



# Science Management and Informing Decision Making

## Example - Profile Analysis

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# Systemic Assessments

- Coordinate trans-NIH level required reporting
- Respond, and ensure compliance, to federally-mandated performance reporting mechanisms
  - Government Performance Results Act (GPRA)
  - Program Assessment Rating Tool (PART)
- Foster development of more appropriate assessments for
  - Innovative science assessments
  - Large complex systems/Organization assessments
- Facilitate Science of Science Management activities

# Challenges for Science Managers

- Uncertain pathways, timeframes, or products to develop science advances
- Differences across spectrum of research (ex. discovery vs. translational) to move science from bench to bedside
- Multiple modes of research (high reward / high risk, innovative, large multi-part initiatives) to foster the best science

# Current Environment

- Science managers must make decisions to select / guide research
- Many choices, often lack tested evidence
- Resource and budget constraints limit activities
- Growing accountability for actions and results, but appropriate assessment lags

# Current Practices

- Customary / Historic practices
- Pressure / Persuasion
- Desire for acceptance / likeability
- Imitation of outside practices
- Directives

# Possible Alternatives

- Need systematic approaches
  - Appropriate results
  - Tested evidence
  - Credible data
- Always combined with judgment

# What is the issue?

**Knowledge is lacking on how to best manage the breadth of science research**

# Systematic Field of Study

## Science of Science Management

A process:

- To understand federal stewardship
- To foster the innovative use of resources for planning, conducting and disseminating scientific research
- To inform decision-making

That enhances science productivity and improves public health



# Possible Theoretical Approaches

- Wholey approach
  - How to inform management?
  - How to support evidence-based decision making?
  
- Program Theory approach
  - How does science management work?
  - How to test how it works?

Need to separate tested from anecdotal,  
fact from fiction, and valid from customary

# Possible Outcomes

- Support science management decision-makers with tested evidence
- May improve decisions versus ad hoc
- Better inform oversight and withstand scrutiny
- Systematic process to develop knowledge

# Example – Selecting Scientists

- Proposals requesting funding often outweigh resources
  
- Committees weigh proposal and scientist to select best candidate
  - Assess the scientific merit of proposal
  - Assess scientist's ability to complete proposal

# Current Selection Practices

- Assess proposal merit
  - Scientific value of outcome
  - Feasibility of achieving outcome with stated design
  
- Assess scientist's ability
  - # of publications
  - List of publications

# Science Management Question

**Are there attributes or characteristics of scientists that could facilitate selecting the best candidate?**

# Science Management Research

- Conduct a profile analysis
  - Formal summary or analysis of data representing distinctive features or characteristics of scientists
  
- Possible concepts
  - Total publications / Total citations
  - Impact of research (citations per publications, h-index)
  - Recent productivity
  - Normalizing across fields
  - Citation cycles / patterns

# Profiling Analysis in Practice

National Institute on Drug Abuse (NIDA)

Division of Basic Neuroscience and Behavioral Research (DBNBR)

- Data: 430 proposals from 2006
  - Bibliometrics (# of publications, # of citations, citations per publication) for 1996-2000 and 2001-2005
  - H-Index (impact measure)
  - Proposal selection score
  
- Findings
  - **No correlation** between any bibliometric measure and scores
  - **Higher H-Index** for selected proposals vs. non-selected

# Future Research

- Perform additional research on value of H-index to determine if appropriate for reviewer use
- Develop historical quasi-experiments to test validity
- Research cross-field normalizing models to support generalizability
- Study citations to identify patterns



# Possible Management Impacts

- First Steps
- Raises questions about use of only volume measures in scientist selection
- Suggests possible value of impact measures
- Creates evidence for science managers who determine selection policies

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# Possible Applications of Theory

- Wholey
  - Provide evidence relevant to management
  - Support collection of research across organization
  
- Program theory
  - Question existing beliefs about assessing science and scientists
  - Test models and develop evidence
  
- Making spaces to support change

# What is needed?

- Develop a customary practice of science management research
- Build infrastructure to conduct science management research
- Replicate research to validate and generalize findings (as in any field of research)
- Create a central repository for results and practices
- Incorporate findings into standard practices for planning and management