

EMBL-EBI Industry Programme

Jennifer McDowall
Dominic Clark,
Industry Programme Manager,
clark@ebi.ac.uk.

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EMBL-EBI



Overview

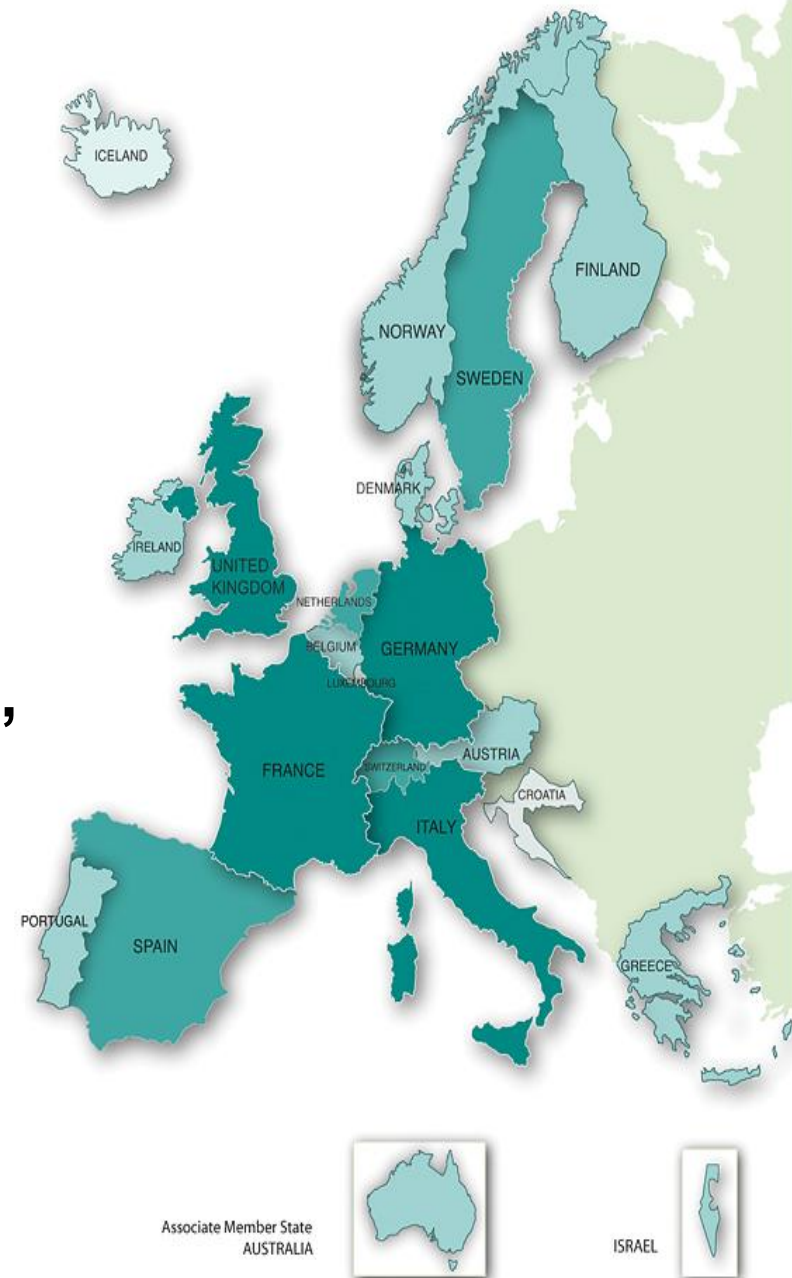
- In this presentation, I will start off with a short overview of EMBL-EBI. I will then describe the various forms of interaction between EMBL-EBI and industrial companies and organisations through the EMBL-EBI Industry Programme and the EMBL-EBI SME Forum.
- For the SME Forum, I will describe the key factors of interest to the smaller sized companies and how interactions are managed
- For the Industry Programme, I will describe the principal industry drivers behind the involvement of companies in the Industry Programme and some of the pre-competitive projects that have resulted.

What is EMBL-EBI?

- Based on the Wellcome Trust Genome Campus near Cambridge, UK
- Part of the European Molecular Biology Laboratory
- Non-profit organisation

EMBL member states

**Austria, Belgium, Croatia,
Denmark, Finland, France,
Germany, Greece, Iceland,
Ireland, Israel, Italy, Luxembourg,
the Netherlands,
Norway, Portugal, Spain, Sweden,
Switzerland and the United
Kingdom**
**Associate member state:
Australia**



The five branches of EMBL

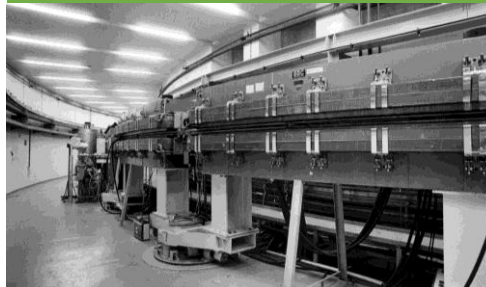
- EMBL is a basic research institute funded by public research monies from 20 member states.
- 1400 staff, over 60 nationalities.

Heidelberg



Basic research in
molecular biology
Administration
EMBO

Hamburg



Structural biology

Hinxton



Bioinformatics

Grenoble



Structural biology

Monterotondo

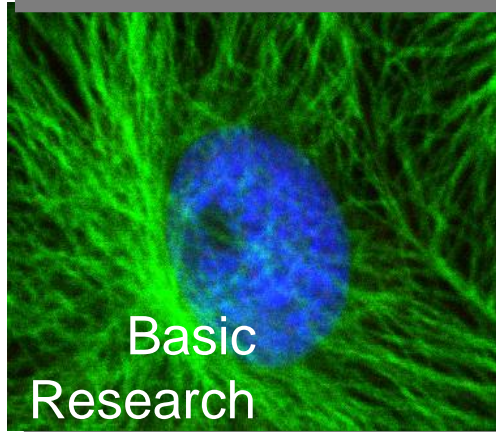


Mouse biology

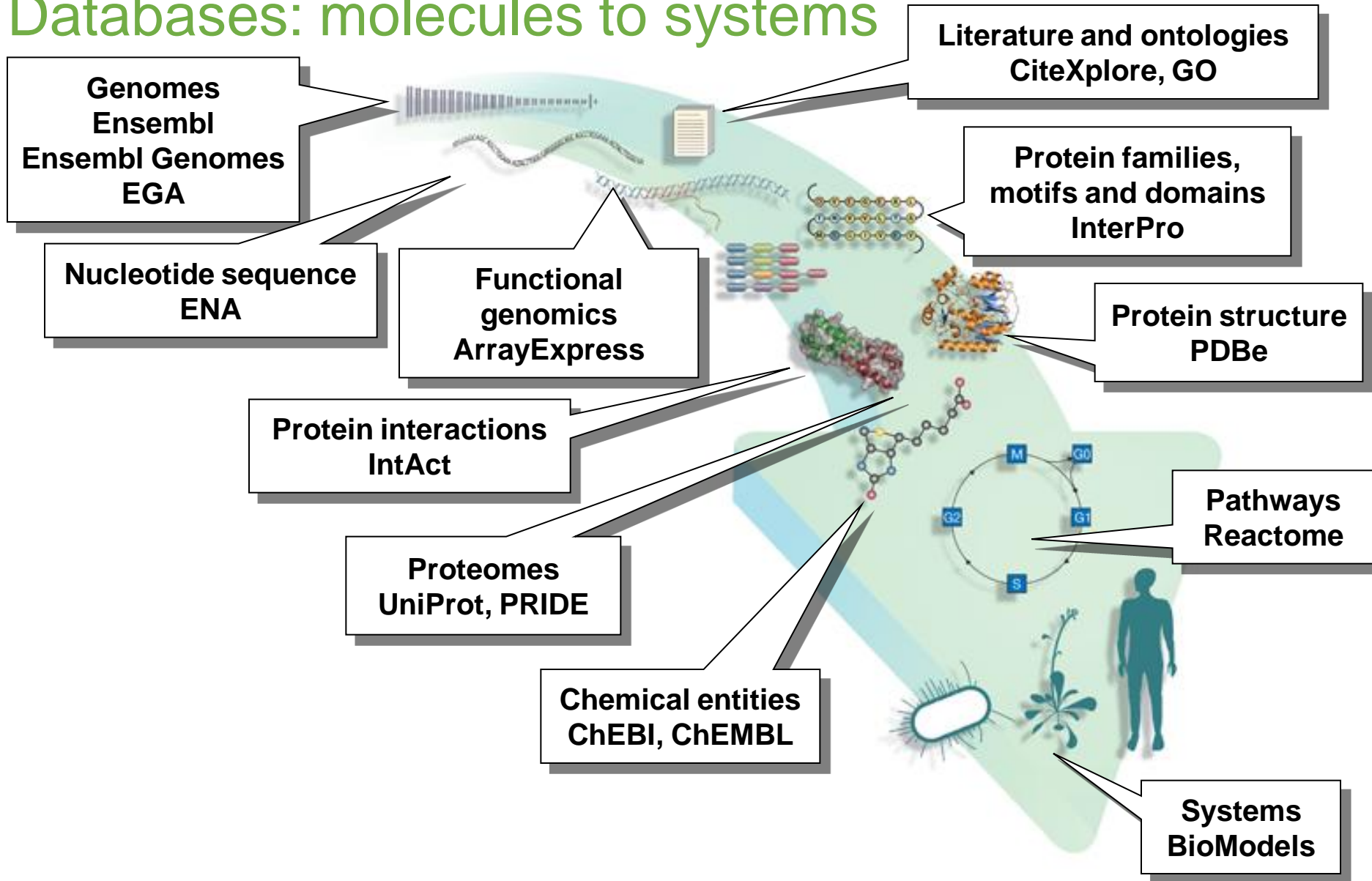
EMBL-EBI's mission

- To provide **freely available data and bioinformatics services** to all facets of the scientific community in ways that promote scientific progress
- To contribute to the advancement of biology through basic investigator-driven **research** in bioinformatics
- To provide advanced bioinformatics **training** to scientists at all levels, from PhD students to independent investigators
- To help disseminate cutting-edge technologies to **industry**

TODAY: EMBL-EBI's Mission



Databases: molecules to systems



EMBL-EBI: Most important data collections

Genomes & Genes

1. **Ensembl**: Joint project with Sanger Institute - high-quality annotation of vertebrate genomes
2. **Ensembl Genomes**: Environment for genome data from other taxons
3. **1000 Genomes**: Catalogue of human variation from major World populations
4. **EGA***: European Genotype-Phenome Archive* – genotype, phenotype and sequences from individual subjects and controls
5. **ENA**: European Nucleotide Archive – all DNA & RNA, nextgen reads and traces

Transcription

6. **ArrayExpress**: Archive of transcriptomics and other functional genomics data
7. **Expression Atlas**: Differentially expressed genes in tissues, cells, disease states & treatments

Protein

8. **UniProt**: Archive of protein sequences and functional annotation
9. **InterPro**: Integrated resource for protein families, motifs and domains
10. **PRIDE**: Public data repository for proteomics data
11. **PDBe**: Protein and other macromolecular structure and function

Small molecules

12. **ChEBI**: Chemical entities of biological interest
13. **ChEMBL**: Bioactive compounds, drugs and drug-like molecules, properties and activities

Processes

14. **IntAct**: Public repository for molecular interaction data
15. **Reactome**: Biochemical pathways and reactions in human biology
16. **Biomodels**: Mathematical models of cellular processes

Ontologies

17. **GO**: Gene Ontology, consistent descriptions of gene products

Scientific literature

18. **CiteXplor**: Bibliographic query system

* Requires approval

The EMBL-EBI service Mission

- In addition, there are 25-30 small specialist databases and supporting resources such as controlled vocabularies. According to a recent survey run in the context of ELIXIR, the emerging European Life-Science Infrastructure for Biological Information, there are roughly 200 databases offered by 100 institutions throughout Europe. The EBI, perhaps not surprisingly, was found to hold the largest data collection and serve by far the largest number of users. EMBL-EBI also forms a European node in several global data-sharing collaborations.
- The EMBL-EBI also offers a range of computational tools to explore the data available in the repositories, for example tools for sequence alignment or pattern searching. These services are used by academic and commercial researchers throughout Europe

Database collaborations



Standards development – international

collaborations

Genome annotation
www.geneontology.org

Nucleotide sequence
www.insdc.org

Microarray and Gene Expression Data (MGED)
www.mged.org

Cheminformatics
www.ebi.ac.uk/chebi

Metabolomics Standards Initiative (MSI)
www.metabolomicssociety.org

HUPO-Proteomics Standards Initiative (PSI)
www.psidev.info/

Pathways
www.reactome.org
www.biopax.org

Genomics Standards Consortium (GSC)
<http://gensc.org>

Protein sequence
www.uniprot.org

Protein structure
www.wwpdb.org

Systems modelling standards
www.sbml.org

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What Technologies?

- Bioinformatics resources
- Literature resources
- Cheminformatics resources (ChEBI, CDK)
- ChemoGenomics resources (ChEMBL)
- Knowledge management technologies and standards
- ...

Industry is a broad term

- **Business Focus**

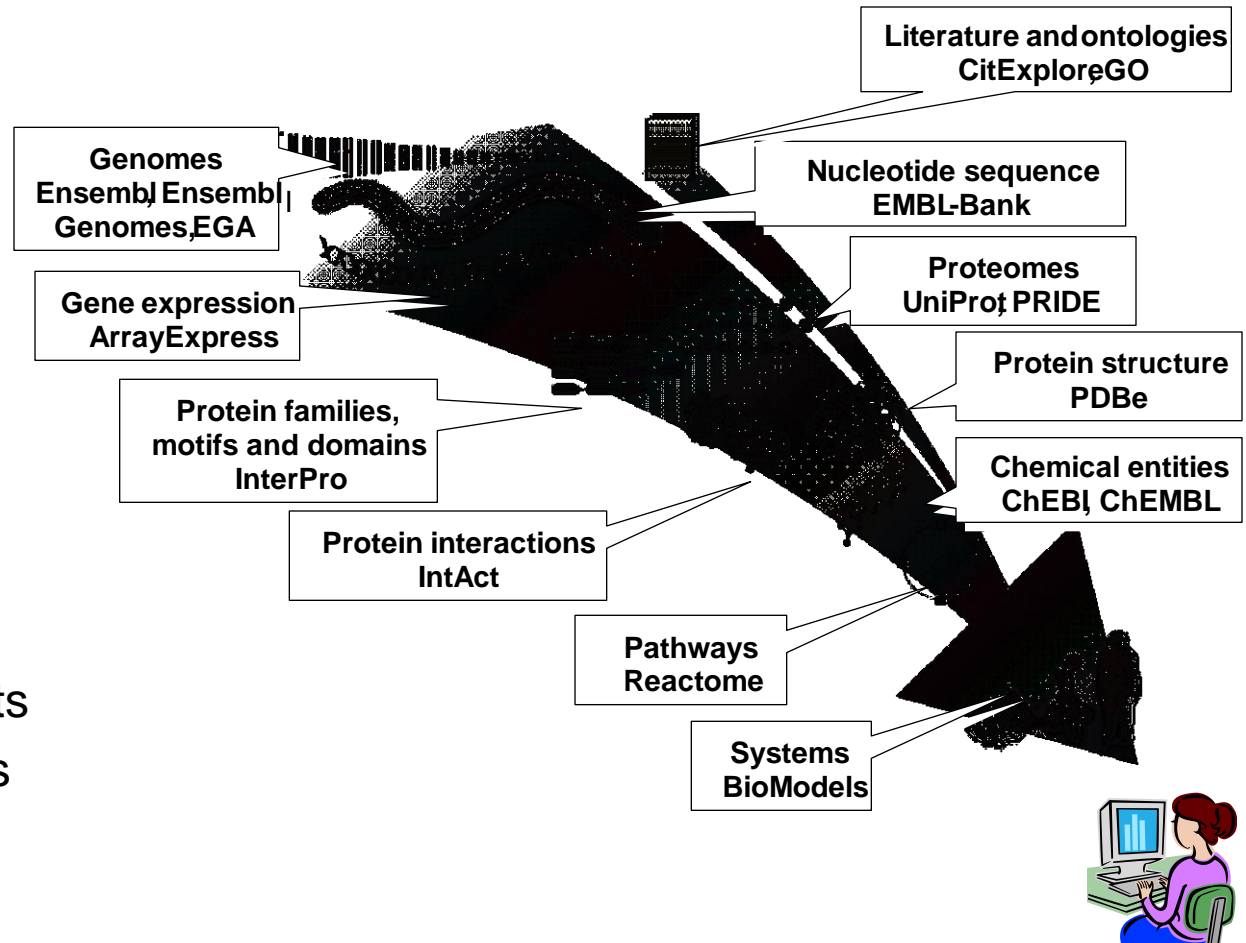
- Pharmaceuticals/Drug Discovery
- Biotechnology companies
- Agriculture and Agrochemicals
- The food industry
- Diagnostics
- Imaging
- Livestock breeding
- DNA forensics
- Microbial genomics
- Bioprocessing

- **Size**

- Large Multinationals
- SMEs

Many to many mapping

- Life sciences
- Medicine
- Agriculture
- Pharmaceuticals
- Biotechnology
- Environment
- Bio-fuels
- Cosmaceuticals
- Nutraceuticals
- Consumer products
- Personal genomes
- Etc...



How do we support industry, generally?

- EMBL-EBI data resources and services are freely available to industry stakeholders in the same way as they are freely available to members of the academic research community. With the exception of EGA, they can be searched, downloaded in their entirety etc.
- For training courses that are funded through EMBL-EBI core funds or EU grants, industry stakeholders may attend all EMBL-EBI on a similar cost basis as academic researchers.
- (But restrictions apply to courses funded by Wellcome Trust, EMBO and FEBS)
- www.ebi.ac.uk/training/handson/
- www.ebi.ac.uk/events

Why an SME Forum?

- SMEs are enormously important for the economies of EMBL member states.
- Support for Industry is part of the mission of the EMBL-European Bioinformatics Institute.
- To this end we have established an annual series of information workshops based in differing locations in Europe hosted by regional agencies in bio-clusters, who have existing links with the SMEs in their cluster.

How do SMEs benefit?

- In relation to the larger companies, SMEs are often driven by shorter-term expedients.
- Our experience is that SMEs benefit most greatly from knowledge dissemination meetings that focus on tools and information resources that are:
 - freely available in the public domain
 - can add value to their business processes immediately.
- These workshops are designed to allow SMEs to hear about data resources, tools and services that are provided freely by EMBL-EBI and our collaborators.
- This year there is a major additional focus on tools and data provided the European Patent Office (EPO).

Annual Forum for SMEs

- These meetings have been initially funded from EU projects coordinated by EMBL-EBI.
- In 2008, the forum was held in Berlin.
- In 2009, the forum was held in Vienna.
- [In 2010, it was in Munich and co-hosted by Bio-M and the EPO.](#)
- www.enfin.org/SME2010

The Forum Topics

- The topics of the workshop have been specifically selected on the basis of previous interactions with SMEs and include:
 - chemogenomics, cheminformatics,
 - proteomics,
 - text mining, literature services and analysis,
 - web services
 - and patent services providing by EMBL-EBI and the European Patent Office.
- This year in addition to the presentations, discussion and networking opportunities, there will also be an opportunity for some hands-on tutorials at the offices of the EPO.



Mathias Lamparter

Bio^M Biotech Cluster Development GmbH

Monday 18th October 2010

12.40	Welcome from Bio ^M Prof. Dr. Horst Domdey , Managing Director, BioM Biotech Cluster Development GmbH
12.50	Meeting Overview (Dominic Clark & Pascal Kahlem , EMBL-EBI)
12.55	Overview of EMBL-EBI data resources and services (Dominic Clark , EMBL-EBI)
13.10	EMBL-EBI Proteomics data resources and services (Rafael Jimenez , EMBL-EBI)
13.40	ENFIN – EnVISION and DAS (Rafael Jimenez , EMBL-EBI)
14.10	Cheminformatics resources and services at EBI (Chris Steinbeck , EMBL-EBI).
14.40	COFFEE BREAK



Chris Steinbeck, EMBL-EBI

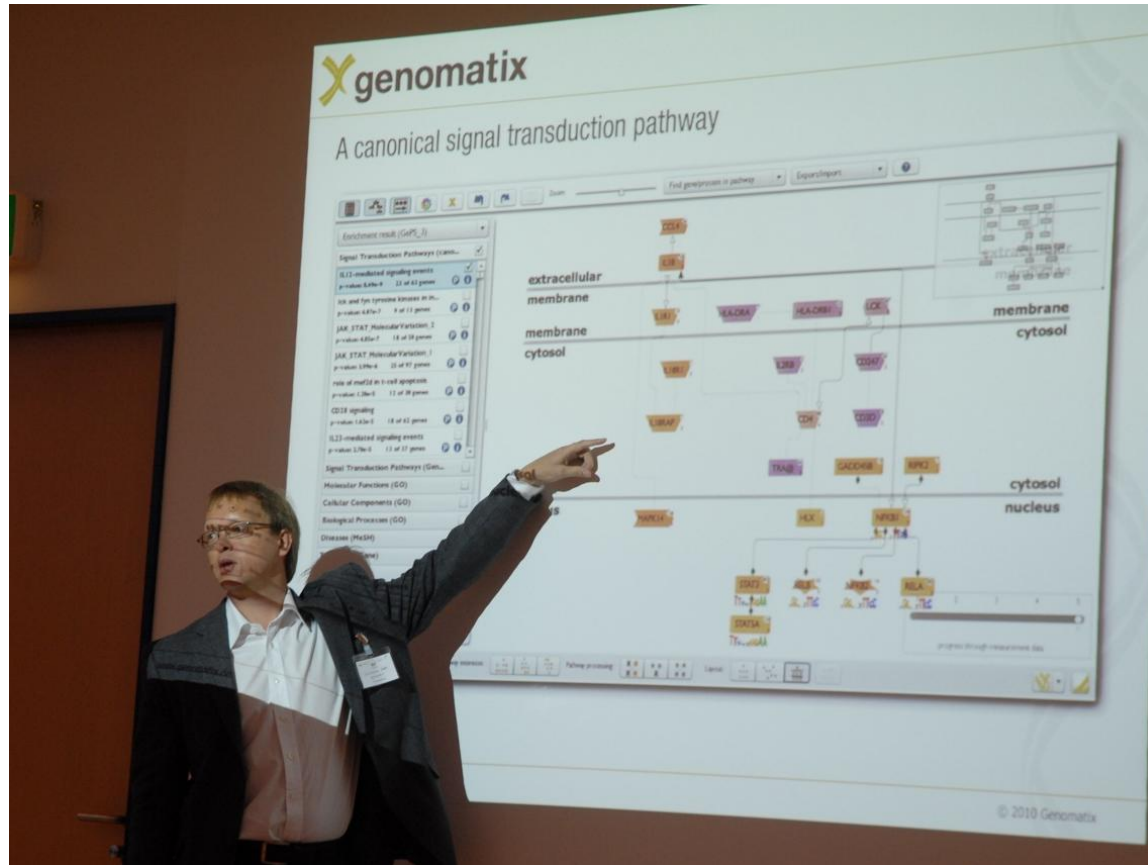
Head of Cheminformatics and Metabolism

<http://www.ebi.ac.uk/chebi/>

<http://www.steinbeck-molecular.de/steinblog/>

Monday 18th October 2010

15.10	Using Web services in Your Data Analysis Pipeline (Erik Bongcam-Rudloff , U. Uppsala)
15.40	Web Services: The Biocatalogue Project (Eric Nzuobontane , EMBL-EBI)
16.10	ChEMBL databases and tools: Support of target selection and validation (John Overington , EMBL-EBI)
16.40	Short Break
17.00	Presentations from Regional Organisation: Introduced by Mathias Lamparter , Bio ^M .
17.15	Knowledge Management for Scientific Intelligence with BioXM, Klaus Heumann , CEO, Biomax Informatics AG, BioMax Informatics AG, (http://www.biomax.com).
17.45	Presentation from Dr. Martin Seifert , Vice President Business Development and Consulting, Genomatix Software GmbH.
18.15	Closing Comments, Bio ^M
18.25	Closing Comments (Dominic Clark & Pascal Kahlem, EMBL-EBI)
18.35	Networking Buffet Supper



Dr. Martin Seifert, VP Genomatix



Noël Campling, EPO Director of Know-How introduces the second day.

Representing EBI: Jennifer McDowall, Johanna McEntyre, Dietrich Rebolz-Schuhmann and Dominic Clark

Tuesday 19th October 2010, EPO, room 8661 (Grasserstr 2), Munich.

Time	Item
08.45	COFFEE
09.00	Welcome Noël Camping , Director of Know-How, EPO Introduction to the second day (Dominic Clark , EMBL-EBI)
09.10	EMBL-EBI Literature Services and Applications (Jo McEntyre , Head of Literature Services, EMBL-EBI)
09.40	EMBL-EBI text mining tools and mapping of targets/pathways to disease (Dietrich Rebholz-Schuhmann , EMBL-EBI)
10.10	EMBL-EBI Patent related services (Jennifer McDowall , EMBL-EBI).
10.35	COFFEE

Tuesday 19th October 2010, EPO, room 8661 (Grasserstr 2), Munich

11.00	EPO Services, resources for SMEs and the SLING project (Stephane Nauche , European Patent Office)
11.15	EPO information resources and esp@cenet (www.espacenet.com) (David Evans , European Patent Office, Munich)
11.45	How the EPO searches prior art in Biotech; and dissemination of knowledge (Titus Vogt , European Patent Office)
12.15	Biotech patentability (Titus Vogt , European Patent Office)
13.00	Wrap up of second morning including Panel Q&A – Pascal Kahlem EMBL-EBI..
13.15	Lunch

Hands-on Tutorials (in EPO training rooms 1909 & 1910, Bayerstr 115 “Building no. 7”).

14.30	Workshop A: EMBL-EBI resources (Jennifer McDowall , EMBL-EBI) Workshop B: EPO resources (David Evans)
15.30	Break
15.45	Workshop A: EPO resources (David Evans) Workshop B: EMBL-EBI resources (Jennifer McDowall , EMBL-EBI)
16.45	Wind down cocktail & feedback discussion
17.30	Close of day



Tutorial on using EBI Patent searching services

Tutorial Contents

- Workshop A: EMBL-EBI resources (**Jennifer McDowall**, EMBL-EBI)
- Workshop B: EPO resources (**David Evans**)
 - The basics of how to use the public patent database: espacenet - ep.espacenet.com/
 - How to use patent classification codes (IPC & ECLA) for more targeted searching
 - How to interpret the search results; how to "read" a patent; how to use the search report on a patent for further leads
 - How to use espacenet to find collaborators and partners
 - How to monitor a pending application of interest in Register Plus - www.epo.org/patents/patent-information/free/register-plus.html
 - How to use INPADOC to check the status of a patent (has it lapsed? is it in force in a particular country?)



Sector of your organization

Industry/Commercial/SME (61)

11%



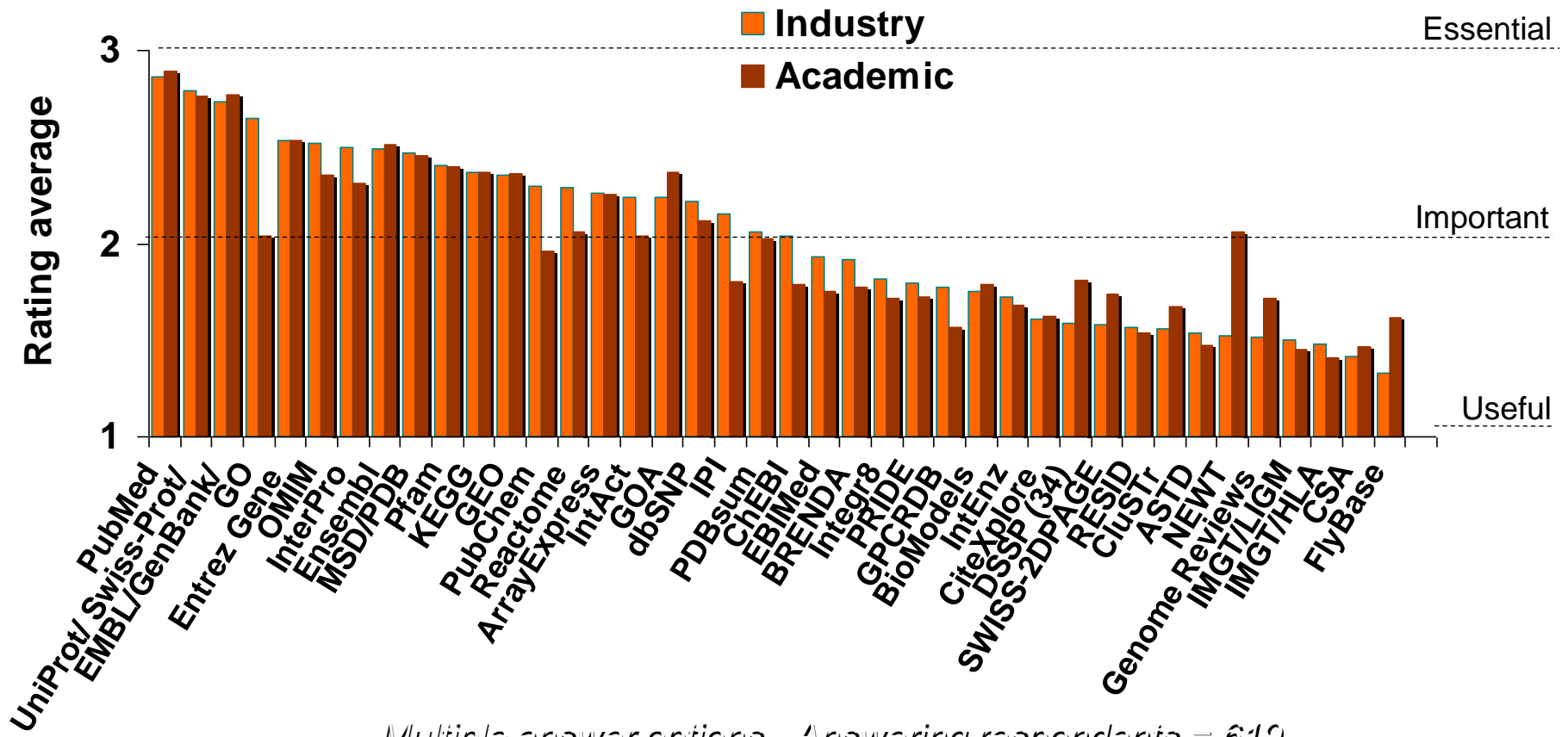
89%

Academic/Non-profit (516)

Response frequency = % of answering respondents (i.e. 577)

Interests of Industry & academics overlap

Important databases according to **sector**



Multiple answer options - Answering respondents = 619

We support larger companies through the “Industry Programme”

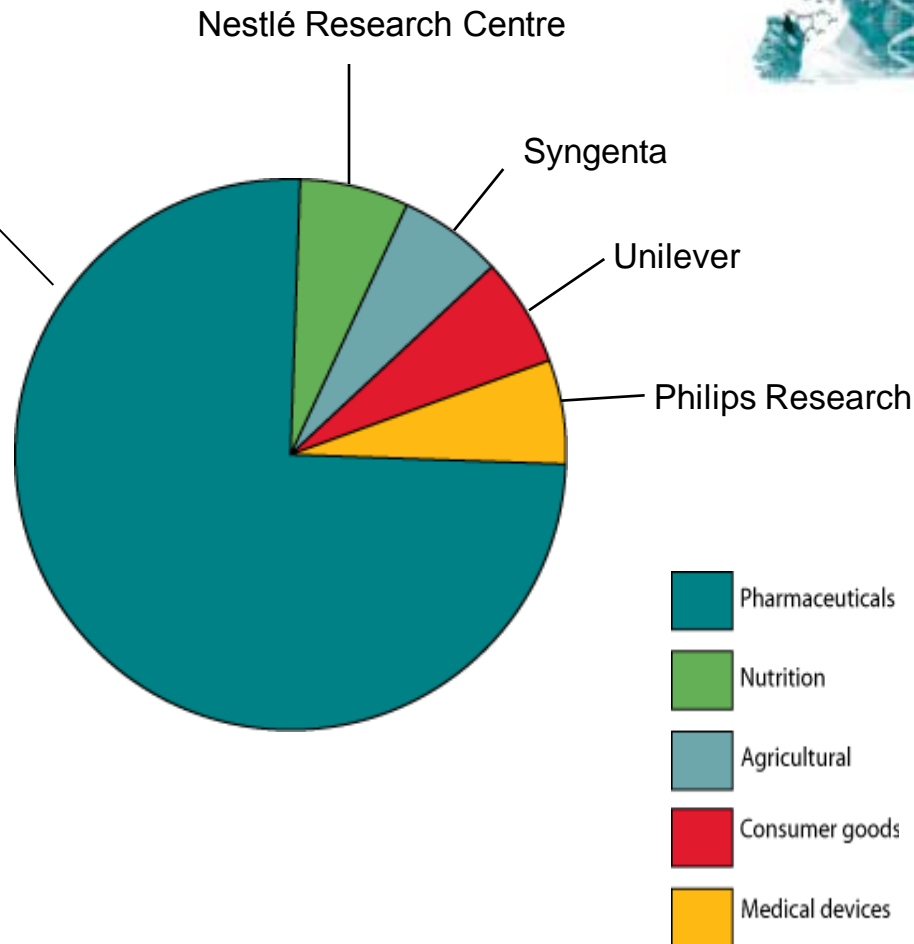
- The Industry Programme was set up in 1996 and is now well established.
- It is a subscription-funded programme for larger companies.
- Through the Industry Programme, EMBL-EBI provides specialist workshops, standards-based activities and pre-competitive research and development opportunities of particular relevance to the industry programme members.
- <http://www.ebi.ac.uk/Information/Brochures/>

Scope of Industry Programme

- **1. Forum** for interaction between EBI and our users in industry
- 2. Provide **training** for our commercial users
- **3. Inform** ‘industrial users’ of EBI’s status and future plans
- 4. Feed industry requirements into the EBI’s planning (**influencing**)
- 5. Provide a neutral meeting place for **inter-company interactions** on bioinformatics
- 6. Coordinate **workshops** on topics decided by programme – gathering expert speakers (industrial and academic)
- 7. To initiate ‘**pre-competitive projects**’ at EBI with targeted collaborative funding
- 8. External **liaison** as appropriate with other industry initiatives (Standards initiatives, industry organisations)

18 Industry Programme members

- Astella Pharma
- AstraZeneca
- Bayer Schering Pharma
- Boehringer Ingelheim
- Eli Lilly and Company
- F. Hoffmann-La Roche
- Galderma
- GlaxoSmithKline
- Johnson & Johnson Pharmaceutical Research & Development
- Merck Serono
- Novo Nordisk
- Orion Pharma
- Pfizer Ltd
- Sanofi-Aventis



“The Industry Programme’s regular meetings foster inter-company interactions as we collaborate on special projects and liaise on other industry initiatives”

Bertram Weiss,
Principle Scientist,
Target Discovery, Bayer Schering Pharma

Quarterly Strategy Meetings

- The Industry Programme members meet on a quarterly basis at the EMBL-EBI to:
 - In March, June, September and December
 - Business meeting of the industry programme
 - discuss the current status and future directions of the programme
 - be updated on the EMBL-EBI's activities and strategy
 - review progress on pre-competitive initiatives
 - review outcomes of workshops
 - review priorities for future workshops and potential pre-competitive research areas
 - discuss funding for pre-competitive research areas

Precompetitive challenges and opportunities

- Pharma R&D is facing significant challenges that have prompted the industry to shift funding from early to late stage to maintain the rate of drug development.
- There are many opportunities for precompetitive activities
 - **Target and Target Pharmacology Space**
 - **Drug Safety and Efficacy Space**
 - **Knowledge Management Space**
 - **Pharmaceutical R&D relevant Infrastructure**

Workshops

- The Industry Programme organises high quality workshops and symposia, providing expert level presentations and strategic discussion opportunities for the Industry Programme members and other key opinion leaders
- Workshops are typically:
 - organised through a planning team,
 - Facilitated
 - include key opinion leaders and other relevant stakeholders
 - Include stakeholders from the research and industry communities
 - Either open, by invitation only or a combination of the two
 - technically focussed or as part of a more general pre-competitive initiative
- The subject areas for the workshops are prioritised by the Industry programme member companies through the quarterly strategy meetings or annual prioritisation process.

Workshops 2010

- Feb: Joint OBO Foundry & Pistoia Alliance
- March: Therapeutic Applications of Computational Biology and Chemistry
- May: Cheminformatics in R
- June: Computational Drug Repositioning
- Sept: Structural Biology & PDBeMotif
- Oct: Ontology Engineering workshop
- Nov: Toxicology Ontologies Roadmap
- Dec: Chemical Structure Resources

What happens after workshops

- Workshops organised through the EMBL-EBI industry programme are either training workshops or knowledge exchange workshops.
- The latter may result in the identification and documentation of shared needs among industry companies that can be considered as “pre-competitive”.
- Such projects may relate to the development of standards, support for data resources in the public domain, public information integration activities and development of new services.
- Where appropriate EMBL-EBI will act as a coordinator or broker in establishing pre-competitive collaborations between Industry programme members (and third parties – academic groups, funding organisations, other commercial companies)

Pre-competitive initiatives

OPINION

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

*Michael R. Barnes, Lee Harland, Steven M. Foord, Matthew D. Hall, Ian Dix,
Scott Thomas, Bryn I. Williams-Jones and Cory R. Brouwer*

NATURE REVIEWS | DRUG DISCOVERY | VOLUME 8 | SEPTEMBER 2009 | 701

- Disease knowledge, targets, safety, infrastructure

Pre-competitive Activities/Projects

- The typical timeline will involve:
 - Identification of an opportunity at a knowledge exchange workshop
 - documentation of a specific project
 - discussion and agreement by key stakeholders (EMBL, industry companies providing funding and other participants)
 - legal agreement through EMBLEM.
- Because the outcomes of these projects are made publicly available through EMBL-EBI, benefits are shared across all stakeholders in EMBL member states and not just limited to the industry funders.

What about the Agri-Food industry?

- Later adopters of informatics than Pharma
- But many with significant activities
- and common interests with the Pharma companies
- R&D scientists throughout agri-food and specialist bioinformatics services providers: knowledge of developments in methods, especially in: metagenomics, small molecule informatics, gene expression and interaction, handling next-gen sequence data, text mining, ontologies and knowledge engineering, data integration, pathway/network analysis, literature and patent searching.

In Summary

- EMBL-EBI is committed to supporting industry
- Where-ever possible we provide access to resources and training in the same manner to industry as academia.
- For SMEs we organise an annual subsidised forum, to subscribe to the mailing list for information, visit www.ebi.ac.uk/industry/sme
- For Larger companies we have the Industry Programme. This promotes pre-competitive projects that benefit all our stakeholders.