

Experiences with open and commercial sharing of models, data and modeling tools

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We have attempted 2 approaches for sharing models and data:

- OpenDiseaseModels.org
 - Metrum Institute project
 - Open forum for collaborative model building and evaluation.
- METAMODL
 - Metrum Research Group project
 - MEtrum Therapeutic Area MOdel and Data Library
 - Commercial distribution of models and data funded by subscription and license fees.
- Metrum also participates in CAMD model development efforts.

Both projects were motivated by the following principles:

- Development of pharmacometric models is an extremely resource-intensive effort.
- Pre-competitive insight and resources shared across companies/institutions will lead to better models than could be developed by a single institution.
- Shared models, which are transparently developed and widely vetted, will be more widely accepted and better positioned to impact the entire scientific/biomedical/health community.

OpenDiseaseModels.org

The objective of OpenDiseaseModels.org was to provide an open forum for collaborative model building and evaluation.

Three open model development projects were initiated at OpenDiseaseModels.org.

- A systems biology model for calcium homeostasis and bone resorption,
- An Alzheimer's Disease progression model based on the ADAS-cog endpoint, and
- A schizophrenia disease progression model based on the PANSS total endpoint.

Then reality struck

- Without external funding a small company has limited time and funds to:
 - Develop model and data content.
 - Promote the site and its potential to external participants.
- There was insufficient involvement by external participants.

OpenDiseaseModels.org was discontinued.

Key realization: Within the context of a relatively small company a commercial model for model and data distribution is a more financially viable approach.

That realization led to METAMODL

METAMODL is:

- A web-based library of models, public source clinical outcome data and software tools to support strategic decision-making via model-based meta-analysis and disease progression models.
- Funded by subscription fees.

METAMODL

- METAMODL content development is done entirely by Metrum Research Group.
- Subscribers influence development priorities by participating in TA-specific working groups.
- The models are distributed to subscribers as a combination of documentation, data, and code for model development and simulation.
- Previous ODM.org content is distributed freely as part of METAMODL.
- Additional free content may be added such as selected sub-models and previous versions of current METAMODL models.

Current METAMODL therapeutic areas

- Model and data content
 - Alzheimer's disease
 - Osteoporosis and bone health
 - Hepatitis C
 - Multiple sclerosis
 - Migraine prophylaxis
 - Lupus
- Literature models
 - Non-small cell lung cancer
 - Rheumatoid arthritis

Barriers to model and data sharing

- “What’s in it for me?”
 - Companies are often unwilling to share IP without more certainty that they will get something in return that is worth even more.
- “They won’t let me.”
 - Prior agreements with third parties may restrict IP sharing.
- “I’m too busy.”
 - Near-term objectives often trump longer term goals addressed by model and data sharing.
- “We can’t give up the crown jewels.”
 - Companies fear they would lose a competitive advantage by sharing such IP.
- “Don’t look behind the curtain.”
 - Sharing only model-based tools (without details about the model or the data upon which it is based) limits credibility and further model development as new evidence becomes available.

My ideal would be for high quality models and data to be shared freely with the entire community

- Is that a shared ideal?
- If so, how could it be achieved?
 - Funding sources
 - Shared effort: data and model development, e.g., contribution of scientists time and effort.
 - Technical framework for model implementation.
 - Framework for peer review and content curation.
 - Distribution: Perhaps a combination of read-only content and a wiki for user contributions.

What can we learn from other models for knowledge building and sharing?

- DDMoRe (<http://www.ddmore.eu>)
- Virtual Physiological Human (VPH) projects (<http://www.vph-noe.eu>)
- Biomodels Database (<http://www.ebi.ac.uk/biomodels-main/>)
- Human Genome Project (<http://www.genome.gov>)
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