NIH
Council of Councils
(November 20, 2008)

Science of Science Management

(Highlights: October 2-3, 2008 Meeting)

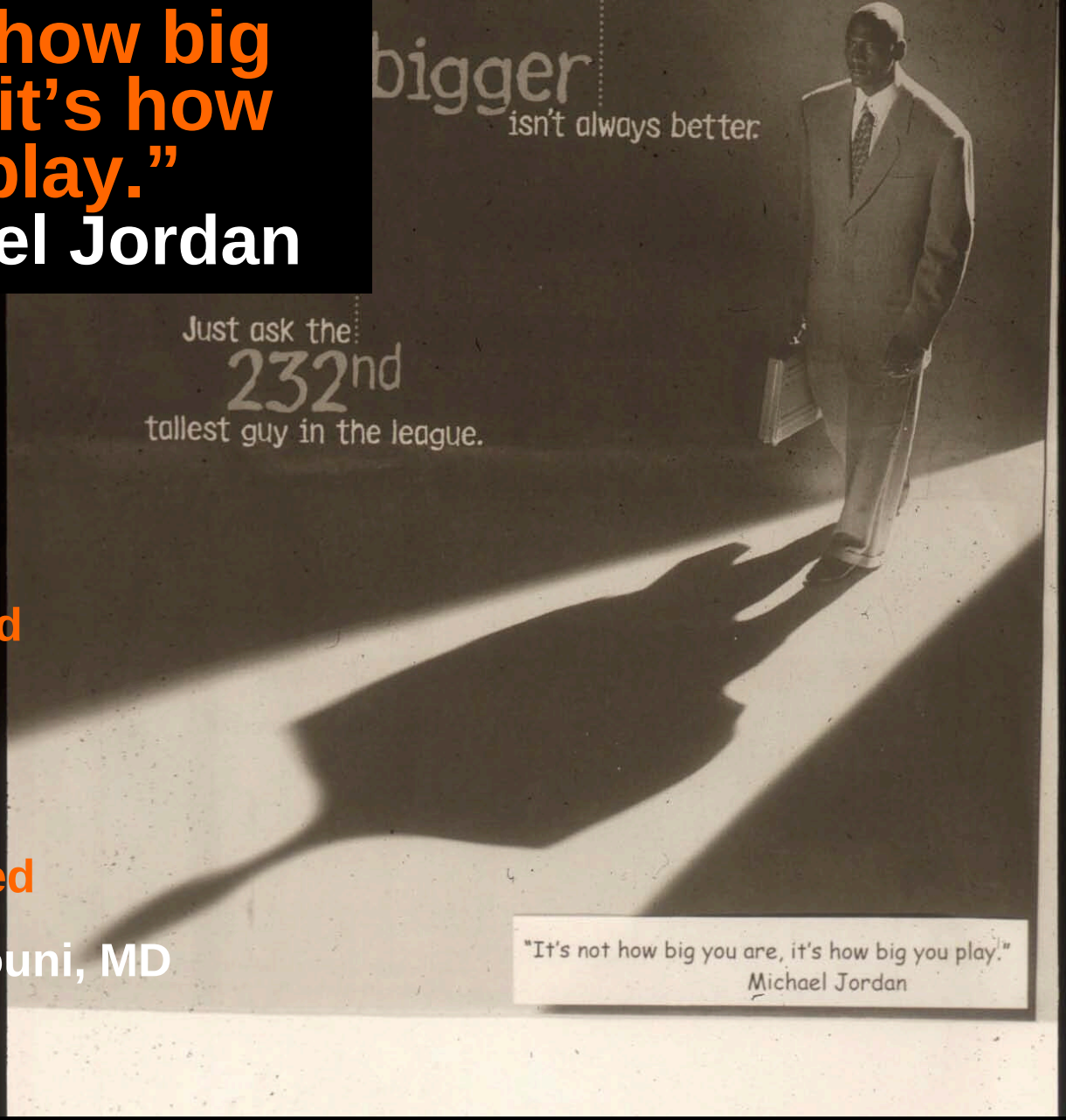
Lenworth N. Johnson, MD
Professor of Ophthalmology & Neurology
Mason Eye Institute
University of Missouri-Columbia

NIH Reform Act of 2006

3 Functions of Congress

- Authorize (create)
- Appropriate (fund)
- Oversight (investigate)

“It’s not how big you are, it’s how big you play.”
Michael Jordan



- **High risk**
- **High reward**
- **Innovative**
- **Quality**
- **Value Added**
- **Elias Zerhouni, MD (2002-08)**

NIH Reform Act of 2006
Key Provisions

- Establishes a Division of Program Coordination, Planning and Strategic Initiatives (DPCPSI)
- Establishes use of a Common Fund to support trans-NIH research
  - Trans-NIH Research proposals must include milestones and goals research
  - Consideration must be given to proposals from *first-time NIH investigator* applicants
  - Currently 1.7% NIH ($30B) budget
- Creates a Council of Councils to guide trans-NIH priorities
- Establishes a Scientific Management Review Board (SMRB)
  - oversee evaluation or organizational structures & authorities for improvements
- Initiates a public process to review potential organizational changes

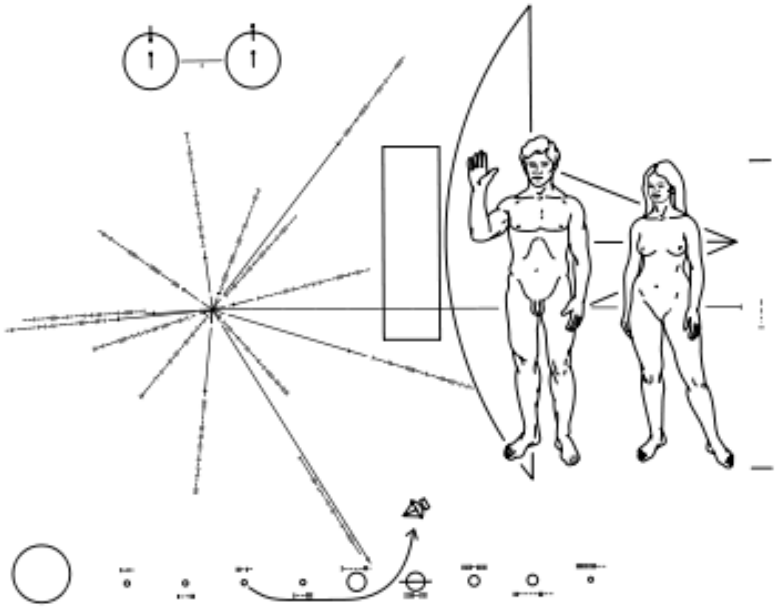
"*The first omnibus reauthorization of NIH in 14 years*"

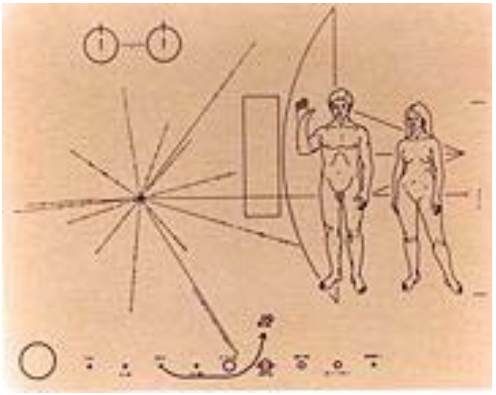
What is DPCPSI's Mission?

- To provide NIH Institutes and Centers methods, tools, and information necessary to improve management of the large and complex scientific portfolios
- To identify -- in concert with multiple other inputs -- important areas of emerging scientific opportunities or rising public health challenges
- To help accelerate investments in these areas, focusing on those involving multiple Institutes and Centers
- To coordinate and make more effective use of NIH-wide evaluation processes

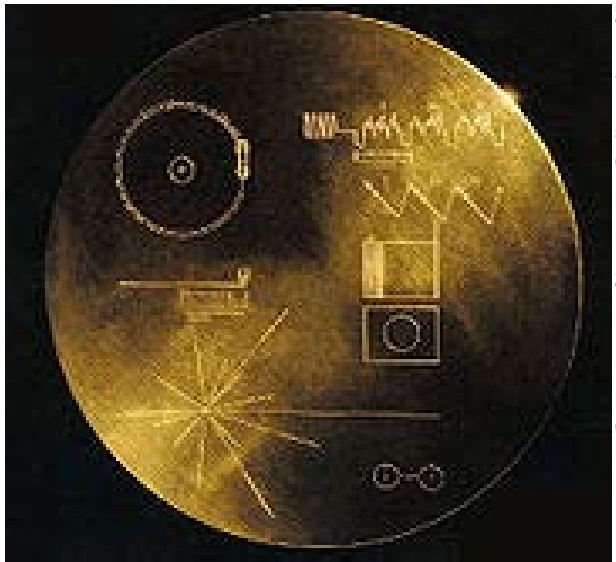
Rodeo Drive (Los Angeles, CA)

Pioneer 10 &11 (1972 & 1973)





Voyager 1 & 2 (1977)



2006 – Voyager exit solar syst

Speed – 17 Km/sec
(38,000 mph)
55 languages
Chuck Berry, Louis Armstrong

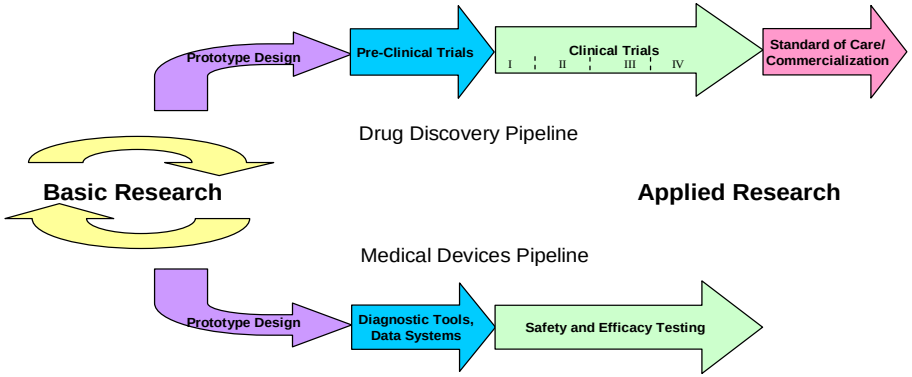
1 light year ≈ $6x10^{12}$ mi
≈ $9x10^{12}$ km
2007 – Voyager 14 light-Hours
(30 years awa

Universe
at least 1 Billion Galaxies (1
Galaxy
avg 1 Billion Stars (10^9) /Gal

dbGaP Captures Existing Phenotype Investment As Is

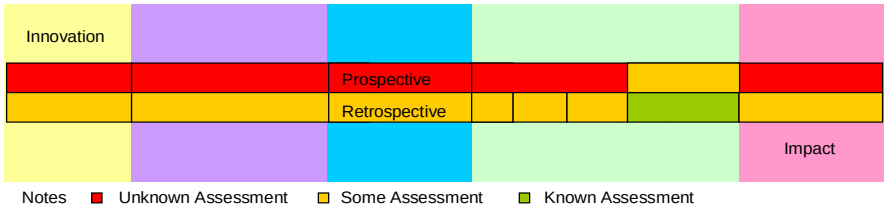
Scientific Discovery Process

Stages of Research and Development



Science Discovery Continuum to Practice

Science Assessment



Science of Science Management Objectives (↑science & ↑public health)

- **Provide evidence-based results** → for science decision-making, planning, prediction, and policies
- **Identify Patterns, Pathways & Profiles** of science discoveries and scientific careers → to identify intervention or tension points that can lead to scientific advancement
- **Build capacity and infrastructure** → to conduct systemic & systematic assessments of: 1) science, and 2) the science of science management for improved science performance
- **Develop strategies and resources** → to enable diffusion of the strategies used to assess science management practices

Other Federal Activities

- NSF (Natl Sci Foundation – for Social, Behavioral & Economic Sciences)
  - SciSIP (Science of Science and Innovation Policy)
  - TPAC (Technology Policy and Assessment Center)
- OSTP (Office of Science and Technology Policy)
  - Science of Science Policy
  - SoSP Roadmap
  - SoSP Literature Synthesis
- NIST (National Institute of Standards and Technology)
  - ATP (Advanced Technology Program)
  - TIP (Technology Innovation Program)
- DOE (Dept of Energy)
- Science of Science Policy **Workshop Dec 3-4, 2008**

International Activities

- European Union
  - US-EU Match Network
  - Cordis FP6/FP7 (EU Community Research & Development Information Service)
- Germany (DFG)
  - Performance Indicators
- Norway
  - Intellectual Property Rights
- Japan
  - Grants-in-Aid for Scientific Research
- Canada
  - Criteria for evaluators
  - Criteria for evaluations

Science of Science Management
SoSM Meeting

October 2 & 3, 2008

Expected Outcome: Identification of concepts that can advance assessment strategies which can be tested by fostering potential pilot studies and other efforts to launch this field of study

SoSM Pre-meeting Activities

- NIH working group input
- Field Specific Conference Calls
  - Identified state of field
  - Assessment of challenges
- Theme Specific Conference Calls
  - Selection of overarching guiding questions
  - Construct discussion
- NIH scientist/staff participant conference calls

SoSM Meeting Activities

- Summaries of pre-meeting activities
- Expert presentations (cross-field discussion)
  - Charge: Set baseline for current known strategies for assessing science and science management
- Theme specific breakouts (cross-discipline discussion)
  - Charge: Develop four concepts that can be tested to provide pilot data for science of science management research and field advancements

SoSM Meeting Participation

- Onsite Participants – 150

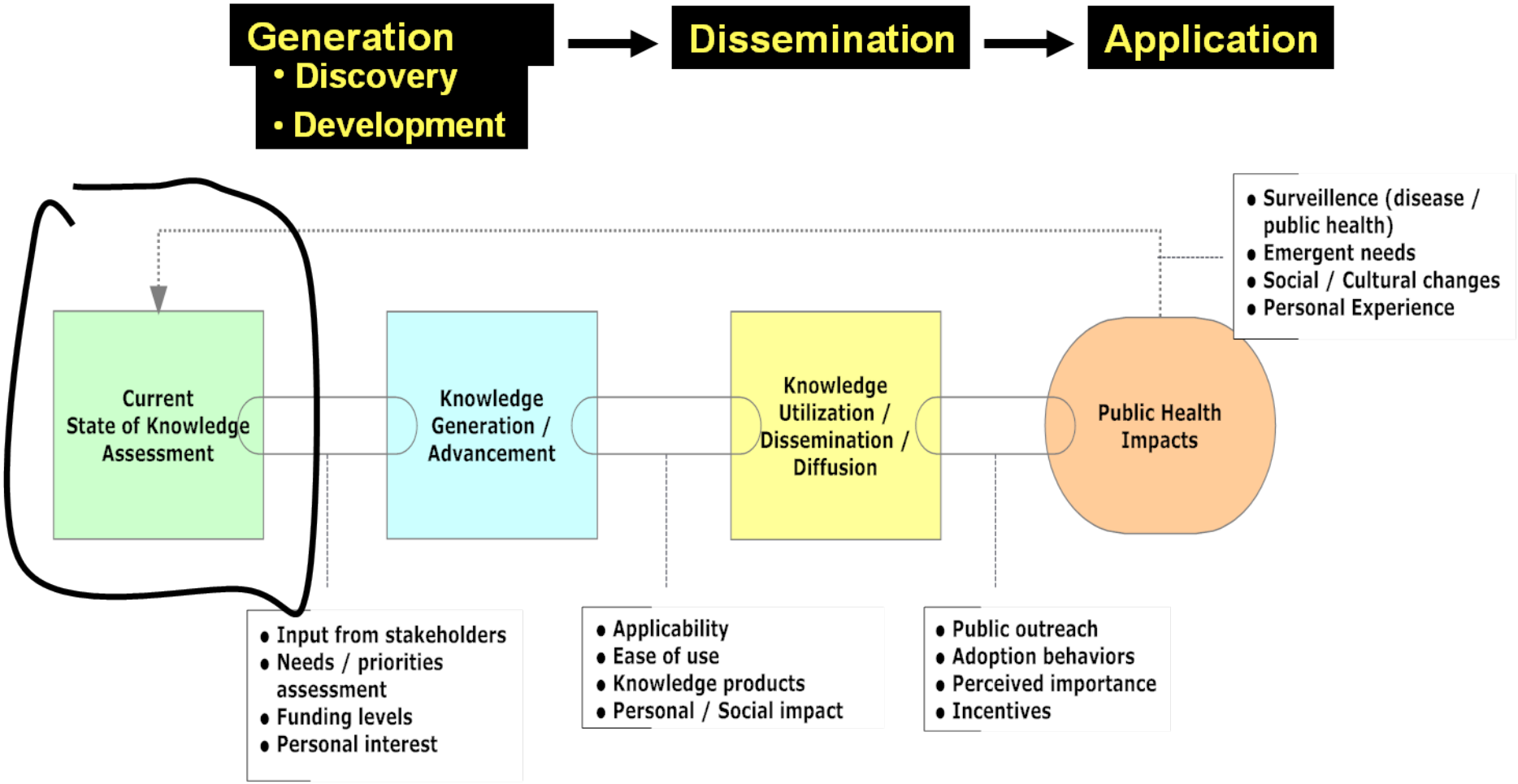
- Videocast
  - Total views – 517
    - 49% NIH
    - 35% domestic (9 other Fed 27 domestic)
    - 16% foreign (20 countries)

Field Expert Presentations (rows)

- Evaluators
- Economists
- Organizational theorists
- Incentives
- Behavioralists
- Knowledge management (IT systems)
- Systems analysts
- Policy analysts
- Modelers
- Science historians / anthropologists

Meeting Structure by Areas of Expertise	Current State of Knowledge Assessment	Knowledge Generation/ Advancement	Knowledge Utilization/ Dissemination/ Diffusion	Public Health Impact
IC Director / Chair	Lawrence Tabak, NIDCR	Nora Volkow, NIDA	Thomas Insel, NIMH	Paul Sieving, NEI
Evaluation / Assessment	David Wilson George Mason, Associate Professor, Dept of Public and International Affairs	Scott Stern Northwestern University, Associate Professor, Kellogg School of Management	William Trochim Cornell University, Professor, Dept of Policy Analysis and Management	Doris Rubio University of Pittsburgh, Associate Professor of Medicine, Biostatistics, and Nursing
Knowledge Discovery / Management	Mary Kane Concept Systems Incorporated, President	Katy Börner Indiana University, Associate Professor of Information Science and Informatics	Jason Owen-Smith University of Michigan, Assistant Professor, Sociology and Organizational Studies	Nate Osgood University of Saskatchewan, Assistant Professor, Dept of Computer Science
Systems / Modeling/ Policy	Adam Jaffe Brandeis University, Dean of Arts and Sciences and Fred C. Hecht Professor in Economics	Susan Cozzens Georgia Institute of Technology, Director Technology Policy and Assessment Center	Lynne Zucker University of California-Los Angeles, Professor of Sociology & Policy Studies	Daniel Sarewitz Arizona State University, Director of the Consortium for Science, Policy and Outcomes
Scientists	Michael Darby University of California-Los Angeles, Professor of Money and Financial Markets	Edward Roberts (keynote) Massachusetts Institute of Technology, Professor of Management of Technology / Founder and Chair MIT Entrepreneurship Center	Fiona Murray Massachusetts Institute of Technology, Associate Professor, Management of Technology, Innovation and Entrepreneurship	Harold Pincus Columbia University, Professor, Dept of Psychiatry
Scientists	James Wong COPR, Hitachi Global Storage Technologies, Senior Product Strategist	Gilbert Omenn University of Michigan, Professor of Internal Medicine, Human Genetics and Public Health	Michelle McMurry Aspen Institute, Director, Health, Biomedical Science and Society Initiative	Ernst Berndt Massachusetts Institute of Technology, Professor of Applied Economics
Council of Councils Members	Lenworth Johnson University of Missouri, Professor of Ophthalmology & Neurology	Arthur Kleinman Harvard University, Professor of Medical Anthropology	Edwin Flores Chalker Flores LLP, Founder	Phyllis Wise University of Washington, Provost and Executive Vice President
P&E Officers	Kathie Reed NIA, Director, Office of Planning, Analysis, and Evaluation	Kevin Callahan NIAID, Director, Office of Strategic Planning and Financial Management	Della Hann NIMH, Director, Office of Science Policy and Program Planning	Lori Mulligan NCRR, Director, Office of Science Policy
NIH Scientists	Alan Koretsky NINDS, Senior Investigator, Laboratory of Functional and Molecular Imaging	Susan Gottesman NCI, Senior Investigator, Biochemical Genetics	David Lipman NLM, Director, NCBI; Senior Investigator	Ronald Germain NIAID, Senior Investigator, Lab Immunology
NIH Scientists	Robert Star NIDDK, Director, Division of Kidney, Urologic and Hematologic Diseases	Mark Guyer NHGRI, Director, Division of Extramural Research	Anita Linde NIAMS, Director, Office of Science Policy and Planning	Clifford Lane NIAID, Senior Investigator, Division of Clinical Research
NIH Scientists	Richard Suzman NIA, Director, Division of Behavioral and Social Research	Richard Fabsitz NHLBI, Deputy Chief, Epidemiology Branch	Stephen Marcus NCI, Scientist, Tobacco Control Research Branch	Richard Fisher NEI, Associate Director for Science Policy and Legislation
NIH SOSM Working Group	Christie Drew NIEHS, Health Scientist Administrator, Program Analysis Branch	Nancy Jones NIAID, Planning and Evaluation Specialist, Strategic Planning and Evaluation Branch	Patty Mabry OD, Office of Behavioral and Social Sciences Research	Susan Daniels NIAID, Health Scientist Administrator, Office of Scientific Coordination and Program Operations
Obserrvers	Luci Roberts (OPASI)	Joni Rutter (NIDA)	Christina Clark (COPR)	Genevieve R Dealmeida-Morris (NIDA)

Conceptual Model of Science Research



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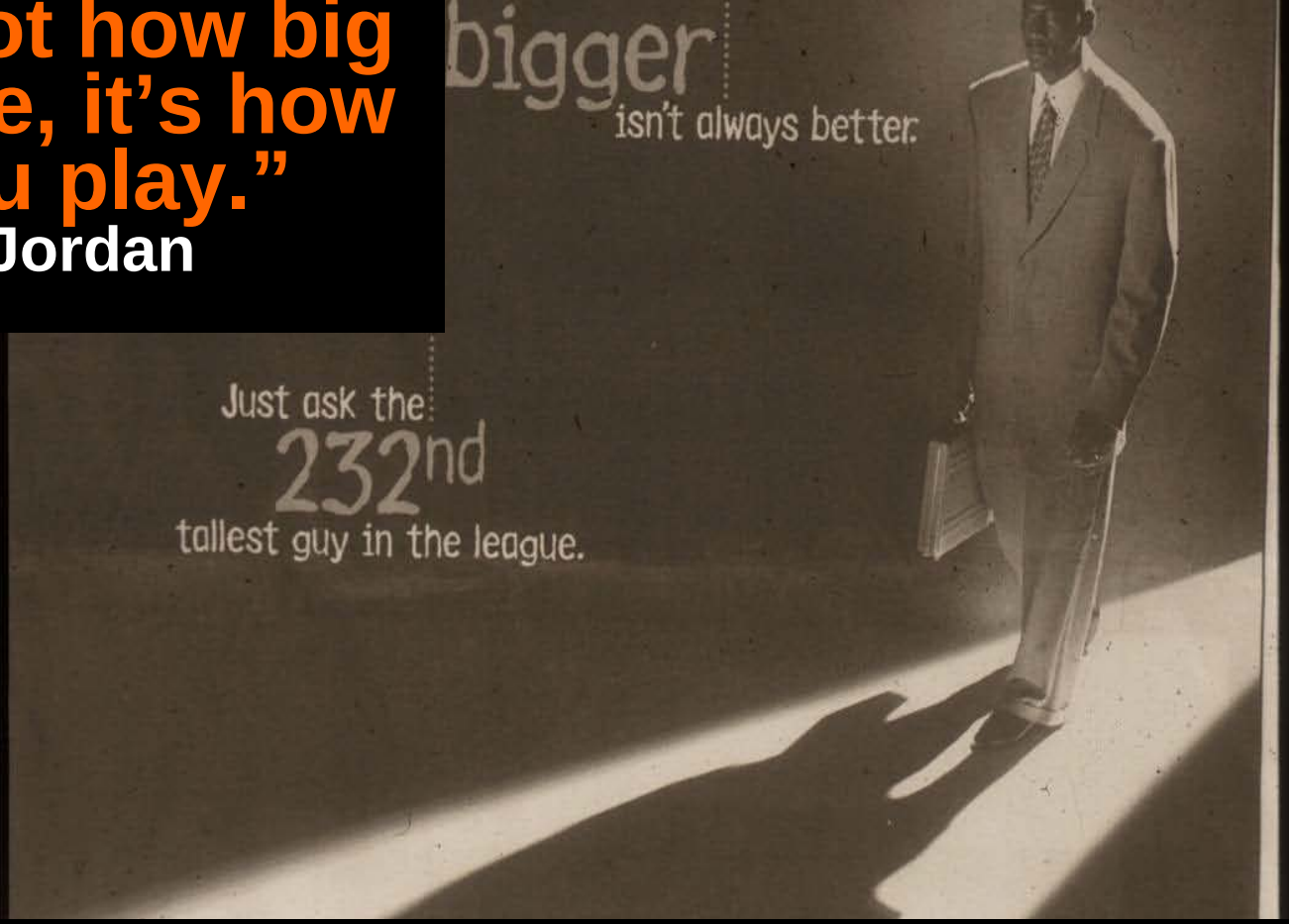


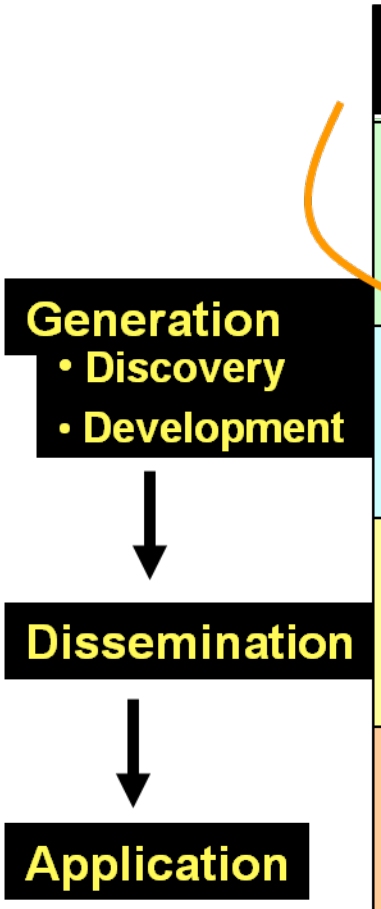
High risk
High reward
Innovative
Quality
Value Added
Elias Zerhouni, MD

Database Search

“*Neuro-Ophthalmology*”

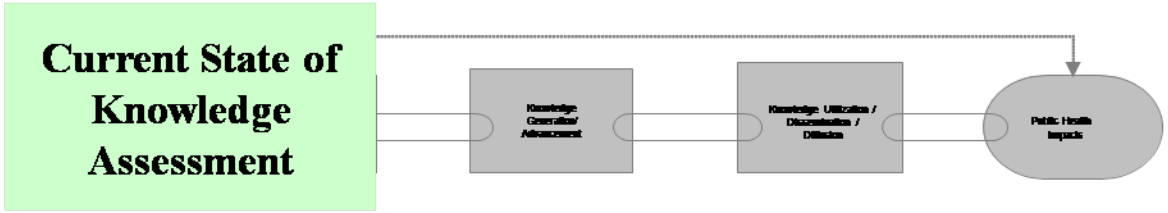
- Crisp ➔ 300+ hits (not applicable)
- Google ➔ top 5 (close)

Breakout: Theme Specific Priority Questions (columns)



Science of Science Management Meeting	
Current State of Knowledge Assessment	How do we assess the current state of knowledge to identify science opportunity for innovative research?
Knowledge Generation / Advancement	What is needed for the assessment of NIH knowledge generation?
Knowledge Utilization / Dissemination / Diffusion	How can we best leverage social networks to facilitate information utilization?
Public Health Impact	How do we measure the impact of NIH research on public health?

Current State of Knowledge Assessment

Current State of Knowledge Assessment	
	
Overarching Guiding Question:	What components should be included in a comprehensive framework of processes, analytic tools and methods that can be used to assess and prioritize the state of knowledge in a basic, clinical, or population-based research field to encourage innovation and advancement?
Priority Question to be Discussed at October Meeting:	**How do we assess the current state of knowledge to identify science opportunity for innovative research?**

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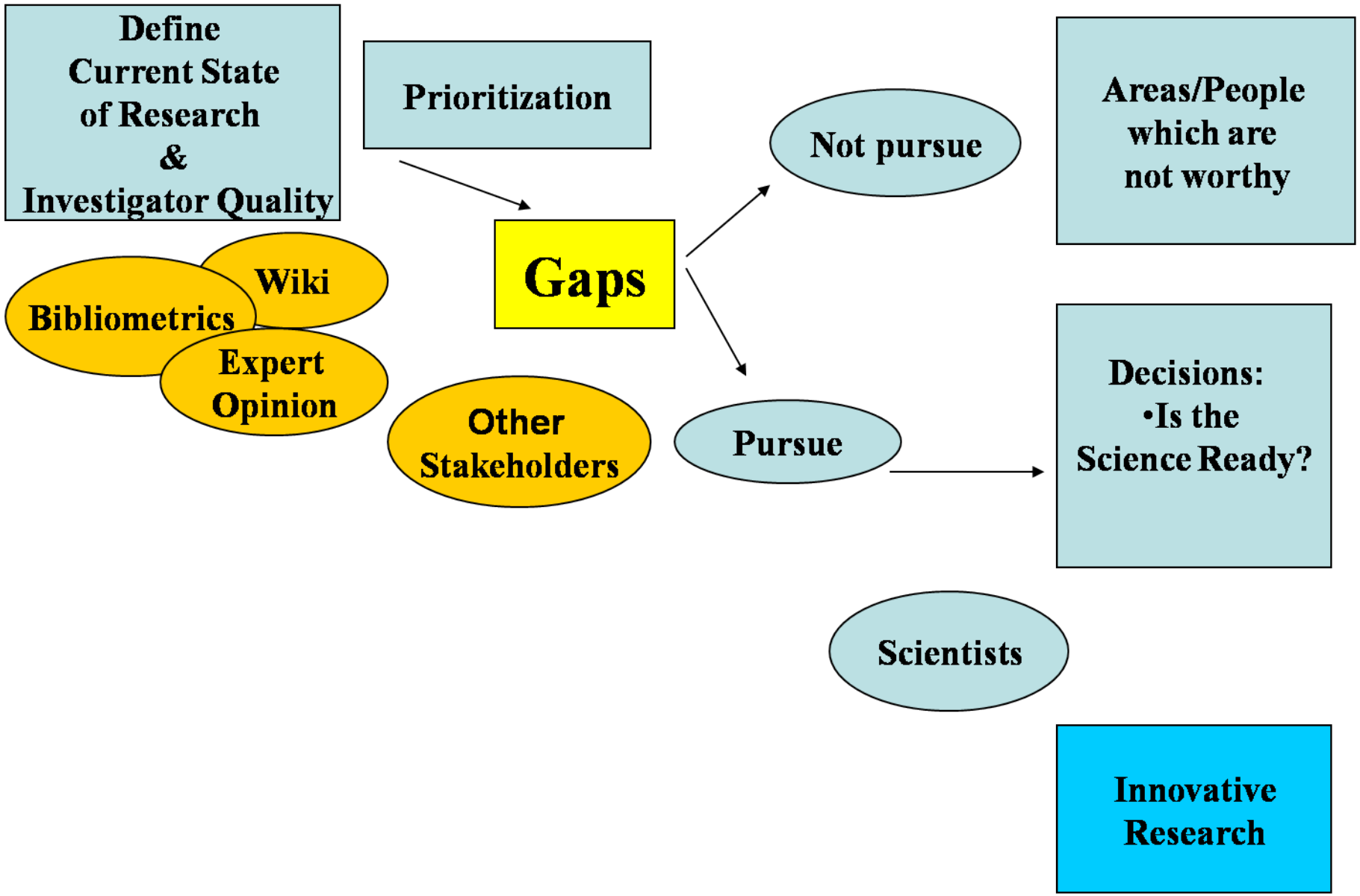

Knowledge Generation/Advancement

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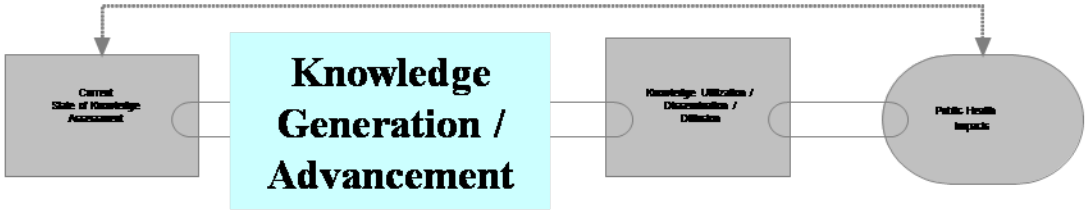	
Overarching Guiding Question:	What is needed for a comprehensive assessment of NIH knowledge generation and advancement?
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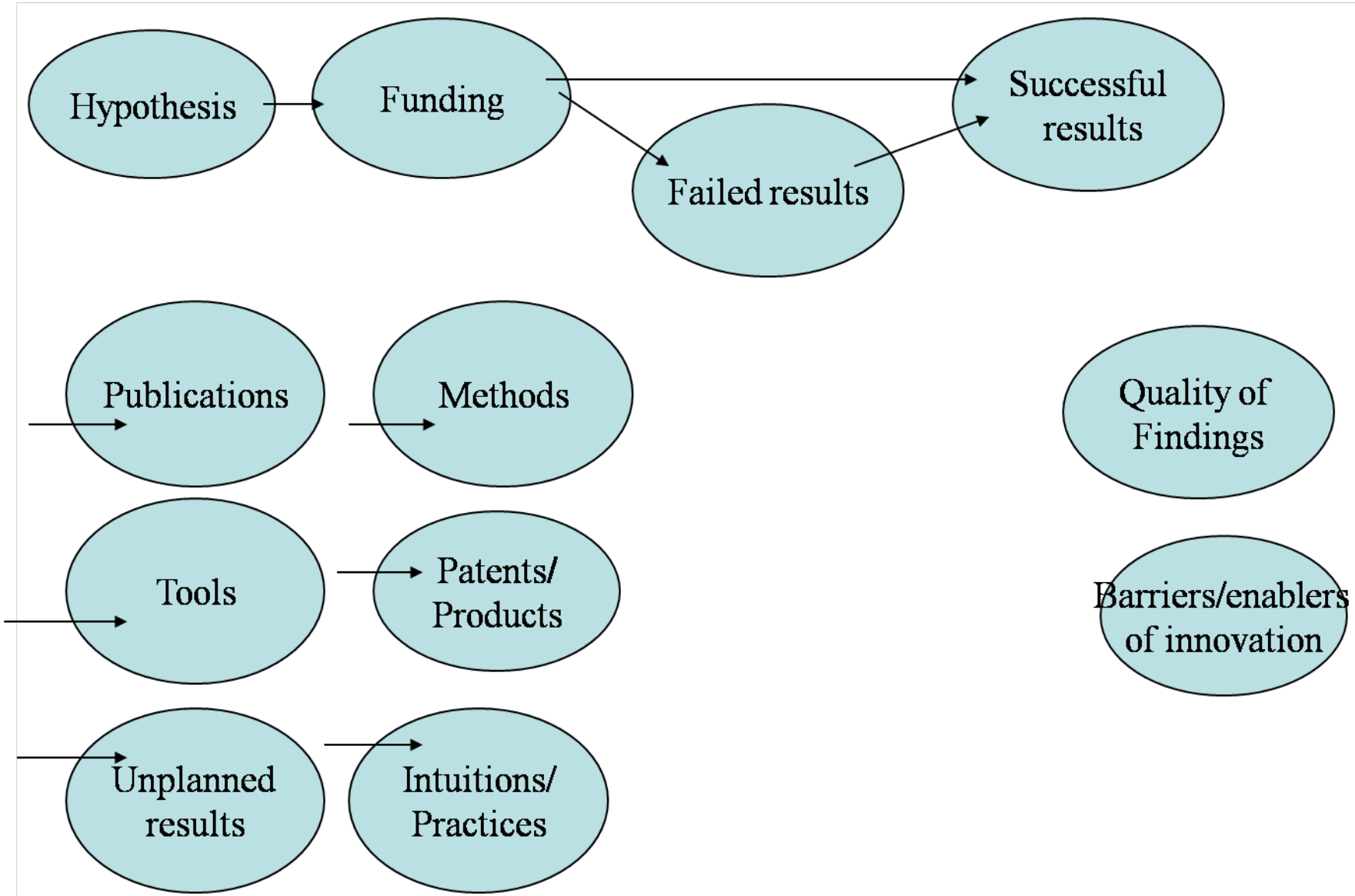
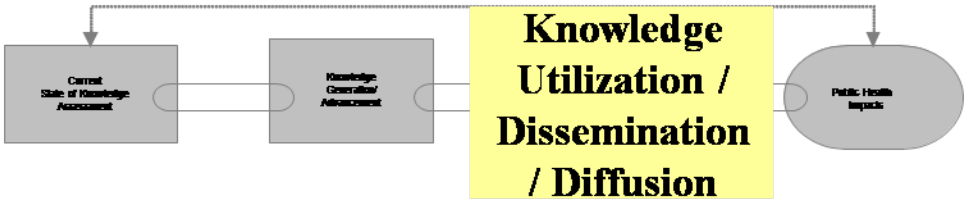


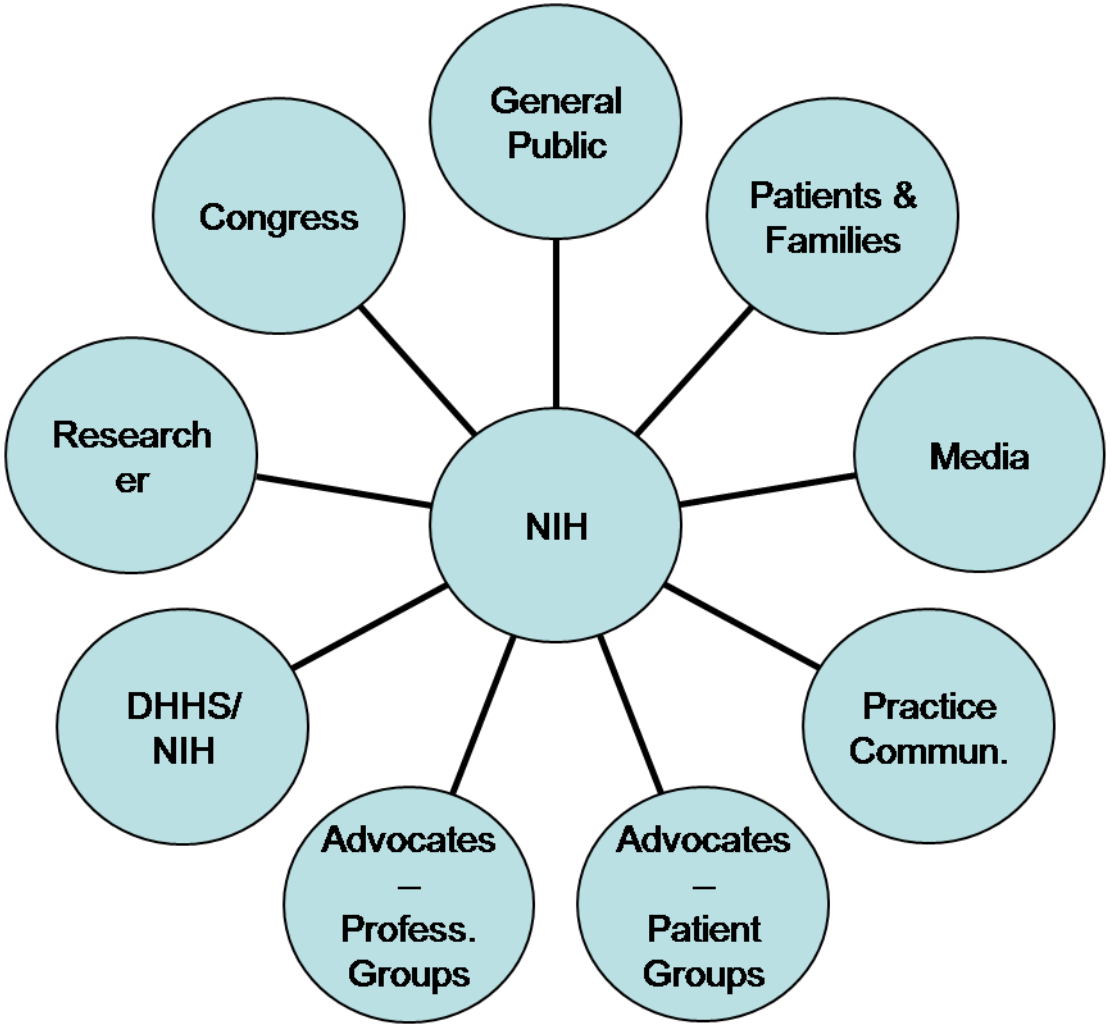
What is needed for the assessment of NIH knowledge generation?

Construct/ component	Ways to measure	Source
Individual vs group science	scale of team, personal factors, Career stage (group and indiv.) factors, spectrum of productivity, nature of work, objective data,	Uzzi, Jones, Whactel;
IT / tools / databases Infrastructures of science	Use / downloads, databases, mapping & connectedness, public availability, new technology developments from private sector	Contractor & Lazar; Agarwal & Goldbulm;
Beyond / in addition to bibliometrics / New set of outputs	New methods, trainees, technologies, workshops, unpublished results (negative, unplanned), use natural experiments, timeframe of metrics, use vs citation data, patents	Olsen& Finholt; BIRN; Giles & Cronin
Adaptability	Diversity of investments, overstudy or understudy	
Value of redundancy & Recognition of gaps areas	Evidence-based guidelines across institutes, translational aspects	
Management / Organization structures	People vs projects, comparison of IC director management styles, internal and external prediction markets	

Knowledge Utilization/Dissemination/Diffusion

Knowledge Utilization / Dissemination / Diffusion	
	
Overarching Guiding Question:	How can social networks and collaborations among constituents/stakeholders facilitate the exchange and use of relevant knowledge to enhance learning and innovation and to facilitate the utilization of the information in practical applications and at key decision points?
Priority Question to be Discussed at October Meeting:	**How can we best leverage social networks to facilitate information utilization?**

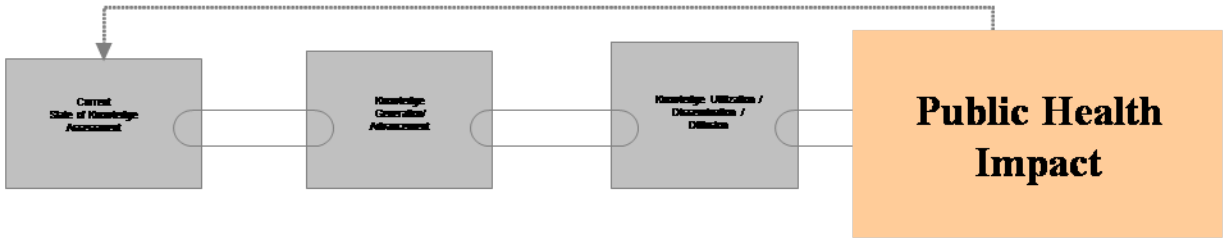
What are some of the relevant social networks/stakeholders to consider?



How can we best leverage social networks to facilitate information utilization?

Who wants information?	What kind of Information and Purpose?	Leveraging Dissemination	Impeding Factors	Ways to Measure Dissemination
Producer to Producer	-Research findings -Types of research -Summary Information	-Meetings -Research literature -Colleague discussions/ training -Databases/ materials	-Intellectual property – -Jargon/ Conceptualization/ -Cultural -Incentives -Time -Repositories	-Surveillance systems -Bibliometrics -Licensing -MTA
Producer to User	-Research findings	-Web (Pubmed Central) -Media -Synthetic pubs -Gatekeepers -Systematic review	-Jargon -Time -Not in digestible format -Competing information -Competing interests and policies	-Surveillance systems -Dissemination statistics -Clinical/Epi
User to Producer	-Research ideas	-Money through legislation -Political will -Advisory boards -Advocacy/ civil action/ -Coalitions	-Lack of access / cultural barriers	-Clinical feedback -Consumer research advisory groups
User to User	-Research findings	-Media -Patient to patient networks -Personal relationships	-Lack of access / cultural barriers	-Social-advocacy group networks dissemination -Media web measures

Public Health Impact

Public Health Impact	
	
Overarching Guiding Question:	What systemic models for improved public health, including pathways and contexts, could be useful for informing multiple NIH decision making processes?
Priority Question to be Discussed at October Meeting:	**How do we measure the impact of NIH research on public health?**

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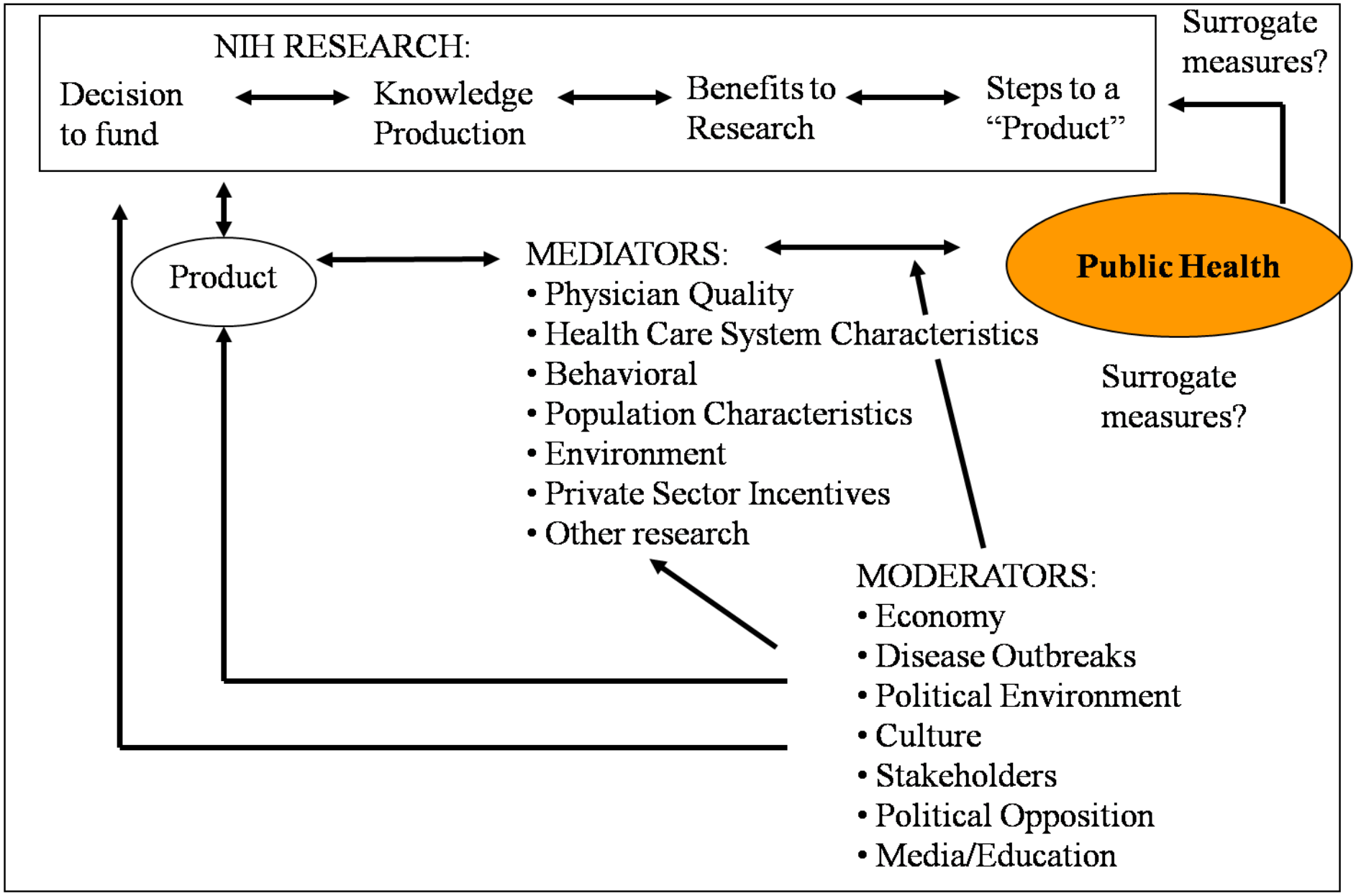

Welcome to the new www.AllScienceData.Gov Website

Alan, thanks to you, Deb Duran, and the "posse" [OPASI], the NIH, has funded **5-7 competing teams** to each create a **frontier-reaching**, essentially instantaneously-updated **voice, video, and written, intelligent and easily searchable, secure, valid** and **reliable** medical and scientific database that **guarantees** you will be within 3 clicks of the data you wish to evaluate.

Len, it's **Lana Skirboll, Deb Duran,** and DPCPSI now. They will be able to create RFAs so doctorates, post-docs, and other investigators can help continuously identify and fill gaps in our knowledge. The new NIH Director will know where to strategically put dollars from the Common Fund and Other NIH funds.

And what do you think about the **"Just-In"** section of the new website which has up-to-the minute contributions of failed and successful research, promoting rapid and innovative science?

Sir, If you had looked at the **"Just-In"** section at the NIH sponsored **All_Science_Data.gov** website, you would have seen that **less than 2 minutes ago**, I presented new data which filled in the gap of our knowledge that carbonated beverages enhance calpain activity in gastric parietal cells. And this can be deleterious!

Factors for Success

- Science First
- Planning based on evidence
- Maintaining transparency
- Communicating plans
- Managing change

"In the end, the success of DPCPSI (*and the Council of Councils*) will be measured in their ability to fill gaps, alleviate redundancies and add value to strategic planning and the portfolio of the largest biomedical research institution in the world."

AK/EZ