Technical Communication for Computer Scientists

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Dec. 04, 2020

Review of The Big Picture (PSOC)

- Problem: (i) Input (ii) Output (iii)Significance
- State-of-the-art (SOA):
  - What are the SOA?
  - What are the limitations?
- Opportunity:
  - What is your opportunity to address the limitations?
  - New observations? New techniques?
- Challenge:
  - What is the challenges of using the Opportunity to address the limitations?

Learning Objectives for Today

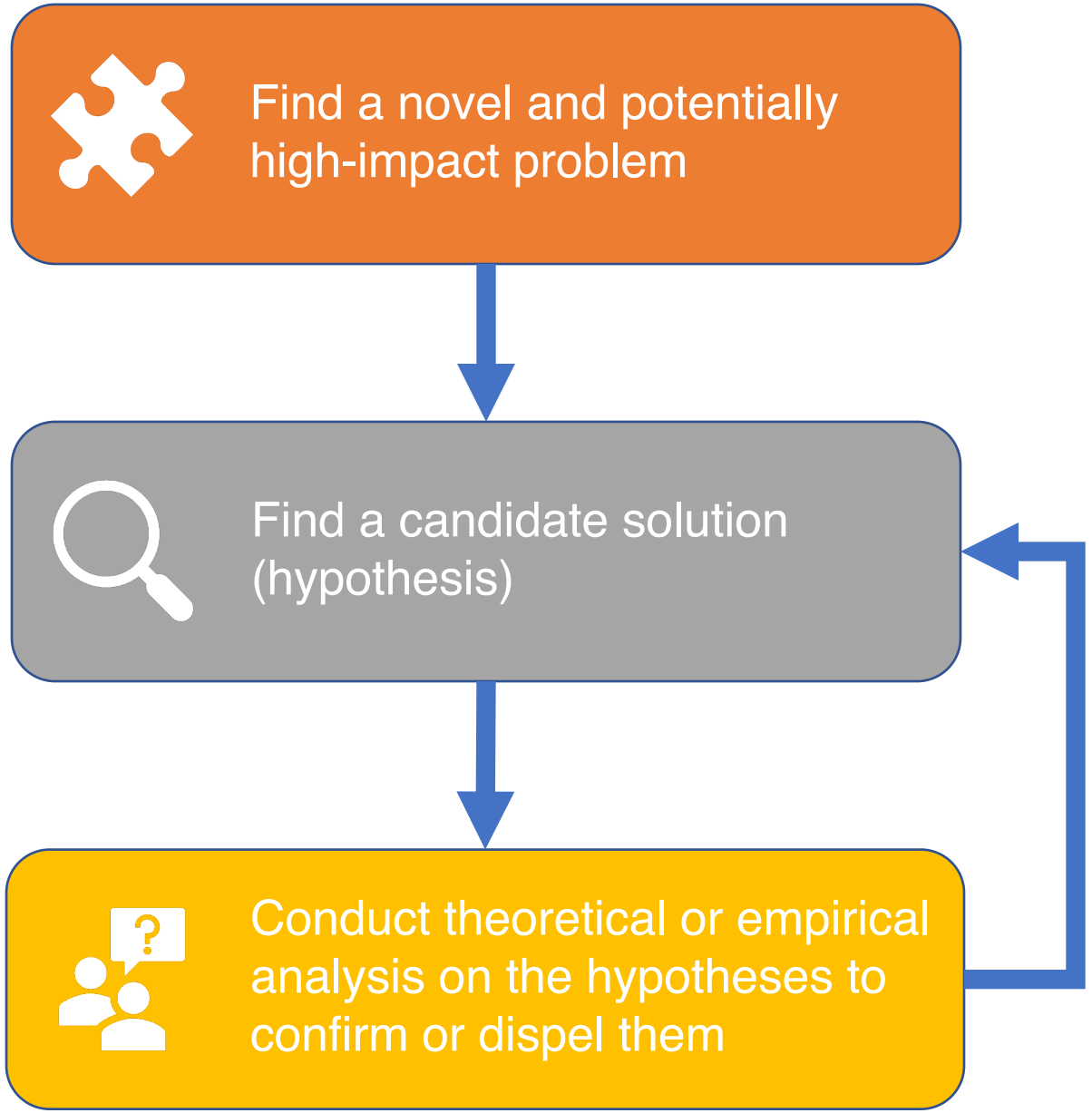
Conduct Solid Research

Outline

- Overview of Research Process
- Should I pursue this project?
- Research Hypotheses
- Confirm Hypotheses
- Brand Yourself
- Writing Papers

RESEARCH PROCESS

FOUR STEPS


Find a novel and potentially high-impact problem
Find a candidate solution (hypothesis)
Conduct theoretical or empirical analysis on the hypotheses to confirm or dispel them

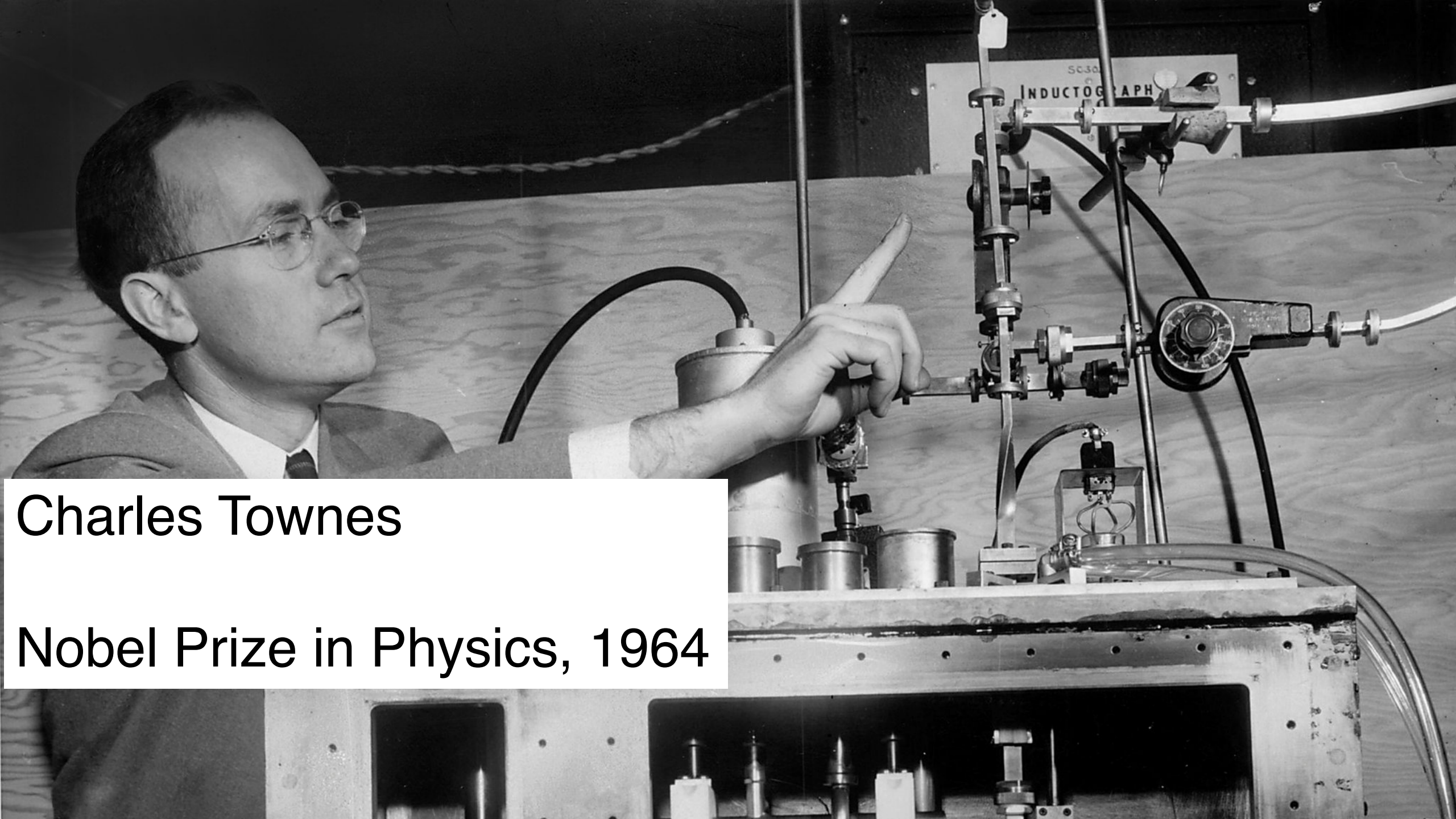
SUCCESSFUL RESEARCH

A Curious Adventure

A Serious Business to Manage

Start from

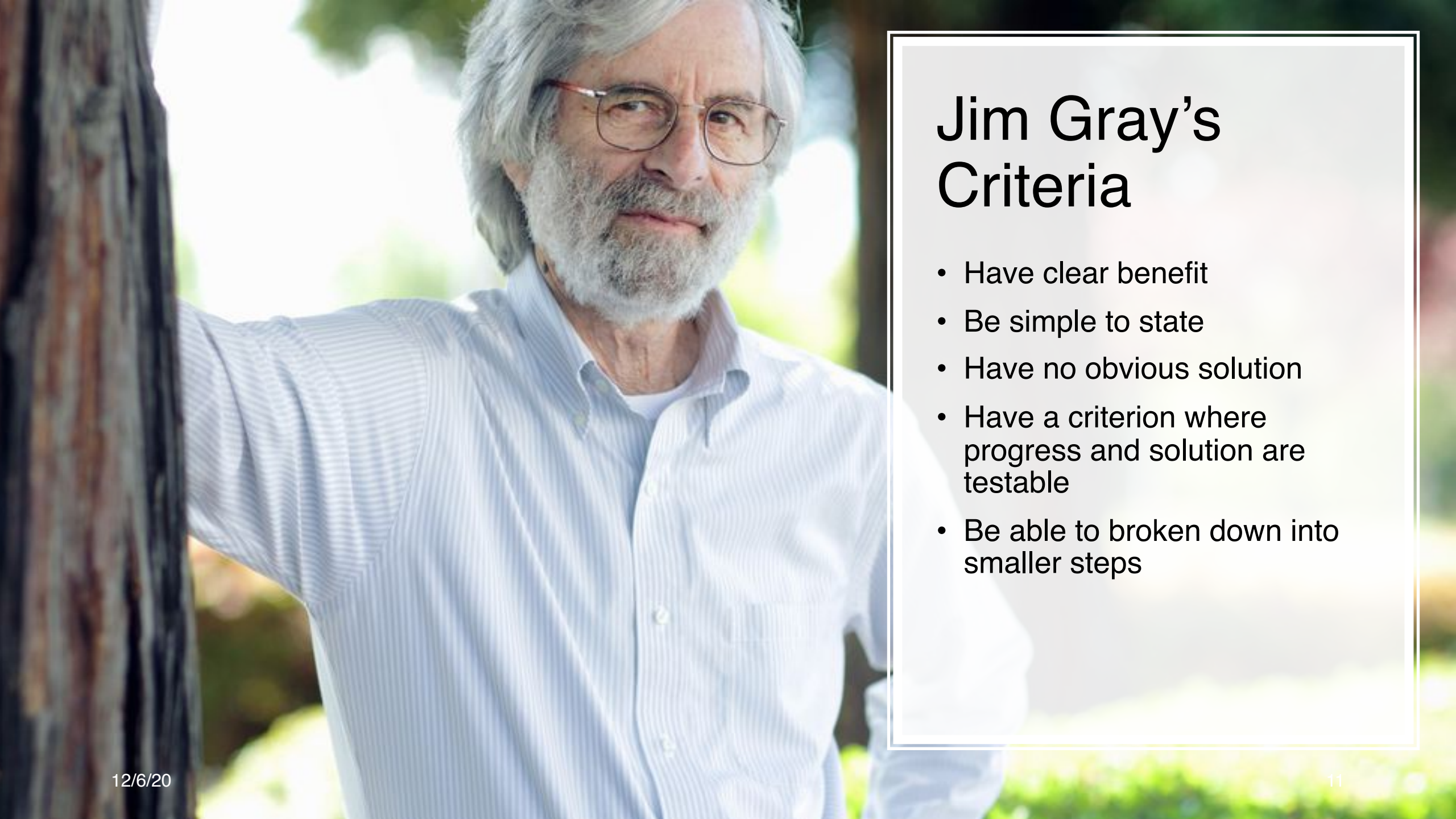
CURIOSITY



Charles Townes

Nobel Prize in Physics, 1964


Go Deeper

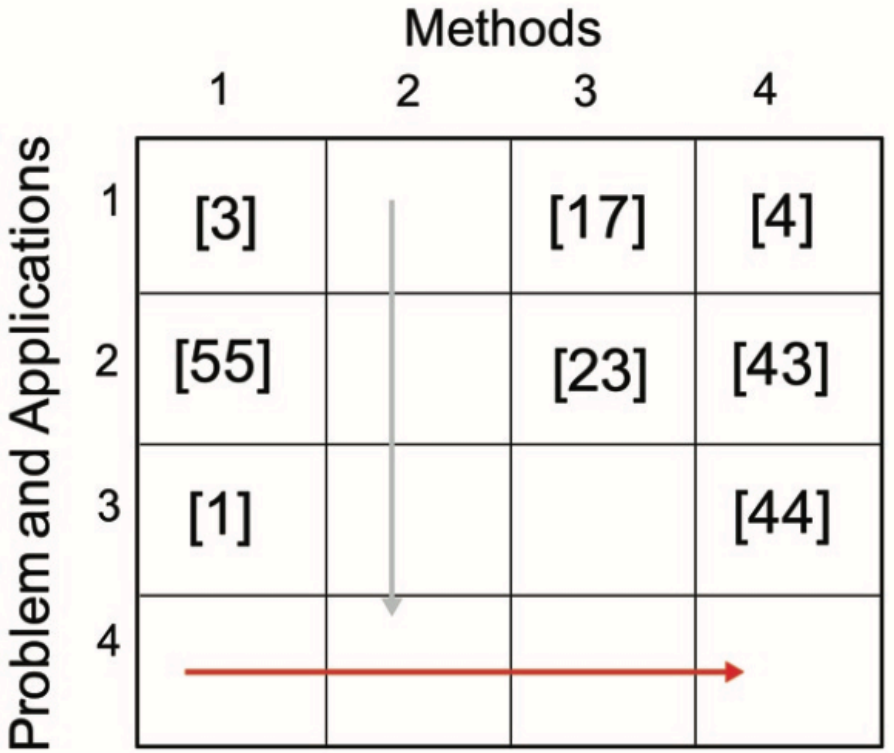


Jim Gray's Criteria

- Have clear benefit
- Be simple to state
- Have no obvious solution
- Have a criterion where progress and solution are testable
- Be able to broken down into smaller steps

THE RESEARCH MATRIX METHOD

The Matrix Method



HYPOTHESIS

1

State your research objective in one understandable sentence

Design better search engine than google

Use social networking information in Web search results toward more accurate ranking results compared to not using such information

My algorithm ABC uses social networking information of masses of users as well as hyperlink information. We expect that ABC gives better Webpage ranking results than Google's PageRank algorithm when the former uses additional social networking knowledge.

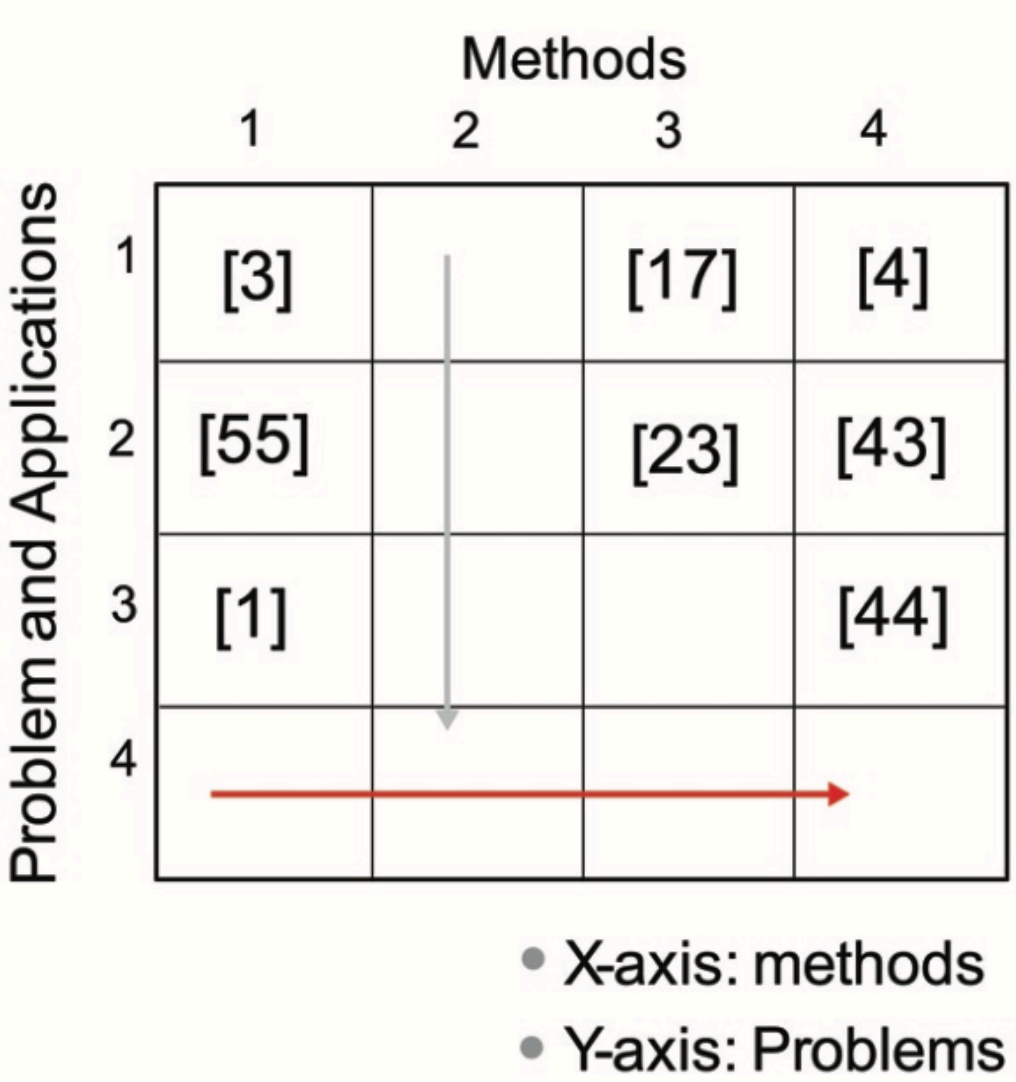
VARIFY HYPOTHESIS

2

Empirical Experiments

- Data
- Scenarios
- Training / Testing
- Interpretation
- Significance tests

BRAND YOURSELF



TEAMWORK AND MULTI-DISCIPLINARY RESEARCH

Writing and Publishing Papers

High-Impact

- Citation
- H-index
  - a scholar with an index of *h* has published *h* papers each of which has been cited in other papers at least *h* times

http://www.guide2research.com/scientists/

	**Anil K. Jain** Michigan State University United States	740	215,953	191
	**Herbert Simon** Carnegie Mellon University United States	80	378,408	182
	**Jiawei Han** University of Illinois at Urbana-Champaign United States	982	197,438	178
	**Yoshua Bengio** University of Montreal Canada	726	346,110	174
	**Michael I. Jordan** University of California, Berkeley United States	554	195,967	174
	**David Haussler** University of California, Santa Cruz United States	169	231,182	169
	**Philip S. Yu** University of Illinois at Chicago United States	1,427	130,916	167
	**Terrence Sejnowski** Salk Institute for Biological Studies United States	199	155,223	165
	**Andrew Zisserman** University of Oxford United Kingdom	568	228,606	164
	**Takeo Kanade** Carnegie Mellon University United States	474	165,039	164

Review Process

Conference & Journal

What Makes A Great Paper

Rating 1-5

Novelty of the paper?

Results significant?

Technically sound?

Clearly written and well presented?

Practice

- Summary the hypothesis of the paper you read

> My algorithm ABC uses social networking information of masses of users as well as hyperlink information. We expect that ABC gives better Webpage ranking results than Google's PageRank algorithm when the former uses additional social networking knowledge.