Industry Challenges and Opportunities

Bryn Williams-Jones
Chief Operating Officer, Connected Discovery Ltd
bryn@connecteddiscovery.com

5th Annual Forum for SMEs: Piemonte Bioindustry Park
October 7th 2011

http://pistoiaalliance.org
Presentation Outline

1. Introduction - the current Pharma Healthcare landscape
2. Precompetitive research, the importance of innovation and standards
3. The Pistoia Alliance - lowering the barriers to innovation by improving interoperability of R&D business processes
4. Reflections on progress - with reference to challenges
5. Highlighting opportunities to participate in current and emerging efforts
What has changed the Pharma Health Care Landscape?
Business Environment

- Generic Competition
- Increasing risks of drug development
- Regulatory Compliance
- Cost Containment
- Payer-Provider-Patient & US Health Care Reform
- Improve R&D Productivity
- Retain & Develop Workforce Skills
- Drug Efficacy is not the same as Drug Effectiveness
- Patent Expiry
- Retain & Develop Workforce Skills

Increasing risks of drug development
Drug Efficacy is not the same as Drug Effectiveness
Patent Expiry
Payer-Provider-Patient & US Health Care Reform
The terms “efficacy” and “effectiveness” have very different meanings.

- **Efficacy** refers to the extent to which a drug does more good than harm in clinical trials where patients are carefully selected and monitored.
- **Effectiveness** refers to the extent to which a drug does more good than harm in real life where patients are not so narrowly selected and often not closely monitored.

[Today] “Pharma is developing drugs that bring incremental benefits, but at a premium price. This has given rise to the debate between the providers and payers—what is the value of the extra benefit?”

Hans-Georg Eichler, M.D., M.Sc.
Senior Medical Officer at the European Medicines Agency in London, United Kingdom
The Tale of Health Care Reform - DIA Global Forum December 2010 p20
Challenges in a Changing Landscape

- Patent Expiry
- Generic Competition
- Cost Containment
- Improve R&D Productivity


Graph showing the value of patent expiries from 2001 to 2015 (constant USD $1.3B). The average annual loss is US$ 15.4 bn.

Bar graph indicating the decline in R&D productivity from 1979 to 2007.
1. Is there an homogeneous level of affordability of information systems?

2. Why do all these companies (and the other myriad of smaller companies) need to build their own information systems?

http://en.wikipedia.org/wiki/List_of_pharmaceutical_companies
Pharma are accessing, processing, storing & re-processing public domain data.
Public Domain Drug Discovery Data
- The Current Situation

We are all doing this many times......

- Pfizer
- AZ
- GSK
- Merck
Industry drivers for change

Data

- High volume / high quality data is in the public domain
  - Internal data generation does not transform drug discovery
- Data ownership not competitive
  - Real benefit is entirely in use
- The use of data provides the competitive edge, e.g.
  - Novel Algorithms
  - Novel Inferences
  - Data Integration
- Owning data can be a burden
  - e.g. 2nd-gen sequence
  - Processing, storage, updates

Infrastructure

- Cost-pressure: funding for IT infrastructure universally in decline (Pharma)
- Tech developments have increased platform complexity
  - e.g. 2nd-gen sequencing
- Costs are difficult to manage with limited competitive benefit
  - This is only set to continue
- Public infrastructure and services are a real alternative to internal solutions
  - Failure to adopt them could present an opportunity cost

*If something is unsustainable it will stop*

(Herbert Stein, chairman of the Council of Economic Advisers 72-74)
Its still hard to....
Information Underload

“Old Problem”

Now... Where to Start?
Data tombs
Targets Surrounded By Information

“Too much data”   “Too many applications”
“This doesn’t apply to me”   “You need a PhD in IT to use this stuff”
“What does this really mean to my project?”
The Electric Power Grid Analogy
(beyond utility computing...)

- **Power Grid**
  - **1900**
    - Local/internal power suppliers
    - No standards (v, amps, sockets)
    - No national grid
    - Little innovation in electric apps

- **Power Grid**
  - **1940**
    - Central power suppliers
    - Standard access
    - National grid - utility power
    - Lots of innovation in electric apps

- **Power Grid**
  - **2010**
    - 1000s of power suppliers
    - Standard supply & access
    - National grid
    - Mass use of electric applications

---

c.f. “The Big Switch” Nicholas Carr 2008
The Electric Power Grid Analogy
(beyond utility computing...)

Few standards (delivery)
No information grid
Low innovation in information use
Supplier specific interfaces

1000s of suppliers

Standards (content)
‗Information grid‘
– semantic web

Innovation in information use
User specific interfaces

Info Grid 2010?

Info Grid 2015?

Consumers can combine info from any supplier and tailor to need.

c.f. “ The Big Switch” Nicholas Carr 2008
Challenges of public and private data

- Historical resource costly bespoke solution mirroring and integrating public data with proprietary
- Resource focussed on integration with less available for innovation
- Most Pharma companies replicate this pipeline

- Future stable high quality public resources can be taken directly, proprietary data and services being overlaid
- Substantially less resource needed on integration if common standards are implemented
- Pharma and public share higher quality stable resources
The Technology Stack for Electronic Biology

---

**PERSPECTIVES**

**OPS 2016**

**Lowering industry firewalls:** pre-competitive informatics initiatives in drug discovery

Michael R. Barnes, Liv Hervort, Steven M. Hunt, Matthew D. Hall, Ian De, Scott Thomas, Rynn J. William and Cary G. Brenner

Abstract: Pharmaceutical research and development is facing substantial challenges that have prompted the industry to shift its emphasis from early-stage projects toward the evaluation of potential drug targets and biomarkers. In this article, we discuss the background to these changes and propose new areas of collaboration between academia and the pharmaceutical industry.

---

**SERVICES**

- Application (Knowledge)
  - Fact Visualisation e.g. Target Dossiers; SAR Visualisation

- Assertions
  - e.g. Gene-to-Disease; Compound-to-Target; Compound-to-ADR

- Standards
  - Ontology/taxonomy;
  - Minimum information guide;
  - Dictionaries; Interchange mapping

---

**DATA**

- Targets; Chemistry; Pharmacology; Literature; Patents

---

**DEFINING NEEDS**

- Define needs; Design algorithms; Develop “plug-in” architectures?

- Define needs; Contribute algorithms & develop tools (e.g. text mining); Enhance existing approaches

- Support existing standards; Drive new DD-relevant ontologies; Work with publishers

---

**Defining needs; Knowledge; Data Contribution**

---

After Barnes et al Nature Review Drug Discovery 2009 doi10.1038/nrd2944
Why Standardise?
Why the Pistoia Alliance?

• Industry was at a cross roads
  - Change in business models required

• We are all in this (mess) together (Life Science, technology vendors, service IT, academia, etc.)

• Need industry applicable services and standards

• Collect all the stakeholders together
  - agree the commonly-shared, pre-competitive use cases

• Focus on delivery of proofs of concept to stimulate and foster new business models
The Mission of the Pistoia Alliance

Lowering the barriers to innovation by improving the interoperability of R&D business processes via pre-competitive collaborations
If you want to go fast, go alone.
If you want to go far, go together.
Signpost clearly
The Focus of Each Domain

2010-2013
Big Data, Analytics, Semantics

Biology

2012-2014
Supply Chain, Tech Transfer

Chemistry

2012+
Vocabularies, Use Cases, Best Practices

Scientific Collaboration
The scenario:

All industry data services are delivered in an interoperable form so that I can

• Buy target data from commercial providers mined from literature
• Connect to public services from EBI and NCBI
• Use open source, commercial, and proprietary analysis tools in a trusted hosted environment.
The scenario:

All industry data services are delivered in an interoperable form so that I can:

- Buy target data from commercial providers mined from literature
- Connect to public services from EBI and NCBI
- Use open source, commercial, and proprietary analysis tools in a trusted hosted environment.

The cast:

- Life Science Scientist
- Life Science IT
- Software Vendor
- Commercial Content Provider
- Public Content Provider
- Service Provider
Hosted solutions are fit for purpose and easy to use. I can find everything I need.

Pistoia compliant services lower cost and decrease time to deliver customer solutions.

Decreases costs and increases the value of the software by reducing number of interfaces that need to be supported.

Increases value of products as data is more easily consumed. Eliminates middleman who reformats, sells data repacked as more consumable.

Increases utilization of a public good and provides commercial advocacy for government investment.

Pistoia compliant services lower cost and decrease time to deliver customer solutions.
IMI and Open PHACTS

Open PHACTS Project Partners

Pfizer – Coordinator
(Bryn Williams-Jones, Connected Discovery)
Universität Wien – Managing entity of IMI JU funding
(Gerhard Ecker)

Technical University of Denmark
(Sören Brunak)
University of Hamburg, Center for Bioinformatics
(Matthias Rarey)
BioSolveIT GmbH
(Christian Lemmen)
Consorci Mar Parc de Salut de Barcelona
(Ferran Sanz)
Leiden University Medical Centre
(Barend Mons)

Royal Society of Chemistry
(Richard Kidd)
Vrije Universiteit Amsterdam
(Paul Groth)
Spanish National Cancer Research Centre
(Alfonso Valencia)
University of Manchester
(Carole Goble)
University of Maastricht
(Chris Evelo)
AQnowledge
(Jan Velterop)
University of Santiago de Compostela
(Mabel Loza)
Rheinische Friedrich-Wilhelms-Universität Bonn
(Martin Hofmann-Apitus)

AstraZeneca
(Niklas Blomberg)
GlaxoSmithKline
(Andrew Leach)
Esteve
(Leo Salgado)
Novartis
(Edgar Jacoby)
Merck Serono
(Thomas Grombacher)
H. Lundbeck A/S
(Askjaer Sune)
Eli Lilly
(Hans Constandt)
Connected Discovery
(Lee Harland, Bryn Williams-Jones)
Bryn Williams-Jones
Chief Operating Officer

Tel: +44 (0) 203 239 3112
E-mail: bryn@connecteddiscovery.com
Skype: brynwilliamsjones
Twitter: @ConnDisco

ConnectedDiscovery Ltd.,
27 Old Gloucester Street,
London,
WC1N 3AX

www.connecteddiscovery.com
Our industry needs a Disruptive Innovation.

That Disruption...is Pistoia

IF YOU WANT TO GO FAST, GO ALONE
IF YOU WANT TO GO FAR, GO TOGETHER