Interdisciplinary Research

Council of Councils
March 31st 2008

Lawrence A. Tabak, D.D.S., Ph.D.

Co-Chair, Interdisciplinary Research Implementation Group, NIH Roadmap

SIXTY NIDCR YEARS 1948 - 2008

Thanks to the Members of IRIG

Patricia Grady, NINR (Co-Chair)
Lawrence Tabak, NIDCR (Co-Chair)

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***Terry Bishop, NIDDK**
***Allison Chausmer, NIDA**
Margaret Chesney, NCCAM
***Rebecca Clark, NICHD**
***Alison Cole, NIGMS**
George Coy, NIDCR
Bret Dean, NIDCR
***Nancy Desmond, NIMH**
***Gregory Farber, NCRR**
Valerie Florance, NLM
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John Haaga, NIA
Tanya Hoodbhoy, OPASI
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Ellie Johnson, NINR
Karen Kemp, NIMH
Mary Kerr, NINR
***Patty Mabry, OBSSR**
Michael Marron, NCRR
William Martin, NIEHS
Lore Anne McNicol, NEI
Howard Moss, NIAAA
***Deborah Olster, OBSSR**
***Lisa Onken, NIDA**
MaryLou OsterGranite, NICHD
***Melissa Riddle, NIDCR**
Susana Serrate-Sztein, NIAMS
David Shurtleff, NIDA
Philip Smith, NIDDK
Brent Stanfield, NIDDK
Kathleen Stover, NIA
Daniel Sullivan, NCI
Richard Suzman, NIA
Francie Vocci, NIDA
Elizabeth Wilder, OPASI
Kester Williams, NDMHD
Marian Willinger, NICHD

• Previous Principal Leads:
Wendy Liffers
Betsy Wilder

*** Project Team Leaders**

Points to Cover

- **Context and Background**
  - **Team Science; Multi- and Interdisciplinary Research (IR)**
  - **IR in the Context of Roadmap**
  - **Assumptions and goals of the IR Implementation Group (IG)**
- **Challenges to IR and the IRIG Response**
  - **Research Consortia**
  - **Integration of Behavioral and Social Science Research**
- **Incentives for collaboration among disciplines**
- **Training**
- **Evaluation of IRIG Activities**
- **Interdisciplinary Research in *cis* and *trans***

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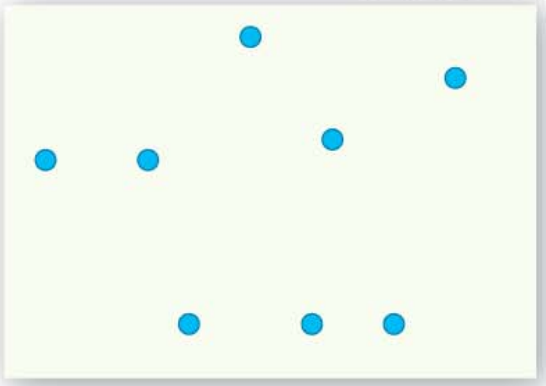
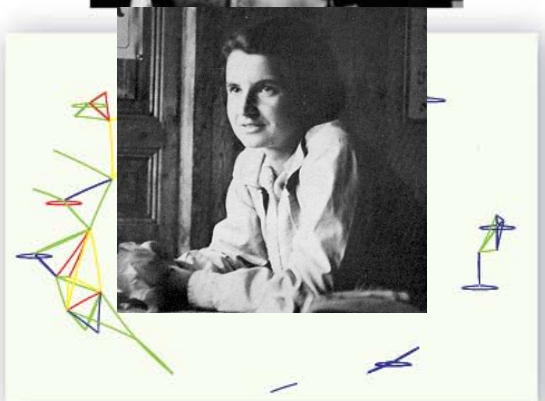
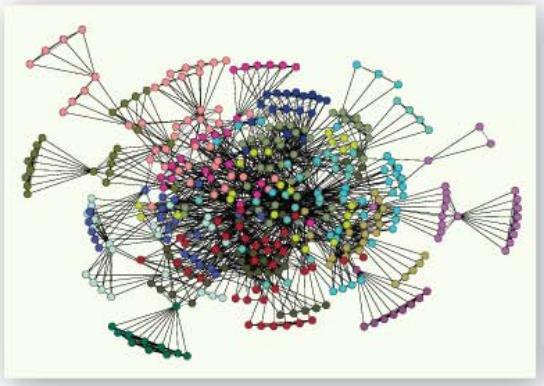
Multi- and interdisciplinary research teams, will be required to solve the “puzzle” of complex diseases and conditions

- Genes
- Behavior
- Diet/Nutrition
- Infectious agents
- Environment
- Society
- ???

Evolution of the Scientific Enterprise*

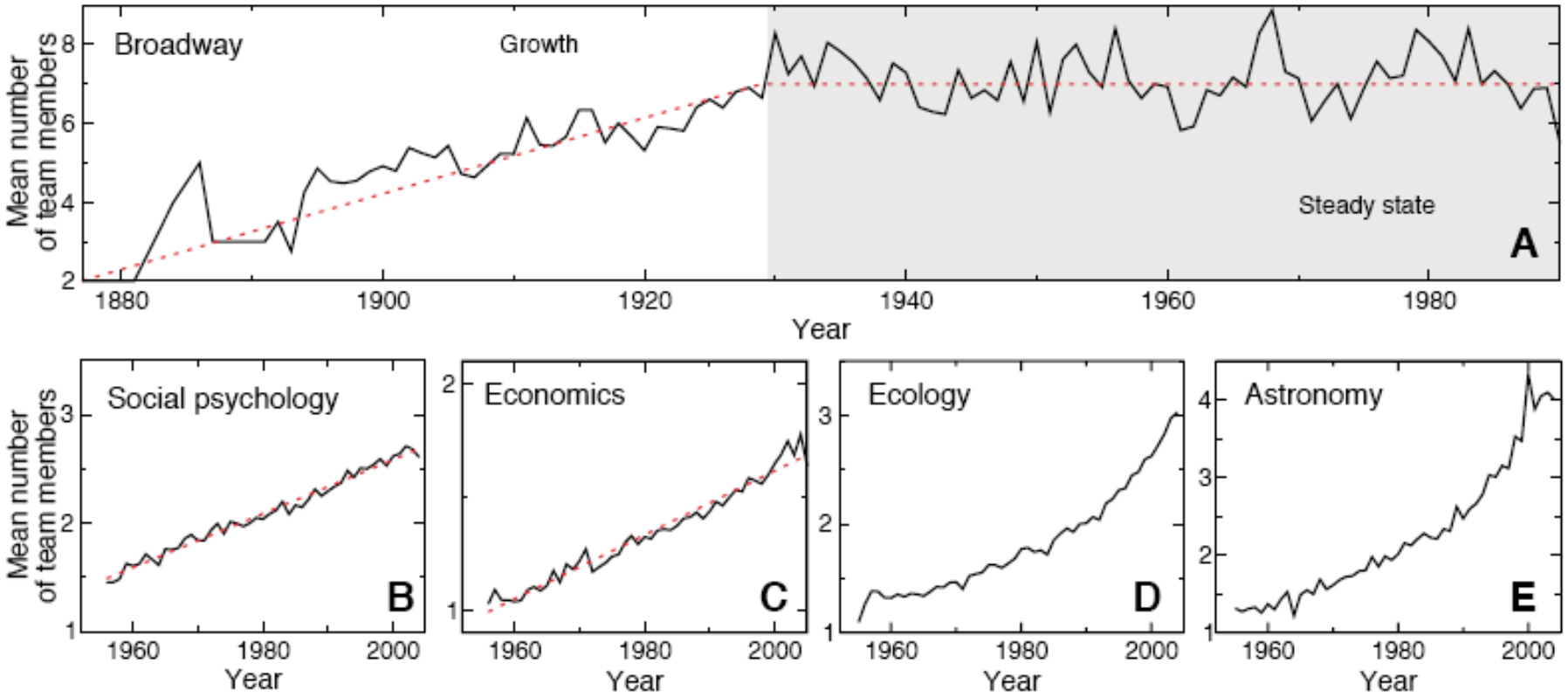






*Barabási, Science 308:639, 2005

Evolution of Team Size: Science is still Searching for the Optimal Size



Guimerà et al., Science 308:639, 2005

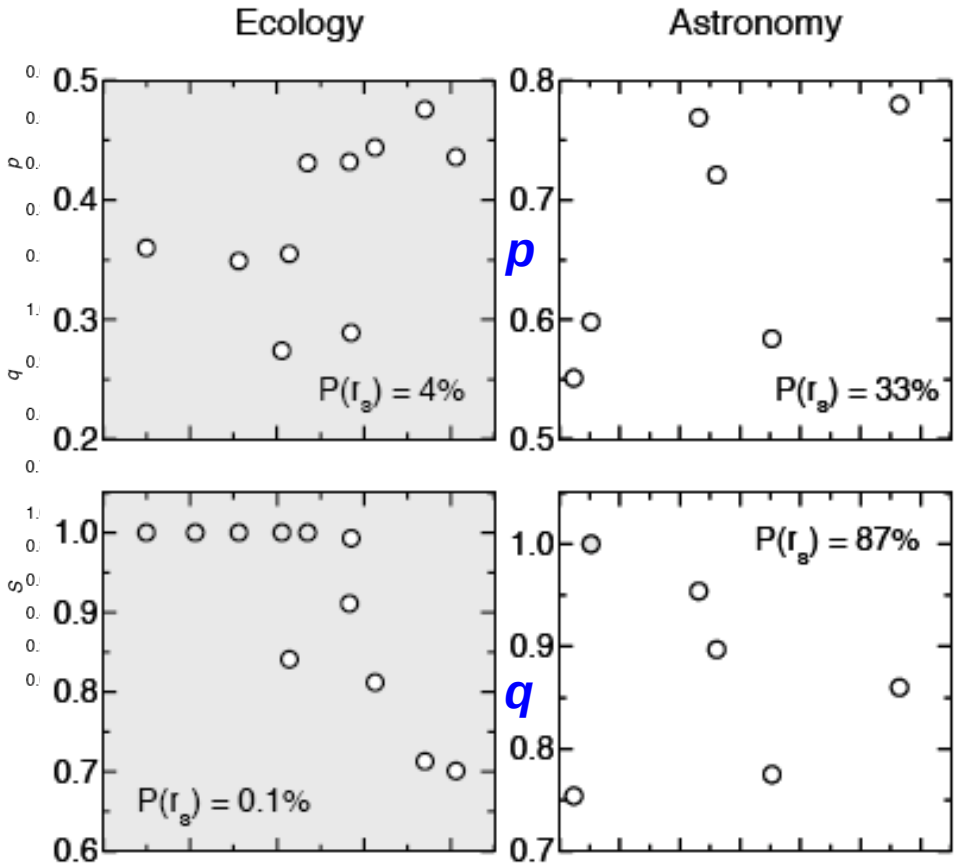
Relationship between team assembly mechanisms, network structure and performance

***p*, the probability of selecting incumbents, was positively correlated with impact factor**

- **-Successful teams have a higher fraction of incumbents who contribute expertise and know-how to the team**

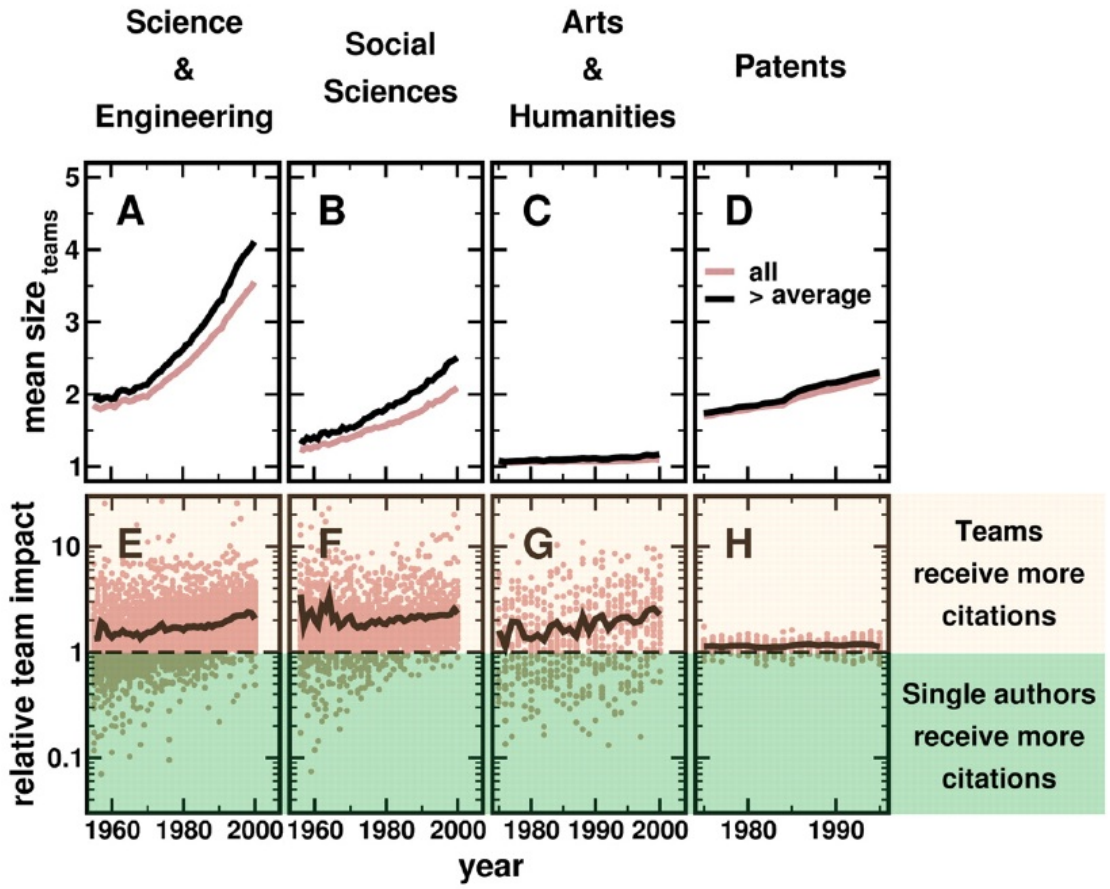
***q*, the propensity of incumbents to select past collaborators, was negatively correlated with impact factor**

- **-Teams that are less diverse typically have lower levels of performance**



Guimerà et al., Science 308:639, 2005

The Relative Impact of Teams

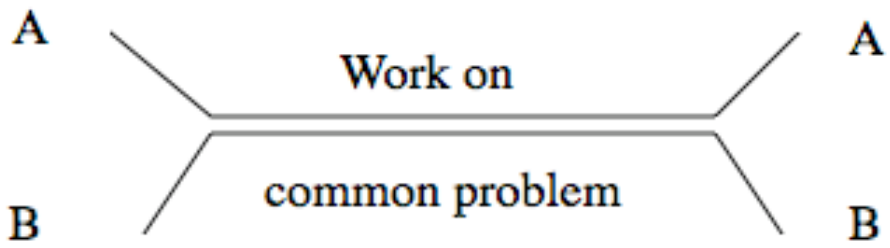


Mean team size comparing all papers and patents with those that received more citations than average in the subfield

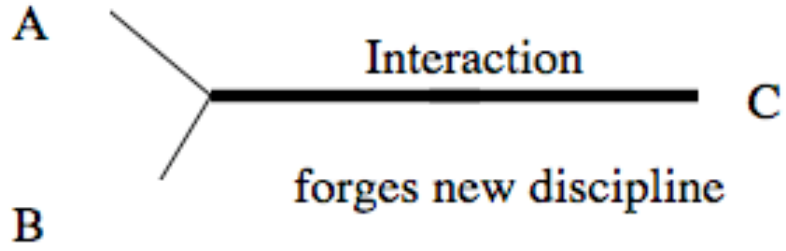
Relative Team Impact (RTI) – mean number of citations received by team authored work divided by the mean number of citations received by solo-authored work. An RTI =1 means there is no difference

Wuchty et al., Science 316:1036, 2007

Team Science is not necessarily Multi- or Interdisciplinary Science

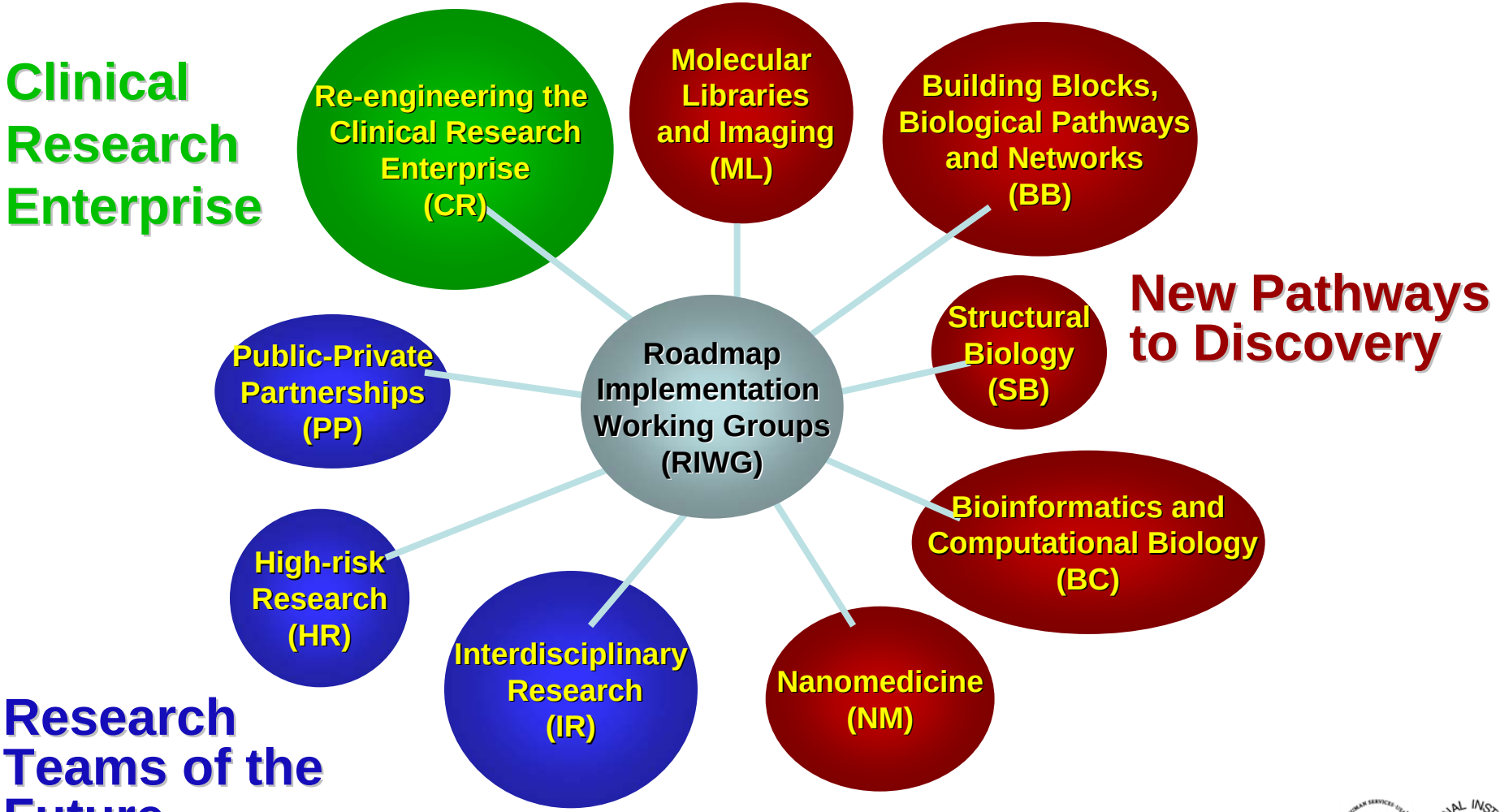


Multidisciplinary



Interdisciplinary

Roadmap Themes and Working Groups



Interdisciplinary Research Implementation Group

A trans-NIH group to focus on developing initiatives that would *incubate* IR.

- ✓ **Goal: to support significant advances in public health by stimulating research that crosses boundaries defined by scientific disciplines (i.e., IR)**
- ✓ **Approach: identify the barriers to IR and propose/support initiatives that remove these barriers**

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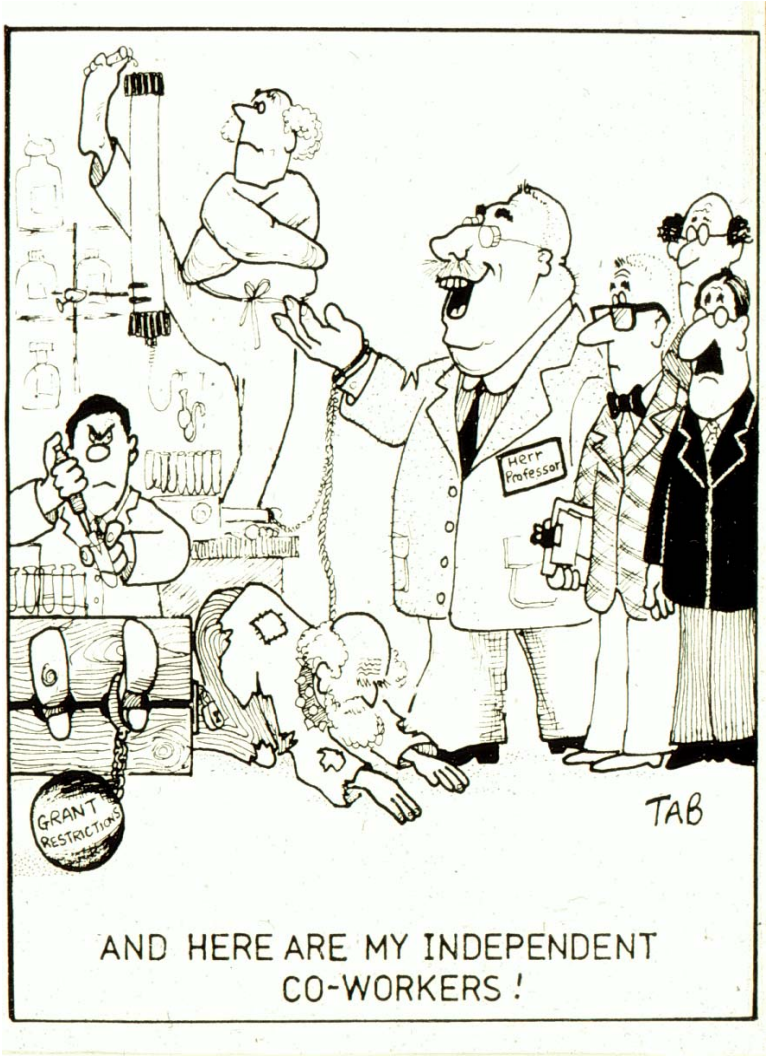
Challenges to Team and IR

The current system of academic advancement favors the independent investigator



Challenges to Team and IR

The current system of academic advancement favors the independent investigator

Most institutions house scientists in discrete departments

"I see by the current issue of 'Lab News,' Ridgeway, that you've been working for the last twenty years on the same problem I've been working on for the last twenty years."

Challenges to Team and IR

The current system of academic advancement favors the independent investigator

Most institutions house scientists in discrete departments

Interdisciplinary science requires interdisciplinary peer review

2 R01 DE00000-00A2
Applican, T.

RESUME AND SUMMARY OF DISCUSSION: The proposed interdisciplinary study will investigate…….....
…….....
…….....
…….....

While the reviewers agree that the principal investigator and her team is outstanding, this remains an overly ambitious, unfocused application.

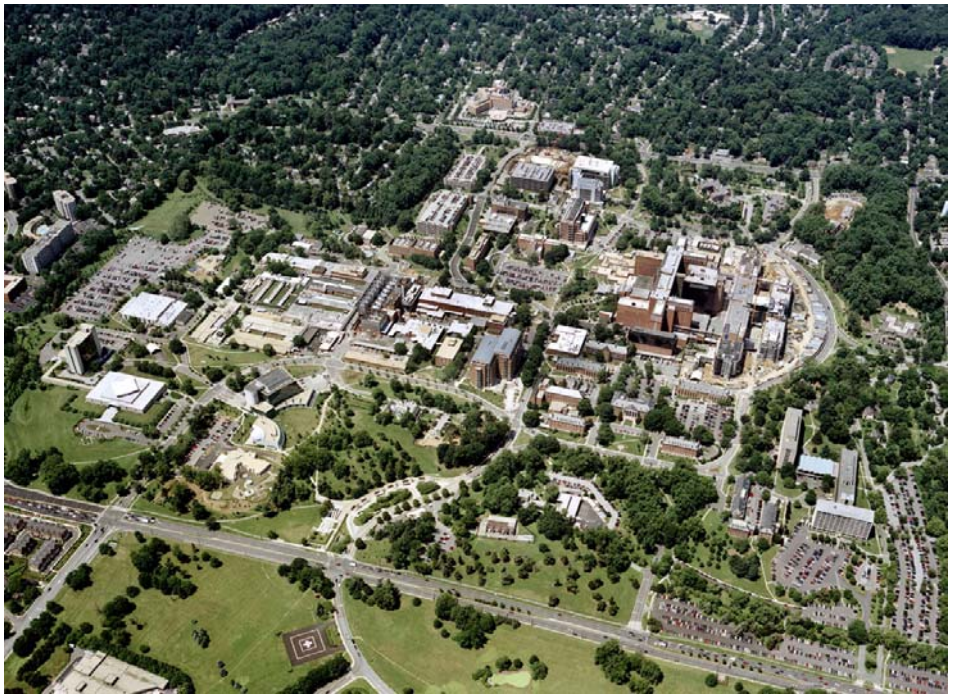
Challenges to Team and IR

The current system of academic advancement favors the independent investigator

Most institutions house scientists in discrete departments

Interdisciplinary science requires interdisciplinary peer review

Project management and oversight is currently performed by discrete NIH Institutes



Challenges to Team and IR

- The current system of academic advancement favors the independent investigator
- Most institutions house scientists in discrete departments
- Interdisciplinary science requires interdisciplinary peer review
- Project management and oversight is currently performed by discrete NIH Institutes
- **Interdisciplinary research teams take time to assemble and require unique resources**

"We study, we plan, we research. And yet, somehow, money still remains more of an art than a science."

Barriers to IR

Infrastructure to support IR

Bridging basic biological sciences and behavioral and social sciences

Incentives for collaborations among disciplines

IR training of new and established investigators disciplinary Research

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IRIG Initiative

IR Consortia

- 21 P20 Exploratory Centers
- X02 (Pre-application) for IR Consortium –> 17 groups
- 9 U54 IR Consortium
  - 84 individual awards to 32 institutions
  - ~$42.5M in total costs per year
  - 16 ICs are participating in the management of awards

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Health System > NeuroTherapeutics Research Institute > Welcome

- NeuroTherapeutics Research Institute
- About NTRI
- More on FXTAS and Fragile X Syndrome
- Interdisciplinary Training Program
- Our Research Team
- Contact Us
- Donations and Support

UC Davis NeuroTherapeutics Research Institute (NTRI)

Welcome to the UC Davis NeuroTherapeutics Research Institute (NTRI), established in 2007 as one of nine interdisciplinary research consortia funded by the National Institutes of Health (NIH) Roadmap for Medical Research, with additional support provided by the UC Davis School of Medicine. The principal objective of the UC Davis NTRI (pronounced "entry") is the implementation of highly integrated approaches to develop targeted therapeutics, including molecular interventions, for neurogenetic disorders.

The UC Davis Institute, as the hub of the interdisciplinary research consortium, will bring together clinical and

Links of Interest

Yale School of Medicine

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Stress, Self-Control & Addiction Consortium

Home | About Us | Research Projects | Faculty | Resources

Stress, Self-Control & Addiction Consortium
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2 Church Street South
New Haven, CT 06519
Tel: 203.974.7353
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stress@yale.edu

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Welcome

Although research on the links between stress and addiction, stress and psychiatric disorders and stress and chronic diseases exists, systematic research on the interactions between stress, self-control and addiction have been rare.

The **Interdisciplinary Research Consortium on Stress, Self-Control and Addiction** (IRCSSA) based at the Yale Stress Center (YSC) brings together over 50 leading scientists, representing 20 disciplines, 5 schools (Medicine, Arts and Sciences, Management, Nursing and Public Health) and three academic institutions (Yale University, University of California-Irvine and Florida State University). These researchers are collaborating to gain a greater understanding of stress and self-control mechanisms in addiction in order to develop new prevention and treatment strategies to enhance self-

Our Research

Smoking, alcohol consumption and over-consumption of rich and high fat 'comfort' foods are the top three causes of preventable death and disease in the US today. more...

News

NIH Launches Interdisciplinary Research Consortia
The NIH Roadmap for Medical Research will fund 9 interdisciplinary research consortia more...

the Oncofertility Consortium

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The Oncofertility Consortium is a national, interdisciplinary initiative designed to explore the reproductive future of cancer survivors.
It is supported by the National Institutes of Health Interdisciplinary Research Consortium Grant (NIH Grant: U54RR024347).

Cancer survival rates among young patients have steadily increased over the past four decades thanks, in part, to the development of more effective cancer treatments. Today, both women and men can look forward to life after cancer but many face possible infertility as a result of their life saving treatments.

The Oncofertility Consortium was developed by Dr. Teresa Woodruff to address the complex health care and quality-of-life issues that concern young cancer patients. The main goal is to establish a multidisciplinary, inter-institutional and inter-professional network of medical specialists, scientists, and scholars to study the relationships between health, disease, survivorship and fertility preservation in young cancer patients.

Dr. Teresa Woodruff

Dr. Woodruff is the Thomas J. Watkins Professor of Obstetrics and Gynecology at the Feinberg School of Medicine, Northwestern University. She coined the term oncofertility to describe a new discipline that bridges the information and technology gaps between oncology and reproductive medicine, providing viable fertility preservation options for people with cancer and other fertility threatening diseases. Dr. Woodruff is also Chief of the Division of Fertility Preservation and Executive Director of the newly created Institute for Women's Health Research at Northwestern University.

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Taskforce for Obesity Research at UT Southwestern (TORS)

- Home
- Investigators
  - > Team 1
  - > Team 2
  - > Team 3
  - > Team 4
- Post-doc Fellowship Opportunities
- Obesity Alliance - Weekly Conferences
- Recent Publications
- Contact

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Supporting the NIH Roadmap Initiative for Interdisciplinary Research

We have assembled the best investigators and technology at The University of Texas Southwestern Medical Center at Dallas to focus on a major medical problem in the U.S. - obesity and the associated constellation of metabolic disorders referred to as the metabolic syndrome (atherogenic dyslipidemia, hyperglycemia, hypertension, prothrombotic and proinflammatory states). This grant will support the efforts of investigators from diverse disciplines to examine the behavioral, metabolic, and molecular mechanisms that cause obesity and the metabolic syndrome. The major focus of our project is the brain and liver, organs that play central roles in the development of obesity and its adverse metabolic consequences.

Northwest Genome Engineering Consortium (NGEC)

Search

- Overview of the NGEC
- Faculty
- NGEC Cell and Virus Core Facility
- Educational Opportunities
- Pilot Projects
- Recruiting
- Resources

Overview of the NGEC

The Northwest Genome Engineering Consortium (NGEC) brings together researchers at Seattle Children's Hospital Research Institute, Fred Hutchinson Cancer Research Center and the University of Washington to develop new methods for gene repair, an innovative approach to gene therapy.

The NGEC is funded by the National Institutes of Health (NIH) Roadmap for Medical Research, a new type of NIH grant program designed to address especially complex problems in research that require expertise across multiple scientific disciplines. Dr. Andy Scharenberg and Dr. David Rawlings, both of Seattle Children's Hospital Research Institute, serve as NGEC co-directors and principal investigators.

DEPARTMENT OF HEALTH & HUMAN SERVICES USA

NATIONAL INSTITUTES OF HEALTH

IR Consortia

Focus Area	# of Awards	ICs	Institutions
Genome Engineering	11	NCI, NHLBI, NIGMS, *NCRR/NIDCR*	**Children's Hospital Seattle**, University of Washington, Fred Hutchinson
Drug Discovery	4	NCI, NHGRI, NIGMS, *NCRR/NIDCR*	**Broad Institute**
Stress & Addiction	14	NIAAA, NIDA, *NCRR/NIDCR*	**Yale**, UC Irvine, Florida State
Oncofertility	10	NCI, NIBIB, NICHD, *NCRR/NIDCR*	**Northwestern**, University of Missouri, Oregon Health Sciences U, UC San Diego, Evanston Northwestern Healthcare Research Institute

IR Consortia

Focus Area	# of Awards	ICs	Institutions
Neuropsychiatric Phenomics	8	NIDA, NIMH, NINDS, NLM, *NCRR/NIDCR*	**UCLA**, University of Helsinki, University of Oulu, UC Santa Barbara, MUSC
Geroscience	10	NIA, NIEHS, NIGMS, NINDS, *NCRR/NIDCR*	**Buck Institute**
Neurotherapeutics	6	NIA, NIDA, NINDS, *NCRR/NIDCR*	**UC Davis**, Scripps Florida, University of Washington, Erasmus Medical College, University of Colorado Health Sciences Center
Obesity	10	NHLBI, NIDDK, NIGMS, *NCRR/NIDCR*	**UT Southwestern**, Integrative Bioinformatics, Inc.
Organ Design	11	NHLBI, NIBIB, NIDDK, *NCRR*/NIDCR	**Brigham and Women's**, Harvard, Vanderbilt, Children's Hospital Boston, Harvard Med, Boston U, MIT, Mass General

Barriers to IR

Infrastructure to support IR

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Incentives for collaborations among disciplines

IR training of new and established investigators

IRIG Initiative

Research collaborations between behavioral/social sciences and biomedical sciences:

- **Facilitating IR via Methodological and Technological Innovation in Behavioral and Social Sciences (R21) – RM-07-004**
- **Administrative Supplements to Support IR in the Behavioral and Social Sciences (R01-R37) – RM-05-007**
- **Supplements for Methodological Innovations in the Behavioral and Social Sciences (Type 3 R01/P01) – RM-04-013**
- **Meetings and Networks for Methodological Development in IR (R13/R21)–RM-04014**

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IRIG Initiative

Multiple PI policy change at NIH*

Sharing of credit for funding across ICs

***A joint initiative among several trans-NIH groups and Offices**

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Funding Opportunities

- Funding Opportunities (RFAs, PAs) & Notices
- Unsolicited Applications (Parent Announcements)
- Research Training & Career Development
- Small Business (SBIR/STTR)
- Contract Opportunities

NIH-Wide Initiatives

- New Investigators Program
- Multiple Principal Investigators

Multiple Principal Investigators

All Federal research agencies are currently preparing for the implementation of policies and procedures to formally allow more than one Principal Investigator (PI) on individual research awards. This presents a new and important opportunity for investigators seeking support for projects or activities that clearly require a "team science" approach. The multiple-PI option is targeted specifically to those projects that do not fit the single-PI model, and therefore is intended to supplement, and not to replace, the traditional single PI model. The overarching goal is to maximize the potential of team science efforts, responsive to the challenges and opportunities of the 21st century.

The "General Information" section of this site presents the essential background and features of the multiple-PI policy, frequently asked questions as well as the major issues to be considered during implementation. The remaining sections on this page focus on implementation strategies beginning in February 2007, the results from the Requests for Information through which the National Institutes of Health (NIH) and the Office of Science and Technology Policy (OSTP) solicited advice and comments from the scientific Community, and information uncovered during the Pilot Phase of the Initiative between May and December 2006.

Related Notices

- Establishment of Multiple Principal Investigator Awards for the Support of Team Science Projects
- Enabling Technologies for Tissue Engineering and Regenerative Medicine (R01)

http://grants.nih.gov/grants/multi_pi/index.htm

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IRIG Initiative

RFAs to establish training programs:

Curriculum Development Award in IR (K07) – RM-04-007
Short Programs for IR Training (R13) – RM-04-008
Interdisciplinary Health Research Training: Behavior, Environment and Biology (T32) - RM-04-010 & -RM-05-010
Training for a New IR Workforce (T90/R90) –RM-04-015 & RM-06-006

Training a New Workforce (T90)

Feature	*T32 (NRSA)*	*T90 (NIH Roadmap)*
Trainee	NRSA requirements	Foreign nationals, Any stage of career
Salary	None for PI	Up to 10% allowed
Approach	Multidisciplinary	Interdisciplinary
Evaluation	Peer review and progress reports	Self-evaluation and annual meeting
Payback requirements	All trainees	No payback for trainees on R90
Unfilled trainee slots	Pre/Post flexible	Fixed # slots

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Assessing the overall contribution of the team

- Ascertain contributions to the creation of a new field- the degree to which the work relates to antecedent disciplinary knowledge
- Ascertain degree to which the work contributes to a network of knowledge
- Social network analysis to assess relationships among investigators in the team and to identify “hot spots” of interdisciplinary research
- Ascertain degree to which the work leads to practical answers to societal questions

Assessing the contribution of the individual team member

- Does the team member publish work independently (e.g. methods develop) that enables the team effort?
- Does the team member participate in reviews of interdisciplinary science?
- Has the team member been asked to speak at national/international meetings in areas outside of their own traditional discipline?
- Analyze the informal network to ascertain the degree to which the individual contributes to a network of knowledge

Evaluation Plan is Focused on Process and Short-term Outcomes

- **Process**
  - **Initiative-Planning & Grants Announcements**
  - **Scientific Review**
  - **Portfolio Selection**
  - **Program Management & Grants Oversight**

- **Short-term outcomes**
  - **IR Consortia:**
    - **Do investigators see added value to IR collaborations? Do NIH staff view activities of consortia researchers as unique?**
  - **Bridging Biomedical and Behavioral Sciences:**
    - **Have new methodologies/technologies been developed to facilitate bridging fields? Have new or stronger collaborations been established? Do investigators plan to continue these collaborations?**

Evaluation Plan is Focused on Process and Short-Term Outcomes (cont.)

- Process
  - Initiative-Planning & Grants Announcements
  - Scientific Review
  - Portfolio Selection
  - Program Management & Grants Oversight

- **Multiple PI Policy Change:**
  - **Have there been any changes in institutional policies related to credit sharing resulting from MPI? Have there been any other benefits to grantees resulting from MPI?**
- **IR Training:**
  - **Does IR training have an impact on student attitudes towards IR? Do faculty-mentors engage in more collaborative research?**

Short-Term* Assessment of IR Training Initiatives

- Census
- Meeting of T90/R90 Training Directors – May, 2007
- Independent assessment by training directors NOT supported by IR training grants – October 29, 2007
- Evaluation of Training program content for similarity or uniqueness relative to other NIH training programs - ongoing

* Referred to within RM as the “Mid-Course”

Census of T90/R90 and T32 (Interdisciplinary Health Research Training: Behavior, Environment and Biology) Programs

Number of trainees supported in 2006:

	Undergraduates	Pre-doctoral		Post-doctoral	
		NRSA	non-NRSA	NRSA	non-NRSA
T32	NA	NA	NA	35	1*
T90/R90 Phase 1	38	88	31	20	13
T90/R90 Phase 2	9	23	2	7	1
TOTAL (268)	47	111	33	62	15

*FTTP provided by grantee institution

Summary of Short-Term Assessment

Institutional Issues:

- **Insuring quality of training by building measures of scientific rigor into programs**
- **Identifying whether or not there is a core skill set that all IR trainees should have following training.**
- **Need to facilitate a stronger connection between the various components that make up IR (e.g., between biological and quantitative areas or between basic and clinical approaches)**
- **IR training activities should not be an add-on to ongoing departmental requirements for faculty.**
- **Developing methods for attracting, identifying and selecting the very best students available including those from underrepresented groups and foreign students.**

Summary of Short-Term Assessment

Program-specific issues include:

- **Development of degree-granting programs**
- **Use of mentoring committees/teams vs. co-mentors**
- **Core competency courses vs. a ‘menu’ of courses individually tailored for students**
- **Front-loading courses before students engage in research**
- **Involvement of basic research students in clinical work**

Summary of Short-Term Assessment

- Both IR and independent training directors indicated that IR focused training programs are needed –
  - Led to creation of new programs at most institutions
  - Increases institutional recognition for/acceptance of IR training
  - Provides a vehicle for more broadly-based IR training than available through individual IC-supported programs
- Even at institutions where IR training was ongoing, the RM program allowed funding from a single source centralizing administration and consolidating training efforts; in some cases increased the breadth of the scope of training
- T90/R90 inclusion of undergrads and international students enhances diversity of trainee cohorts
- Disease-specific peer review/funding make support of IR training difficult to obtain
- Single-IC designations, even for administrative purposes, can have profound, negative effects on attracting broadest applicant base

Questions Arising from Short-Term Assessment of IR Training Programs

- Should NIH support IR training outside of traditional IC training programs?
  - Where does the money come from?
  - Who does the primary and secondary review?
    - Need IR expertise to give fair peer review; should IR applications compete with traditional IC training programs?
  - How are grants designated to reflect trans-NIH support?
    - Needs a designation to reflect the fact that this is trans-NIH and not tied to a specific IC
    - Use of IC designation can reduce response to program
- Who makes funding decisions? Who has programmatic responsibilities for grants?

Life After Roadmap: Current Transition Plan

- IRIG members are working with TAC and PIs of IR training programs to match currently funded IR training programs with relevant/interested ICs
- Will ICs support full IR programs as currently constituted – or will they be morphed into greater alignment with IC mission relevance?

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Interdisciplinary Research in *cis* and *trans*

- There is a fundamental tension between IR that lies within the interface of traditional IC boundaries and the alignment of support for IC mission
- We find that the more IR a training program is, the less likely it is will be "adopted" up by an IC

Interdisciplinary Research in *cis* and *trans*

But, "without tension, there can be no music"

Mary Beckerle