean-up
  - Logs
  - Cache
    - DELETED
    - Project cache
  - Pre-archive

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Trouble shooting

- Report a Bug
  - Added in XNAT 1.4
  - Sends email to site administrator including:
    - Descriptions
    - Site info (versions)
  - Can be forwarded to XNAT team

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Troubleshooting: Logs

- webapps/PROJECT/logs/
  - access.log (log of user activity)
  - turbine.log (log from turbine framework)
  - velocity.log (log from parsing VM files)
  - xdat.log (common XNAT log)
  - application.log (log for XNAT addons)
  - sql.log (log of problems with database)
- TOMCAT_HOME/logs/
  - Catalina.out   (System.out from server)

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Troubleshooting: Debugging

- Determine if the problem is repeatable
- Review the system logs (xdat, application, catalina)
- Review the discussion group
- Contact the XNAT Team
  – Report a bug

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Common problems

- Memory issues
  - Recommend > 512MB
- Site URL
  - Should match users accessible address
- Pipelines
  - Application.log
- SMTP
  - Currently needs un-authenticated SMTP server

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Questions

- ???

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