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Computing for Human Experience and Wellness

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LSDIS

Large Scale Distributed Information Systems

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Computing for Human Experience and Wellness:

Views from the LSDIS lab @ UGA

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Next Opportunities & Market

Opportunity:

Computing for Human Experience and Wellness

Market:

Entertainment/Personalization, Life Sciences

But there is a substantial gap between commercialization-worthy lab innovations and VC funding to launch viable companies

Computing for Human Experience

- Much of what we did in the past was for productivity enhancement (supply chain, portals, e-commerce, …); but global sourcing of technical talent leaves very few opportunities in this area
- Finally, communication continuum is covered: Broadband to mobile Web
- Next steps: Semantics, Perception and Experience …not only at application level but also at middleware and networks

Semantics for the Web, Enterprises and Personal Experiences

- Knowledge and agreement about human activities and the natural world can be modeled captured as ontologies
- All types, format, mode and media content can be annotated with semantic metadata
- So next generation search, better integration and new capabilities in analysis (connecting the dots), mining and discovery are evolving

Digital Media
Semantic Metadata's role in iTV

Video

Enhanced
Digital Cable

Semantic Web
(Semantic) Mobile Web
(Semantic) Multimedia

Caution: avoid software, tools and middleware route; take service route

GREAT
USER
XPERIENCE

nhanced
XML
escription

"Laure

oney"

rich
Node

Computation, data and semantics in life sciences

- “The development of a *predictive biology* will likely be one of the major creative enterprises of the 21st century.” Roger Brent, 1999
- "Biological research is going to move from being hypothesis-driven to being data-driven." Robert Robbins
- We’ll see over the next decade complete transformation (of life science industry) to very database-intensive as opposed to wet-lab intensive.” Debra Goldfarb

Semantics is a key enabler for achieving the above predictions.

Ontologies are popular in life sciences and health care

OBO Ontology Browser

Browse the tree by clicking on the category names; click on an ontology name to view more information on it.

- **anatomy**
  - cell type
  - **gross anatomy**
    - **animal gross anatomy**
      - C. elegans gross anatomy
      - Drosophila gross anatomy
      - eVoc (Expressed Sequence Annotation for Humans)
      - **human developmental anatomy**
        - Human developmental anatomy, timed
        - Human developmental anatomy, abstract
      - medaka fish anatomy and development
      - **mouse anatomy**
        - Mouse adult anatomy
        - Mouse anatomy and development
      - Zebrafish anatomy and development
    - **microbial anatomy**
      - Fungal anatomy
      - Dictyostelium anatomy
    - **plant anatomy**
      - Arabidopsis anatomy
      - Cereal anatomy
      - Maize anatomy
      - Plant anatomy
  - organ
  - BRENDA tissue / enzyme source

GALEN and the "Galen-Core" high-level ontology for medicine.
The ONIONS methodology - designed to build the ON9 medical ontology.
MedO - a bio-medical ontology developed at the Institute of Formal Ontology and Medical Information Systems, Germany.
TAMBIS (Transparent Access to Multiple Bioinformatics Information Sources) which uses an ontology of bioinformatics tasks and molecular biology to form a common user interface over multiple bioinformatics information resources.
The ontology for the HL7 Reference Information Model (RIM)
The Foundational Model of Anatomy

UMLS knowledgebase

The world is flat

- However, its implication on supporting/exploiting knowledge services is not the same as that for IT services
- New challenges in global knowledge services – e.g., international collaboration in drug development.

My commercialization of lab research

- First product from a large company
- Then product in business process area (Infocosm, Inc.; govt. commercialization grant and self funded from on-going operations) <- most profitable
- Then A/V search engine (Taalee; VC funding), leading to Semantic Application Development Platform (Semagix) currently focusing on Risk & Compliance

Challenges

Research labs such as the LSDIS lab@UGA have a good bit of research funds from federal government, 10-25 students and staff, lots of new technologies are produced at lower cost then in big companies. Biggest problem: (a) mapping the value of innovation and technology to market and money (b) funding the transition and bridging the capability gap (research innovation/technology to customer) – entrepreneurs that are not inventors

On commercialization and funding

- Very few VCs provide full potential value (contacts, customers, etc. except for the money). Need to spend too much time to educate them. Are too risk averse.
- Approach them sparingly, use them sparingly, go to them as late as possible (usually after the market is clear), by pass them by getting acquired
- Bootstrap, partner with industry, prove technology with early sales and business model
- Entrepreneurship takes a lot of effort away from research and things professors know better. Financial incentives not clear (common stock may often lead to poor returns, easier and less risky to make money from consulting)

If interested in Semantic Web technologies and applications to life sciences or knowledge services

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