Software Update
CMAST
March 2015

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Smart Clients

- NFRC introduced the plan for using a Smart Client approach to remodeling CMAST
- A Smart Client is well-developed method for seamlessly connecting an end user to server-based applications (like CMAST)
- A Smart Client is an Internet-connected device that allows the user's local applications to interact with server-based applications through the use of Web services.

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Smart Clients

- Smart clients are distinguished by key characteristics:
  - They support work offline. Smart clients can work with data even when they are not connected to the Internet (which distinguishes them from browser-based applications, which do not work when the device is not connected to the Internet);

Smart Clients

  - Smart client applications have the ability to be deployed and updated in real time over the network from a centralized server;
  - Smart client applications support multiple platforms and languages because they are built on Web services;

- Smart client applications can run on almost any device that has Internet connectivity, including desktops, workstations, notebooks, tablet PCs, PDAs, and mobile phones.

Smart Sync

- The first Smart Sync client release of CMAST was released to NFRC staff for testing and evaluation in December 2014
- Although it took longer to complete the first release, the resulting application provides broader capability than initially designed

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Smart Sync

Smart Sync deliverable provides the following:

- Centralized data transfer, designed to provide a new base design for future upgrades to CMAST
- Faster, batch-oriented component and assembly submissions and approvals
  - decoupling of the submission workflows from the previous synchronization workflow

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Smart Sync

- Faster modeling time as users have a more ‘a la cart’ experience, allowing them to choose only components and assemblies needed for current modeling activities
- Time savings during submission of Frame Components, Spacer Components, Glazing Components, and Product Validations in batch via the Smart Synchronization Client, rather than ‘one at a time’ via workflow in the original CMAST Client
- Better insulation from errors, as many additional validations were added to the Smart Synchronization Client to protect against existing, inconsistent data

Smart Sync

- Database Improvements:
  - Analysis was completed to improve adherence to best practices in database design and data retrieval
  - The server database identifier keys were improved to increase data retrieval and storage speeds
  - New database communication models were introduced to reduce timeout errors and improve efficiency

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Smart Sync

- A smaller/leaner client modeling database which provides:
  - Faster loading and selection of component lists
  - Removal of dependence on the current ‘all in one’ synchronization model
  - Faster upload and download transfer speeds between server and client
  - The ability to start with a client database that doesn’t have to be pre-synchronized, removing the need for periodic releases to deliver glazing data.

Challenges and Discoveries

- Analysis, design, and development related to the new Smart Synchronization Client, server and client database improvements, and the Original CMAST Client began in the fall of 2013.
- Challenges were anticipated, but not to the degree with which they were actually encountered.
- The system analysis that was previously performed in 2011 highlighted deficiencies in documentation and best practices, and an out of date coding base.

Challenges and Discoveries

- No documentation that clearly outlined the mapping between client and server database schemas
- Client and Server databases have different relationships between tables storing similar data (e.g. data stored in 5 tables in the client may be stored in 3 tables in the client database)
- Database key fields that exist in many client database tables have no counterpart in the Server database, necessitating those keys being created ad hoc, during import of data from the server

Challenges and Discoveries

- Many values were stored differently in the client database than they were in server database, requiring bidirectional translators to be written for the various data types found throughout almost every database table, in varying combinations.
- Where various client side values are noted as character, the specific characters differed from table to table, thus requiring special translators for each type. These translators were needed in hundreds of locations.

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Challenges and Discoveries

- Date fields that were inconsistently encoded
- String encoded GUIDs were inconsistently encoded both with and without dashes (‘-‘)
- Random null values require general null data protection during data retrieval

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Challenges and Discoveries

- Component and Assembly submissions are dependent on current synch upload process
  - The Smart Synchronization Client design was designed for component transfer only. Once it was determined that the component and assembly approval submissions were dependent on the current/old synchronization process, the design had to be modified and the workflow adjusted to accommodate this functionality
  - The Smart Synchronization Client was designed initially to be role agnostic, but component and assembly submissions are role dependent. This required additional software controls in order to expose submission controls only to desired roles

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Challenges and Discoveries

- The old synchronization model is unsustainable as the database size increases
    - Synchronization was taking longer and longer as more and more entities were added to the database
    - As a result, more and more timeout errors were occurring
- The new synch model was incompatible with the old synch model by design
- When discoveries were made that component submissions were tied to synchronization, the Smart Synchronization Client had to be modified to account for this change in workflow, while maintaining separation of synchronization and submission functions

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Challenges and Discoveries

- Source files were encoded before storage sometimes
  - Image, THERM, THERMX, and other key files were impacted
  - Files are not encoded before storage in the client database
  - Files are encoded when stored in the server database
  - Encoder/decoder methods needed to be translated from the original CMAST Client source code written in Objective Pascal and rewritten in C#

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When?

- Over the next few weeks all of the rework required by staff discoveries will be completed.
- Then, multiple NFRC staff will do a complete regression test
- Some power users will be invited to participate in user acceptance testing
- Manuals will be updated and a training session prepared and scheduled before Production is updated

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Future Plans

Remaining deliverables in the Project:

- Calculation changes (Window/Therm 7)
- Bid Report updates and centralization
- Batch Approval changes
- Documentation Trail Audit
- Statistical Auditing

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New Platform

- Many of the original 192 issues/bugs/feature requests identified in the original CMAST have been subsumed by this project and by better management
- Smart Sync release will provide a new benchmark from which to move forward
- 3 to 6 months of experience and task group meetings to begin planning

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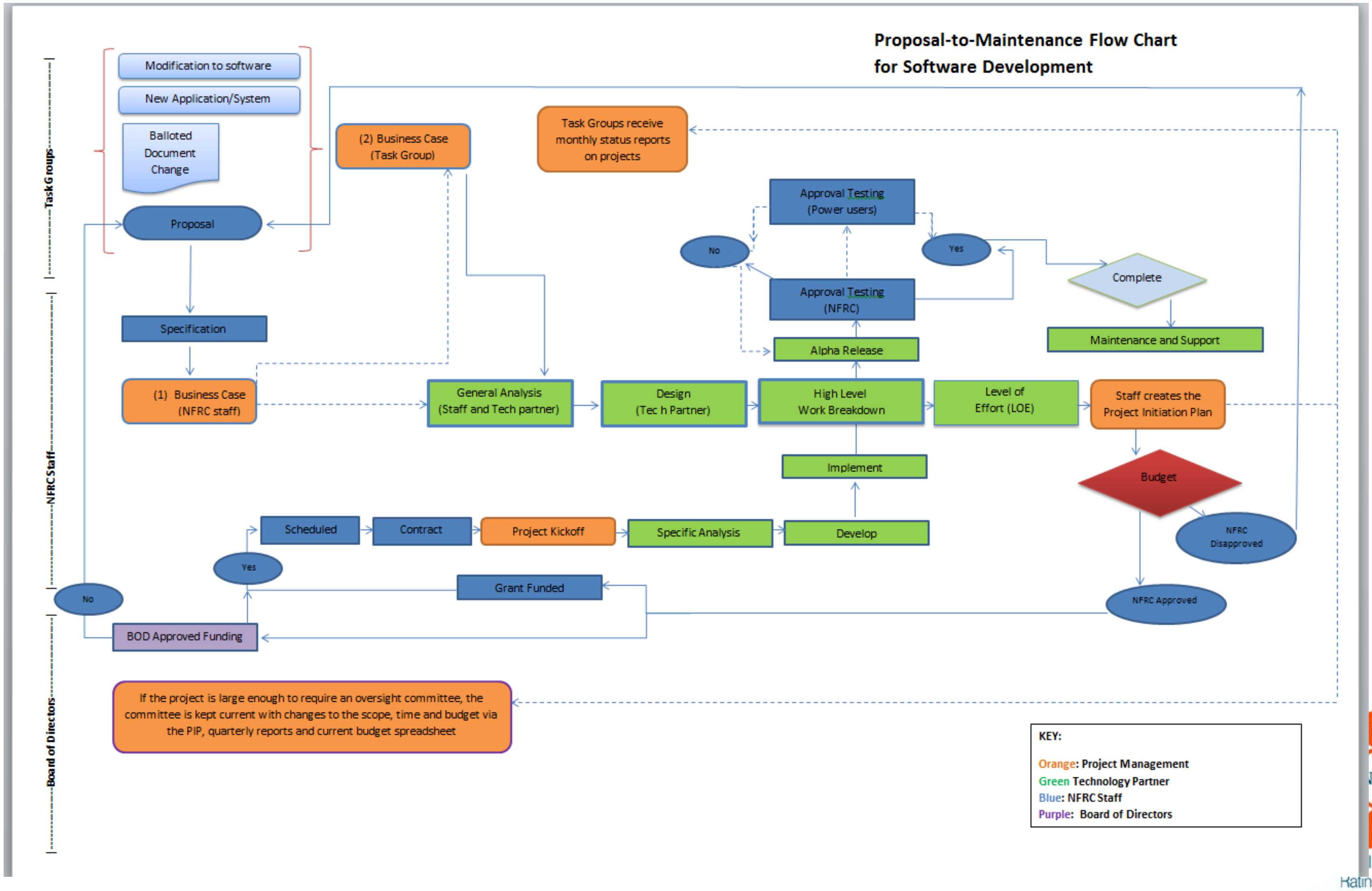
Proposal to Maintenance Flow


Proposal-to-Maintenance Flow Chart
for Software Development
Task Groups
NFRC Staff
Board of Directors
Modification to software
New Application/System
Balloted Document Change
Proposal
(2) Business Case (Task Group)
Task Groups receive monthly status reports on projects
Approval Testing (Power users)
No
Yes
Complete
Approval Testing (NFRC)
Alpha Release
Maintenance and Support
Specification
(1) Business Case (NFRC staff)
General Analysis (Staff and Tech partner)
Design (Tec h Partner)
High Level Work Breakdown
Level of Effort (LOE)
Staff creates the Project Initiation Plan
Implement
Budget
NFRC Disapproved
Scheduled
Contract
Project Kickoff
Specific Analysis
Develop
Yes
No
Grant Funded
NFRC Approved
BOD Approved Funding
If the project is large enough to require an oversight committee, the committee is kept current with changes to the scope, time and budget via the PIP, quarterly reports and current budget spreadsheet
KEY:
Orange: Project Management
Green Technology Partner
Blue: NFRC Staff
Purple: Board of Directors