Center for Health Informatics and Bioinformatics & CTSI Biomedical Informatics Core (BMIC) progress Report

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Program Director: Constantin Aliferis MD, PhD

CTSA BMIC Program Description:

The CTSA BMIC has several and wide ranges goals arranged in 6 specific aims. The aims largely overlap with the aims of the Informatics Center, thus the present report does not make distinctions between the two. However we list below the formal aims of the CTSA BMIC:

Specific Aim I: Establish the Center for Health Informatics and Bioinformatics (CHIBI)

Specific Aim II: Create new, institution-wide resources for clinical, genomic and multi-modal data integration and mining.
a. Create a Research Patient Registry (RPR)
b. Create a Clinical Research Database Ontology (CRDO).
c. Create an institution-wide federated data warehouse.
d. Establish services and systems in support of high-quality, very-large scale mining of aggregated data.
e. Ensure Data Security and Human Subjects Protection.

Specific Aim III: Align University-wide bioinformatics resources to pursue advanced research and provide state-of-the art services and computing infrastructure.
a. Establish the Bioinformatics Best Practices Service and Integrative Consultation Core (BPIC).
b. Develop the CHIBI High-Performance Computing Parallel Cluster Facility.

Specific Aim IV: Develop educational informatics programs, informatics in support of education and novel educational informatics technologies for the efficient translation of new medical knowledge into clinical practice.
a. Create the NYU Graduate Training Program (GTP) in Biomedical Informatics (BMI).
b. Establish an informatics methods and systems seminar and continuing education series.
c. Enhance and disseminate SoM's cutting-edge educational technologies.

Specific Aim V: Expand collaborations with the Ehrman Medical Library, one of the country's top ten academic health sciences libraries, to establish a common Web-based gateway for the research community.
"Find-a-Researcher" project.
Deploy novel information retrieval models.
Create a common Web-based gateway for the research community.

Specific Aim VI: Establish several new laboratories dedicated to developing high-impact clinical and translational methods.
The Molecular Signatures Laboratory (MSL).
The Computational Causal Discovery Laboratory (CCDL).
c. The Evidence-Based Medicine Information Retrieval and Scientometrics Laboratory (EIRSL).

Progress in establishing program:

To date, we have made significant progress meeting all our milestones for year #1 while being ahead of our timeline.

Successes To Date:

Because of the institutional importance of the newly-created Center for Health Informatics and Bioinformatics (CHIBI) and the resources invested in its development, work toward the BMIC objectives started well ahead of our official funding through the CTSA. Specifically since November 1st 2008 we have made the following progress:

1. We hired **5 new informatics faculty** in critical new methods innovation and service areas.
2. We brought together **17 total faculty (12 full time, 3 part time, 2 consulting) and fostered a common academic research, teaching and educational environment.**
3. We launched **3 new research informatics labs** with cutting edge research:
    - Molecular Signatures Lab
    - Computational Causal Discovery Lab
    - Evidence Based Medicine Information Retrieval and Scientometrics Lab.
4. **6 staff hires were made and staff were trained.**
5. **High Performance Computing Phase I** design & implementation and Phase II design were completed.
6. We launched the **Best Practices Informatics Consultation Service (BPIC).**
7. We launched the **Research and Clinical Data Base Management service.**
8. We acquired extensive new computing equipment.
9. We developed fiscally **responsible and sustainable Business Plans with flexible cost recovery and several free (i.e., CTSA and Dean-subsidized) service components** to researchers.
10. **We developed a full range of next generation sequencing informatics capabilities to support all next generation sequencing protocols.**
11. We developed extensive and in-depth **working relationships** with MCIT, Genomics Center, Cancer Center, and numerous research labs.
12. We secured an **extensive IP portfolio for free use at NYU.** This portfolio powers many of our services and research capabilities as was provided to NYU free of charge for academic use.
13. **We launched comprehensive educational activities: tutorials, courses, seminars, invited speakers, resident training.**

14. We are leading the charge for a **powerful and cost-effective design of Federated Data Warehouse and Laboratory Information Management System for all high-throughput data.**
15. **We supported or led >30 grant proposals.**
16. We launched the **comprehensive CHIBI web site (www.nyuinformatics.org).**
17. We launched **benchmarking activities** spanning sequencing informatics methods, and pathway analysis algorithms.
18. **We actively managed faculty grants and provided career mentoring:** exceeding Dean' standards & moving toward consistency with national informatics RPT standards.
19. We assembled an **external advisory board** with 5 distinguished advisors.
20. **Our faculty published >40 papers in peer-reviewed journals including highest-profile journals in biology, medicine and informatics.**
21. Our faculty published 1 book and contracted 2 more.

Challenges To Date:

Our challenges have been many and while some have been addressed, several still remain:

1. Definitional and authority/responsibility. Because several units/departments were doing informatics work before the establishment of organized informatics (e.g., IT, Biostatistics), there has been some confusion and in some cases difficulties in understanding or agreeing upon the precise boundaries of informatics space.
2. Faculty PRT and comp standards and mentoring: prior to establishing CHIBI informatics faculty were not mentored by professional informaticians in ways consistent with the professional standards in the field. We have made great progress but we still need to work with the institution to establish the right mentorship and RPT criteria, standards, and processes.
3. BMIC and CHIBI are scattered and in temporary space. We anticipate that in July 2010 we will move 90% of CHIBI to a permanent space in the dry labs building recently acquired by NYU.
4. Chargeback vs subsidized services: many scientists believe that informatics services should be provided for free however this model may not be sustainable.
5. Funding of all CTSA aims: although CTSA funding of informatics is substantial the scope and difficulty of informatics aims require continued and ideally expanded funding since we are currently burning development moneys to cover the deficit.
6. Quick/service-centric service model often contradicts culture of academic excellence and best practices. In other words many PIs feel that informaticians should execute the techniques that are most likely to yield a publication or in other cases the techniques that colleagues of theirs report using regardless of the appropriateness of those techniques versus provably better/more reliable ones.
7. Some high-profile non NYULMC entities are too self-sufficient and/or overloaded to seek collaborations with NYULMC informatics (and the best practices approach also may act as deterrent to some).

Collaborations:

- Within NYU/HHC: we have established extensive collaborations with multiple entities. Informatics acts as a central hub of scientific activity that channels information and connects a diversity of scientists, educators and clinicians. The entities that routinely and closely collaborate with BMIC/CHIBI include:

• Genetics, Genomics Core/Microarray, Proteomics, mRNA Facility, Centers of Excellence, Cancer Center, Computational Biology, MCIT, many departments/Labs, Biomedical Library, Polytechnic.
• Several entities in NYU with interests in developing informatics programs (SoM, Continuing Education, School of Nursing)

- With Other CTSAs: we have started examining how we can best help and be helped by our colleagues in other CTSAs. In the next year we will emphasize:

• Evaluation of prima facie useful technologies from other CTSA programs (e.g., i2b2, scientific networking technologies, REDCap).
• Talks with Sinai and Columbia for technology transfer, and regional consortium-based research.

- With Other Communities (as applicable): we participate in several scientific and industrial collaboratives and joint development discussions including with the:
• AMDec consortium.
• NG Sequencing QC consortium.
• Causality Challenge and workbench.
• Private companies.

Next Steps:

The following constitutes a synopsis of our goals for year #2:

1. Implementation **of High Performance Computing Phase II**.
2. Design, defend and launch **MS/PhD/ Post-Doctoral Training program in Health Informatics and Bioinformatics.**
3. Execute remaining **faculty and staff hires & training.**
4. **Move to permanent space.**
5. Launch **walk-in BPIC stage 1 consultation.**
6. **Publish SoPs and Policies, white papers** for BPIC and NG sequencing informatics.
7. Issue **FDW report.**
8. Issue **LIMS report.**
9. **Establish Informatics faculty compensation and RPT advisory committee.**
10. **Develop the new library informatics innovations report and start executing aims of the BMIC/CHIBI - Library Collaborative.**
11. Remodel **find-a-researcher methods and tools.**
12. Re-design **biorepository informatics.**
13. **Launch data mining unit and pilot projects.**
14. **Develop and launch an CIS evaluation lab and service (subject to funding approval).**
15. **Develop and launch a text processing lab and service (subject to funding approval).**
16. Further **enhance NG sequencing informatics capabilities and expand R&D.**
17. **Develop the Cancer Center Informatics Core.**
18. **Continue and enhance education activities** with new tutorials, speakers, and classes.
19. **Strengthen collaborations** with additional NYU and non-NYU entities.
20. Complete current **benchmarking** cycle and launch new cycle.
21. Execute a broad **informatics needs and user satisfaction survey.**
22. **Expand informatics faculty grant and paper portfolios; faculty career development.**
23. Explore and develop regional/national CTSA and external informatics synergies.
24. **Expand Web presence functionality and information.**