NIF Electronic Operations (NEO): Improving Productivity With IPAD Application Development

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What are NIF Electronic Operations (NEO)?

NIF has many procedures for the installation of hardware in the target chamber.

Electronic Operations is the conversion of these procedures to a tablet based format.

Why use Electronic checklists?
• Eliminate errors and overhead caused by manual entry.
• Reduce amount of paperwork staff need to carry in the field.
• Integration with other NIF software to automate manual tasks.
• Provide reporting on execution times and archiving of results.

NEO tablet based procedure execution has improved efficiency and the accuracy of results.
Procedure Execution and Administration

• Execute checklists on the iPad or through a web application
• Review previously executed checklists through the web application
• Application integration
  — Ability to communicate and complete workflow steps with other systems triggered by completion of a checklist.
  — Eliminates overhead and errors in manually updating these tasks.
• Configuration management (CM)
  — NEO plugin architecture integrates with any CM system
  — NEO and CM ensures that only the latest valid checklist is being used in the field.
• Detailed reporting on executed checklists
  — See average completion times per step or group of steps over a given date range.
  — Drill down into individual checklist execution times.
  — See number of executed procedures.

The Web based administration application handles procedure maintenance and metrics. The iPad handles execution only.
Checklist Features

• Works without a network connection.
  — Needed in the facility where wireless is spotty.

• Checklist author can:
  — Define step inputs / input type (checkbox, text, image, serial # ref, etc.)
  — Reference other step inputs for equations.
  — Define images displayed in a step.
  — Make a step jump to another sub-checklist.
  — Require comments if a step is skipped.
  — Group steps into categories for reporting purposes.

• Checklist users can:
  — Execute steps out of order.
  — Add optional comments to a step.
  — Take images with iPad camera and attach to a step as a comment.
  — Transfer checklists between devices (workstation or iPad).
    — Only one device may have the same checklist instance.

Checklist have a rich set of features and meet the business needs of a variety of groups.
NEO Checklist Management

- New checklist revision is uploaded to NEO or CMS.
- Once a checklist is managed by CM it cannot be modified through NEO.
- Old version is retained for reporting purposes.
- Checklist instances and reporting is done through NEO web application.
NEO Checklist Execution

- Checklist definitions are downloaded to device.

- Device creates a checklist instance and updates the server as it is executed.

- IPad operates in disconnected mode for when network connection is spotty.
Application Architecture

• iPad
  — Native application written in Objective C.
    – Alternative frameworks were jQuery mobile, Cordova.
    – Went with Native app for camera access and best user experience.
  — Local data model defined in Core Data.
  — Communicates with RESTful services.

• Web
  — jQuery client backed by Jersey RESTful services.
  — Service endpoint for iPad operations.
  — Spring/JDBC used to store checklist model in Oracle database.

The use Objective C and jQuery provided the best user experience on the iPAD and in the Web application
Future Work

• Add support for redlines
  — Allow expert users to mark aspects of a checklist as outdated if conditions have changed in the field.

• Modify NEO so that it can be used for other projects, internal and external to NIF and perhaps even LLNL.
  — Remove integration with NIF specific systems.
  — Make integration with external software more pluggable and generic.

• Questions or interest in NEO?
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