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The FreeMedForms team
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
FreeMedForms

- Linux, MacOsX, Win32, Win64, (FreeBSD)
- C++ using Nokia's Qt libs
- Documented using Doxygen
- Massive usage of MVC architecture
- Buil ded using dynamic libraries with plugins architecture
- Using SQLite and/or MySQL for database
Some short definitions, a drug can interact with:

- Another drug == drug-drug interaction (DDI)
- Patient's conditions and diseases (allergies, diseases, renal filtration, age...)
- For old people == potentially inappropriate medications (PIM)
- Food == food-drug interactions (FDI)
- Some other items that are not listed here...

Some « must to have » classifications:

- ICD10, ATC (INN == international non-proprietary name)
- Each risk (DDI/PIM/FDI) as its own Drug Engine inside FreeMedForms
Drug Engine: DDI

- Started in 2008 with a very special attention for the DDI management
- DDI source data were identified [2-4]
- Free governmental drugs databases (FreeToolBox)
- Are actually available (with DDI management):
  - France, USA, Canada, Belgium, South Africa (partial), in preparation: Portugal, Danemark, Brazil
- Creation the **FreeDiams** application

[2]: Thésaurus des interactions médicamenteuses. AFSSAPS, France
[3]: Drug Interactions: Cytochrome P450 Drug Interaction Table. Flockhart DA. Indiana University School of Medicine
[4]: P-glycoprotein Table - the Effect of Drugs and Foods. Oesterheld Jessica.

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Drug Engine: PIM

• Quickly, the FreeMedForms EMR became usable (2010-11) we started the implementation of PIMs

• Main sources identified with PubMed, multiple countries (US, CA, FR, DE at least) [5-8]

• « By hand » XML encoding in connexion with
  • The ICD10 classification and plugin to process patient's diseases
  • The drug's ATC classification to process drugs

• 11 July 2011 → only 1 source is encoded (US)

[8]: MacLeod Canadian list. CMAJ156p385-91(1997 Feb 1)
What is a PIM ???

- PIMs are strong recommendation made by a panel of medical experts of the elderly (geriatricians)
- PIMs can be related
  - Only to drug (some drug should be avoid)
    - Eg: long acting benzodiazepines
  - And/or to the conditions and diseases of the patient
    - Eg: nsaids with chronic heart failure; fluoxetine with malnutrition
- This second part needs the ICD10 coding of the patient physiology and diseases
  - That is one the **major** problem of PIM calculation (time, knowledge...)
Data (drugs)

Raw drug database

Requirements (mandatory):
- Brand drug names
- Know molecular composition
  - Molecule name
  - ATC of molecule (optional)
  - Dosage and reference to dosage
- Route of administration

Optionally:
- National unique identifier
- Drug ATC code
- Drug packaging
- Drug package prices

Formalized FreeMedForms Drugs database

Available:
- Drug brand name
- Country
- INN composition with ATC links from the molecular composition of the drug
- Normalized route of administration
- Normalized dosage

Not yet available:
- Packaging of drugs and price

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Data (interactions)

- Governmental agencies monitoring
- Literature monitoring

Selection of interactions to insert/update/examine

- Scientific committee (benevols)
  - Addition
  - Update
  - Rejected

Translation and risks categorization / normalization

No automated data mining
Drug-Drug Interactions calculation

Drug 1

ATC
Active substance 1.1
Active substance 1.2
Active substance 1.3

To ATC

DDI Engine

Drug Database

Active substance 2.1
Active substance 2.2
Active substance 2.3

To ATC

Drug 2

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Alert philosophy [9]

- Two kinds of alerts: static and dynamic alerts
  - Static → icon and tooltip
  - Dynamic → blocking dialog
- Alert system provides three levels of risk: low, medium, high;
- And an infinite number of categories (DDI, PIM, drug duplication, dose checking, allergies, intolerances...)
- Each drug engine (DDI / PIM) owns its alert computation
- Threshold of alerts can be adapted by the user for each type of alerts
- Question: cumulative score of drug interactions?

Timing of the alert system

Searching drugs  Drug selection  Dosage validation

Dose processing

Drugs allergies
- Processed
- Noticed

Drugs intolerances
- Processed
- Noticed

* DDI & PIM not dose-related: processed
* DDI & PIM dose-related: noticed in some special cases or if prescription is only a selection of drugs (w/o dosing)
* Management of route

DDI & PIM dose-related processed and noticed

DDI & PIM dose-related processed and noticed

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Dynamic alert
And Alert processing

Informative alerts
Drug interactions: Interoperability

Your Electronic Medical Record

exchange files command line

FreeDiams

Integrated as plugin

FreeMedForms EMR

Drug Database

Your Web Based EMR

GNUmed MedinTux

FreeMed Care2x SynapseEMR

OpenReact (Web service)

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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