A Health Sciences Perspective

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A Health Sciences Perspective

Neil Rambo

7 April 2010
eScience + biomedicine =

???
eScience + biomedicine = Informatics?
eScience + biomedicine = (Production) Informatics?
eScience + biomedicine =

Bioinformatics
Biotechnology
eScience + biomedicine = 

Bioinformatics / Biotechnology -Omics?
Fig. 1. Omics methods in life sciences
Table 1. Some examples of the application data crisis

<table>
<thead>
<tr>
<th>Application</th>
<th>Storage Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical imaging (fMRI):</td>
<td>~ 1 GByte per measurement (day)</td>
</tr>
<tr>
<td>Bio-informatics queries:</td>
<td>~ 500 GByte per database</td>
</tr>
<tr>
<td>Satellite world imagery:</td>
<td>~ 5 TByte/year</td>
</tr>
<tr>
<td>Current particle physics:</td>
<td>~ 1 PByte per year</td>
</tr>
<tr>
<td>Future particle physics:</td>
<td>~ 10-30 PByte per year</td>
</tr>
</tbody>
</table>

Figure 2.

Growth of the total number of structures in the RCSB/PDB database (Kouranov et al., 2006). The exponential growth follows the same pattern of Fig 1.
Figure 1.

"There will be increasing reasons for each of us to have our complete genomes determined and placed in medical files," Collins noted.

"Five years after that, there will be compelling enough evidence that this is good medicine for both prevention and treatment that third parties will cover the cost," Collins said. "Health-care providers will have immediate access to [this information] about you, about what decisions to recommend. It's not one-size-fits-all, but really just about you."

"When I was in training, genetics was a small insignificant subspecialty of pediatrics," Marion noted. "And now pediatrics is a small insignificant subspecialty of genetics."

F. Collins, R. Marion, J.P. Evans, April 1, 2010, Nature
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- Find a homolog for a gene in another organism
- Find genes associated with a phenotype or disease
- Design PCR primers and check them for specificity
- Find the function of a gene or gene product
- Determine conserved synteny between the genomes of two organisms

See all …
Discover associations among previously disparate data

Tools for Discovery

PubMed Literature

Entrez Nucleotide and Protein Sequences

Entrez Structures

and more...

Various data types, such as literature, nucleotide and protein sequences, and three-dimensional structures, are often submitted to public databases independently of each other by different research groups. Yet these data are related through their coverage of the same topic via different research methods. The Structure group contributes to the broader NCBI effort to identify associations among previously disparate data. See an example...
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Create an open access, integrative bionetwork evolved by contributor scientists working to eliminate human disease

Sage Bionetworks is a new, not-for-profit medical research organization established in 2009 to revolutionize how researchers approach the complexity of human biological information and the treatment of disease. Sage's objectives are:

- to build and support an open access platform and databases for building innovative new dynamic disease models

- to interconnect scientists as contributors to evolving, integrated networks of biological data

Sage Bionetworks - 1100 Fairview Ave. N. - Seattle WA 98109

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The Institute for Health Metrics and Evaluation (IHME) is an independent research center at the University of Washington rigorously measuring the world’s most pressing health issues and providing scientific evaluations of health system and health program performance in order to guide health policy and accelerate global health progress.

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We study how health services contribute to improving health outcomes by measuring the crude coverage of specific health interventions, as well as estimating the effectiveness of those interventions by integrating the concepts of need, utilization, and quality.
Roles for HS Libraries/Librarians?

With current skill sets

- Metadata consulting
- Develop data management plans
- ...
Roles for HS Libraries/Librarians?

With current skill sets
• Metadata consulting
• Develop data management plans

With additional/advanced skill sets
• Data design, organization, management
• Data analysis, synthesis, meta-analysis
• Data repurposing
• ...

How do we go forward?

• It’s a tough time to innovate and expand
• Most of us won’t be doing this
• iSchools aren’t responding adequately
  – Exceptions: UIUC, UNC
• Need to draw from other professions/training
  – Biostatistics, research methods, informatics
• Need to forge new, expanded partnerships
Onward. Thank you.