**Proposal for an Educational Platform**

**for Pharmacometrics**

**Motivation**

Pharmacometrics is an emerging discipline that applies mathematical and statistical modelling and simulation concepts to pharmacology, aiding: *i*) the interpretation of data from clinical trials, *ii*) decision making, and *iii*) selection of optimal trial designs.

Pharmacometrics is a highly-sought of set of professional skills both in academia and in the pharmaceutical industry, but no traditional undergraduate program offers courses that are suitable for training students in concepts and application routinely employed in the Pharmacometrics arena. A respective educational program requires rigorous training in different fields including pharmacology, mathematics, statistics, and some basic computer programming. While several free online courses are available for those disciplines, freely available learning material with a focused curriculum on Pharmacometrics is scarce.

Moreover, the available teaching material tends to be quite “static”, in a text-book format with abundant use of mathematical notions. While learning the theory and the fundamentals is obviously important, Pharmacometrics is very much subject to “learning by doing”.

Only very few interactive tools are freely available and they normally come adjunct to a software package that is not tailored for Pharmacometrics. This normally entails installation and setup first (already a hurdle for some students), and then learning how to use the tool itself, which normally consists in writing some code. Unfortunately, all these steps represent a major hurdle for unsupervised students, and switches the focus from how to apply Pharmacometircs tools and concepts to answer a clinically-relevant question to how to use software.

Face-to-face workshops and short courses are offered by the major modelling groups in academia, but they are normally costly and they tend to be too short for the student to assimilate the concepts. It would be useful if the students already had a good background when they come to the courses and if there were some material online for them to do a certain level of self-studying at home.

**Proposal**

We propose to create a web-based educational platform that is specifically geared towards teaching Pharmacometrics concepts and applications for self-study. This web-based platform will be freely available from anywhere in the world, simply by connection to the internet.

The website will be set up to present the concepts through the use of interactive charts and applets, which enables the user to easily grasp the basic Pharmacometrics concepts. The interactive material will be accompanied by theoretical background material that explains the underlying concepts in greater detail and hence allows the students to intuitively apprehend the core ideas.

The content will be articulated in three main sections:

1. **General concepts**

* *Pharmacometrics* (PK, PD, PKPD)
* *Statistics*: models (continuous, categorical, count and survival data models, mixed effects models), methods and algorithms (estimation, model assessment, model selection, simulation).

1. **Modelling in practice**

* General principles of model building.
* Application to pharmacology.

1. **Interactive hands-on exercices**

The proposed educational platform will add value to the field of Pharmacometrics in that it provides a unique training opportunity including self-study for scientists and future leaders in the field. Ultimately, this innovative training platform can be used as the basis for a rigourous training environment that integrates notions from all the ancillary disciplines and make them available to students in a comprehensive and self-explanatory format. Moreover, the use of interactive tools will make the learning experience more stimulating and further the hands-on applications of the learned material. Most of the interactive applets, will be developed using the R package Shiny.

http://shiny.rstudio.com

http://webpopix.org/shiny/ShinyExamples.html

Most importantly, all this would be ready to use and freely available. Students, who want to take their efforts to the next level want to apply the learned modelling concepts and techinques to their research, will be referred to the available stand-alone software solutions.

**Milestones**

* A seminal idea of the project is already available online at http://model.webpopix.org
* A first version dedicated to individual fitting will be available online 6 months after the start of the project.
* A completed version, including population approach, will be finalized after 12 months.

(More material will then be continuously added.)

**What is needed?**

Website hosting and maintenance

A post-doc, with a PhD in Pharmacometrics (or biostatistics) or equivalent degrees, will be recruited

Financial support for post-doc salary and miscellaneous costs (e.g. travel, publication).

(Software is freeware or available under academic licencing. R Studio offers for free Shiny Version Pro for this project.)

**Institutional partners and contacts**

Inria, France (Marc Lavielle)

University of Cape Town, South Africa (Paolo Denti)

University of Florida, USA (Stephan Schmidt)

University of Manchester, UK (Leon Aarons)