Functional Genomics Ontology FuGO and Metabolomics Society Ontology group

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EMBL-EBI

Metabolomics Society and MGED Society

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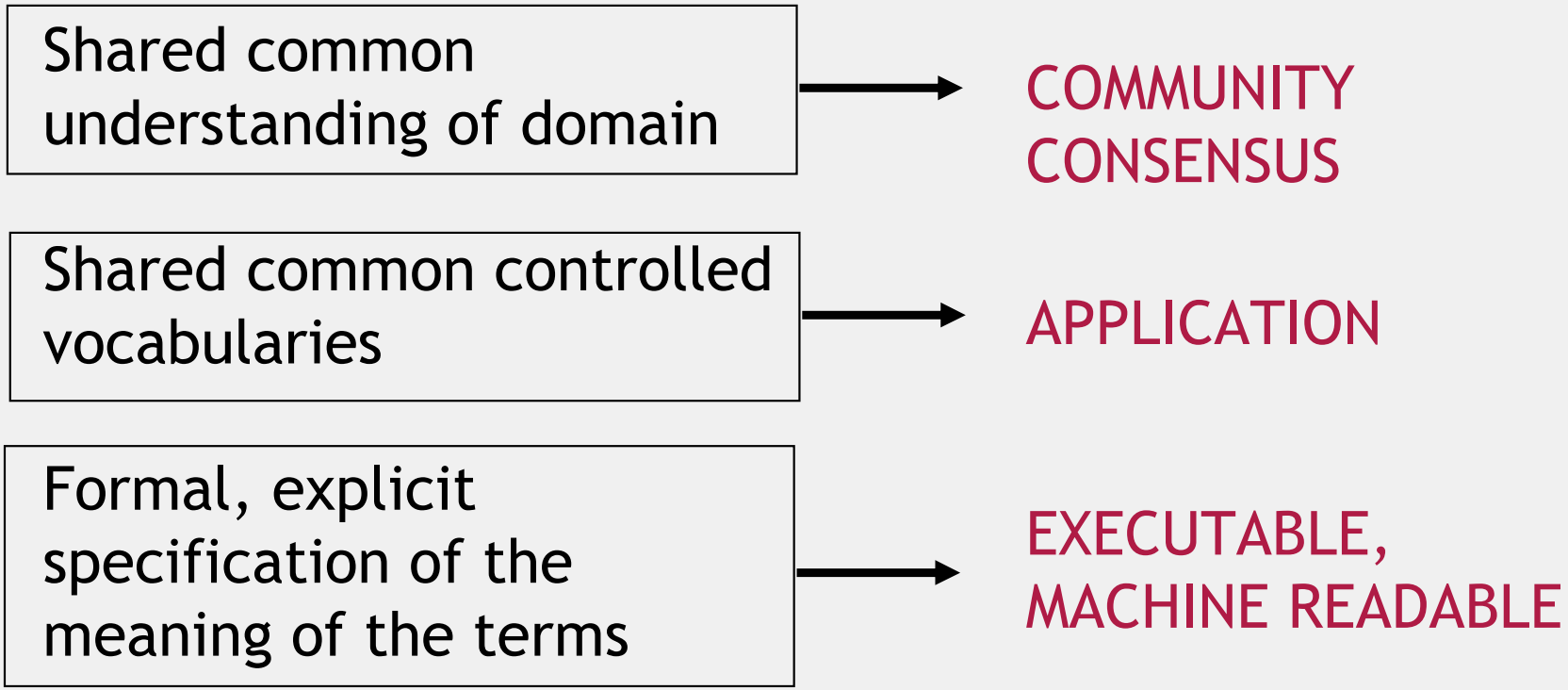
Functional Genomics Context

- Standardization activities in (single) omics domains
  - Reporting structures, object models and CVs/ontology
- Pieces of the functional genomics puzzle
  - Standards should stand alone BUT also function together
    - Build it in a modular way
    - Maximize interactions
- Benefits
  - Optimize development of tools (time and costs)
    - Manufactures and vendors covering in multiple technologies
  - Facilitate integration of omics data
    - Experimentalists, developers, data miners, reviewers
- Extensive liaisons between communities and culture change !
  - Individual projects vs international-open collaborative efforts

Ontology - Goals

- From **Carole Goble**:" The Capulets and Montagues - A plague on both your houses?" presentation, SOFG meeting, 2004
  - "*Interoperating resources, intelligent mining and sharing of knowledge, be it by people or computer systems, requires a consistent* ***shared understanding of what the information contained means***"



Functional Genomics Ontology - FuGO

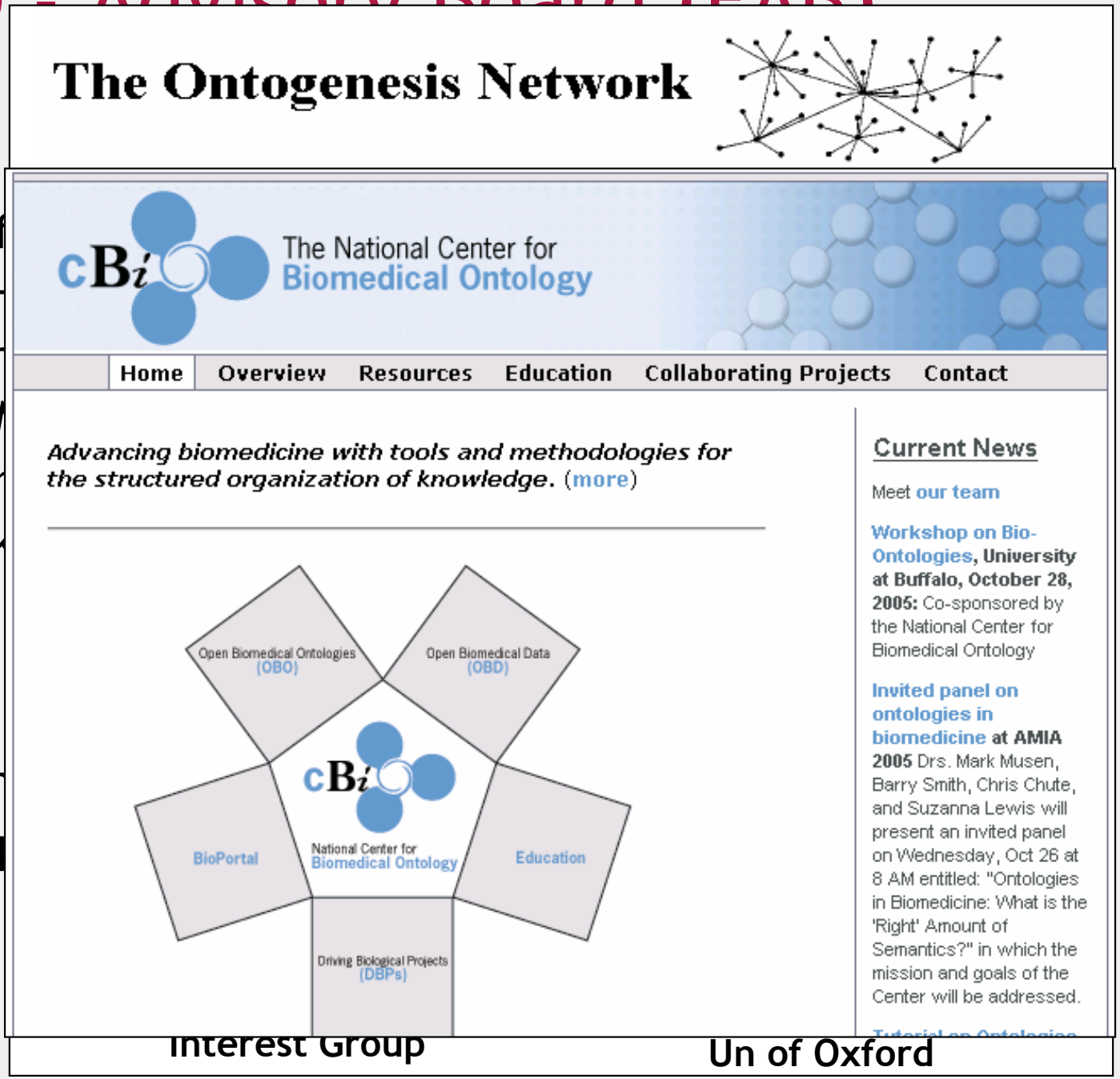
- Goals
  - Unambiguous description of how the investigation was performed
  - Consistent annotation, powerful queries and data integration
- Coordinated activity since 2004
  - Several groups representing technological and biological domains
    - HUPO-PSI, MGED and Metabolomics Society Ontology working groups
    - RSBI working groups
      -> Toxicogenomics (Industry, governmental bodies, incl NIEHS, NCI, FDA)
      -> Nutrigenomics (European organization NuGO)
      -> Environmental genomics (NERC Bioinformatics Center)
- Open source approach
  - Protégé tool and OWL format
- No dependency on any Object Model
  - Can be mapped to any object model, e.g. FuGE OM

Functional Genomics Ontology - FuGO

- Purpose
  - NOT model biology, NOR the experimental workflow
  - BUT provide descriptors for experiment components
    - Investigation (organization, intent, design etc)
    - Material (biological and chemical, manipulation and transformation)
    - Protocols and instrumentation
    - Data generated and types of analysis performed on it
  - Core of ‘universal’ descriptors
    - Regardless of specific biological/technological domain described
  - Biological and technological domain-specific terms
    - To meet the annotation requirements of any given domain
- Interoperability with existing bio-ontology
  - Mechanisms to refer to those and avoid overlapping

FuGO - Advisory Board (FAB)

- Current members
  - Barry Smith, Buff
  - Frank Hartel, NIH
  - Mark Musen, Star
  - Robert Stevens, M
  - Steve Oliver, Mar
  - Suzie Lewis, Berk
- Role
  - Advising on high
    - Unified vs m
  - Linking to other I



FuGO - Preliminary Independent Works

- MGED Ontology working group
  - Review and refactor MGED Ontology
    - Separating general concepts from microarray specific one
- HUPO-PSI Ontology working group
  - Compile controlled vocabularies (CVs) lists
    - Molecular interaction
    - Mass Spectrometry
    - General Proteomics
- RSBI Toxico- Nutri- and Environmental Genomics groups
  - Agree on a ‘core set of common terms’
    - Describe investigations employing multiple functional genomic and conventional technologies
- All groups
  - Gathering real use cases of functional genomics investigations

Metabolomics Society Ontology WG

- Current members
  - Oliver Fiehn (Un of California Davis, US)
  - Helen Jenkins (University of Wales, Aberystwyth)
  - Matej Oresic (VTT Technical Research Centre of Finland)
  - Philippe Rocca-Serra (EBI, Nutrigenomics/Toxicogenomics MGED)
  - Susanna-Assunta Sansone (EBI, MGED)
  - Daniel Schober (EBI) -> BBSRC eScience funds for FuGO-Metabolomics
  - Irena Spasic (Un of Manchester)
  - Larissa Soldatova (University of Wales, Aberystwyth)
  - Chris Taylor (EBI, HUPO-PSI)
- Teleconferences and minutes of discussions
  - First on December 16th 2005, next Jan 12th 2006 then every 2 weeks
  - Ontology WG page on the Metabolomics Society website (soon)

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Metabolomics Society Ontology WG

- Current activities
  - Introductions and survey
    - Identify other key members
    - Compile a list of existing, individual relevant efforts
      -> ArMet CVs, NMR draft ontology, PSI MS list of terms, etc..
  - Roadmap
    - Compile a list of agreed controlled vocabularies (CVs)
      -> Draft ready for review by June 06 (Metab Society meeting)
    - Identify a mechanism to build an ontology
      -> Engage with FuGO
  - Awareness
    - Participate to relevant meetings and advertise our activities

Acknowledgements and Resources

- Metabolomics Society Ontology WG
  - www.metabolomicssociety.org/mstandards.html
- FuGO Working Group
  - http://fugo.sourceforge.net
- Funds
  - NIH-NHGRI funds (Towards FuGO workshops)
  - BBSRC e-Science Development Fund (Towards a dedicated FuGO postdoc)
  - NERC, NuGO and funds to individuals
- References for standardization initiatives
  - OMICS journal, special free, on-line issue in Mar/Apr
  - Metabolomics Standard initiative , MGED, PSI, FuGE, FuGO papers and many others

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