

Roadmap

Looking toward the XNAT future









Presenter: Kate Alpert, Flywheel

Sr Director of XNAT Product and Engineering at Flywheel Has worked with XNAT since 2008, first at Northwestern University customizing for targeted data science workflows; later with Radiologics, Inc. and Flywheel on core application Bummed that London precip is not currently in her preferred frozen form 🌌

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Agenda

What will we cover in this talk?

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- Review the XNAT roadmap
 - Near-term focus
 - Features
 - NFRs
 - Over the next 4 years of the R01
 - Architecture
 - Integrations
 - Apps
- Hear from you!
 - Interactive discussion
 - Feedback form









Flyvheel

Near-term focus

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Features aimed at extensibility for the end-user





...and NFRs to ensure quality



≜UC







XNAT & eXtensibility

A bit of history

XNAT: eXtensible [Neuro]imaging Archive Toolkit

- Through v1.6,
 - Customizations required developers to fork XNAT core and/or the pipeline engine and struggle through a potentially complex, manual merge process to upgrade
 - User-facing customizations available around naming, default searches, custom variables, permissions, etc.
 - As of v1.7,

- Spring integration supports plugin injection, allowing developers to maintain isolated repositories for their customizations thereby reducing burden of updating core (but plugins are not aware of one another)
- Container service offers end-users the ability to dynamically configure processing launch UI from json configuration and leverage any published container image for processing
- As of v1.8,

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Event service facilitates user-configured actions in response to application events (e.g., creating a project, archiving a session, etc.)

Features

Day 3 emerging feature demo teasers ahead!













Custom forms MVP

- WYSIWYG form builder from form.io
 - (json also supported)
 - Dynamically-typed data collection
 - No more xml modifications or clunky custom variables
 - Still must "hang" on an existing data type
 - Fully dynamic data type management is in the works
 - Federation-ready

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Jupyter notebook integration MVP (IC3R @ WUSTL with support from Flywheel)

- Launch and manage notebooks straight from XNAT, stage data, do science!
 - xnatpy (Erasmus MC)

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• Leverage notebooks to quickly prototype custom UI

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Viewer enhancements (ICR/NCITA team with support from Flywheel)

- Measurement service
- MONAI Label integration
 Metadata crawler performance optimizations















Coming soon(ish)!

Viewer enhancements cont'd (ICR/NCITA team with support from Flywheel)

- More activities in 3D
- In-viewer forms

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Microscopy support







ICR The Institute of Cancer Research

±UC





...and more

Unified OpenID plugin Integrating AIS core, PKCE support, and 0 streamlined UI customization MONAI template container for use with XNAT-ML (IC3R @ WUSTL) "Pick your framework" 0 Additional k8s feature support in CS \bullet PVC, images labels -> node constraints, in-app management Anonymization profiles in DicomEdit Imports, conditional blocks, 0 federation-ready

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Nonfunctional Requirements



I TOO LIKE TO LIVE DANGEROUSLY

made on imgur













Coming soon(ish)!

Nonfunctional requirements

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Tackle some tech debt

- Enhanced horizontal scalability Ο
- Dependency updates (Spring, etc) 0
- Performance optimizations 0
- Enhance our automated test suites
 - Performance tests 0
 - **REST** tests
 - Selenium tests 0
- Streamline deployment
 - K8s helm chart (AIS)
 - Dev and prod 0









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Coming soon(ish)!

Nonfunctional requirements, cont'd

- Improve instrumentation & metrics collection
- Optimize the SDLC (FWE)
 - Monorepo
 - Robust Cl
 - TBD branching model, moving toward CD
 - Increase release cadence
 - MVP

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Feature flags
 Path for community contributions

DEVOPS LIFECYCLE













These near-term advancements are made possible by numerous valuable collaborations and contributions.

In particular, we would like to acknowledge work from the IC3R @ WUSTL, ICR/NCITA, AIS, and Erasmus Medical Center, as well as funding and support from Flywheel's commercial clients, and efforts from the entire Flywheel team.

We are thrilled to have such a vibrant community!













The Future













What are our longer term goals?

• Modernize the XNAT platform architecture

- Simplify the XNAT codebase
- Enable faster development cycles
- Improve maintainability, security, scalability, and performance
- Expand XNAT core capabilities
 - Focus on integrations
- Develop new XNAT capabilities
 - Leverage integrations
- Support and grow the XNAT community











Modernize the XNAT platform architecture

• UI overhaul

- New archive management service
 - Abstract storage (file, object, perhaps more!)
 - Direct database tracking, no more catalog files
 - Improved versioning
 - Billing
 - Native zip support
 - New database management service
 - Replace XFT with a standard ORM (e.g., Hibernate)
 - Explore database technologies (horizontally scalable relational database, noSQL, graph, etc.)

Multiprovider compute

- Container execution across multiple providers and platforms (swarm, k8s, HPC, etc.)
- Access controls (and billing) by project, user, and container requirements
- Federation-ready

$Monolith \rightarrow microservices$

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• Scalable, reliable (isolated), flexible (independent services), maintainable, CD

Expand XNAT core capabilities

Facilitate integrations via flexible tooling

- Consistent, well-documented RESTful APIs

 DICOMweb

 Robust SDKs

 xnatpy! Erasmus MC
- Webhooks



ICR The Institute of Cancer Research

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Health+Bioscience

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Develop new XNAT capabilities

- User-facing worklists to streamline manual, task-oriented activities
 - E.g., rapid reader with hanging protocols
- Portable user workspaces for cohort building, exploration, and processing
 - Filter and snapshot
 - Lessons learned in XNAT-ML dataset builder
- Orchestration/workflow engine supporting complex, multistage pipelines including human-in-the-loop tasks
- Productivity applications that bring it all together for a streamlined, targeted UX
 - E.g., ML Studio

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Support and grow the XNAT community



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Outreach

- Hosting workshops and hackathons V
- Conferences
- Social media
- Documentation and support
 - Updated website & documentation
 - Moderating discussion group
- XNAT Academy
 - "Virtual Lab" courses
- Promote and integrate code and documentation contributions











Discussion & Feedback















What should be easier to do in XNAT?

















What should be easier to do in XNAT?

(i) Start presenting to display the poll results on this slide.

What is missing in XNAT?

















What is missing in XNAT?

(i) Start presenting to display the poll results on this slide.

Why do you use XNAT instead of another tool or platform?













slido



Why do you use XNAT instead of another tool or platform?

(i) Start presenting to display the poll results on this slide.

What's your favorite thing about XNAT?

















What is your favorite thing about XNAT?

(i) Start presenting to display the audience questions on this slide.

Roadmap feedback

We would love to hear from you!



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Health+Bioscience