Re-envisioning Evaluation of Investments in Basic Research

Tools to Create an Evidence Framework that Catalyzes Funding Decisions

Cynthia C. Phillips, PhD

Chief Evaluation Officer

Evaluation and Assessment Capability Section
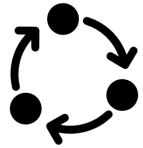
National Science Foundation

What is your role?

Evidence Consumer
I use evidence to make decisions

Evidence Producer
I build evidence for decision makers

Evidence Broker
I facilitate the flow of evidence between consumers and producers

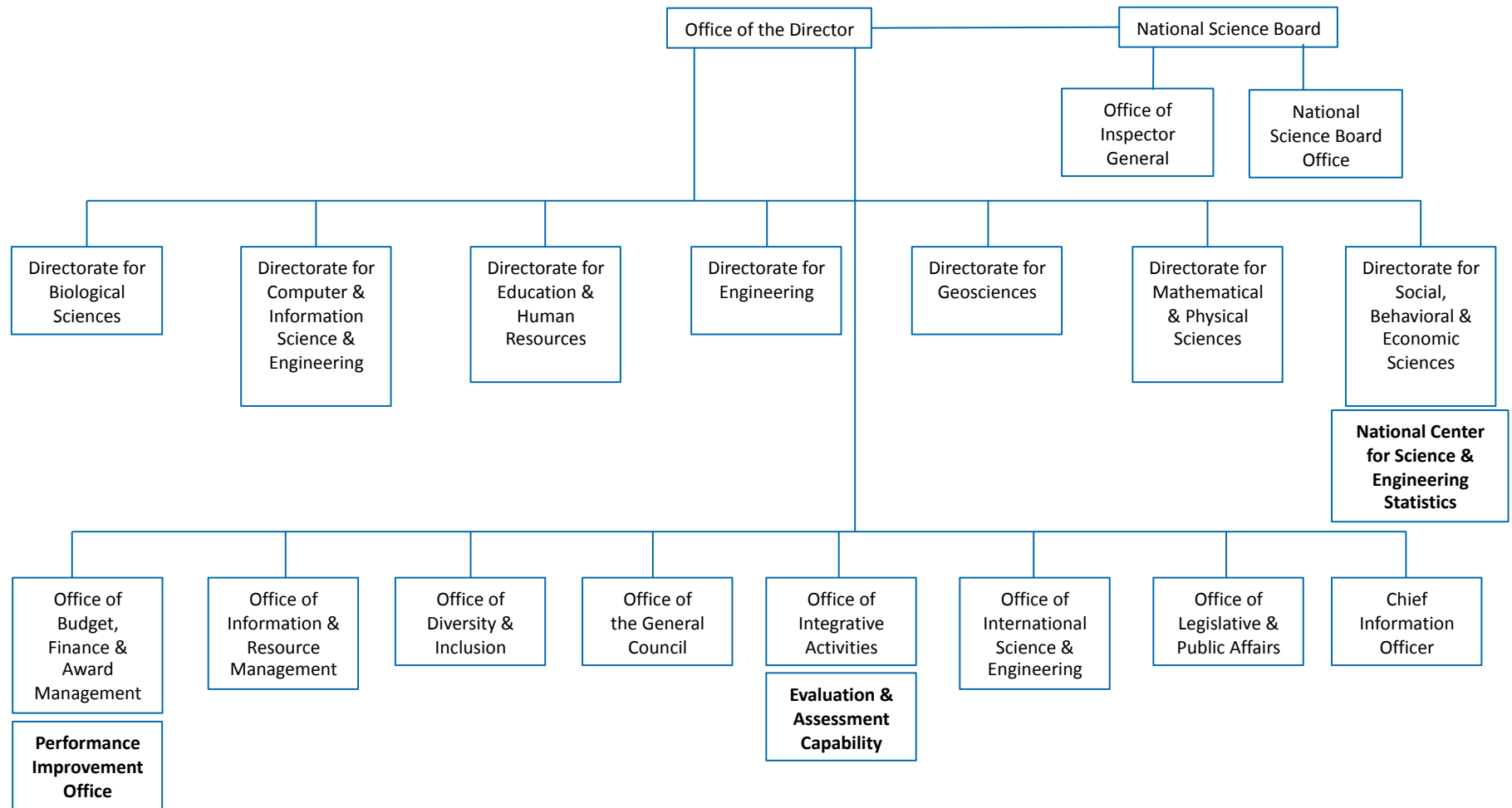**Something Else**
Another stakeholder or unsure of role.

National Science Foundation

Image Credit: *Nicolle Rager Fuller, National Science Foundation*

NSF Mission

"To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..."

NSF Agency Profile

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                    ┌─────────────────────┐          ┌──────────────────────┐
                    │ Office of the Director│          │ National Science Board│
                    └─────────────────────┘          └──────────────────────┘
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Office of the Director		National Science Board

	Office of Inspector General	National Science Board Office

Directorate for Biological Sciences	Directorate for Computer & Information Science & Engineering	Directorate for Education & Human Resources	Directorate for Engineering	Directorate for Geosciences	Directorate for Mathematical & Physical Sciences	Directorate for Social, Behavioral & Economic Sciences
						National Center for Science & Engineering Statistics

Office of Budget, Finance & Award Management	Office of Information & Resource Management	Office of Diversity & Inclusion	Office of the General Council	Office of Integrative Activities	Office of International Science & Engineering	Office of Legislative & Public Affairs	Chief Information Officer
Performance Improvement Office				**Evaluation & Assessment Capability**			

PRINCIPLES

Consider More Than Data

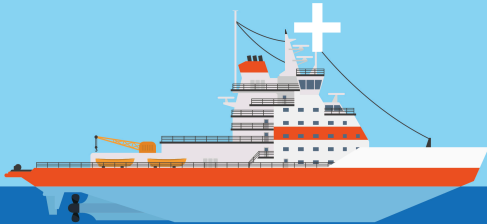Planned collection, analysis, and synthesis of data and experience

EAC → Informed decisions & actions

Focus on Building and Use

Planned collection, analysis, and synthesis of data and experience

+

Time and process devoted to development of insight

+

Willingness and ability to change

EAC → **Informed decisions & actions**

https://docs.gatesfoundation.org/Documents/guide-to-actionable-measurement.pdf

Select High Visibility, High Priority

RESEARCH IDEAS

Harnessing Data for 21st Century Science and Engineering

Work at the Human-Technology Frontier: Shaping the Future

Navigating the New Arctic

Windows on the Universe: Multi-messenger Astrophysics

Quantum Leap: Leading the Next Quantum Revolution

Understanding the Rules of Life: Predicting Phenotype

ENABLING IDEAS

Mid-scale Research Infrastructure

NSF 2026

Growing Convergence Research at NSF

NSF INCLUDES: Enhancing STEM through Diversity and Inclusion

" … bold questions that will drive NSF's long-term research agenda -- questions that will ensure future generations continue to reap the benefits of fundamental S&E research. "

Start Where You Are
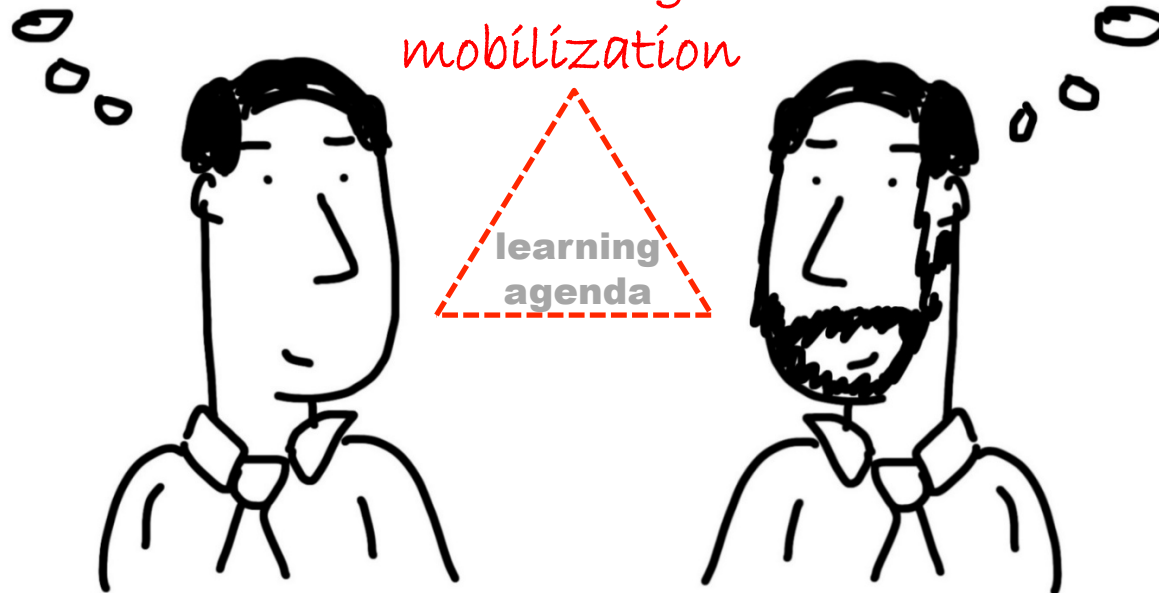
Put People at the Center
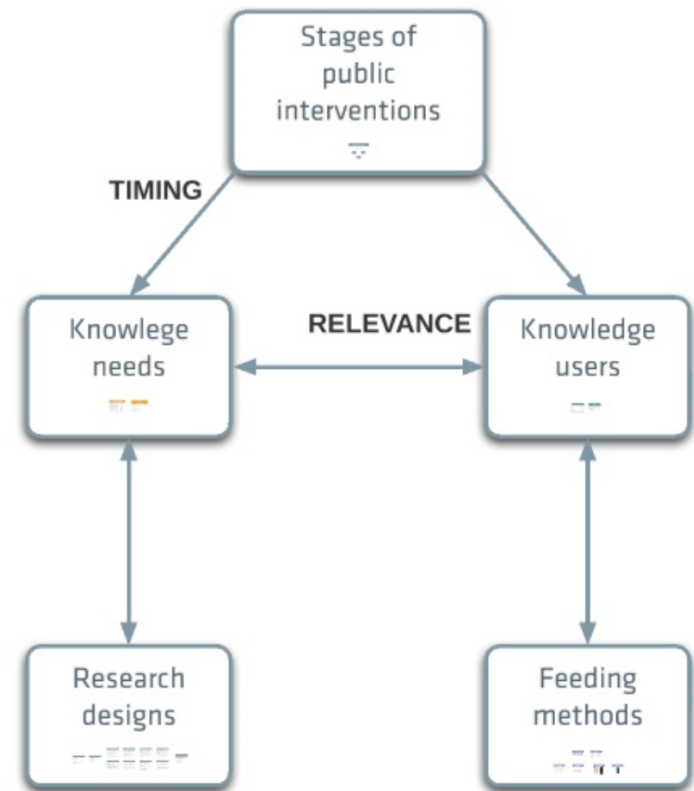
IMPLEMENTATION
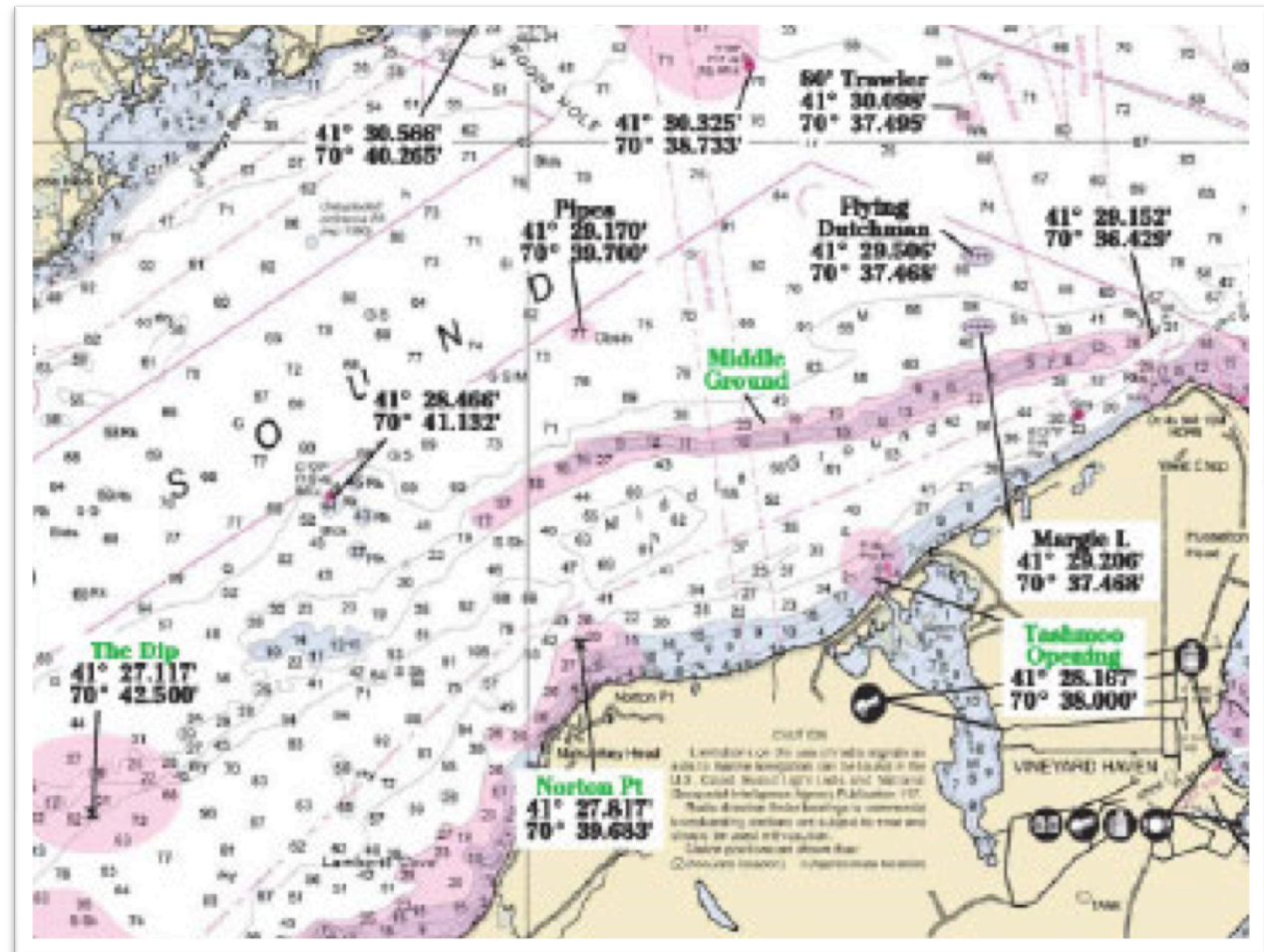
Stage of Implementation

Planning   In process   **Fully implemented**   Fully implemented and operational

NSF Big Ideas
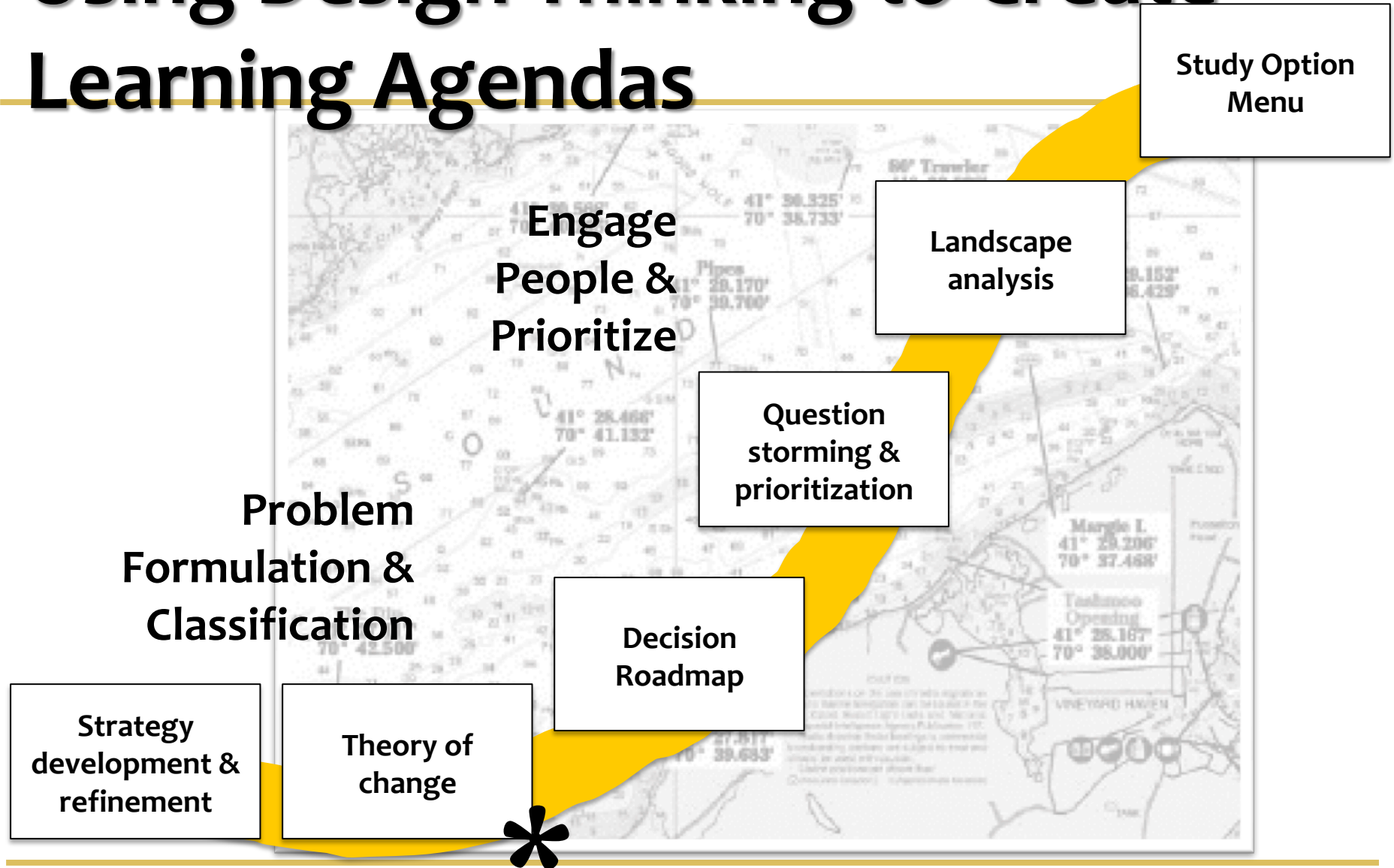
Agency-wide
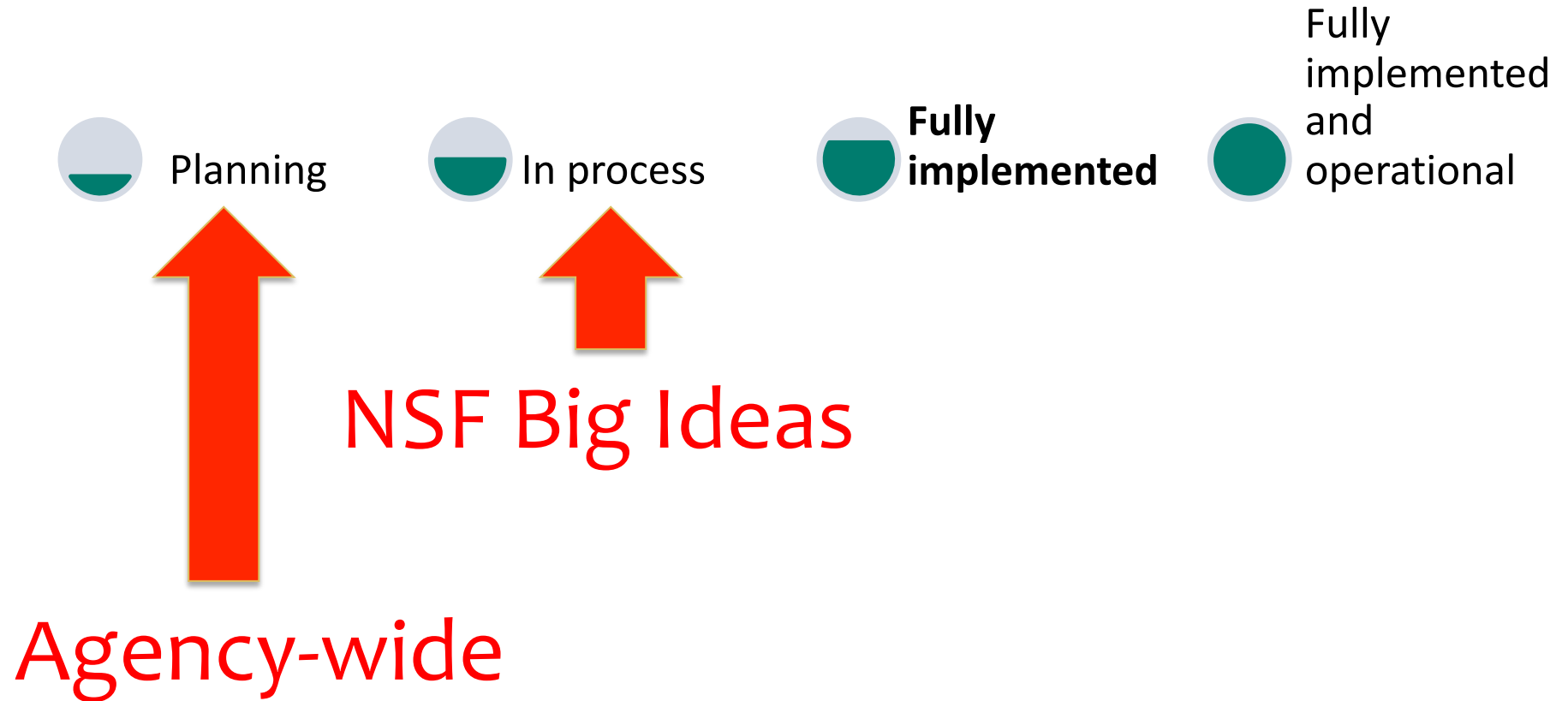
Socializing Learning Agendas

- Learning agenda self-study groups
- Workshop with other federal agency champions
- Strategic Review
- Present to Senior Management
- Present to National Science Board
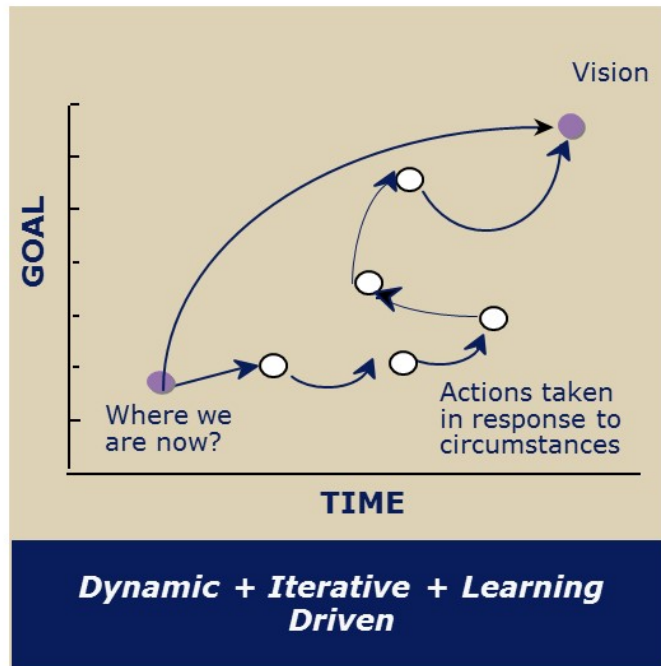- Workshop with scientific R&D agencies
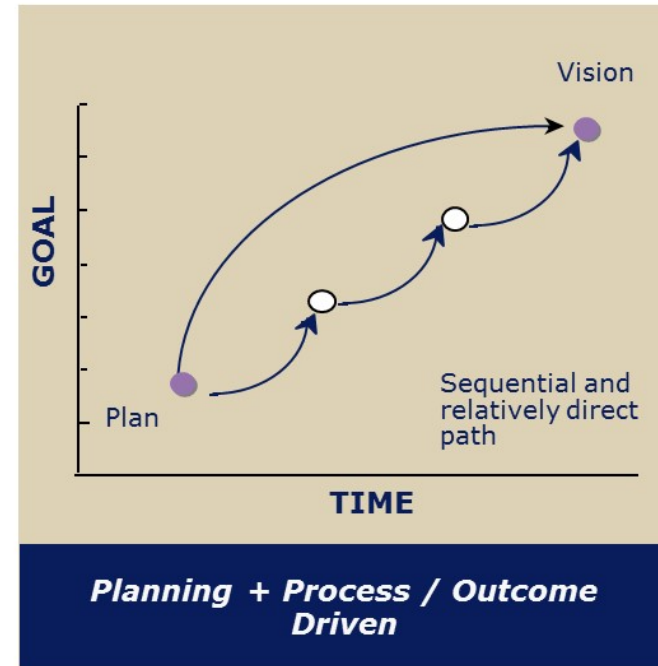
Using Design Thinking to Create Learning Agendas

Study Option Menu

Engage People & Prioritize

Landscape analysis

Question storming & prioritization

Problem Formulation & Classification

Decision Roadmap

Strategy development & refinement

Theory of change

*

15

RDI is Rarely Linear

Developmental Evaluation

GOAL / TIME

Vision

Where we are now?

Actions taken in response to circumstances

Dynamic + Iterative + Learning Driven

Versus

Traditional Evaluations

GOAL / TIME
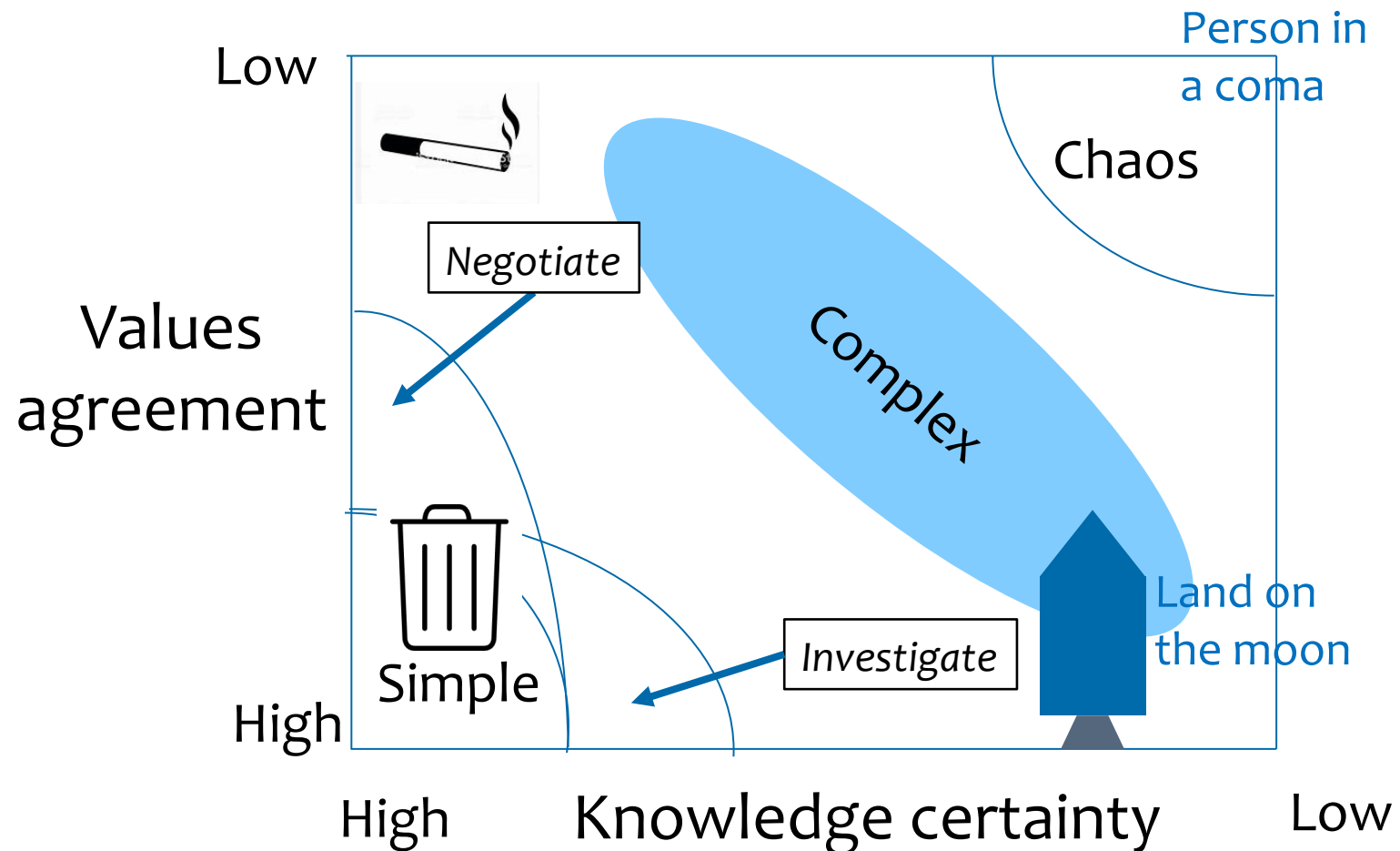
Vision

Plan

Sequential and relatively direct path

Planning + Process / Outcome Driven

Developmental evaluation supports real-time learning in complex and emergent situations. Traditional forms of evaluation work in situations where the progression from problem to solution can be laid out in a relatively clear sequence of steps (Gamble, 2008).
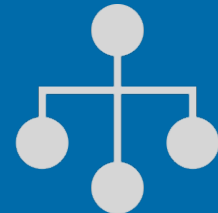
RDI is Complex

Barriers and Strategies

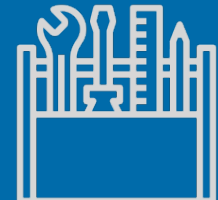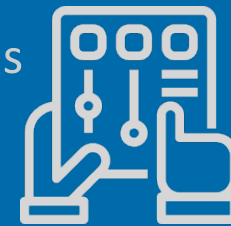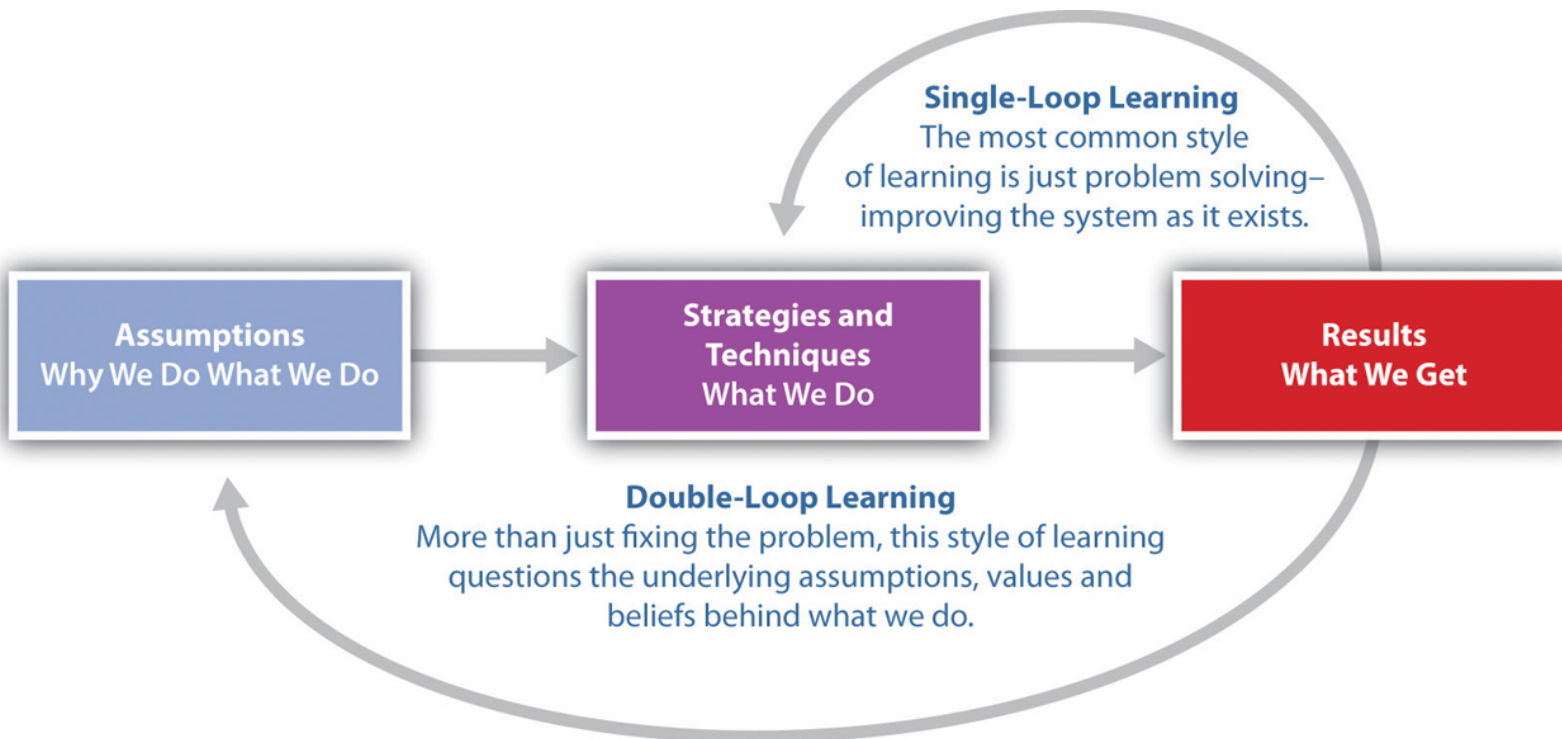|	
Barrier — Siloed agency and communities	**Strategy** — Infrastructure for collaboration
Barrier — Limited, opportunistic stakeholder engagement	**Strategy** — Stakeholder engagement strategy & toolkit
Barrier — Learning agenda forScience R&D	**Strategy** — Actionable questions about things we can control

Organizational Learning

Single-Loop Learning
The most common style of learning is just problem solving–improving the system as it exists.

Assumptions
Why We Do What We Do

Strategies and Techniques
What We Do

Results
What We Get

Double-Loop Learning
More than just fixing the problem, this style of learning questions the underlying assumptions, values and beliefs behind what we do.

"…it is not the data, per se, that add value, but their ability to tighten the feedback loop… that allows problem solvers to broadcast, receive, refine, and adapt solutions on an ongoing basis." McGuiness & Slaughter, 2019
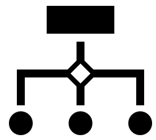
Lessons Learned

- Actionable questions yield action only if will and capacity exist for change

- Create toolkit for stakeholder engagement across the learning agenda

- Demonstrate the value of learning to support improvement early on

- Learning agendas catalyzes appetite for more intentional use of evidence

What are your pain points?

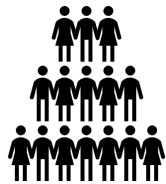**Data infrastructure**
Cost, quality, access, and/or sharing

Timing
Having evidence when decisions are made

Personnel
Dedicated units and/or personnel for evaluation or analytics

Culture
Evidence for accountability vs. evidence for learning and improvement