PROMISe III : FRED Dispense Interface

Technical analysis for FRED Dispense Interface at the conclusion of the Promise III Trial Period

16/11/2009

This report contains a breakdown of the design and workflow of the Fred Dispense User Interface and messaging system developed for the PROMISe III Trial; as well as a summary of the support and implementation issues that FRED faced during the three month Trial period. The report also includes a summary of recommendations and considerations for any future Promise projects and/or a national rollout.
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1.0 Promise III Performance Analysis

1.1 Design and Workflow

In line with the functional specification provided by UTAS, outlined in the document titled *Functional User Interface Aquarius –FRED [v18]11-05-09.doc*, the Promise III Interface has been developed to integrate seamlessly within the Fred Dispense application.

1.1.1 Promise III Messaging Architecture for Fred Dispense

The method of communication used to send data between a Fred Dispense pharmacy and the Promise III Repository is through the use of SOAP messaging (XML) from the Fred communications module (Fred Connect) to the Promise III Web Service (the Repository) over the Internet via SSL.

![Diagram of Promise III Messaging Architecture within Fred Dispense](image)

The diagram above illustrates the process of generating and sending script and intervention data from a Fred Dispense pharmacy to the Promise III Repository.

1. Scripts are dispensed, edited and cancelled; and Promise III interventions are created, edited and deleted on Fred Dispense terminals (including MAIN) within the pharmacy. Both script and intervention records are stored locally on Fred MAIN.

2. Depending on the action, the Fred Dispense terminal will also generate message submission records, containing all of the information required to construct a SOAP message, stored in Promise III message submission database on Fred MAIN.
The following is a list of actions that can be taken in Fred Dispense and the resulting submission records that will be generated:

<table>
<thead>
<tr>
<th>Action in Fred Dispense</th>
<th>Submission records generated on Fred MAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>a script is dispensed</td>
<td>SubmitScript</td>
</tr>
<tr>
<td>an existing script is edited</td>
<td>SubmitScript</td>
</tr>
<tr>
<td>a script is deleted</td>
<td>CancelScript</td>
</tr>
<tr>
<td>a script intervention is saved and submitted</td>
<td>SubmitPatient, SubmitScriptIntervention, SubmitScript for each script for patient in past 6 mths (if not already sent)</td>
</tr>
<tr>
<td>a non-script intervention for a known Dispense patient is saved and submitted</td>
<td>SubmitPatient, SubmitNonScriptIntervention, SubmitScript for each script for patient in past 6 mths (if not already sent)</td>
</tr>
<tr>
<td>a non-script intervention is created for an unlisted (OTC) patient</td>
<td>SubmitNonScriptIntervention</td>
</tr>
<tr>
<td>a script intervention is deleted</td>
<td>CancelScriptIntervention</td>
</tr>
<tr>
<td>a non-script intervention is deleted</td>
<td>CancelNonScriptIntervention</td>
</tr>
<tr>
<td>the Interventions Form is opened</td>
<td>RequestStats</td>
</tr>
</tbody>
</table>

3. Submission records for each Promise III message type are stored (and queued) on Fred MAIN for all terminals.

4. Every 2 hours, as a task, Fred Connect will interrogate the Promise III submission tables on Fred MAIN to check if any messages are available to send to the Repository.

If so, for each Promise III message type (and submission table), where submission records exist, Fred Connect will construct a SOAP message envelope (in XML) that includes up to 100 validated and converted records for that type. If more than 100 records exist, then Fred Connect will create multiple message envelopes for that type.

5. Fred Connect will then send that message envelope to the Promise III Repository Web Service.

Once Fred Connect receives an acknowledgement that the Repository received the message envelope, Fred Connect will delete those submission records from the submission tables.

If the acknowledgement is not received, or the message envelope is rejected by the Web Service, then the submission records will remain until the issue is rectified.

Note: After a RequestStats message is sent to the Repository, Fred Connect will process the response and place the returned “average intervention rate” value in the Promise III configuration table on Fred MAIN.
6. The SOAP message envelopes constructed by Fred Connect are sent to the Repository Web Service over the Internet using SSL encryption.

7. The Web Service on the Repository validates and processes each message envelope (containing up to 100 records), sends an acknowledgement or rejection back to the Fred Connect client (the pharmacy), and updates the Repository.

1.1.2 Promise III Activation/Deactivation

Activation/Deactivation consists of bringing up the Promise III Control Panel via the menu option in Fred Dispense and entering the unique activation code provided by UTAS.

Figure 2: Promise III Control Panel access via Menu

Figure 3: Promise III Control Panel - Activation and Deactivation
Notes:

• The activation code, provided by UTAS, also contained a value used to set a Randomisation group between 1 and 3.

• Upon deactivation, the user is prompted as to whether they want to convert all Promise III Interventions into Fred Dispense History Notes.

• Following Activation and a restart, Promise III functionality is enabled and made visible to the user in the form of Menu options and Toolbar buttons.

1.1.3 The Promise III User Interface (Creating an Intervention – Workflow)

The following is a breakdown of the workflow for recording an Intervention in Fred Dispense and submitting the Intervention to the Promise III Repository.

1.1.3.1 Opening the Intervention Form

Once activated, there were three ways to initiate a Promise III Intervention.

1. From the Fred Dispense menu: Activities->New Intervention Note...

![Create an Intervention - Menu](Image)

2. From the Fred Dispense toolbar...

![Create an Intervention – Toolbar](Image)

3. or from the application-wide hot key ALT+I
1.1.3.2 Creating a New Intervention

Upon creating a new intervention, the Promise III Intervention form is displayed to the user, in one of three modes.

1. Script Intervention (Dispense Patient known)

User has a current script in selected in Fred Dispense. Given this, by default the intervention is a Script Intervention, and the patient (as a consequence) is a known Dispense patient.

For a Script Intervention, Intervention details such as Patient name, Drug, Prescriber etc are pre-populated and cannot be changed. Patient gender and Age Range are pre-populated if known in Dispense; otherwise the pharmacist is prompted to select them. (See Fig. 5)
2. Non-Script Intervention (Dispense Patient known)

User has selected a patient in Fred Dispense, but has no current script. Alternatively, the user can enter a surname in the “Patient:” field and search for a Dispense patient.

For a Non-Script Intervention for a known patient, the patient’s gender and age range are pre-populated if they are known in Dispense; otherwise the pharmacist is prompted to select them. The pharmacist can optionally select a specific drug, or enter a brief description as to the reason for the intervention. (See Fig. 6)
3. Non-Script Intervention (Patient not known)

Where an intervention is created for a patient who is unknown to Dispense, the pharmacist can select “Unlisted patient” on the Intervention form, and enter a brief description of the patient to provide context.

Interventions for “unlisted” patients must be, by definition, Non-Script Interventions. As the patient does not exist in Dispense, the pharmacist is prompted to select the patient’s gender and age range. (See Fig. 7)

1.1.3.3 Intervention Details Entry

1.1.3.3.1 Script Intervention details

For a Script Intervention, the basic script and patient details are displayed on the Intervention Form and are pre-populated. If the gender and/or age range are not known in Fred Dispense, then the pharmacist is prompted to select them.

The pharmacist raising the Intervention is also prompted to enter their initials, which are validated against the initials database in Dispense.
1.1.3.3.2 Non-Script Intervention details

For a Non-Script Intervention, the intervention may or may not be for a known Dispense patient.

**Known patient:**
If so, and the patient has already been selected in Dispense, the patient name, gender and age range will be pre-populated. If the gender and/or age range are not known in Dispense, then the pharmacist is prompted to select them.
If the patient has not already been selected, the pharmacist searches for the patient by entering the patient name and selecting the patient from the Fred Dispense Patient Search Form.

**Unlisted Patient:**
If the patient is not known, then the pharmacist can check the “Unlisted Patient” checkbox and enter a brief description to identify the patient (see Fig. 9). This description is then used to identify the Intervention when browsing intervention lists.

Having selected the patient, the pharmacist can either select a relevant drug from the Dispense Drug List, or enter a free description indicating the reason for the intervention.

Again, the pharmacist raising the Intervention is prompted to enter their initials, which are validated against the initials database in Dispense.

1.1.3.3.3 Recording the intervention via the DOCUMENT model

The DOCUMENT model has been implemented in Fred Dispense as a tab control that the pharmacist can work through to define the type of intervention that was performed, the recommendations that the pharmacist has made, and the define the impact of the intervention.

To allow a pharmacist to quickly determine what mandatory information remains to be entered for the intervention, the title of the tab remains red where required information is missing; and turns to green when all required information has been entered.

Further, as the pharmacist moves forward through the field order, the current tab will change automatically to mirror the workflow from left to right.
The tabs, and subsequently the workflow, have been broken down as follows.

1. **Categories:**
The Categories tab allows the pharmacist to select the appropriate Category and Classification (subcategory) codes, as defined by the DOCUMENT model. The Pharmacist MUST identify the appropriate category (on the left), and then the most appropriate Classification (on the right).

2. **Recommendations**
The Recommendations tab allows the pharmacist to select from one to four Recommendation codes, as defined by the DOCUMENT model, to describe the recommendations they’ve provided the patient. Note: At least one Recommendation code MUST be selected.

   The list on the left is the set of available Recommendation codes, and the list on the right indicates the codes that have been selected for the current intervention.

---

**Figure 11:** DOCUMENT model - Category and Classification

**Figure 12:** DOCUMENT model – Recommendations
3. **Significance**

The Significance tab allows the pharmacist to select a Significance code, as defined by the DOCUMENT model, to indicate the impact of the intervention. **ONE Significance code MUST be selected.**

At this point the pharmacist can also enter any Medical Conditions or Allergies relevant to the intervention as free text.

![Figure 13: DOCUMENT model - Significance](image)

4. **Extra Information**

The Extra Information tab (and field) allows the pharmacist an opportunity to provide any further free text information they feel necessary to explain or document the intervention.

At this point, the pharmacist has completed all required information and is prompted to indicate how much time they’ve spent on the intervention.

The Extra Information tab doesn’t form part of the DOCUMENT model, but is the logical next step in the entry of an intervention and has, therefore, been included as part of the DOCUMENT tab control – more so due to workflow considerations than anything else.

**NOTE:** If the pharmacist has selected either “S3-Prevented or required a GP visit” or “S4-Prevented or required a hospital admission” on the Significance tab, then they MUST provide further information in the Extra Information field.
1.1.3.3.4 DOCUMENT Model Help Panel

Each tab within the DOCUMENT tab control has its own context sensitive Help panel that displays three types of help information for the DOCUMENT code that they have currently selected.

Content for the Help system was provided by UTAS.

The four help categories are:
- When to use
- Examples
- When NOT to use
- Category description (Categories tab only)

The visibility of the Help panel can be turned on and off via the “Display Help Panel” checkbox, or CTRL+UP/CTRL+DOWN.

Figure 14: Extra Information

Figure 15: DOCUMENT Help Panel
1.1.3.5 DOCUMENT Model Help Form

In addition to the Help panel available on the Intervention form, a context sensitive Help Form exists that provides explanations and definitions for all available DOCUMENT model classification, recommendation and significance codes.

![DOCUMENT Help Form](image)

Figure 16: DOCUMENT Help Form

1.1.3.4 Saving the Intervention

Having entered some or all of the details for the intervention, there are two steps that can be taken to store the intervention and send the intervention to the Promise III Repository.

1.1.3.4.1 Saving as a Draft Intervention

If the pharmacist doesn’t have all required information or doesn’t have enough time to complete the intervention, at the time the intervention is created, the pharmacist can save the intervention as a Draft.

Saving an intervention as a Draft results in the intervention being stored locally at the pharmacy but it is not, at this point, sent to the Promise III Repository.
Once saved as a Draft, the Intervention will appear in the patient’s Alternate History in red (see Fig. 20) and, with the patient selected in Dispense, the Promise III Icon will turn red, indicating that Draft Interventions exist for the current patient.

![Figure 17: Saving a Draft Intervention](image)

1.1.3.4.2 Saving and Submitting an Intervention

Once all required details have been entered, the pharmacist can save the intervention and submit it to the Repository.

Submitting the intervention will save the Intervention locally at the pharmacy, but will also send the Intervention details to the Promise III Repository via a SOAP message sent via Fred Connect.

![Figure 19: Saving and Submitting an Intervention](image)

Once submitted, the Intervention will appear in the patient’s Alternate History in green (see Fig. 20) and, with the patient selected in Dispense, the Promise III icon will turn green, indicating that submitted interventions exist for the current patient.

![Figure 20: Submitted Interventions Icon](image)
Note: If any Draft Interventions exist for the patient, then the icon will stay red as per 1.1.3.4.1, and will only appear green if ALL interventions for the current patient have been submitted to the Promise III Repository.

Double clicking on an Intervention History Note in Alternate Patient History displays the intervention.

1.1.3.5 Selecting and Editing an Intervention
Once an intervention has been saved as a draft or submitted, it can be selected for editing – either via the main Dispense Menu:
or via the BROWSE buttons on the Intervention form:

![Figure 23: Browse Interventions - Form Buttons](image)

Either option will bring up a filtered Browse window displaying all relevant interventions, depending on the option selected.

![Figure 24: Browsing all Interventions](image)

After selecting the required intervention from the list, F4 will select the intervention and display it in the Intervention Form to be edited.

Once modifications have been made, the pharmacist can, again, elect to save the Intervention as a Draft or save it and submit the Intervention to the Promise III Repository.
1.1.3.6 Deleting, Clearing or Cancelling an Intervention

At the bottom of the Intervention form, in addition to the save/submit buttons are three buttons: Clear, Delete and Cancel

Clear: This button will clear the Intervention Form and allow a pharmacist to enter a new non-script intervention. If the current intervention is not saved, then changes will be lost.

Delete: This button will logically delete the Intervention from Dispense and also send a message to the Promise III Repository to delete the Intervention.

Cancel (or ESCAPE key): This button will close the Intervention Form without saving the current Intervention.

1.1.3.7 Consumer and Health Professional Intervention Records

Once all required details have been entered for an intervention, the pharmacist is able to print out a record of the intervention – either for the patient (consumer), or for the patient to take back to their doctor (health provider).

The Intervention Record contains the patient’s details as well as classification and recommendations information from the DOCUMENT model, and any notes from the pharmacist pertaining to the intervention.

Note: The intervention does not have to be completed or saved in order to print a CIR or HPIR, provided that all required information for the record has been entered.
1.1.3.7.1 Consumer Intervention Record (CIR)

**Figure 27: Example Consumer Intervention Record**

```
<table>
<thead>
<tr>
<th>Patient Details</th>
<th>Printed: 13 November 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name: CATHERINE FEGG</td>
<td>Gender: Female</td>
</tr>
<tr>
<td>Date of Birth: 12 June 1973</td>
<td></td>
</tr>
<tr>
<td>Prescriber: V/A</td>
<td>Drug / Description: IMPERATIVE TAB 12.5MG</td>
</tr>
</tbody>
</table>

**Intervention details**

(02): On review, the pharmacist found that this dose may not be the most ideal dose for you.

**Recommendation(s)**

(04): The pharmacist recommended an adjustment of the dose of your medication to a dose that is more suitable for you.

**Notes**

This intervention was undertaken on the basis of the patient's specific information available at the time.

Please see: Within: 3-6 weeks/months
```
1.1.3.7.2 Health Professional Intervention Record (HPIR)

**Patient Details**

- **Name**: CATHRINE PEGG
- **Date of Birth**: 15 June 1973
- **Gender**: Female
- **Prescriber**: IAA
- **Drug / Description**: OPENAMIKE TAB 125MG

**Intervention Category**

- **Category**: Problems relating to the prescribed dose or schedule of the drug
- **Classification**: Prescribed dose too low
- **Category Notes**: When the dose prescribed is either too low based on reference dose ranges or too low based on previous therapy. This includes situations where the dose due to be prescribed is less than or proportionately lower.

**Recommendation(s)**

- [ ] Dose decrease

**Notes:**

**Patient was advised to see:**

**Within:** days/weeks/months

This intervention was undertaken on the basis of the patient specific information available at the time.

**Figure 28: Example Health Professional Intervention Record**
1.1.4 Intervention Reports

Two types of reports can be generated to display information about interventions that a pharmacy has performed – a summary report and a detailed report.

The Intervention Reports interface can be accessed via the main menu in Dispense at any time:
Reports -> Intervention Reports

NOTE: Only interventions that have been submitted are used when generating an Intervention Report. Draft Interventions are ignored as they have not been finalised.

Figure 29: Intervention Reports - menu option

Figure 30: Intervention Reports - Parameter Form
1.1.4.1 Intervention Summary Report

An Intervention Summary Report displays a count of interventions, by DOCUMENT Category, matching the search criteria entered on the parameter form (see Fig. 29). The report also optionally displays a breakdown of interventions grouped by any of the available “Group By” fields.

The following example shows an Intervention Summary Report for all interventions created by example pharmacist KEITH GORDIJN, grouped by “Age Range”

![Image of Intervention Summary Report]

**Figure 31: Intervention Summary Report**
### 1.1.4.2 Detailed Intervention Report

A Detailed Intervention Report also displays a count of interventions, by DOCUMENT Category, as well as the details of each intervention matching the search criteria entered on the parameter form (see Fig. 29).

The following example shows the first page of a Detailed Intervention Report for all interventions created by example pharmacist KEITH GORDIJN.

![Detailed Intervention Report](image)

**Figure 32: Detailed Intervention Report**

---

**Table: Interventions by Category**

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>D - Drug Selection</td>
<td>0</td>
</tr>
<tr>
<td>D - Over or Underdose</td>
<td>3</td>
</tr>
<tr>
<td>C - Compliance</td>
<td>1</td>
</tr>
<tr>
<td>U - Underdressed</td>
<td>0</td>
</tr>
<tr>
<td>M - Monitoring</td>
<td>1</td>
</tr>
<tr>
<td>E - Education or Information</td>
<td>0</td>
</tr>
<tr>
<td>N - New Medication</td>
<td>0</td>
</tr>
<tr>
<td>T - Toxicity or Adverse Reaction</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total Interventions:** 5

---

**MATCHING INTERVENTIONS (ORDERED BY NAME)**

<table>
<thead>
<tr>
<th>Intervention ID: 001</th>
<th>Date of Intervention: 12/10/09</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Details</strong></td>
<td></td>
</tr>
<tr>
<td>Name: CATHRINE FEGG</td>
<td>Gender: Female</td>
</tr>
<tr>
<td>Date of birth: 13 June 1973</td>
<td></td>
</tr>
<tr>
<td>Prescriber: NA</td>
<td>Drug / Description: AMOXIL CAP 250MG</td>
</tr>
<tr>
<td>Intervention Category: Problems relating to the way the patient takes their medication</td>
<td></td>
</tr>
<tr>
<td>Classification: Taking too much</td>
<td></td>
</tr>
<tr>
<td>Category Notes: &quot;When the patient uses too much of a medication as a result of forgetfulness or lack of understanding of the instructions on the prescription&quot;</td>
<td></td>
</tr>
<tr>
<td><strong>Recommendation(s)</strong></td>
<td>(RI): Does Increase</td>
</tr>
</tbody>
</table>
1.1.5 Promise III Reminder Prompt

Each pharmacy was assigned a Randomisation Group (from 1 to 3) for the duration of the Promise III trial. The Randomisation group was set via the activation code when the pharmacy activated Promise.

If a pharmacy was in Randomisation Group 2 or 3, then the following prompt would be displayed at 11am and 3pm every day.

The prompt contains a button that allows the pharmacist to proceed directly to the Browse Draft Interventions form, to see a list of all interventions waiting to be completed.

![Figure 33: Promise III Reminder Prompt](image-url)
1.1.6 PPI Alert Message

Each pharmacy was assigned a Randomisation Group (from 1 to 3) for the duration of the Promise III trial. The Randomisation group was set via the activation code when the pharmacy activated Promise.

If a pharmacy was in Randomisation Group 3, then an alert message is displayed upon the selection of any high-dose PPI dug from the Fred Dispense drug tables.

The alert also allows the pharmacist to optionally print a PPI information leaflet for the patient, or for the patient’s GP (leaflet provided by UTAS).

![Figure 34: PPI Alert Message](image-url)
1.1.7 Promise III Repository Configuration (Fred Connect)

Messaging between Fred Dispense terminals and the Promise III Repository was centralised and coordinated by the Fred communications module, Fred Connect.

The design was such that Fred Connect was responsible for constructing and sending SOAP message envelopes of the various Promise III message to the Repository and handling any return messages. As a result, Fred Dispense terminals did not communicate directly with the Repository.

Configuration of the link between Fred Connect and the Repository was handled by the Promise III Configuration Tab in Fred Connect. (See Fig. 35)
1.2 General Performance

The Promise 3 User Interface worked seamlessly within Dispense, with most issues around the Promise interface in Fred Dispense revolved around communications with the Repository.

We did have a number of cases where Pharmacies were reporting a performance hit on the dispensing process when the Promise interface was active, but these issues were addressed during the course of the trial.

A number of scenarios presented themselves during the course of the trial that resulted in pharmacies temporarily losing connectivity with the Promise III Repository – which resulted in updates to both Fred Dispense, and the Repository. In all but one instance, the issues were addressed and messaging at those pharmacies continued where they had stopped, without loss of data.

Connection to the Repository was lost and unable to be reinstated for one pharmacy during the trial, as a result of a switch from standard http web-service calls to using message encryption via Secure Sockets Layer (SSL).

1.2.1 System Failures

As a result of an unresolved connection issues via SSL, one pharmacy unable to send data to the Repository for the duration of the trial, once the standard http interface to the Repository was switched off.

1.2.2 Support issues (identified problems)

- Slow down of Fred Dispense terminals reported as the trial progressed, when saving scripts.

  This came about as result of logically deleting, but not physically deleting, Script messages as they were generated and sent to the Repository.

  As a consequence, the script message tables continued to grow in line with script throughput of the pharmacy, causing a performance hit when a saving script and submitting it to the Repository. This issue was rectified during the trial.

- A handful of pharmacies reported performance issues in Fred Dispense, when dispensing scripts, that were unrelated to the script message issue mentioned above.

  While a reproducible case was unable to be generated – there were enough independent reports to verify that the performance issues were related is some way to the Promise interface.

  Without resolving the issue, early indications were that there was a performance hit when attempting to retrieve the original script dispense date for a repeat, which the pharmacy may or may not have dispensed. This date, if it can be determined, is sent to the Repository as part of the Script message, upon saving the script. Retrieving this date...
requires traversing back through the patient’s script history every time we save the script and can have an impact on performance for patients with large script histories.

- A bug was found in Fred Dispense related to a counter keeping track of the number of scripts that had been sent to the Repository during the trial. This figure was used in calculating the local intervention rate for pharmacy. Initially the counter was only able to store values up to 10000.

As a result, once a pharmacy reached this limit, Fred Dispense would fail when attempting to save a script. This was an issue for a handful of sites, and was addressed before the majority of sites reached this limit.

### 1.2.3 Connectivity (identified problems)

During the course of the trial, a number of sites periodically stopped sending data to the Repository. For all but one pharmacy, the issues were generally simple to overcome and, due to the way in which messages are queued when connectivity with the Repository isn’t available, no data was lost.

The following is a summary of the causes:

- **Control characters in Script submission messages (XML validation)**

  Due to an issue within Fred Dispense, unrelated to the Promise interface, random Control characters were being inserted into the Directions data for a script record. The Directions data then formed part of the XML based Script message that was sent to the Repository.

  These characters are not valid within XML which, as a consequence, would invalidate the Script message, and in turn, the Script message bundle (100 messages). Messaging would stop until the Directions data in the Script message table at each pharmacy were manually rectified.

  This issue was resolved during the trial, with a Fred Dispense update, and affected pharmacies were cleaned up by Fred Support and connectivity restored.

  This issue formed the bulk of the connectivity issues for Fred Dispense during the trial.

- **Updates to Fred Connect without the Promise 3 plug-in**

  During the trial, we had a few cases where connectivity with the Promise 3 Repository was lost as a result of the Fred communications module (Fred Connect) being updated by Fred Support, without including the optional Promise 3 plug-in, or failing to activate the plug-in.

  This occurred where the updates were applied manually, usually as the result of a hardware upgrade or failure, requiring a new installation of the Fred Connect software. Due to the circumstances, this was a rare event which occurred once for two or three sites during the trial.
Connectivity was restored at these sites once the plug-ins were installed and activated by Fred Support.

- **Submission Messages failing web-schema validation.**

  In some instances, connectivity between Fred Dispense clients and the Repository was halted due to a particular submission message failing the validation against the web schema for the Repository.

  Given the messaging architecture implemented for the trial, if a single message failed validation then the entire message envelope (up to 100 messages) would fail validation, but the message envelope would continue to be sent until the problem message was rectified. As a result, all other submission messages would be queued locally.

  While rare, this was usually the result of incorrectly formatted data forming part of the message, or the validation rules on the server being too restrictive to account for all possible scenarios. In both cases, the issues were rectified during the trial.

- **Inability to access Repository via SSL**

  As mentioned previously, 1 pharmacy out of the approx. 160 Fred pharmacies participating in the trial was unable to send data to the Repository AFTER access to the Repository was restricted to SSL only. At this point we can only speculate that communications via SSL was being blocked by a firewall or some other form of network security – as this site was happily connecting to PBSOnline and a number of other internet-based services – and the issue remained unresolved.

### 1.2.4 Interactivity with other programs/security applications

Apart from the connection failure outlined in the previous item - **Inability to access Repository via SSL**, there were no issues that Fred was made aware of, between either the Promise 3 client interface in Fred Dispense, or the Promise 3 plug-in in Fred Connect.

That said, it should be noted that a pre-requisite for participation in the Promise 3 trial was that a pharmacy was also submitting claims via PBSOnline. By default, these pharmacies would already be running networks and network security protocols, configured for accessing internet web-services.
1.3 Quality Management and Assurance

1.3.1 Compliance with the Functional Specification

We would consider that the Fred Dispense implementation of the Promise III client interface has an extremely high level of compliance with the Promise III Functional Specification provided by UTAS.

In all cases where Fred Dispense differs from the current version of the specification, the changes have been made in full consultation with UTAS to address design limitations or enhance the implementation and workflow.

It is our expectation that those enhancements would form part of any final review of the Functional Specification.

1.3.2 Testing

Due to time constraints around development and scheduled rollout, the time available for full end-to-end system testing was less than ideal, with many issues surrounding messaging only becoming apparent once the Trial had started.

For a National rollout, testing would need to be extensive with a period of end-to-end testing at live sites required across multiple vendors, and all data validated on the Repository before a full rollout should take place.

While any testing is beneficial, it is extremely difficult to cater for and test all possible scenarios when dealing with multiple message types, and hybrid network environments encountered on site.

Dispense systems have a multitude of configurations depending on what systems and services a particular pharmacy is implementing (e.g. eRx, PBSOnline, Mirixa etc) and real-time testing on production systems is the most efficient way of addressing conflicts that may arise – once development is complete.
2.0 Potential System Enhancements

2.1 Major Problems Identified (design, performance, outputs, quality)

- *Excessive validation rules in Web-schema*
  There were numerous instances where validation rules for message fields within the web-schema for the Repository were overly restrictive and did not match the acceptable data being provided by the vendors. While many instances were fixed either prior to, or during the trial, in some cases vendors were asked to modify valid data to fit a validation rule that was incorrect, rather than modifying the validation rule to suit the correct data. e.g. pre-pending 0s to ids to pass field length restrictions.

- *Inflexibility in Web-schema development/design (data stuffing)*
  During initial development of the Promise 3 client interface, it became apparent that two pieces of information were missing from the Repository message type for Script Interventions – namely Pharmacist Initials and Date/Time of Intervention – but did exist for Non-Script Intervention messages.

  After it was determined that it wasn’t possible to add these two fields to the Web-schema, we resorted to “stuffing” this data into the Extra Information field, to ensure that this information got to the Repository. This was obviously less than ideal, and the design of the message type should have been fixed instead of a workaround being implemented.

- *Bundling of Repository messages*
  One issue that came out during the trial was an inability to recover from a malformed Repository message, when communicating with the Repository, such that if a malformed message was encountered, all messaging would stop.

  Messages were queued at the pharmacy and, on a 2 hourly basis, Fred Connect (comms module) would bundle those messages into message envelopes of up to 100 messages and send the message envelope to the Repository.

  If just one of those messages failed validation then the Repository would reject the entire bundle. With no ability to isolate and flag the defect message, Fred Connect would continue to resend that bundle every two hours (which would be rejected), until the affected message was manually rectified by Fred Support.

2.1.1 Recommended solutions

- Relaxation of Web-schema validation rules and data-types done in consultation with vendors, such that the validation is driven by the data being provided by vendors, rather than the data being massaged to fit the validation rules.

- Flexibility in web-schema design and ongoing development to be able to handle emergent issues in design and data requirements.
• Ability for the Repository to identify and report on a malformed message within a message envelope, and the Promise III client interface to be able to respond to, and work around that malformed message, such that messaging doesn’t stop.

2.2 Minor Problems identified (design, performance, outputs, quality)

• **Original Rx Date not sent**
  Unfortunately discovered very late in the Trial, while retrieving the dispense date of the original script (if it was known), Fred Dispense was not sending this date to the Repository.

• **BLANK dispensing, own-brand drugs etc.**
  When submitting dispensed scripts to the Repository, Fred Dispense did not filter scripts that may have been for own-brand drugs, or other dispensings for shop-line items etc.

  There were issues surrounding the dispensing of scripts related to drug codes that didn’t exist in the Fred Dispense drug tables. e.g. a drug code BLNK1 indicating a front of shop item.

• **Generic name not sent**
  Confusion over what information was required with regard to generic drug names vs. brand names resulted in the generic name not being sent to the Repository, even if we had the information.

2.2.1 Recommended solutions

• Fix required, but not yet implemented, for Fred Dispense to send the original script dispense date, if it’s available.

• Rethink, possible redesign required on how we handle BLANKS, own-brand drugs etc.

• Clear specification on drug information required for script messages, and non-script intervention messages.

2.3 Recommended Enhancements / Considerations for a National Rollout

• **Simplified Message types**
  For the Promise III trial, 4 types of messages were defined (as well as assoc. Cancel message types). They were:
  - Script message
  - Script Intervention message
  - Non-Script Intervention message
  - Patient message
After working through the similarities and differences between the messages and the data required to be sent to the Promise III Repository, we have identified that there are, primarily, only two situations where data is collected and sent to the Repository:

- on the dispensing of a script
- on the submission of an intervention.

As a result, we would recommend that the messages types could be refined down to two messages types only:

1. **Script Message:** Essentially maintaining existing functionality, a Script message containing the details of the script would be sent to the Repository every time a script is dispensed.

   Instead of defining each of the Drug fields separately, as we currently do for a Script message and Intervention message, we would instead define a Drug data object type that can be used in both messages.

2. **Intervention Message:** An Intervention message would combine the current data requirements of both the Script Intervention and Non-script Intervention messages.

   i. Where the Intervention was script based, the Intervention message would include the Script ID of the related script, and a Patient data object that contains the Patient ID and relevant patient information such as gender and age.

   ii. Where the Intervention was non-script based, for a known Dispense patient, the Intervention message would mutually exclusively include a Drug data object containing all of the required drug information for the selected drug, or a Free Description.

      Patient data object as described in item i) would also be included. The Script ID would either be set to 0, or preferably be optional and omitted.

      Note: The same Drug data object would be used in the Script message type.

   iii. For a non-script based intervention for an unlisted patient, the Patient ID field within the Patient data object would be 0 or preferably optional and omitted.

   iv. All other fields pertaining to an Intervention, such as pharmacist initials, date/time stamps etc, are common to both script and non-script interventions.

      The only proviso here is that, if we wanted to track real-time changes to patient information (e.g. change in DOB or gender) we might need an extra message to update patient information. This was not a consideration for Promise III however, as changes to patient information did not trigger an update on the Repository and would only filter through to the Repository if a new intervention was raised, or an existing intervention resent.
For ease of implementation, we’d recommend continuing with the practice of resending both scripts and interventions if they are updated in Dispense, rather than sending separate “edit” messages to the Repository.

- **Error handling, recovery and connectivity management tools**

  For the purposes of the Promise III Trial, only rudimentary checks were put in place to track errors related to malformed or failed message envelopes being sent to the Repository with little ability for the user to recover from those errors.

  For the purposes of a National rollout, it should be possible to flag errant messages and their related items (e.g. script->intervention) and remove them from the message processing queues, to be resolved by a support technician or dropped altogether, and allow messaging from the site to continue.

  A suite of tools should exist to:
  - Determine connection status
  - Provide feedback to the pharmacy and vendor support on connectivity issues
  - Resolve or flag message conflicts, report them, and continue with normal workflow.

- **Message frequency and bundling.**

  Given the relative frequency for dispensed scripts versus interventions raised, the trial has shown that the vast bulk of network traffic to the Repository is around Script messages.

  It might be worthwhile considering having separate timeframes for sending script messages vs. intervention messages, such that scripts are sent every 2hrs and interventions are sent daily.

  Typically, a pharmacy may send 200 Script messages in a day, but only 3 or 4 Intervention messages.

- **Review Script Message data requirements**

  Given that 95-99% of all traffic to the Repository consists of Script messages, the exact data requirements within a script message have a significant impact on the resources required to process them.

  Reducing the Script message to the smallest sized needed to convey all required information should be a priority – particularly given that Promise is one of a growing number of systems supported by Dispense requiring real-time or near real-time reporting via the internet (e.g. PBS Online, eRx, Mirixa etc)

- **Review need for Orig. Rx Dispensed Date**

  There is a reasonable performance hit within the Dispense system when trying to ascertain whether or not the pharmacy processed the original script; and if so, to retrieve this date.
to populate the Script message. This is due to the need to traverse the pharmacy’s script history to locate the original script – IF it exists.

As it forms part of the Script message, this performance hit is experienced to some degree for EVERY script that is dispensed irrespective of whether and intervention is raised for that script or not.

In the framework of a National rollout, where the Repository would already have the script history of the pharmacy sending the script, as well as the history of all participating pharmacies, this date might be better determined at the Repository on an as needed basis.

- **Review of Medical Conditions, Allergies data entry**

  Currently, Medical Conditions and Allergy information are entered and stored against each Intervention. These fields are not pre-populated from the Dispense patient record even Medical Conditions and Allergy information already exists.

  Further, there is no check to see if information on Medical Conditions or Allergies has been entered on previous Interventions.

  Given this, from the client side, Medical Conditions and Allergies data is sent up every time for every intervention, without regard for what information may have previously existed. Given that the majority of interventions are for known patients on the dispense system, the Medical Conditions and Allergies should most likely sit with the patient information. We’d recommend a review of how and when this data is entered, and subsequently submitted to the Repository.

  Finally, current placement has these fields on the “Significance” tab on the Intervention form. Ideally, these should be tied to Extra Information or moved outside the DOCUMENT tabs altogether.

- **Review of Gender and DOB Patient Data**

  Similar to the above item, the current mechanism for selecting/displaying/sending/storing patient data needs to be further enhanced and defined. Some questions on workflow are:

  - If patient age or gender is changed in Dispense, do we resubmit old interventions/pass the new information to the Repository?

  - If patient age or gender is changed in Dispense, do we display the new data when viewing old interventions, or generating reports, or do we use the data as it existed at the time of intervention?

- **Use of PKI certificates unnecessary**

  Given:

  - The de-personalised nature of the data that is sent from a pharmacy to the Promise Repository.
  - No direct financial gain can be made from the submission of Promise data by an outside party.
Fred strongly recommends against the use PKI certificates in a National Rollout for Promise, given the extremely large resource requirement to implement them in each pharmacy, and then the cost of their ongoing maintenance.

3.0 National Expansion

3.1 Limitations of this system

- **Pharmacy Approval Numbers**
  For the duration of the trial, the same approval number was used to identify the pharmacy, messages from the pharmacy and to construct various ids for scripts and interventions created by the pharmacy.

  For the trial, this “trail id” was locked to the approval number of the pharmacy as it existed at the start of the Trial.

  For a National rollout with an ongoing commitment to sending and receiving interventions, the system will need to be able to handle changes in approval numbers and/or changes in ownership, over time, of the participating pharmacy. This is not currently possible.

- **Pharmacy participation/change of ownership**
  In addition to being able to handle changing approval numbers, the system would also need to be able to handle a change in ownership of a participating pharmacy and a change in status (e.g. participating, not participating for a period, and then participating again)

- **Current Repository Web-schema needs refinement**
  It is our view that there are still significant design flaws with the structure of the Repository messaging system which would need to be addressed before considering a National rollout. A review of all messaging structures and their validation rules would need to be carried out in consultation with, and with the consensus of, participating vendors.

  That said, the overall concept of a web-based messaging system where submitted messages are queued at the pharmacy, before being bundled and sent to the Repository at timed intervals - worked very well.

- **Fault Recovery and comms management, delineation of support is not adequate for national rollout.**
  While reasonably adequate for the trial, the level of reporting and the tools available on the Dispense system, and Repository, would need to be significantly enhanced to support and National rollout.

  Tools/processes that are capable of detecting, reporting and potentially recovering from errors related to communications need to be enhanced and, in some cases, defined.
Clear delineation of responsibilities and required support levels between participating vendors and those managing the Repository would need to be in place for support to operate effectively.

- **Validation of messages at the Repository/ Pharmacist Inits / User credentials etc.**
  During the trial, there was reasonable discussion around the need to validate messages sent to the Repository, through a number of different mechanisms from individual pharmacy credentials, through to validating the pharmacist initials in a message, against a database of initials stored at the Repository.

  The client-side implications of this level of validation are many and varied, and we would strongly suggest that any validation system be designed in conjunction with, and the consensus of, participating vendors – due to the impact on configuration of vendor systems.

- **Supply of vendor drug tables**
  During the trial, the drug tables of each vendor were supplied to UTAS to be used as a tool for cross-referencing drug code etc.

  In an ongoing National rollout, the need and mechanism for achieving this across multiple vendors would need to be considered and accounted for.