

www.freemedforms.com

The FreeMedForms project : structuring patient file, sharing alerts.

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The FreeMedForms team
LSM / RMLL 2013, Brussels

The FreeMedForms project

- The FreeMedForms project is a **suite of medical applications** (EMR, prescriber, drugs interaction checker, some other coding assistants...)
- Driven by a **benevol community** of medical doctors and computer workers/scientists over the pulse of a french team.
- Composed of about 50 members (10 actives members)
- Supported by **OpenSuse Medical, Debian Med, Fedora Medical**, Arch Linux...
- Collaboration with other medical teams: GNUmed, FreeMed, Care2X, SynapseEMR

The FreeMedForms project

- **Linux, MacOSX, Win32, Win64**, (FreeBSD)
- **C++** using Digia's **Qt** libs
- Documented using Doxygen
- Massive usage of MVC architecture
- Builded using dynamic libraries with plugins architecture
- Using **SQLite** and/or **MySQL** for database

The FreeMedForms project

Structuring patient
files



<http://www.freemedforms.com/>
RMLL 2013

Main constation

- Every patient is different,
- Every medical specialty owns a different patient file.
- → Medical software should be adaptable in depth to each patient and to every practice.
- FreeMedForms is build with this constraint in mind.
- Each patient can have a different record's structuration, keeping a central common structure (identity...)
- « on demand » patients' records.
- PS: forms can be multilingual

The form manager

- Forms are grouped in « pages » and are structured in a tree model
- Each page/branch can contain
 - a part of the common central form
 - a sub-form
- Forms contains simple or complex widgets
- Patient records are episode based
- Forms and sub-forms are shareable
 - Between users
 - Using datapack servers
 - (Future dev) Using your mail client

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Capitaine ARCHER Jonathan
♂ 85 année(s) 2 mois 20 jours

PAGES

- Patients
- Agenda
- ATCD
- Médicaments
- Patient
- HPRIM


FORM TREE MODEL

- Identité
 - Identité (1)
 - Personne de confiance (1)
- Consultations
 - POMR avec biométrie
 - Compte-rendus de consultat...
 - Résultats de biologie (textue...
 - Résultats de biologie
 - Compte-rendus divers
- Prescriptions
 - Prescriptions textuelles
 - Prescriptions médicamenteu...
 - Prescription d'analyse biolog...
- Synthèse dossier patient
- Synthèse textuelle
- Codes CIM10

FORM EDITING

FORM CONTENT + EPISODE EDITING/VIEWING

Identité et adresse Détails ▲

 Capitaine
ARCHER

Prénom : Jonathan

Autres noms : Autres noms

Date de naissance : vendredi 20 avril 1928

Genre : Masculin

Adresse 21, StarFleet Command

Ville EarthTown

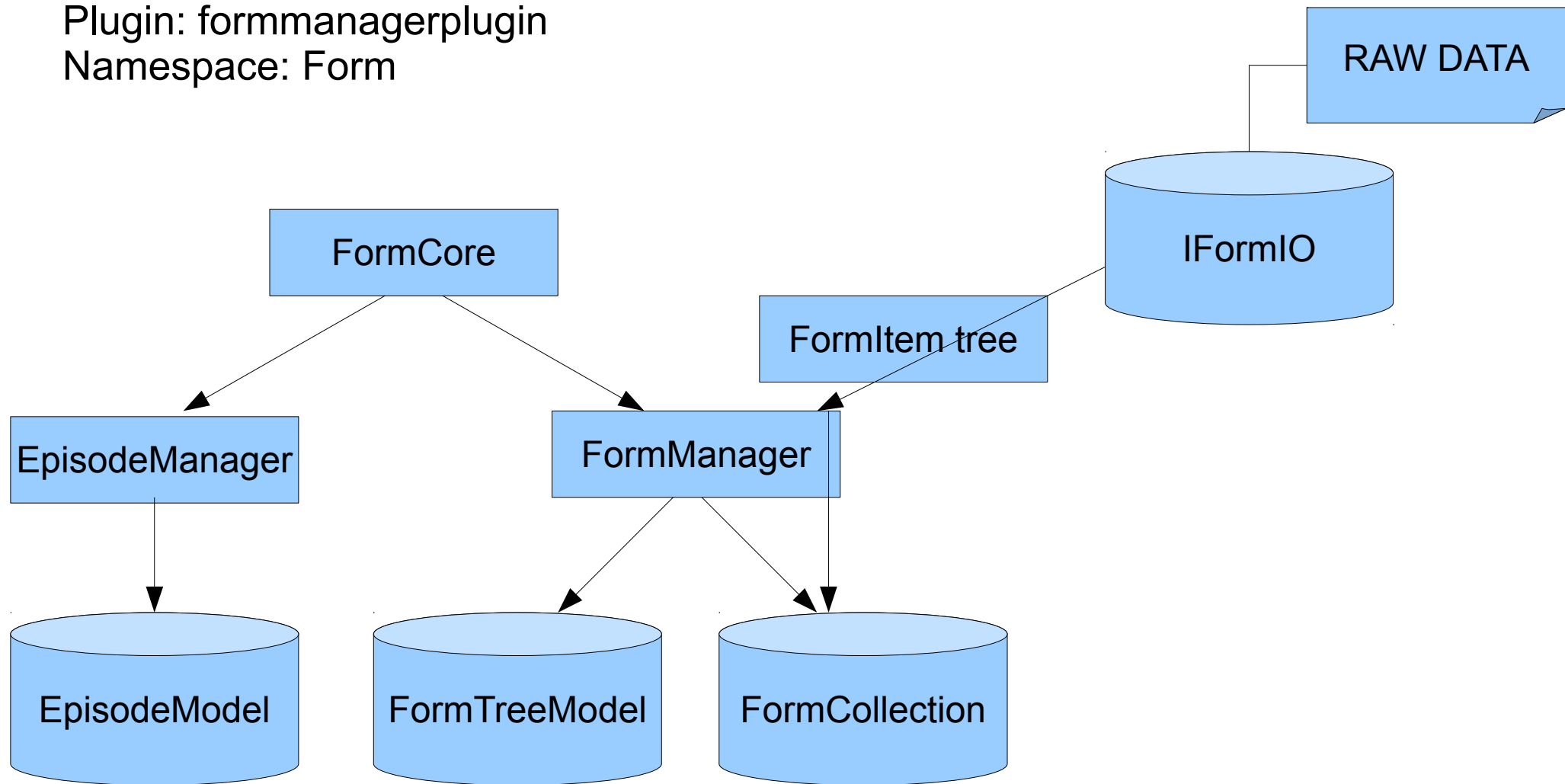
Région

Code postal 1968

Pays UnitedStates

Simple diagram

Plugin: formmanagerplugin
Namespace: Form



Form item widgets

FormItem

- FormItem [IFormItemWidget, IFormItemData, FormItemSpec, FormItemValues, IFormItemScripts...]
- Managed by the FormManager and internally mirrored
 - One « collection » for the user interacting
 - One « collection » for the internal computation and scripting
- Can use the FreeMedForms episode database or their own database
- IFormItemWidgetFactory allow you to create your own « set of widgets »

Form item factories

IFormItemWidgetFactory

- Manage creation of IFormItemWidget
- FreeMedForms « central » factory == BaseWidgetsPlugin
- Must be coded in C++/Qt (QML is not yet supported)
- Widgets can be
 - Simple (one widget eg a combo)
 - Complex (regrouping multiple widgets)
- Are shared inside the plugins manager QObject pool (accessible from anywhere in the code)

Form reader

IFormIO

- IFormIO (the reader), FormIODescription
- Transform form's raw source (eg XML) to a tree of QObject/QWidget (Form::FormItem{Widget})
- Register the new forms into the FormManager
- Any kind of format can be handle (XML, JSON, CSV, pure text...)
- Stores the form's raw source in a central database
- Manages form's update checking
- Are shared inside the plugins manager QObject pool (accessible from anywhere in the code)

XML form reader

XmlForms::Internal::XmlFormIO

- Currently only one reader is available:
XmlForms::Internal::XmlFormIO
- Architecture of the XML file is described in the documentation (the french one is always up to date)
- Forms can be one unique monolytic XML file or many smaller XML files included
- The central XML file (central.xml) contains the description of the form and the form itself (or included sub-forms)
- Must avoid FormItem uuid collition and must keep uuid persistent in time (using uuid equivalence if required)

XML form reader

- Forms can handle
 - Multiple XML form files (eg: definition of multiple pages)
 - HTML files (eg: print mask ; exportation mask)
 - PDF files (eg: PDF-FDF editing/saving/printing ; user manual ; help files)
 - JavaScript files to make dynamic forms
 - QtUi files for a better user experience
 - Can « internally » manage multilingual configuration

Storing data

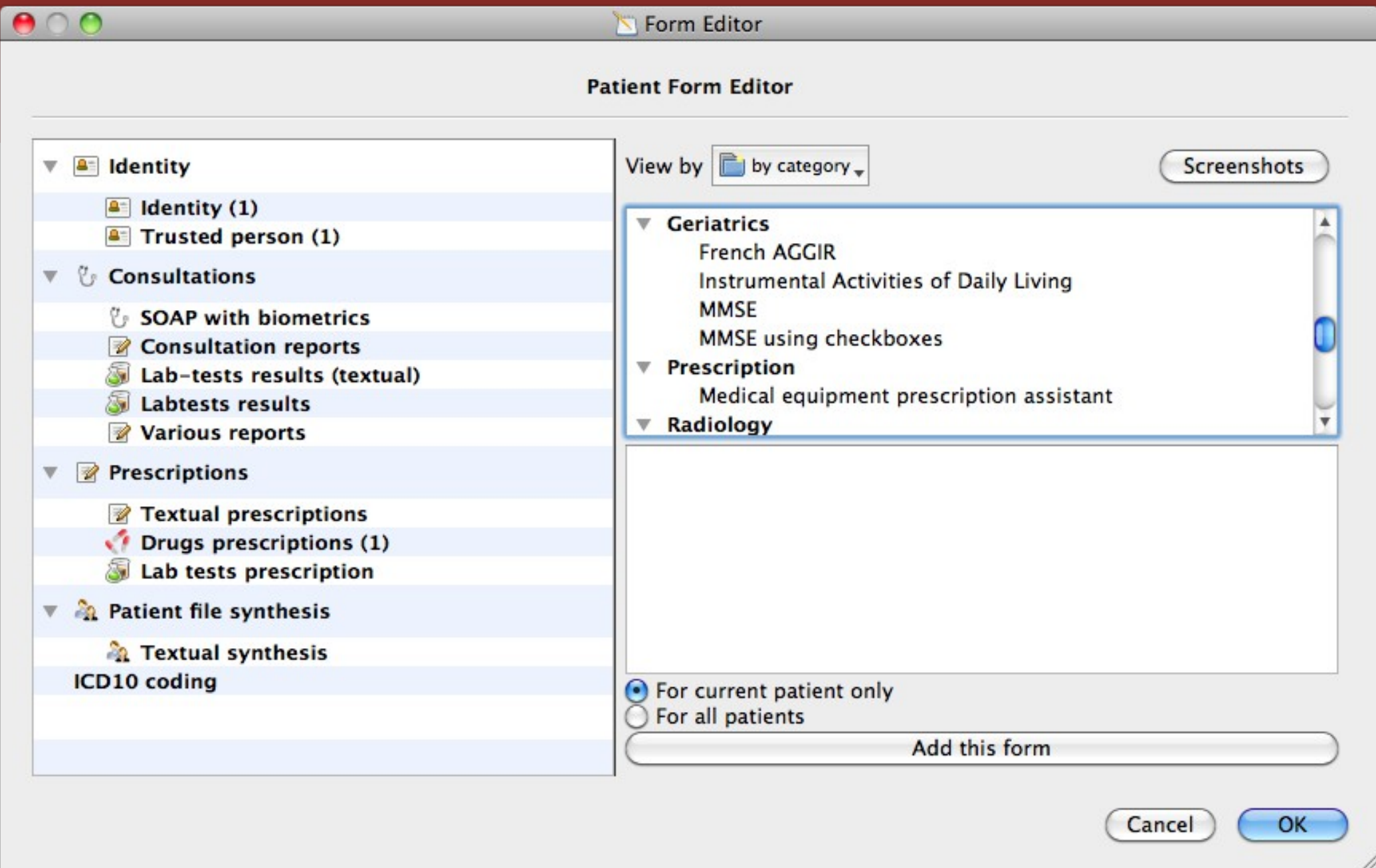
EpisodeModel/EpisodeBase

- FreeMedForms owns a general episode model/database : `Form::EpisodeModel/EpisodeBase` where items can store data (QVariant translated to strings and stored in a XML format using their uuid)
- This is automatic, simple and safe (we have unit tests)
- `Form::IFormItemData` allow you to interact with scripts, view, models and database.
- Use the `storableData()` and `setStorableData()` to set/retrieving your data
- Or you can use your own database (only using our database mechanisms)

Script manager

Script::ScriptManager

- Forms can handle scripts (ECMA scripts) with a full access to form/patient/user data
- All form items can define different « timing » for their scripts
 - OnLoad, PostLoad, OnDemand, OnValueChanged, OnValueRequired
 - OnDependentValueChanged, OnClicked
- As all scripts are loaded in the same script manager instance, they must be protected inside namespaces to avoid collision
- Allow you to interact with: FormItems, Patient/User core object, but also many usefull tools (FDF filler, image viewer...)



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Captain ARCHER Jonathan
 ♂ 85 year(s) 2 month(s) 20 days

Identity

- Identity (1)
- Trusted person (1)

Consultations

- SOAP with biometrics
- Consultation reports
- Lab-tests results (textual)
- Labtests results
- Various reports

AGGIR (French specific) (1)

Prescriptions

- Textual prescriptions
- Drugs prescriptions (1)
- Lab tests prescription

Patient file synthesis

- Textual synthesis

ICD10 coding

V	P	Timestamp	Label	Author
		07 10 2013 23:26	first evaluation	You

AGGIR (French specific)

07 10 2013 first evaluation

French AGGIR autonomy score

Score Gir Dépendant ☒ Autonome ☐

Items et sous-items	Ne fait pas	S	T	C	H	Aucun problème	Score
Transferts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Déplacements i...	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Toilette							C
haut	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
bas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Élimination							B
urinaire	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
fécale	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Habillage							B
haut	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B
moyen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B
bas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B

DISCRIMINANTES							
Libellé	NFP	S	T	C	H	Fait	ABC
Transferts	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Déplacements intérieurs	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Toilette							C
haut	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
bas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Élimination							B
urinaire	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
fécale	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Habillage							B
haut	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B
moyen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B
bas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Alimentation							A
se servir	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	A
manger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	A
Alerter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Déplacements extérieurs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Orientation							B
dans le temps	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
dans l'espace	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	B
Cohérence							C
Communication	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Comportement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C

ILLUSTRATIVES							
Libellé	NFP	S	T	C	H	Fait	ABC
Gestion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Cuisine	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	B
Ménage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Transports	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Achats	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Suivi du traitement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C
Activités temps libre	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	C

Score AGGIR	3
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Légende des adverbes:

- NFP: Ne fait pas
- S: Fait spontanément (même difficilement)
- H: Fait habituellement (même difficilement)
- T: Fait totalement (même difficilement)
- C: Fait correctement (même difficilement)

La case est noire quand les conditions ne sont pas remplies pour l'adverbe.

La case 'Ne fait pas' est cochée s'il faut 'faire à la place' ou 'faire faire', ou 'tout refaire'.

Alert management

Some philosophy ?

Alert philosophy [9]

- Two kind of alerts: **non-blocking and blocking alerts**
 - Non-blocking → icons and tooltips
 - Blocking → blocking dialogs
- Alert system provides **three levels**: low, medium, high;
- And an **infinite number of categories** (DDI, PIM, drug duplication, dose checking, allergies, intolerances...)
- **Threshold of alerts** can be adapted by the user for each type of alerts
- Alerts **can be dynamic** (using scripting)
- Try a maximum to avoid **alert fatigue**

[9]: J Am Med Inform Assoc. 2010 Sep-Oct;17(5):493-501.

Alert philosophy

- Can be **related to**
 - One or all users
 - Application (update notification, backup reminder...)
 - One patient
 - All patients (eg: for medical prevention, cancer screening...)
- Can be « **one shot alerts** » or « **cycling alerts** »
- Can have a defined **validity period**
- Can be edited by user or not
- Can be **validated/overridden & commented** by the user
- Can be **scripted**

Alert packs

- Alerts can be shared via **alert packs**
- Alert packs are shared via the **datapack manager**
- Alert packs must contains
 - packdescription.xml (datapack description file)
 - All XML alerts
- When the user install an alert pack
 - All alerts are saved
 - All alerts are checked
 - All alerts are executed (if required)
- This is really useful to share medical prevention alerts

Alert editor

Alert editor

General information

Label

Category

Description

Icon

Type Timing Script

Related to

Priority

View type

Content type

User override ☒ override requires user comment

Reset Cancel OK

Type Timing Script

Date of alert

Expiration

☐ Never expires

Not cycling

Type Timing Script



Captain ARCHER Jonathan
 ♂ 85 year(s) 2 month(s) 21 days
 + - - - - ⚠️

Identity

Identity

Trusted


Consultations

SOAP v

Example

HIGH

HIGH LEVEL ALERT
 Bla bla bla bla bla bla bla bla bla bla bla bla bla bla bla bla
 Related to current patient
 Started on: mercredi, juillet 10, 2013
 Expires on: jeudi, juillet 10, 2014



2 alerts

Example (2)

HIGH LEVEL ALERT


HIGH


 Bla bla bla bla bla bla bla bla bla bla bla bla bla bla bla bla
 Related to current patient
 Related to current patient
 Started on: jeudi, juillet 11, 2013
 Expires on: vendredi, juillet 11, 2014

HIGH LEVEL ALERT

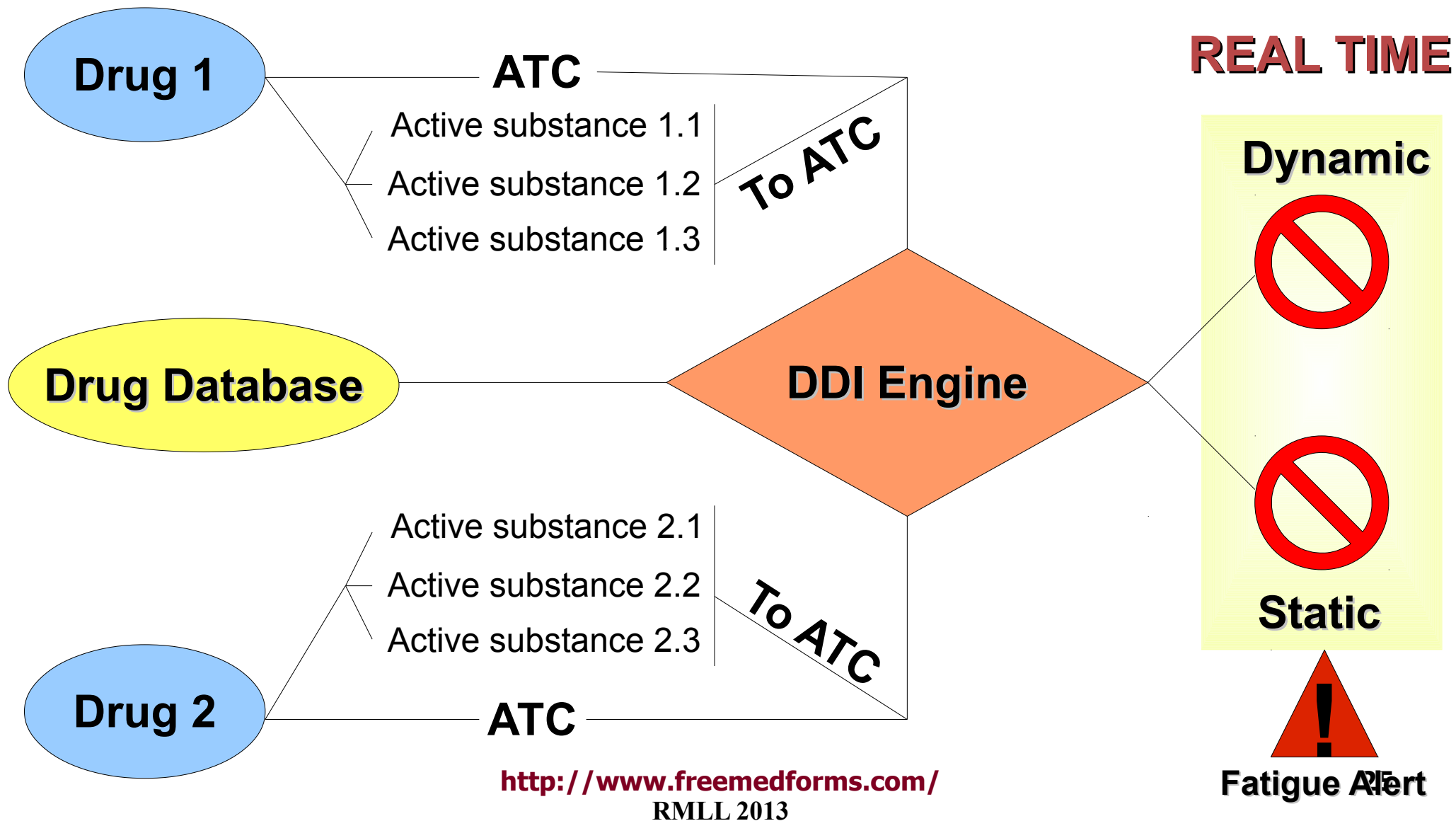
HIGH

 Bla bla bla bla bla bla bla bla bla bla bla bla bla bla bla bla
 Related to current patient
 Related to current patient
 Started on: jeudi, juillet 11, 2013
 Expires on: vendredi, juillet 11, 2014

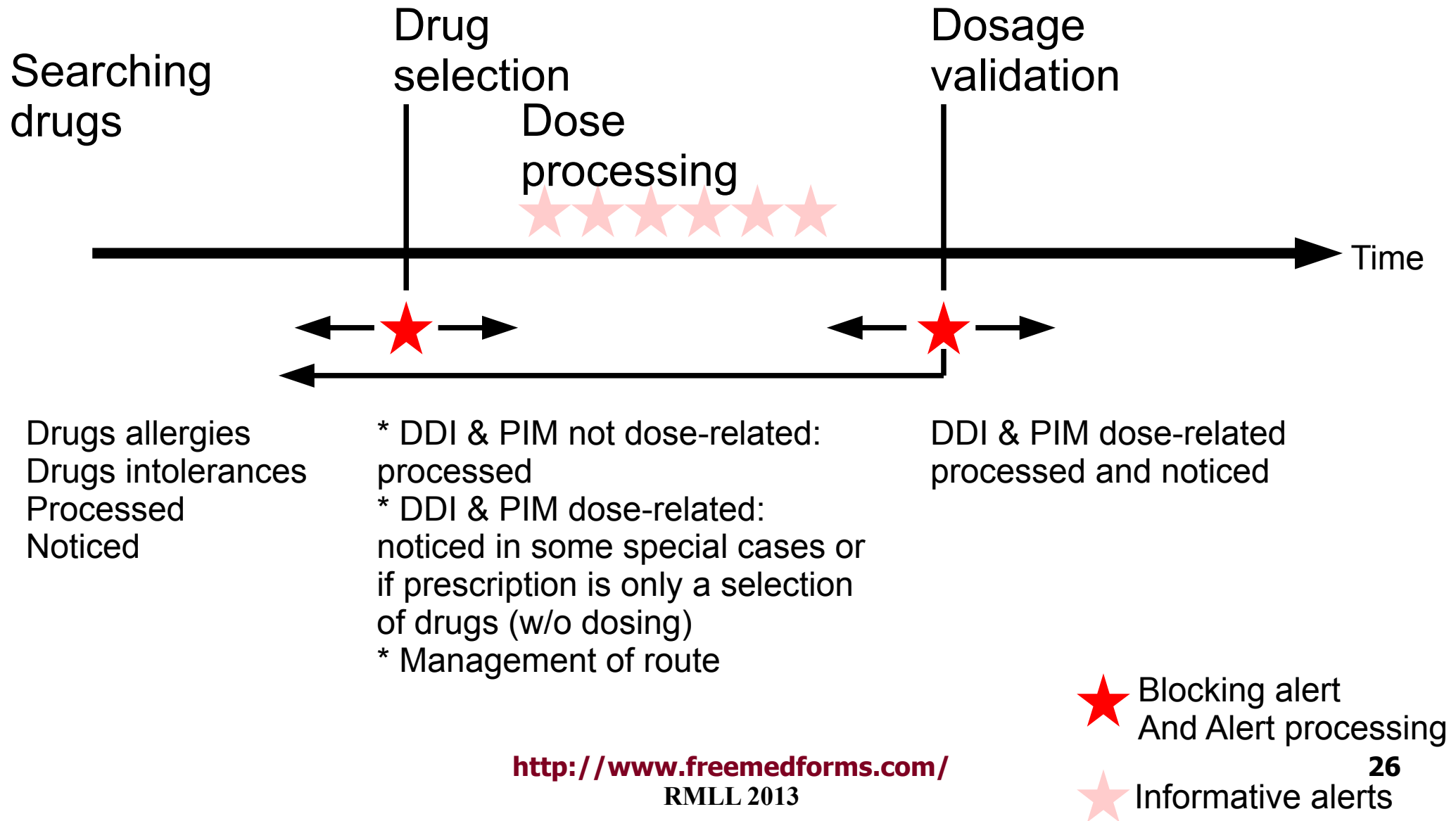

 Override


 Validate

A word about the Drug Interactions alert system



Timing of the alert system



FreeMedForms Needs you !

- FreeMedForms is a great and big project
- Actually unfunded
- Need devs, testers, translators, MD, pharmacists... (and funds)
- Code is available @SVN:
<http://code.google.com/p/freemedforms/source/checkout>
- Web site: <http://www.freemedforms.com/>
- Mailing: freemedforms@googlegroups.com
- Kisses to my wife and children (who support my devs...)
- Thanks, The FreeMedForms Team