



Computing-Related Grant Programs NIH and NLM

Charles P. Friedman
Senior Scholar, NLM
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Overview

- Introduction to NIH and NLM
 - NIH = “National Institutes of Health”
 - NLM = “National Library of Medicine”
- The computational and “informatics” scene at NIH
- A primer on NIH funding
- NLM grant programs

- See also “extra slides” we won’t cover this AM

National Institutes of Health

- The steward of medical and behavioral research for the nation
- One of the world's foremost medical research centers
- Intramural and Extramural research
 - Research Grants and Contracts; Training programs
- \$29 billion Congressional appropriation in FY 2005

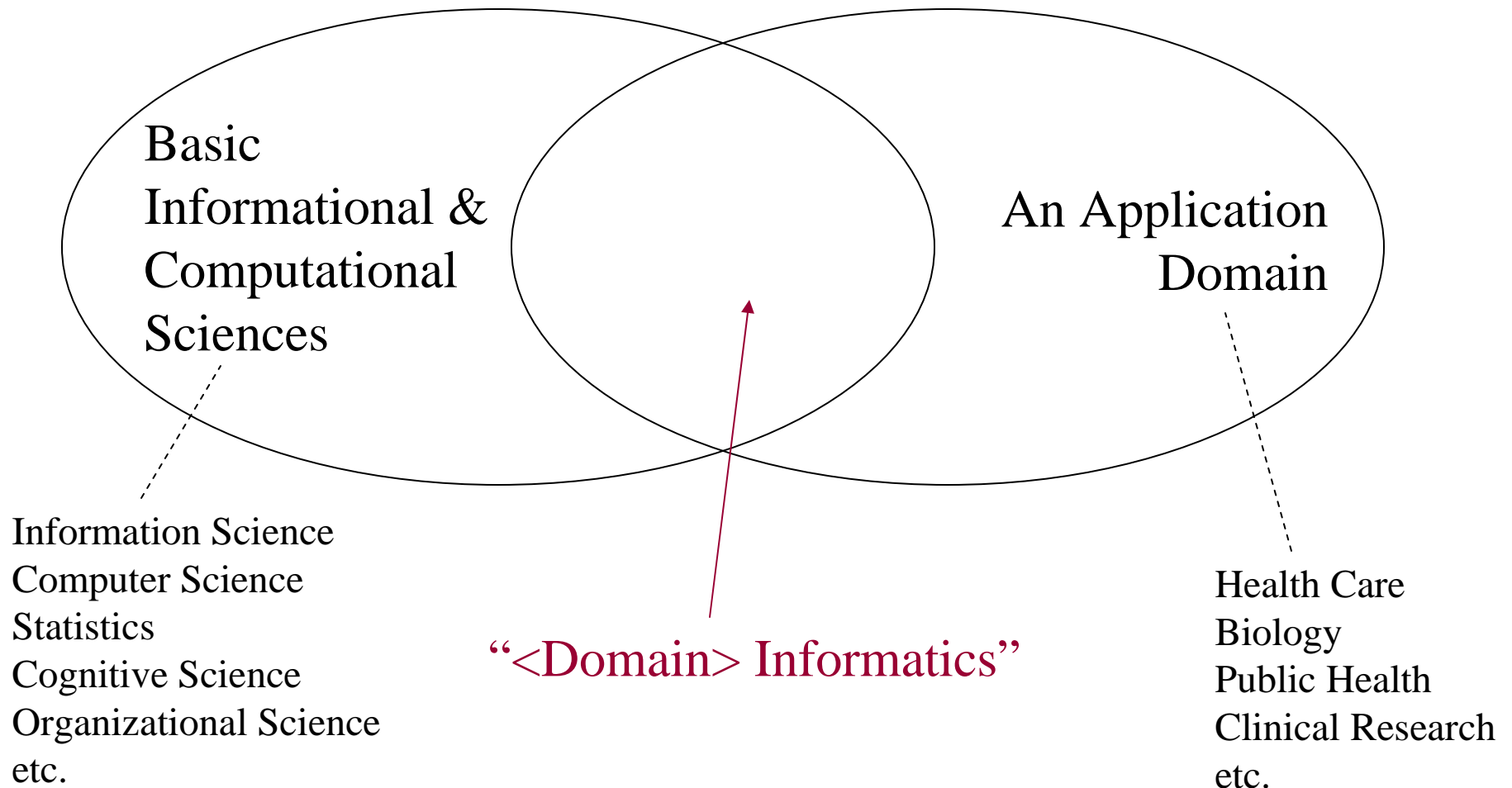
National Institutes of Health

- 27 Institutes and Centers (“ICs”)
 - “Categorical” Institutes - Cancer, Heart, Lung & Blood, Kidney, etc.
 - “Non-Categorical” Institutes - NIGMS, NHGRI, NCRR, NIBIB, NLM
- 77,900 grant applications received in FY 2005

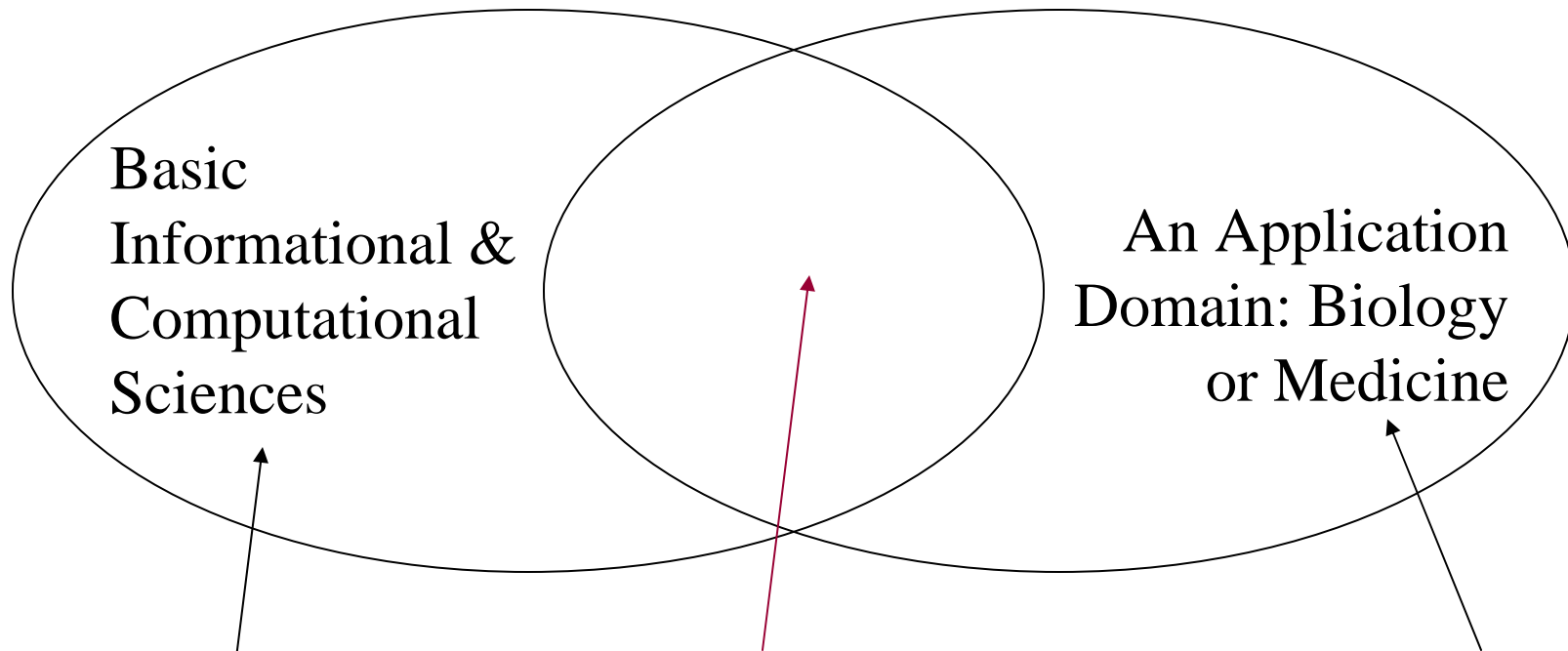
NIH and Computer/Information Science

- Historically, NLM was the “IC for computing”
- Then three epochal events changed things:
 - 1999 Biomedical Information Science and Technology Initiative (BISTI) Report:
<http://www.nih.gov/about/director/060399.htm>
 - 2002 NIH Roadmap:<http://nihroadmap.nih.gov>
 - 2003 Cancer Biomedical Informatics Grid (caBIG):
<https://cabig.nci.nih.gov>
- Now computing and informatics at NIH is spreading faster than it can be tracked

So What Is Informatics?



An “Informatician” is Different...



What an Informatician Knows

What a Biologist or
Physician Knows

What an Information Scientist Knows

The Question of Training...

The trade-offs between:

- “Domain generic” computer or information science training
- Informatics cross-training with domain immersion

- Some CS/IS graduates may want postdoctoral informatics training

NIH Roadmap

Pan-NIH initiatives

Computing threaded through all of them

- **New Pathways to Discovery:** Biological pathways, molecular libraries, bioinformatics, nanomedicine, computational biology
- **Research Teams of the Future:** Interdisciplinary; team science; high risk research
- **Reengineering Clinical Research:** Research networks, outcomes assessment, translational research

National Centers for Biomedical Computing

- Grew out of BISTI and Roadmap
- Networked national effort to build a computational infrastructure for biomedical research
 - From basic research in computational science to providing computational tools and resources for biomedical/behavioral research
- \$4,000,000 per year for 5 years
- 4 funded in 2004; 3 more in 2005

NIH Sources of Information

Computing at NIH is no longer localizable...

- NIH Institutes & Centers <http://www.nih.gov>
- NIH Roadmap <http://nihroadmap.nih.gov>
- BISTI <http://www.bisti.nih.gov>
- NIH Guide weekly listserv
<http://grants1.nih.gov/grants/guide/listserv.htm>
- CRISP database of funded projects
<http://crisp.cit.nih.gov>

The Structure of NIH Funding Opportunities

- Program Announcements (PA): Areas of persistent interest; recurring submission dates
- Requests for Applications (RFA): One-shot but may be reissued
- PAs and RFAs may be issued by a single IC or multiple ICs
- There are multiple grant mechanisms; e.g.:
 - Rxx = research grants
 - Kxx = career development awards

Some Rudiments of NIH (and NLM) Grant Procedures

- After submission, grant applications are assigned to ICs for oversight and payment, should the application be funded
- **Assignment is distinct from merit review!**
- Two modes of merit review assignment:
 - Review by the study sections under the assigned ICs (~ single IC oppys)
 - Review by study sections administered by the Center for Scientific Review (~ multi-IC oppys)

Grant Review Outcomes

- **PRIORITY SCORES on 100 (best) to 500 (worst) scale**
 - 100-150 (most likely to be funded)
 - 150-170 (seldom funded)
 - 170-200 (rarely funded)
 - 250-500 (never funded; sometimes don't receive scores)
- Priority scores are the primary basis of award decisions
- Most applications can be revised and resubmitted twice

Some Hints and Tips

- Generate a idea
- Find potentially compatible receptor sites (PAs and RFAs)
 - Hard to “create” a receptor site at NIH
 - Program scopes are broad but inflexible at boundaries
- Write a “one pager”
- Contact the program officer (you may be referred to a better receptor!)
- Visit if possible
- Don’t expect funding the first time

Funding Activities at NLM

- **Biomedical Informatics is NLM's research domain**
 - We don't fund generic CS/IS
 - Projects must be domain-immersed
- Grants (Mostly Recurring PAs)
- Contracts (Mostly Episodic)
- Training (Recurring)
 - Fellowships for informatics researchers, informationists
 - 18 University-based Training Programs
 - Lister Hill Center intramural training opportunities
 - NCBI short term training
 - Woods Hole Informatics Short Course
- Career Development Awards (Recurring)

NLM & NIH - snapshots

NIH in FY 2005

- \$29 billion from Congress, \$19.8 billion in research grants
- 77,904 grant applications received, 5.6% increase over FY 2004
- 27,700 active grants
- Average research grant = \$355K, 3.7 years

NLM in FY 2005

- \$317.9 million for NLM, \$54.2 million for EP grants
- 500 grants assigned to NLM, 80% reviewed by NLM
- 150 active grants
- Average research grant = \$390K, 4.5 yrs

NLM Informatics Research Areas of Interest (PA06-094): Must be Domain-Immersed!

- Information and knowledge processing, including natural language
- Processing, information extraction, integration of data from heterogeneous sources or domains
- Tools for analyzing and/or storing very large datasets
- Knowledge representation, including vocabularies, ontologies, simulations and virtual reality
- Linkage of clinical and genomic information
- Innovative uses of information technology in health care delivery or public health
- Efficient management and utilization of information and data
- Knowledge acquisition and management, process modeling, data mining, acquisition and dissemination
- Human-machine interaction, including interface design, use and understanding of health related-information
- Uses of information technology to enhance learning, retention and understanding of health-related information

Career Development Awards

- NLM is focusing on new “Pathways to Independence” Awards (K99/R00: PA-06-133)
- One award provides up to five years of support in two phases:
 - 1-2 years of mentored support for postdocs
 - Up to 3 years of independent support contingent on acquiring a tenure-track position
 - 2nd phase does not require a separate competing application
- Minimum 75% supported research effort in both phases

NLM's 18 Training Sites

<http://www.nlm.nih.gov/ep/GrantTrainInstitute.html>



Research Grant Programs

- R01 – Traditional ‘investigator-initiated’ research projects – hypothesis driven research; average \$350,000/yr for 3 yrs
- R21 – Exploratory/Developmental research grants – feasibility & proof of concept; “high risk” \$275,000 over 2 years
- R03 – Small research projects – no prelim data needed; \$50,000/yr for 1 or 2 yrs

Research Grant example

- R01 (Vanderbilt): Clinical and Microarray Data Predict Lung Cancer Outcomes. Compare rule-based induction to support vector and artificial neural networks; develop and validate backward chaining rule induction as a means of 'semi-supervised' learning

Research Grant example

- R01 (Columbia): Discovering & Applying Knowledge in Clinical Databases. Develop and test methods to mine a clinical data repository, exploiting latent associations and methods of data representation to improve classification of cases characterized by complex, missing or inaccurate data, using nearest neighbor and case-based reasoning

Research Grant example

- R01 (Michigan): Computational Approaches, Protein Sequence Analysis. Develop automated knowledge extraction techniques to find molecular biology data expressed as assertions in published articles through multi-stage parsing and preposition templates, making inferences on molecular biological context

Exploratory Research Grant

- R21 (Indiana). Syndromic Surveillance Data Exchange & Analysis. Incorporate geospatial clustering with temporal information to develop pattern recognition algorithms for de-identified patient data at hospitals in 2 cities

Small Research Grant

- R03 (UCLA) Content-based Neuro Image Classification: Perform automated classification of tumor images based on principal componential analysis and provide ability to query by sub-regions of an image

Points of contact at NLM Extramural Programs

- Dr. Milton Corn – NIH Roadmap initiatives
- Dr. Valerie Florance – Research in clinical informatics and information sciences; IAIMS; career development awards
- Dr. Charles Friedman - Research in bioinformatics; Training Programs, Fellowships, National Biomedical Computing Centers
- Dr. Hua-Chuan Sim – KM/AI grants; R03 Small grants; Conference grants; Scholarly Works grants, SBIR/STTR

Basic NLM Contact Information

- friedmanc@mail.nih.gov
- 301-594-4882 for Florance, Friedman
- 301-496-4253 for Sim
- 301-496-4621 for Corn
- <http://www.nlm.nih.gov/ep> for program announcements, FAQ, links to application forms, list of funded projects
- <http://www.nlm.nih.gov/grants.html> for intramural fellowships, research contract information

Additional Slides Follow

Grants for Small Businesses

- SBIR/STTR phase 1 and 2 grants for companies that want to bring a product to market
- For NLM, priorities are the same as for research grants in biomedical informatics
- Fast-track possible – combine phase 1 and 2 in a single application

NIH Review Criteria for Research Grants

Criterion	Questions in Reviewer's mind
Significance	<ul style="list-style-type: none">■ Does it address an important problem?
Approach	<ul style="list-style-type: none">■ Is the conceptual framework sound?■ Is related work discussed?■ Are potential problems recognized?
Innovation	<ul style="list-style-type: none">■ Are the aims, concepts, methods and/or outcomes novel?
Investigator	<ul style="list-style-type: none">■ Does the PI/team have appropriate training and experience?
Environment	<ul style="list-style-type: none">■ How sound is the scientific environment?

NLM Grant Deadlines

	Cycle 1	Cycle 2	Cycle 3
Research, Career, Resource Grants	1-February	1-June	1-October
Revised Applications	1-March	1-July	1-November
SBIR/STTR	1-April	1-August	1-December
Fellowships	5-April	5-August	5-December

Review Steps for Grants

- REVIEW STEP
- Received at CSR
→
- 1st Review by BLIRC
→
- 2nd Review by BOR →
- Final Decision, NLM →
- TIMETABLE
- Feb 1 (Jun 1, Oct 1)
- May (Nov, Mar)
 - Priority scores @ 1 week
 - Summary statement @ 6 week
- Sept (Feb, May)
- @ Nov (Apr, Aug)
 - Notice of grant award mailed

Components of Good Proposals

- Responsive to the program announcement
- Clearly-stated goals and methodology
- A detailed work plan that fits the stated goals, with timeline and milestones
- References to the published literature and/or state of the art tools & systems

Components of Good Proposals

- Research grant proposals require a testable hypothesis and/or an accepted, rigorous research methodology
- Exploratory/developmental grant proposals need milestones and expected benefits
- Involvement of experts from the application domain (biomedical scientists, clinicians)

Components of Good Proposals

- Interesting pilot data
- Evidence that problems & contingencies have been considered
- Key personnel with relevant expertise and adequate FTE dedicated to the work
- Letters of agreement from named collaborators & consultants