

Integrating genetic identifications into adaptive plant management programs for Eurasian and hybrid watermilfoil

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Eurasian and Hybrid water hyacinth

- ▶ Millions of dollars to manage
- ▶ One complication: response can differ between populations
- ▶ High cost of management makes understanding variation a necessity



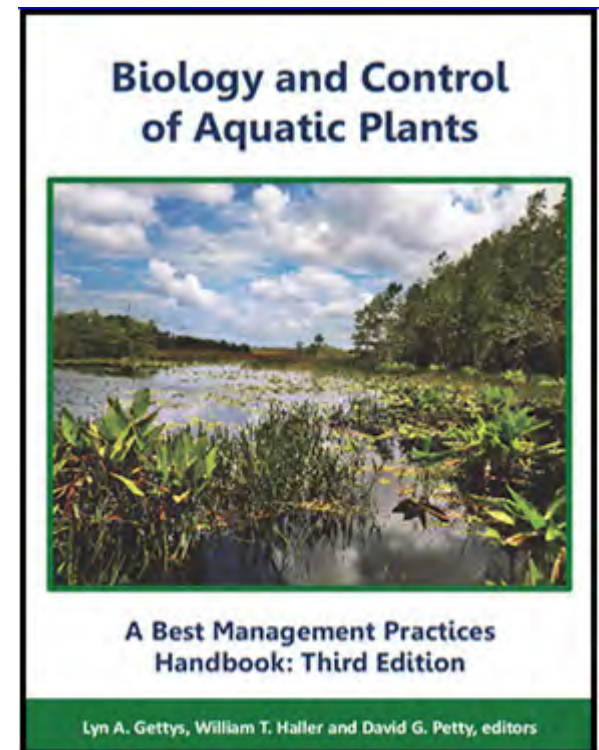
Cryptic Taxa

- ▶ Little is known about the influence of cryptic taxa
- ▶ Differences in response could lead to:
 - ▶ Reduced predictability and efficacy
 - ▶ Wasted resources
 - ▶ Continued spread
- ▶ Understanding the impact requires:
 - ▶ Detection
 - ▶ Adaptive management



Management of Invasiv

- ▶ Quantitative (measurable) data:
 - ▶ "...is objective and provides hard evidence regarding distribution and abundance.."
 - ▶ "...allows for rigorous statistical evaluation..."
 - ▶ "...allows individuals other than the observer to evaluate the data..."



Management of Invasives

- ▶ Often less rigorous methods are used
 - ▶ Can vary by state, experience level, facility, and lake
- ▶ May be ok for simple cases
- ▶ Recent plant populations are more complicated
 - ▶ Hybrid and resistant taxa



Lake studies

- ▶ Assessed the response of hybrid and Eurasian in Gun, Long, and Houghton lakes
- ▶ Pre-Post PI survey/Line intercept survey with rake tosses
- ▶ Variation in relative proportion and reduction

Lake	Starting Proportion EWM:HWM	% Decrease in EWM	% Decrease in HWM
Houghton	10:90	100	26.2
Gun	44:56	48.7	46.3
Long	7:93	85.7	51.1



What's missing?

- ▶ Knowledge of WHAT WORKS
- ▶ Standardized methods for evaluation
- ▶ Effective communication



What do we need to do?

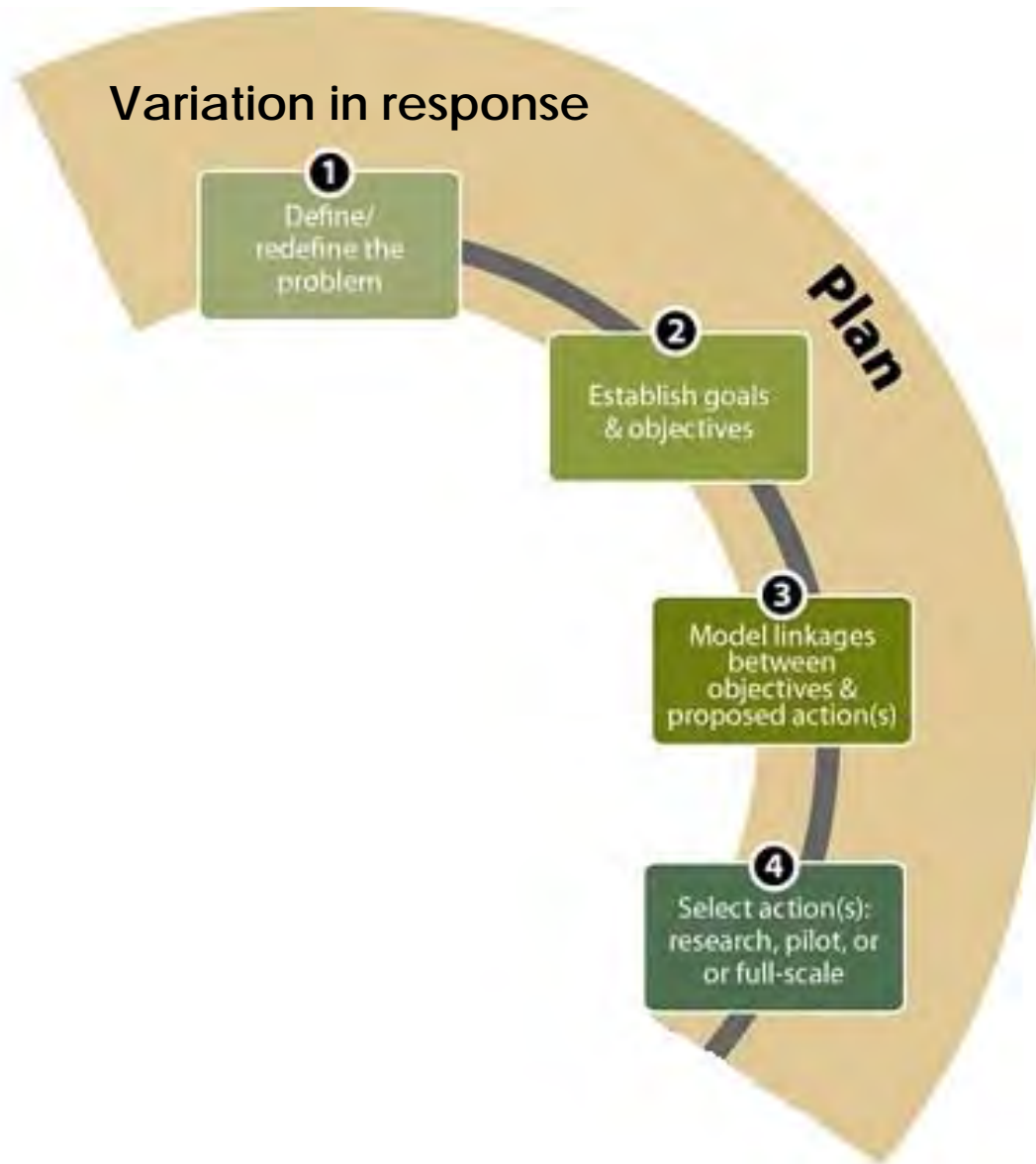
- ▶ Quantitatively compare treatments from year to year and from lake to lake
 - ▶ Define which pieces of information are necessary to collect
 - ▶ Determine best methods for collecting data
 - ▶ Develop standardized statistical evaluations
- ▶ Evaluate variation in:
 - ▶ plant composition
 - ▶ lake condition
 - ▶ Treatment efficacy



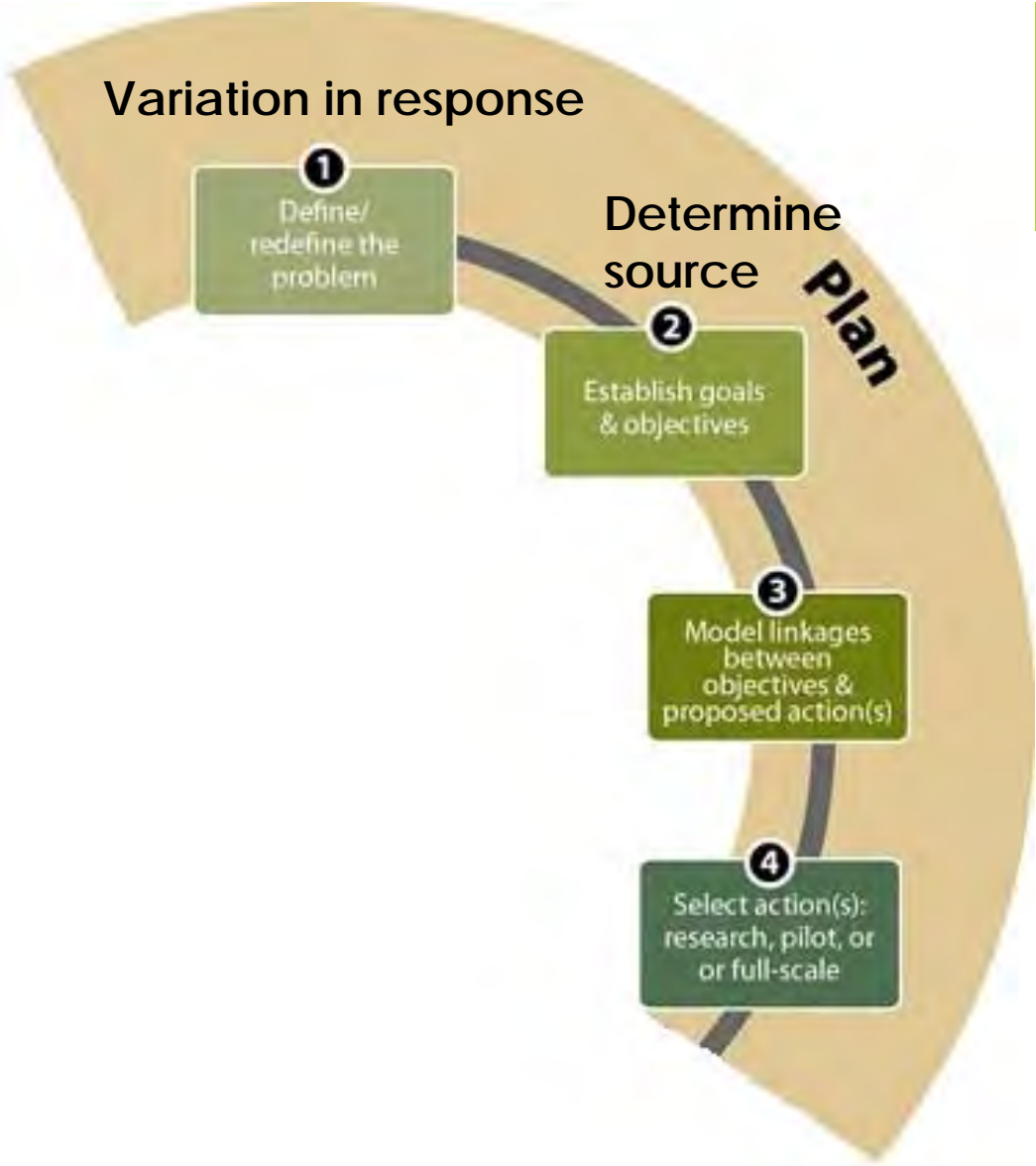
How can we do this?

- ▶ Incorporate an adaptive management framework
- ▶ Rigorously and quantitatively assess outcomes and adapt future actions
- ▶ Based on the recognition of alternative hypotheses
- ▶ Fundamental Goals:
 - ▶ Maximize efficacy of current methods using current knowledge
 - ▶ Assess efficacy of current methods to improve management down the road

Variation in response



Variation in response



Determine source

Plan

1

Define/
redefine the
problem

2

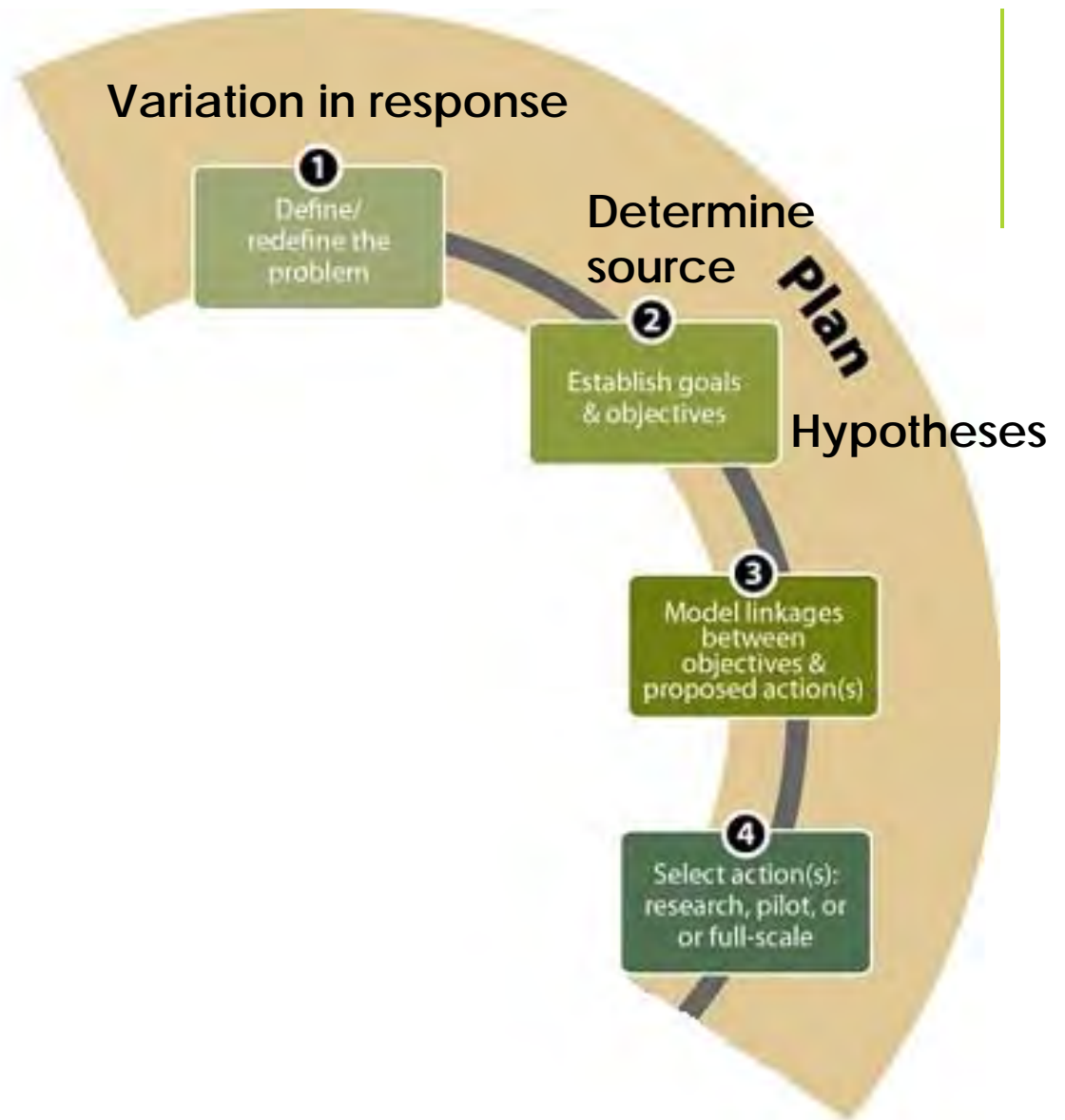
Establish goals
& objectives

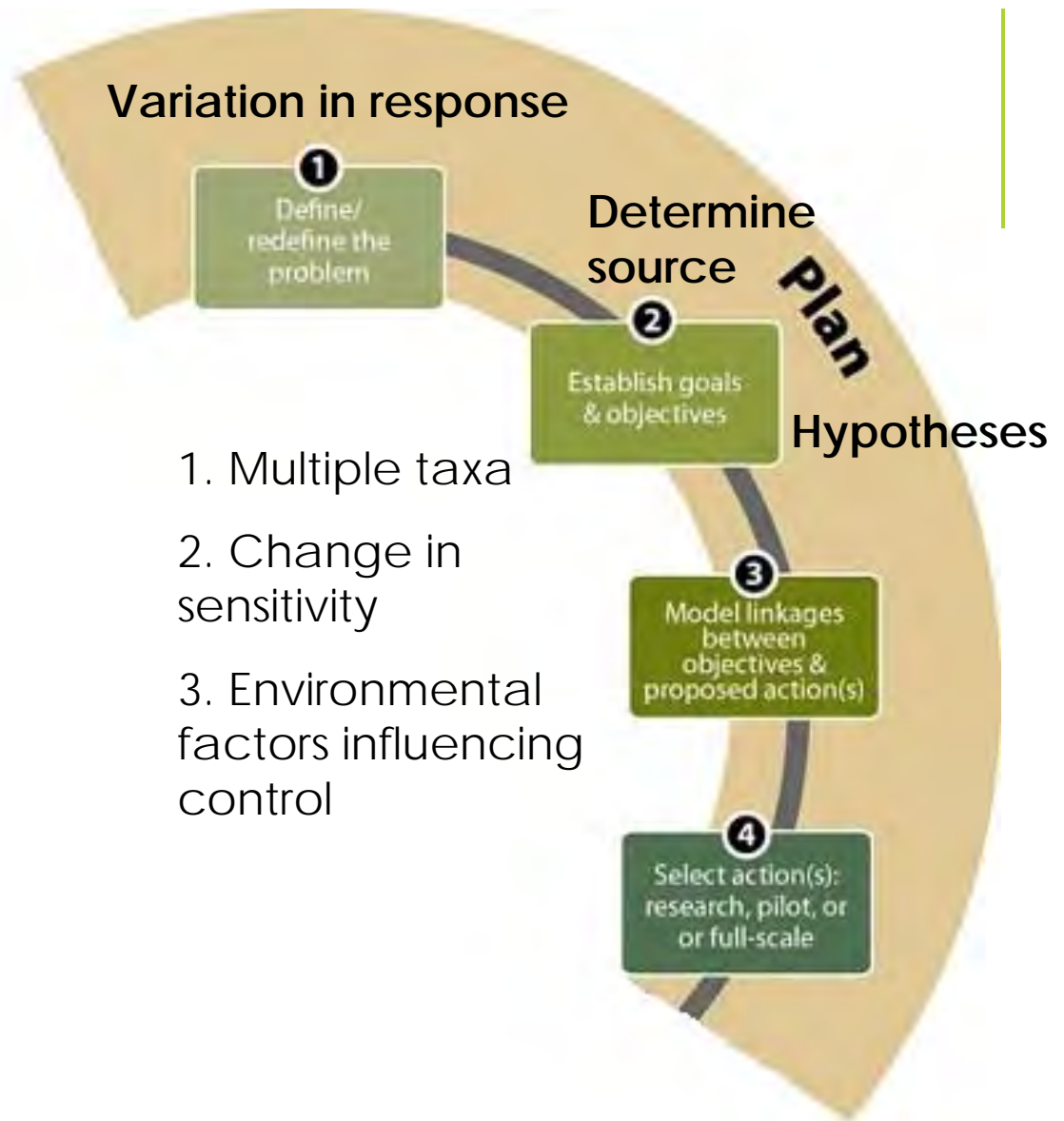
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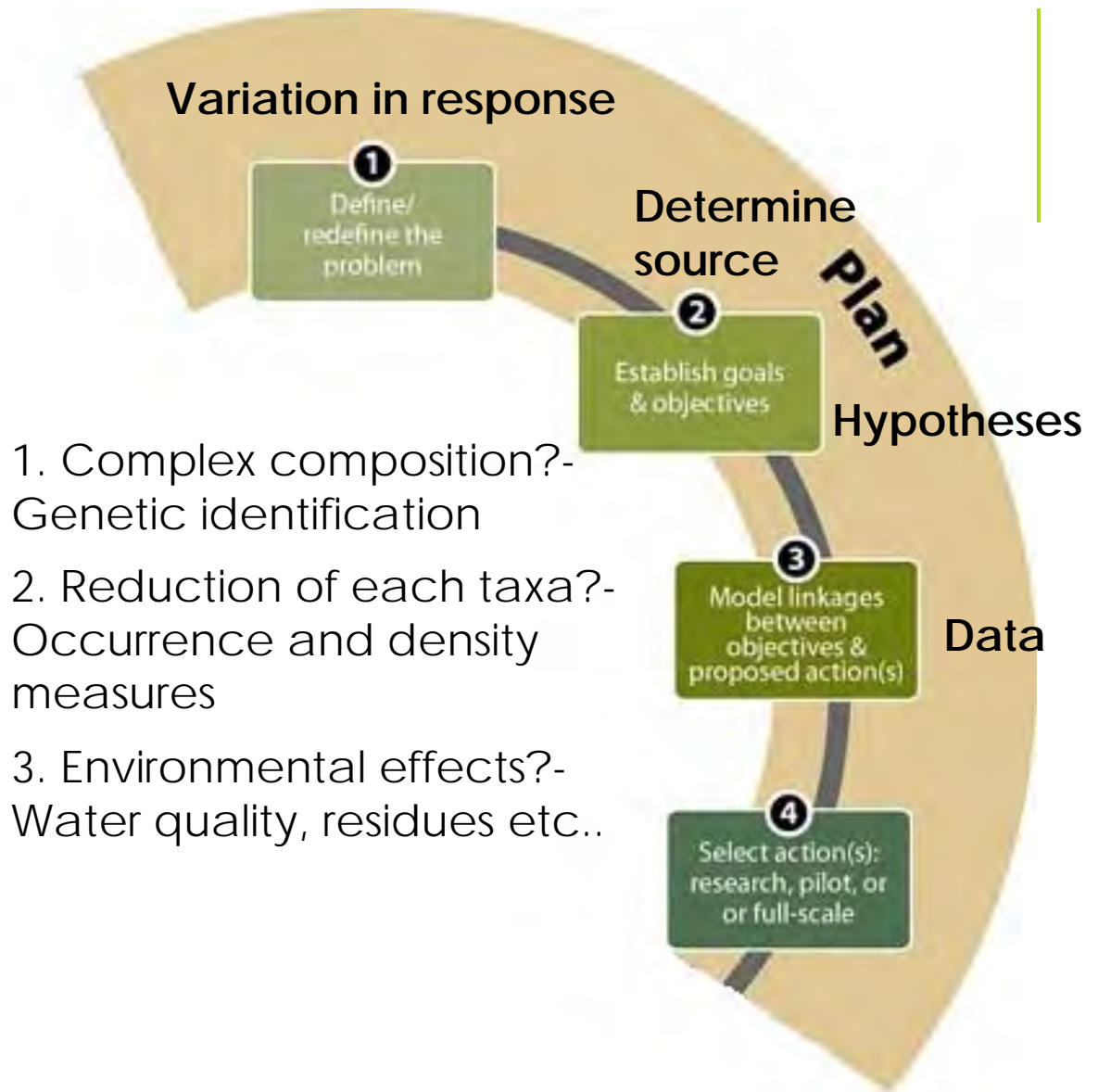
Model linkages
between
objectives &
proposed action(s)

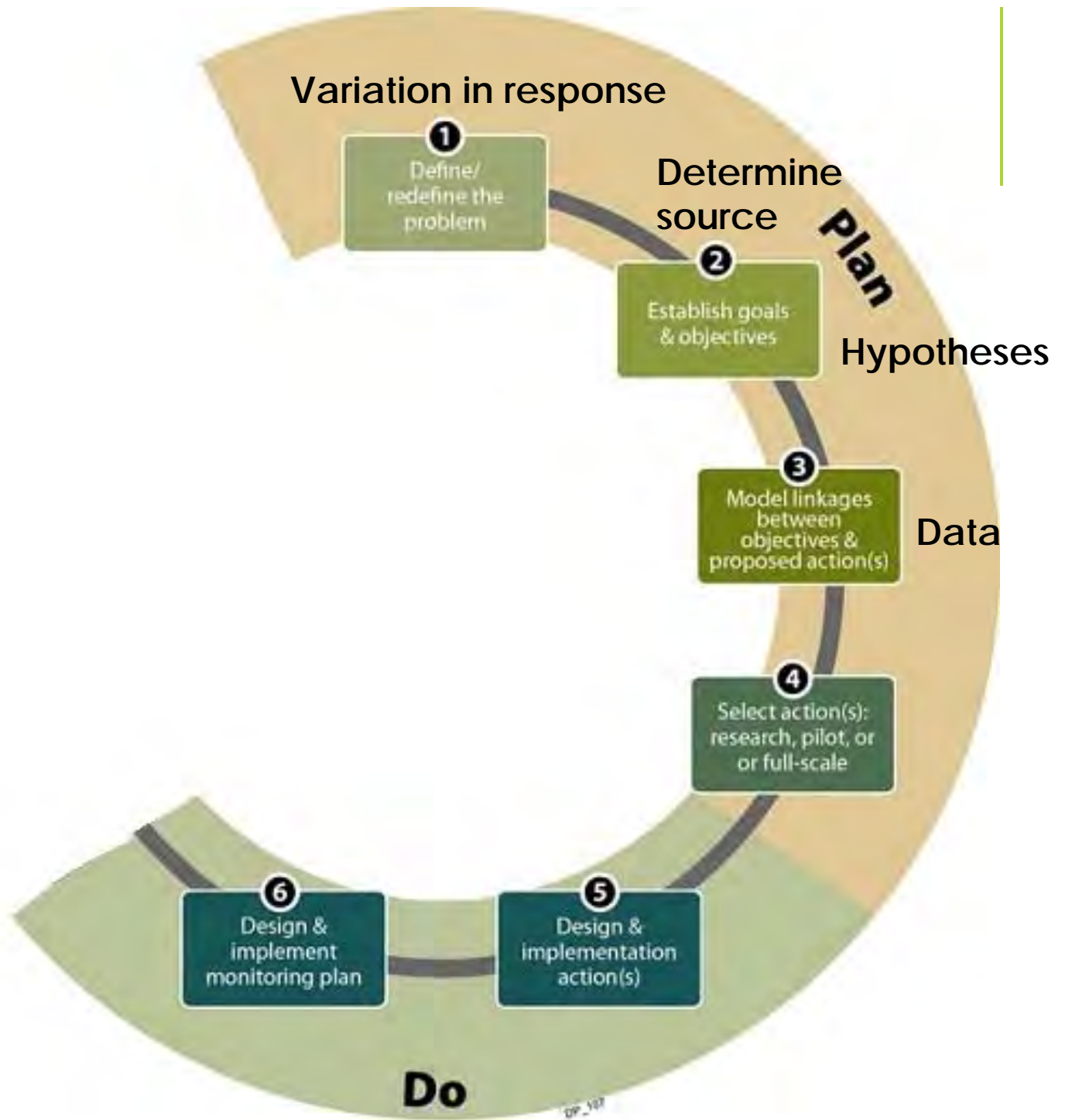
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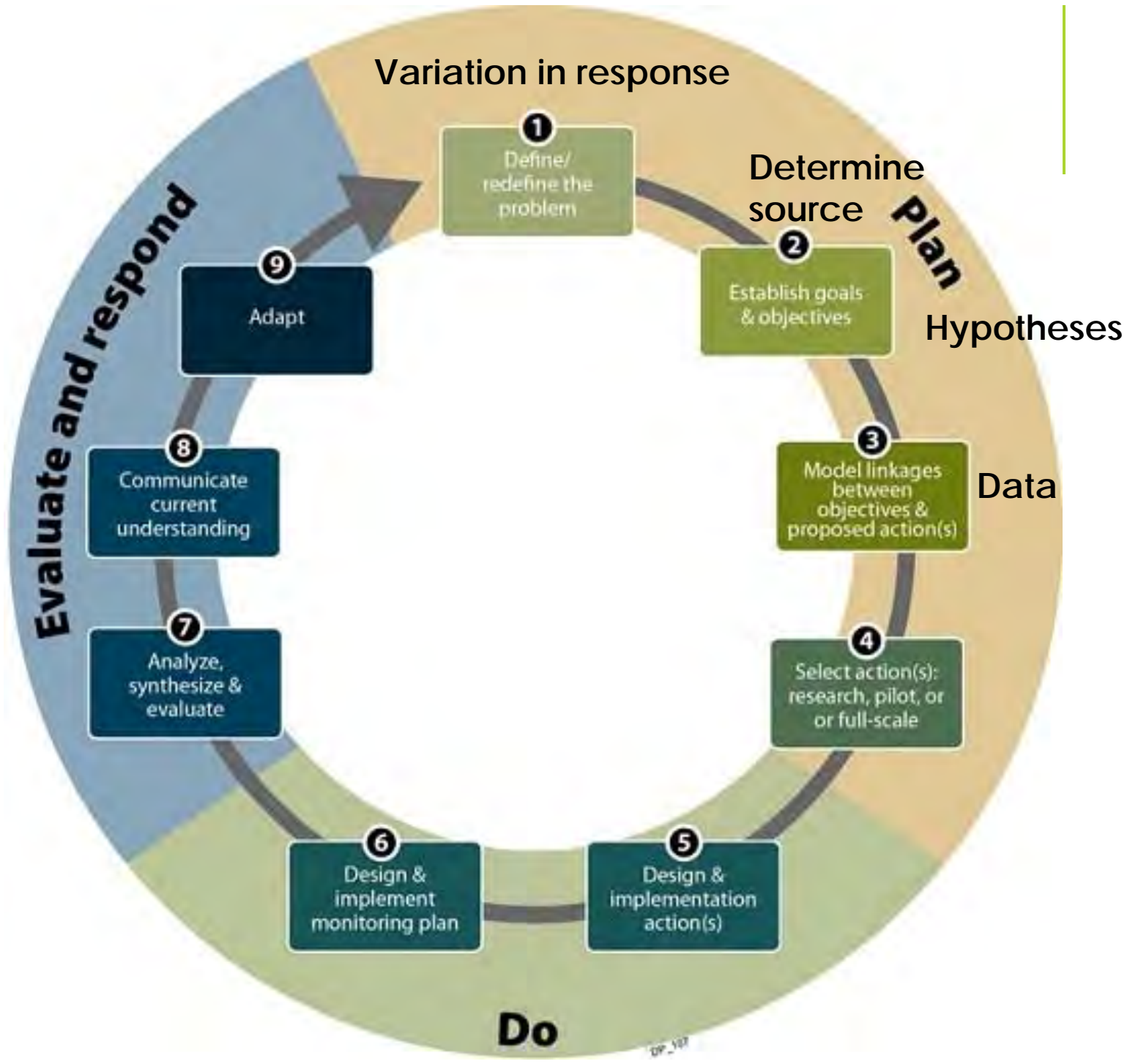
Select action(s):
research, pilot, or
or full-scale





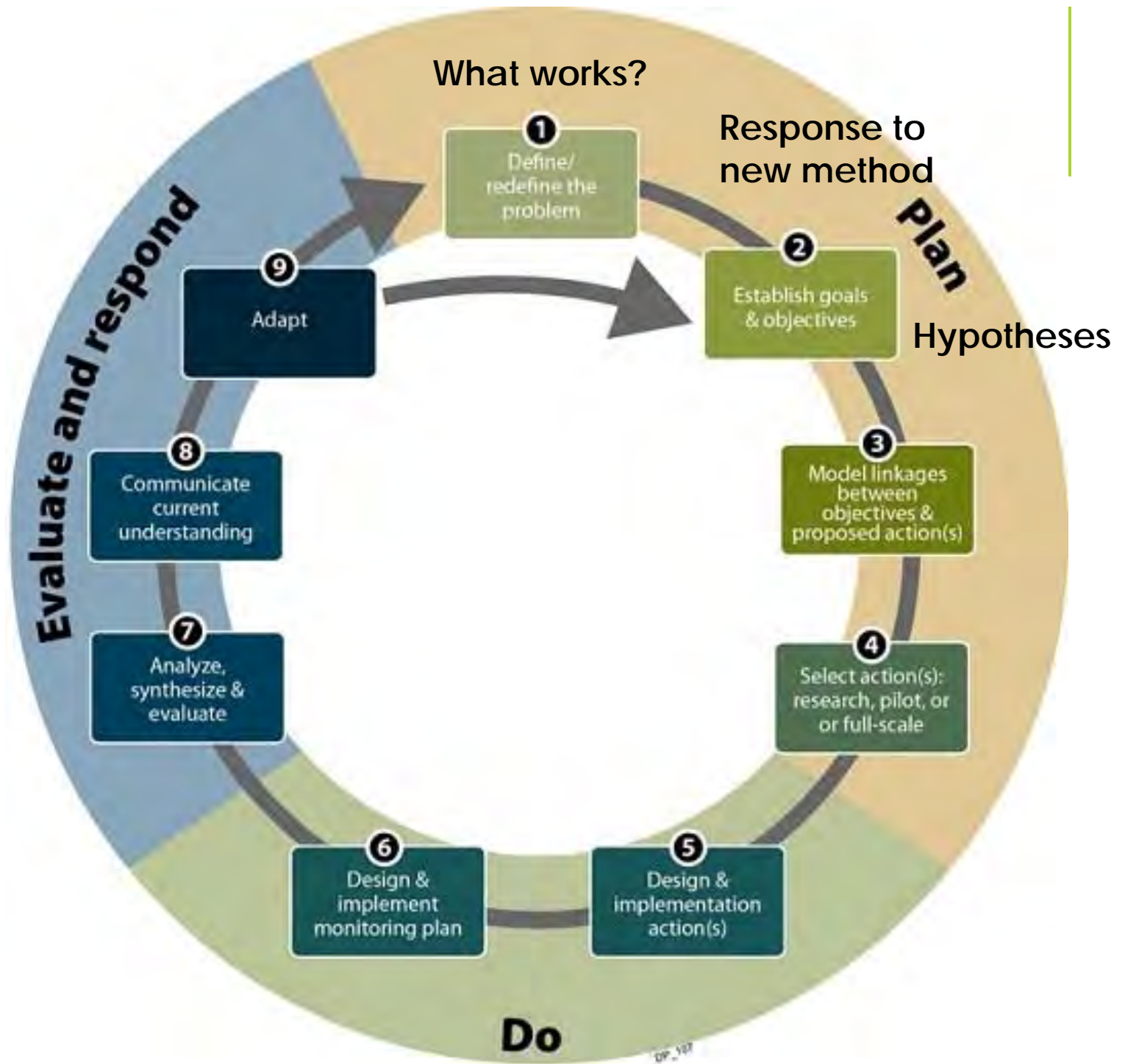


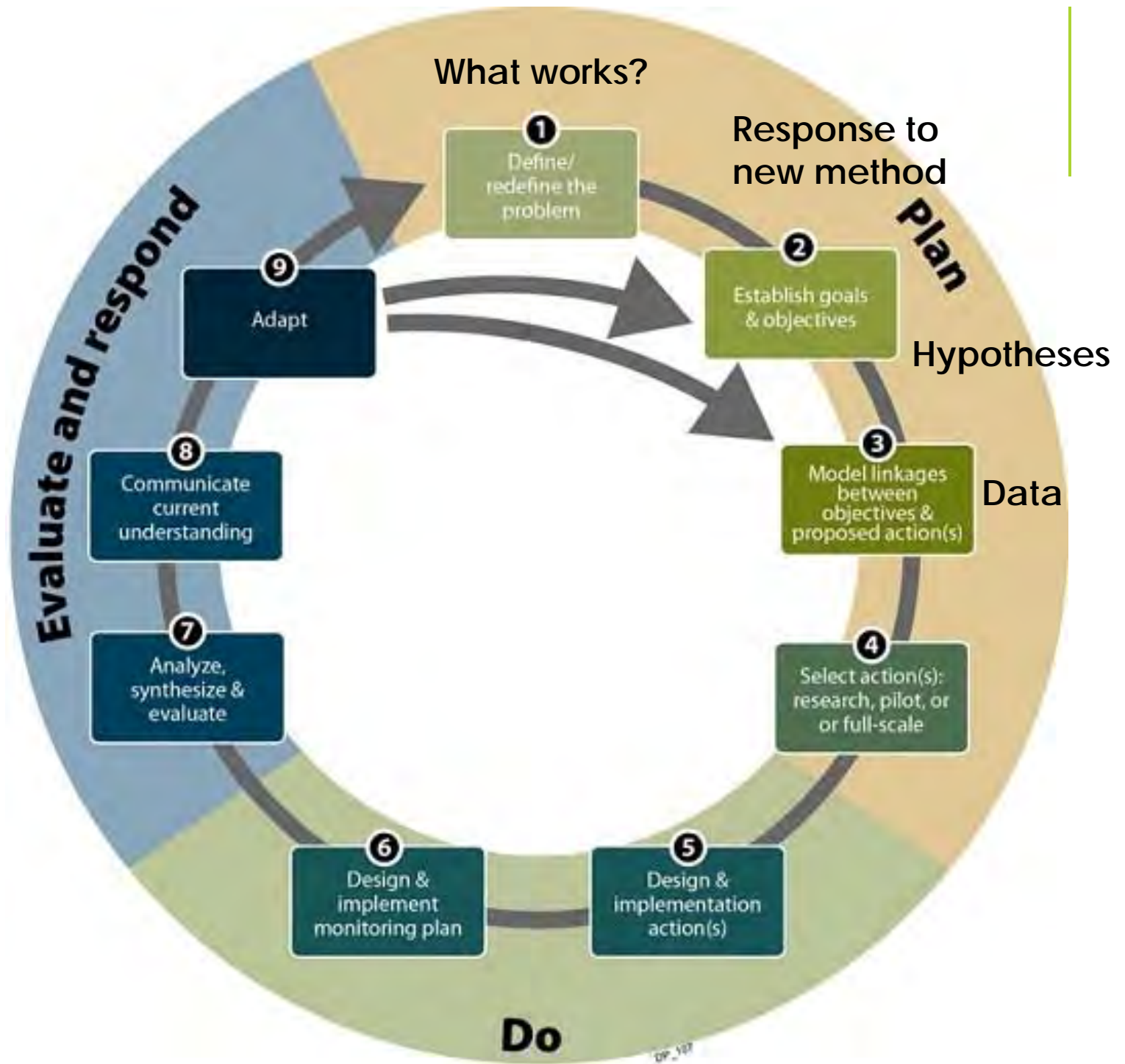


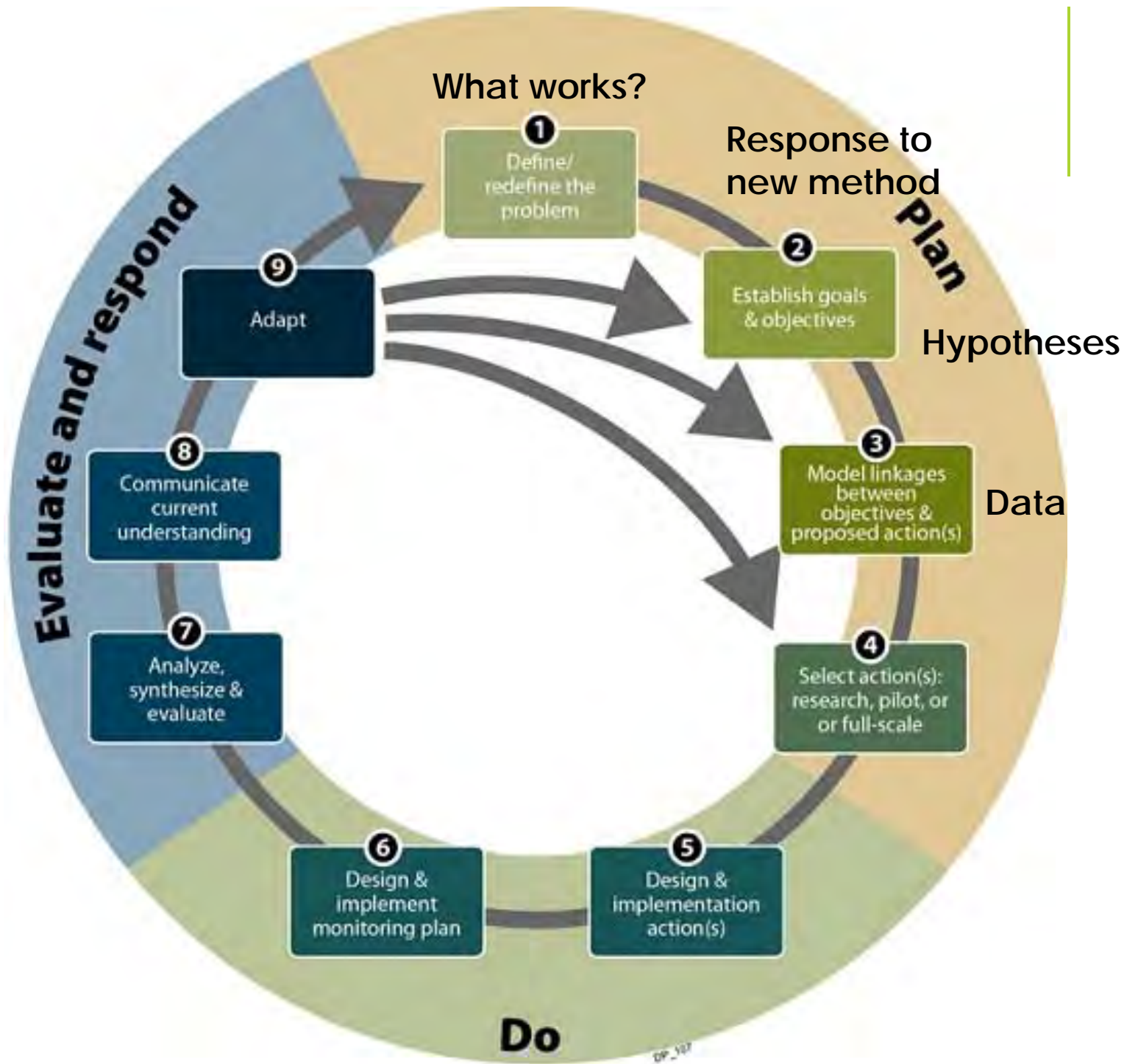


What works?











Adaptive Management Cycle

- ▶ Determine species composition
- ▶ Choose best strategy for management
- ▶ Gather data
 - ▶ Response of each taxon independently
 - ▶ Measure of environmental factors
 - ▶ Herbicide concentrations
- ▶ Assess treatment outcome and communicate
- ▶ Use those results to adjust the strategy
- ▶ REPEAT



The future

- ▶ More rigorous planning and assessment
- ▶ Plant composition monitoring will be critical
- ▶ Collaboration for development, planning, and assessment

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Questions??



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