Open PHACTS
Open Pharmacological Space

Open PHACTS

First year…

Open PHACTS
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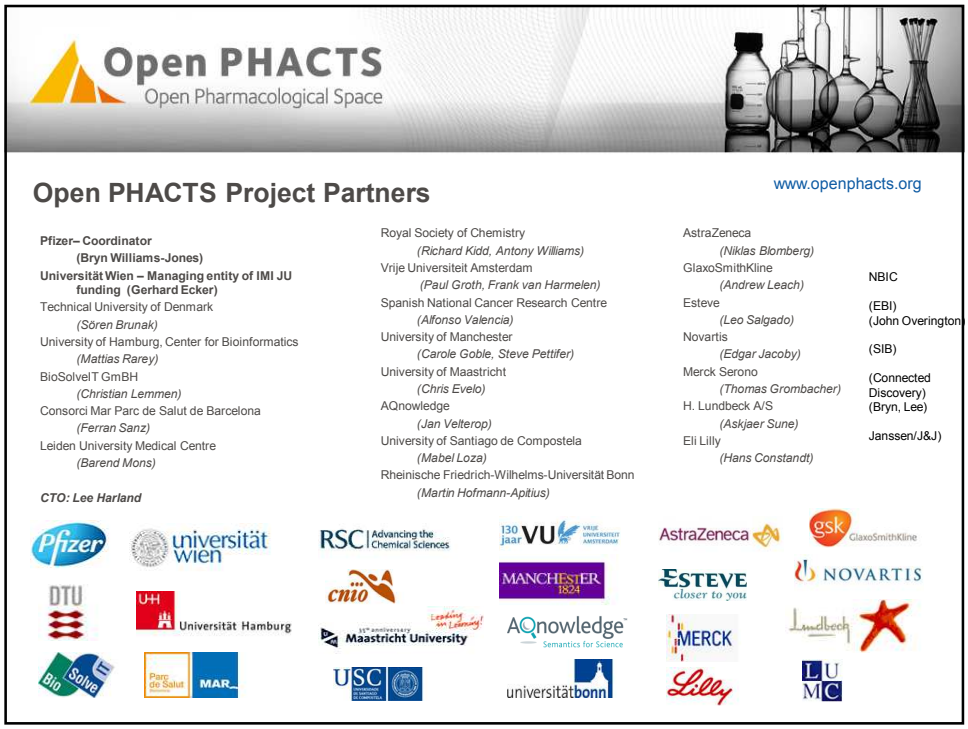
The Innovative Medicines Initiative

- EC funded public-private partnership for pharmaceutical research
- Focus on key problems
  - Efficacy, Safety, Education & Training, **Knowledge Management**

The Open PHACTS Project

- Create a *semantic integration hub ("Open Pharmacological Space")…*
- Delivering services to support on-going drug discovery programs in pharma and public domain
- *Not just another project*; Leading academics in semantics, pharmacology and informatics, driven by solid industry business requirements
- 27 partners, 14 academic, 9 pharmaceutical companies, 4 SMEs (four of these in process)
- Work split into clusters:
  - Technical Build (*focus here)*
  - Scientific Drive
  - Community & Sustainability

The Project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Open PHACTS Project Partners
www.openphacts.org
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Universität Wien – Managing entity of IMI JU funding (Gerhard Ecker)
Technical University of Denmark
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(Mattias Rarey)
BioSolveIT GmbH
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(Alfonso Valencia)
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(Niklas Blomberg)
GlaxoSmithKline
(Andrew Leach)
Esteve
(Leo Salgado)
Novartis
(Edgar Jacoby)
Merck Serono
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H. Lundbeck A/S
(Askjaer Sune)
Eli Lilly
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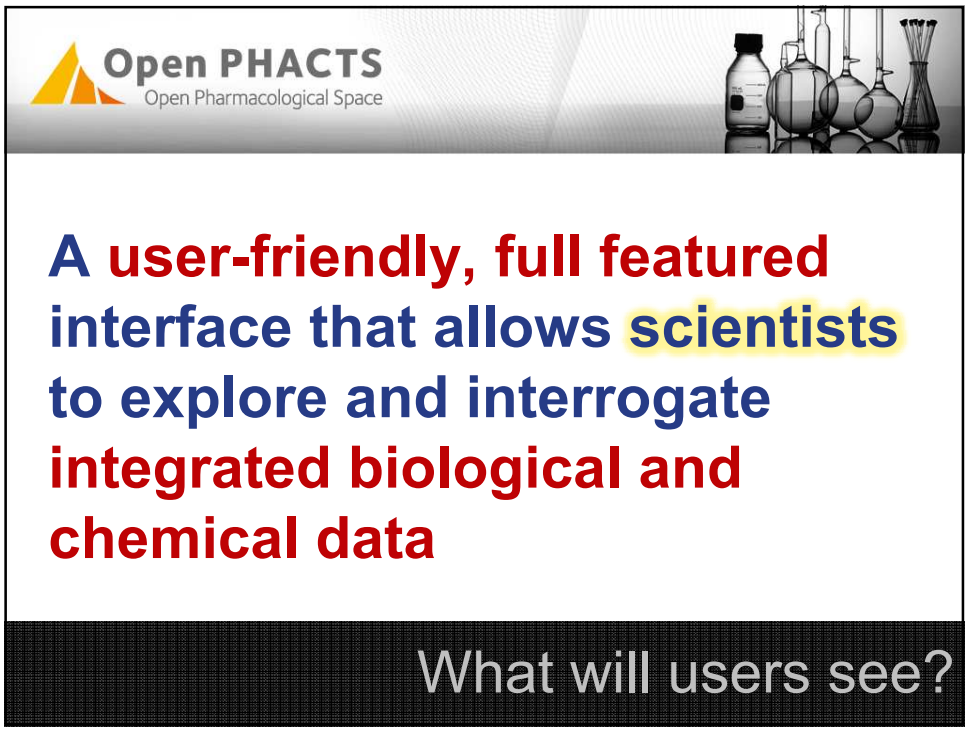
NBIC
(EBI)
(John Overington
(SIB)
(Connected Discovery)
(Bryn, Lee)
Janssen/J&J)


Open PHACTS
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A user-friendly, full featured interface that allows scientists to explore and interrogate integrated biological and chemical data
What will users see?

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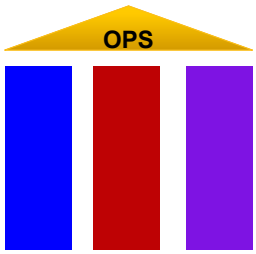
- **A Precompetitive Infrastructure**
  - Begin the task of creating an environment that can also power future collaborative efforts (public & industry)
  - **Expose Industry Experience:** Create drug-discovery focused tools outside of the firewall, influenced by decades of practical experience
- **A Pharmacology Use Case**
  - Showcase one application this technology: a stable, responsive, user-orientated system for Pharmacology Analysis
- **A Data Publishing Methodology**
  - Develop standards and methodologies to promote good data sharing and interoperability
  - An exemplar project for the use of the Nanopublication concept
  - A technical approach that can be repeated in other areas



OPS 3 Pillars

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A use case driven approach

- Main architecture, technical implementation and primary capabilities driven by a set of **prioritised research questions**
- Based on the main research questions define **prioritised data sources**
- **Three Exemplars** will be developed to demonstrate the capabilites of the OPS System and to define interfaces and input/output standards
- **Use cases** have been defined to benchmark the OPS system towards current standard workflows in data retrieval and mining

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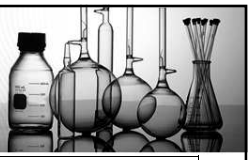

Number	sum	Nr of 1	Question
15	**12**	**9**	**All oxido,reductase inhibitors active <100nM in both human and mouse**
18	14	8	Given compound X, what is its predicted secondary pharmacology? What are the on and off,target safety concerns for a compound? What is the evidence and how reliable is that evidence (journal impact factor, KOL) for findings associated with a compound?
24	13	8	Given a target find me all actives against that target. Find/predict polypharmacology of actives. Determine ADMET profile of actives.
32	13	8	For a given interaction profile, give me compounds similar to it.
37	13	8	The current Factor Xa lead series is characterised by substructure X. Retrieve all bioactivity data in serine protease assays for molecules that contain substructure X.
38	13	8	Retrieve all experimental and clinical data for a given list of compounds defined by their chemical structure (with options to match stereochemistry or not).
41	13	8	A project is considering Protein Kinase C Alpha (PRKCA) as a target. What are all the compounds known to modulate the target directly? What are the compounds that may modulate the target directly? i.e. return all cmpds active in assays where the resolution is at least at the level of the target family (i.e. PKC) both from structured assay databases and the literature.
44	13	8	Give me all active compounds on a given target with the relevant assay data
46	13	8	Give me the compound(s) which hit most specifically the multiple targets in a given pathway (disease)
59	14	8	Identify all known protein-protein interaction inhibitors

Business Question Based Requirements

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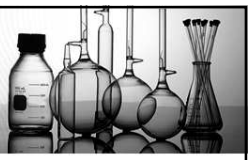

Example Research questions

- Give all compounds with IC50 < xxx for target Y in species W and Z plus assay data
- What substructures are associated with readout X (target, pathway, disease, …)
- Give all experimental and clinical data for compound X
- Give all targets for compound X or a compound with a similarity > y%

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Exemplar Services

- **Chem-Bio Navigator:** querying and visualization of sets of pharmacologically annotated small molecules, on basis of chemical substructures, pharmacophores, biological activities
- **Target Dossier:** *in silico* dossiers about targets, incorporating related information on sequences, structures, pathways, diseases and small molecules
- **Polypharmacology Browser:** map coverage of the chemo-biological space, to facilitate the polypharmacological profiling of small molecules
- **Utopia Documents:** link publications to related data

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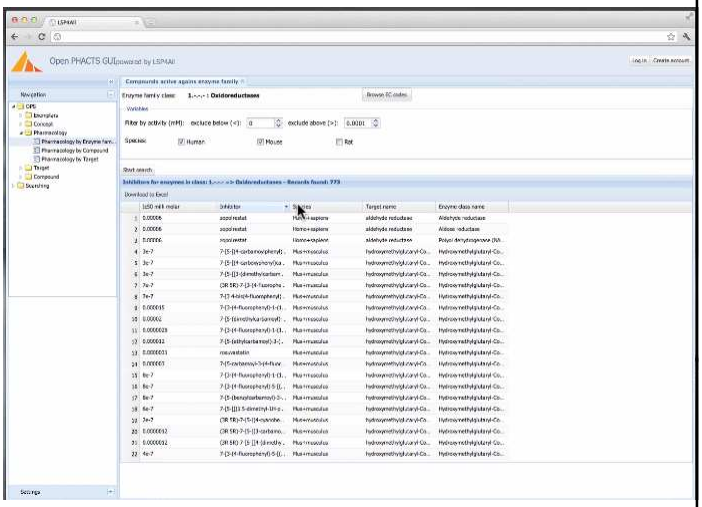
6 month Lash Up Demo

Play



http://www.youtube.com/OpenPHACTS

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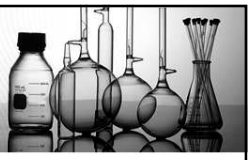

- RDF is our chosen format; it is well suited to describing complex data, open and supported by a growing body of tools and scientists
- Critical data sources are published as RDF and include data set descriptors (see here & here), which are an existing standard, promoted by Open PHACTS. This plays a major role in identifying and maintaining content in integration systems such as OPS
- Providing richer meta data for each dataset increases the value and scope for reuse of that data beyond Open PHACTS
- Producers of RDF can choose to enhance their RDF with information required to create Nanopublications, and promote the citability of data
- We aim to contribute to standards around RDF publishing that promote interoperability and data reuse

- *www.nanopub.org/guidelines/current*

Data Publishing Methodology

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- The core platform will be built on open source technology. This includes the data harvester, the semantic workflow engine/API code, the Open PHACTS GUI and associated widgets
- The standards for producing RDF/Nanopublications will all be open and available
- An open version of the system will be available at openphacts.org, fully functional with public data
- Interested parties will also be able to download the core platform and instantiate it on their own servers, having everything they need to run a local system should this be required
- Note: OPS is decoupled from any specific RDF database engine. It should be possible to run the platform on a range of free and commercial platforms that meet certain criteria (to be published)

What Is Open?

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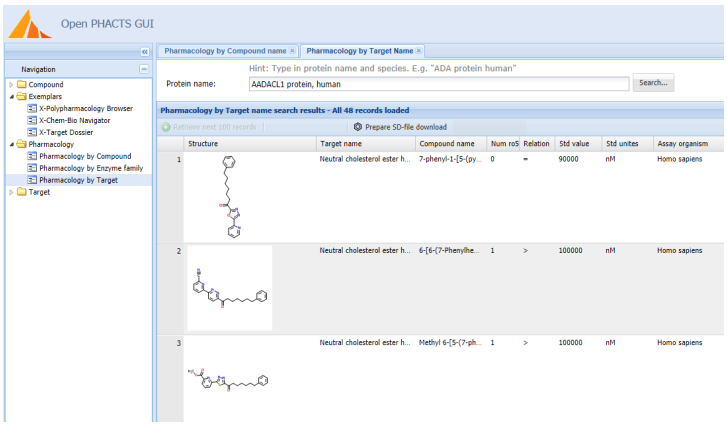

Consortium release March

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The project is now seeking a partnership with a commercial service provider to reliably host the publicly accessible system

Additional partner to host

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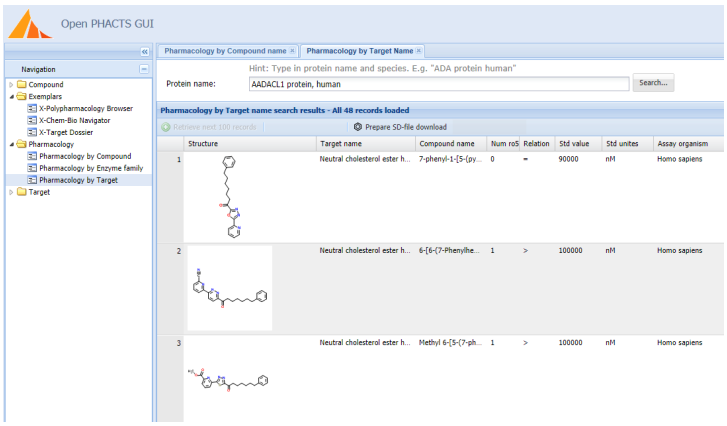

Public beta release Sep 2012