What is XAL?

- Development environment for creating accelerator physics applications, scripts and services
  - Control room applications
  - Analysis applications

- Application framework

- Toolbox of Java packages

- Ant based build system (independent of IDE)

- Developed initially for the Spallation Neutron Source (SNS)

- Used in commissioning and running SNS
Collaboration

• Source Forge Project: xaldev
  – http://sourceforge.net/projects/xaldev
  – Source code managed using Subversion

• Dozens of developers among several sites
  – SNS, SLAC, BNL, JPARC, GANIL and others

• Contact us to participate
Development Requirements

• Java JDK J2SE 5
• Ant 1.7
• Your favorite editor or IDE
• Subversion client (if you want to share code)
Sample from Over Four Dozen Applications

• Orbit Correction
• Knobs
• Optics Measurement and Matching
• Quadrupole Shaking for alignment measurement
• Snapshot and Restoring conditions
• RF Cavity phase and amplitude setting
• Logging machine conditions
• Database browsing
• Virtual Accelerator
Toolbox

• Channel Access API abstraction wrapping JCA
• Correlator for correlating channel access events by time stamp
• Optimization
• Data Adaptor for object archiving
• Plotting
• Statistics Package
• Math packages
Accelerator Physics

• Accelerator device hierarchy
  – Object representation of accelerator hierarchy
  – Relational database -> XML -> object tree

• Online Model
  – Models the accelerator beam dynamics
  – Performs twiss function generation
  – Synchronizes with live machine, design or historical machine snapshots
Application Development

• Application Framework
  – Consistent look and feel
  – Document based applications
  – Pre-baked modern application features

• Bricks GUI Builder
  – Rapid visual development of user interfaces
  – Model-View-Controller compliant
  – Integrates with application framework
  – Supports compile-free application development with scripts (jython or jruby)
Recent Core Developments

• Adopt JRuby for scripting
  – [http://jruby.codehaus.org](http://jruby.codehaus.org)
  – more powerful alternative to Jython

• Menu and toolbar items gain standard icons

• Automatic Copy, Cut and Paste support for any control with drag and drop support

• Bricks user interface builder

• Support for site specific devices
Recent Applications and Scripts

• Magnet Cycling
• Ring Tune Monitor
• Loss Viewer II
• RF Simulator
• Quad Shaker
• Lab Book
Current Development Efforts

• Significant improvements to the Online Model
• Support for rolled magnets and alignment errors
• Distributed agent based services
• Configuration Management
• Support for full featured scripted applications
• Generate both web and Java user interfaces from the same Bricks description
• Adding new features to existing applications
• Bug fixing
**XAL 2**

- **Fresh effort**
  - Borrow XAL technology and concepts that work
  - Rewrite code from scratch as necessary
  - Parallel to XAL effort

- **Cross Site compatibility**
  - Work closely with collaborators to design XAL for compatibility across laboratories

- **Long Term development (no timeline)**

- **Source Forge Project: xal2**
  - [http://sourceforge.net/projects/xal2](http://sourceforge.net/projects/xal2)

- **Chris Allen is leading this effort**
XAL Course

• USPAS course on “Control Room Accelerator Physics” is being offered
  – Will use XAL extensively
  – June 23 - 27, 2008