

Improvement Science Basics

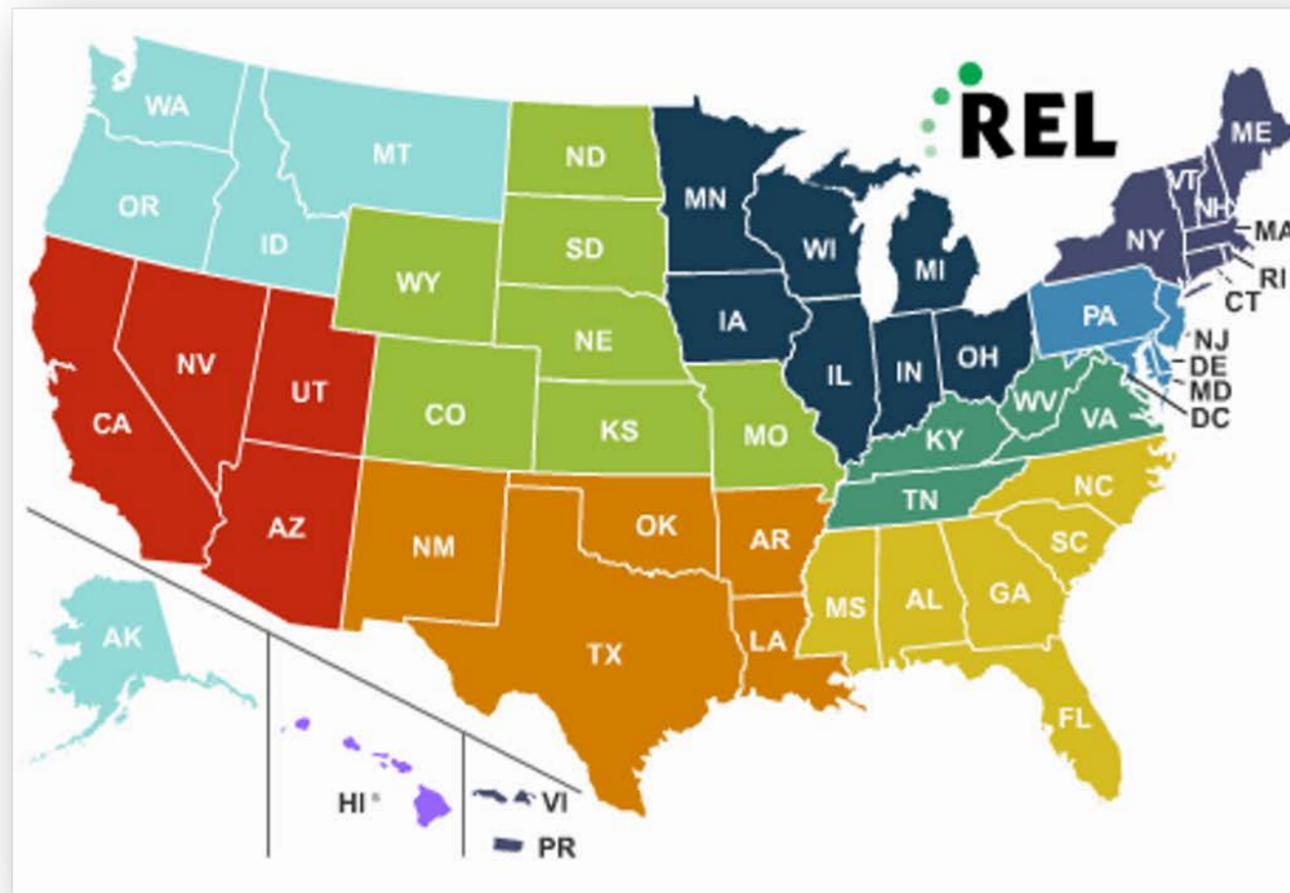
Lenay Dunn and Sola Takahashi

Arizona Leading Change Conference

June 7, 2019

About the Regional Educational Laboratory (REL) Program

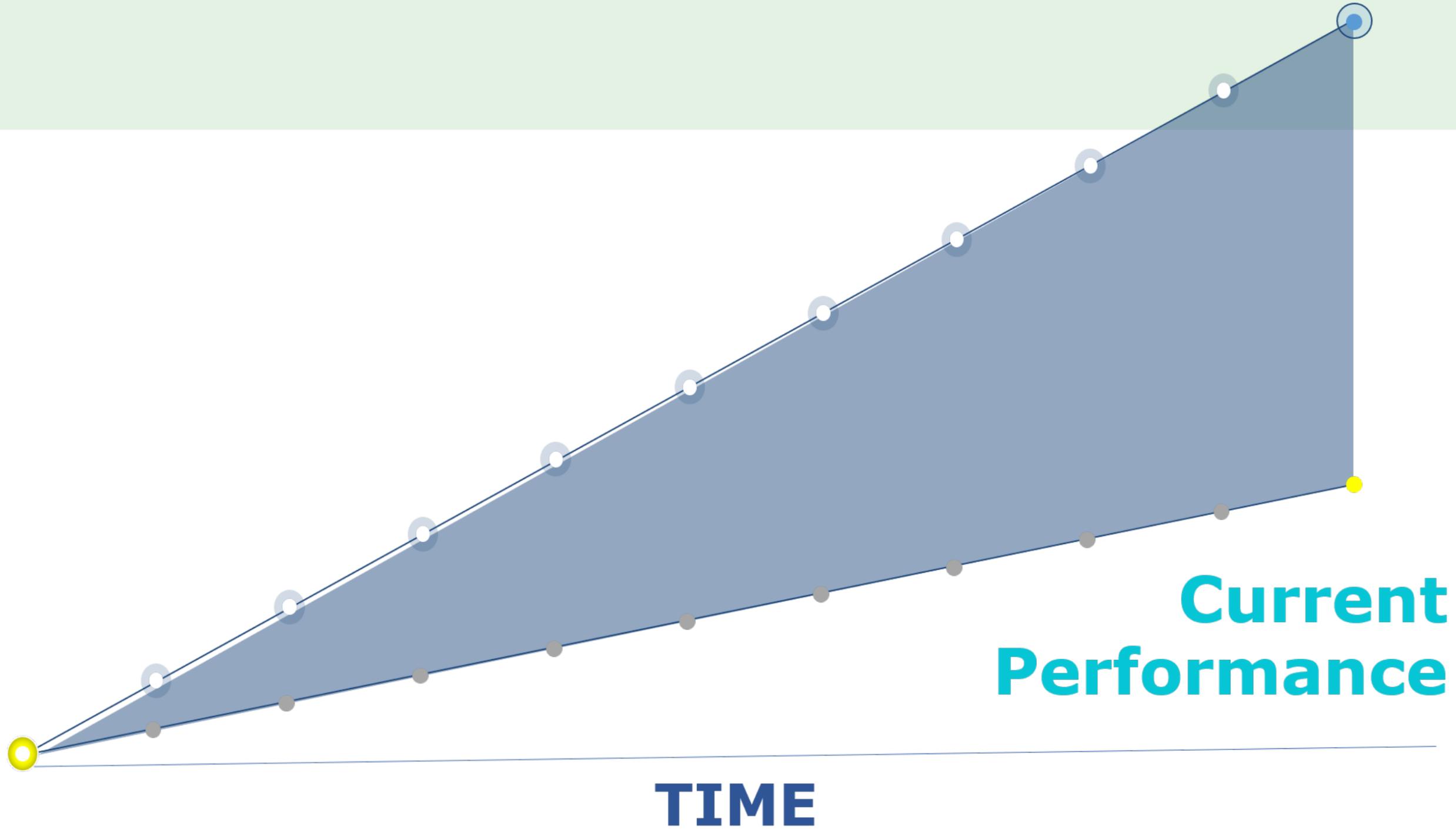
Ten RELs work in partnership with LEAs, SEAs, and others to use data and research to improve academic outcomes for students.



RELS: Three Main Activities

- Conduct applied research
- Facilitate the flow of actionable, credible, up-to-date research evidence
- Provide technical support around data collection, evidence use, and research

Our Aspiration



Current Performance

How Do We Make Change?

The Traditional Way

Failures that we
don't understand

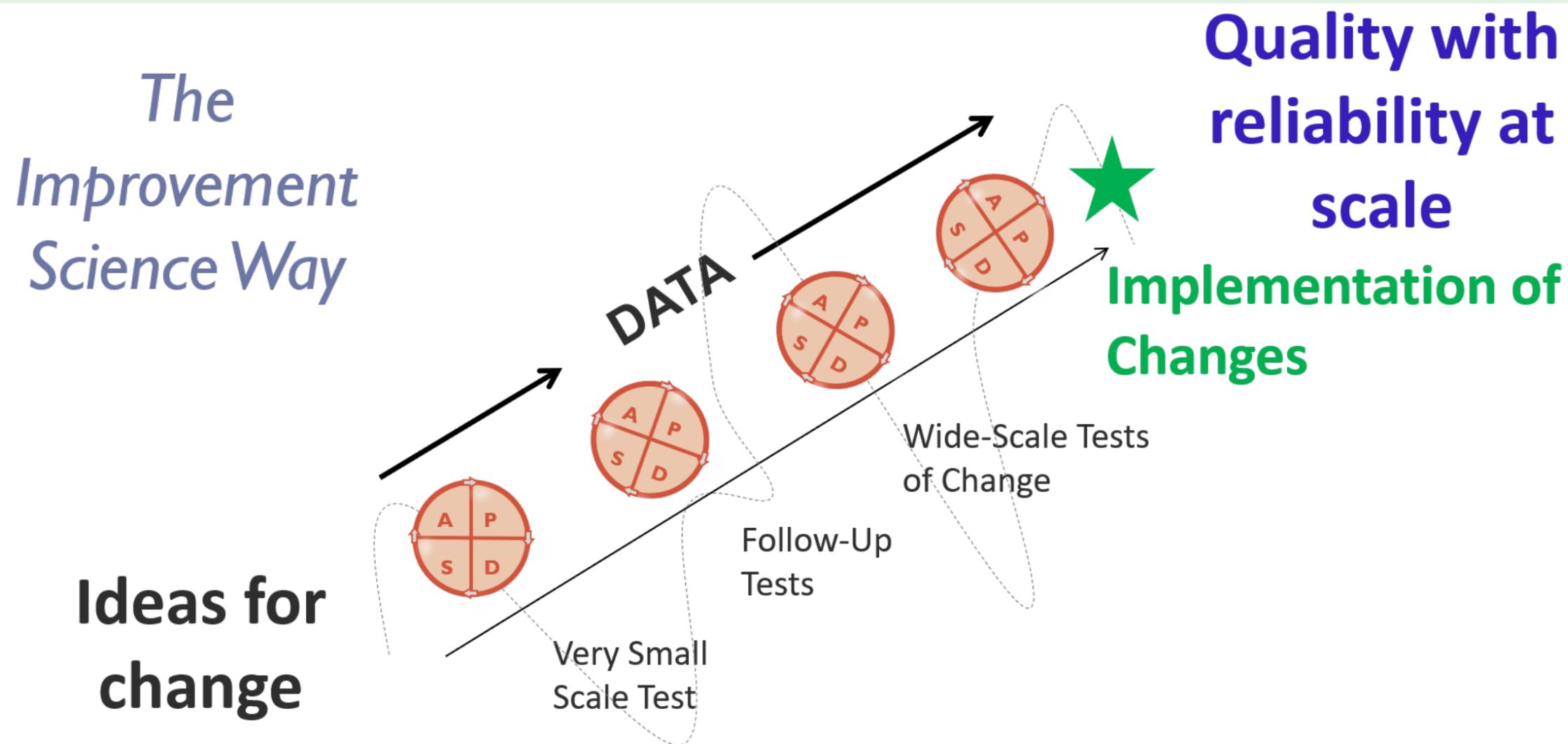
Quality
~~reliability~~
at scale

Planning

Ideas
for
change

Implementation
of Changes

How Do We Make Change? *(continued)*



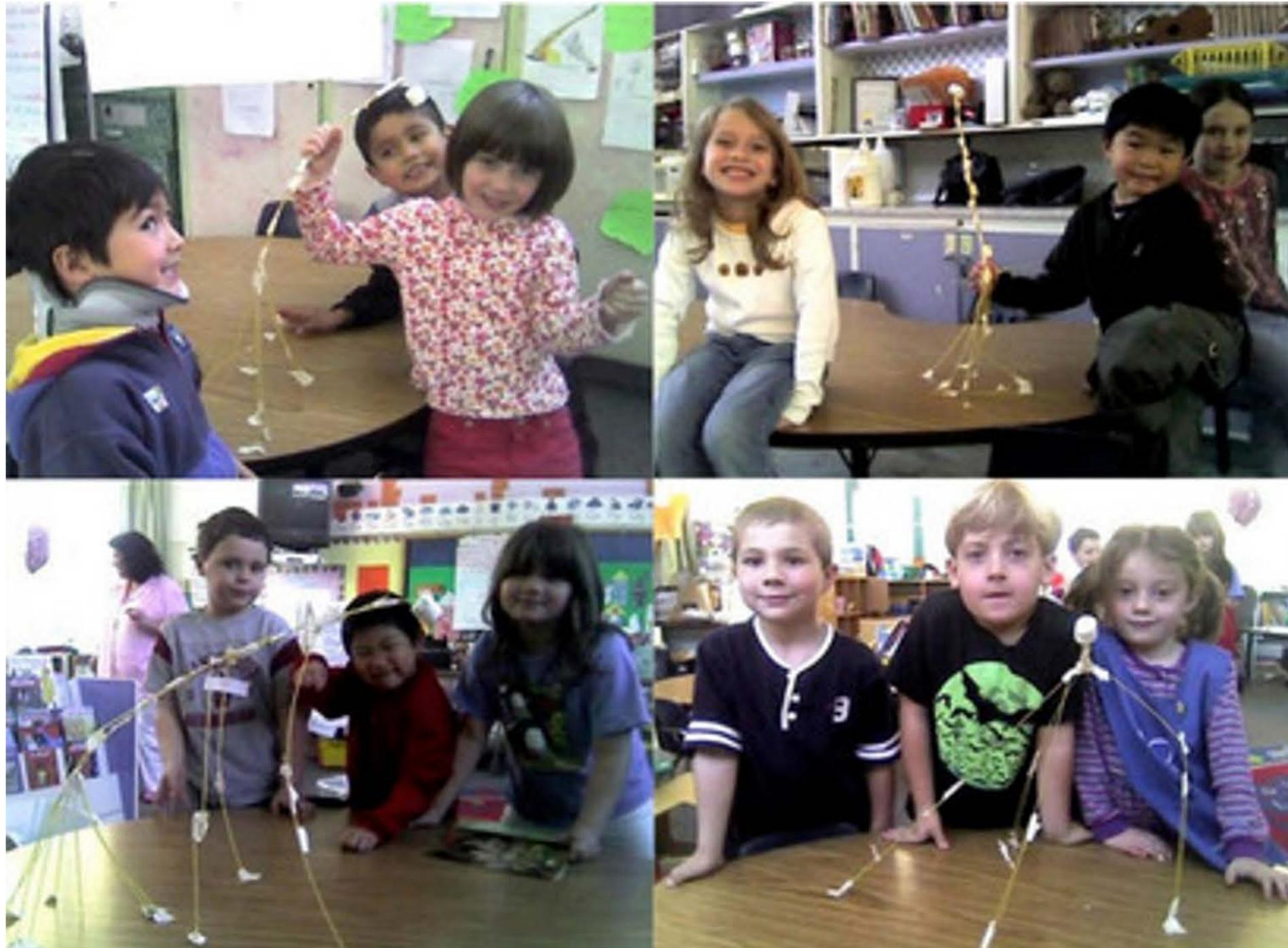
The Goal of Improvement Science

Achieve “Quality with Reliability”



Educators as
empowered
change agents

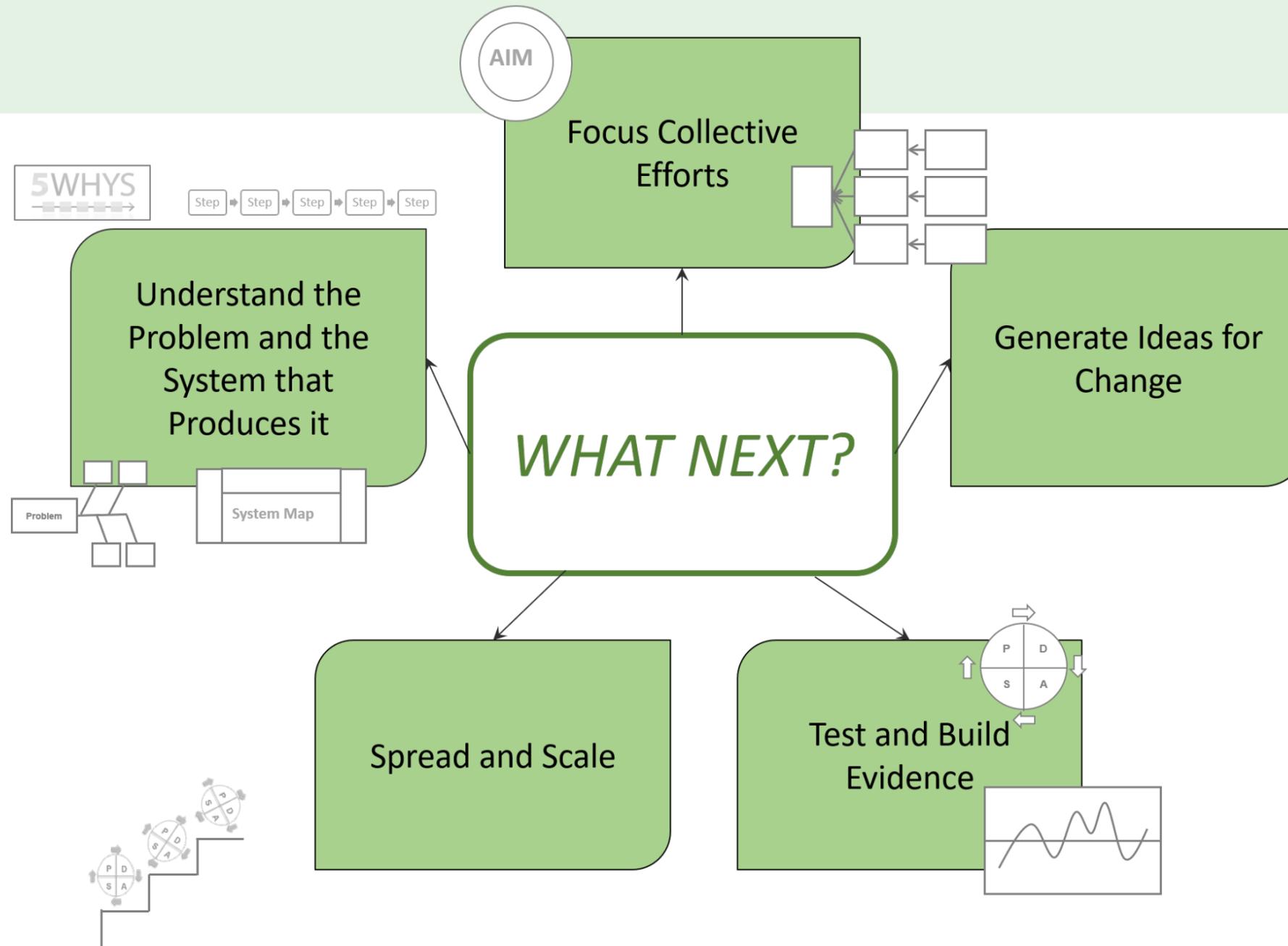
Marshmallow Challenge



Iterative tests:
Fail fast, learn fast

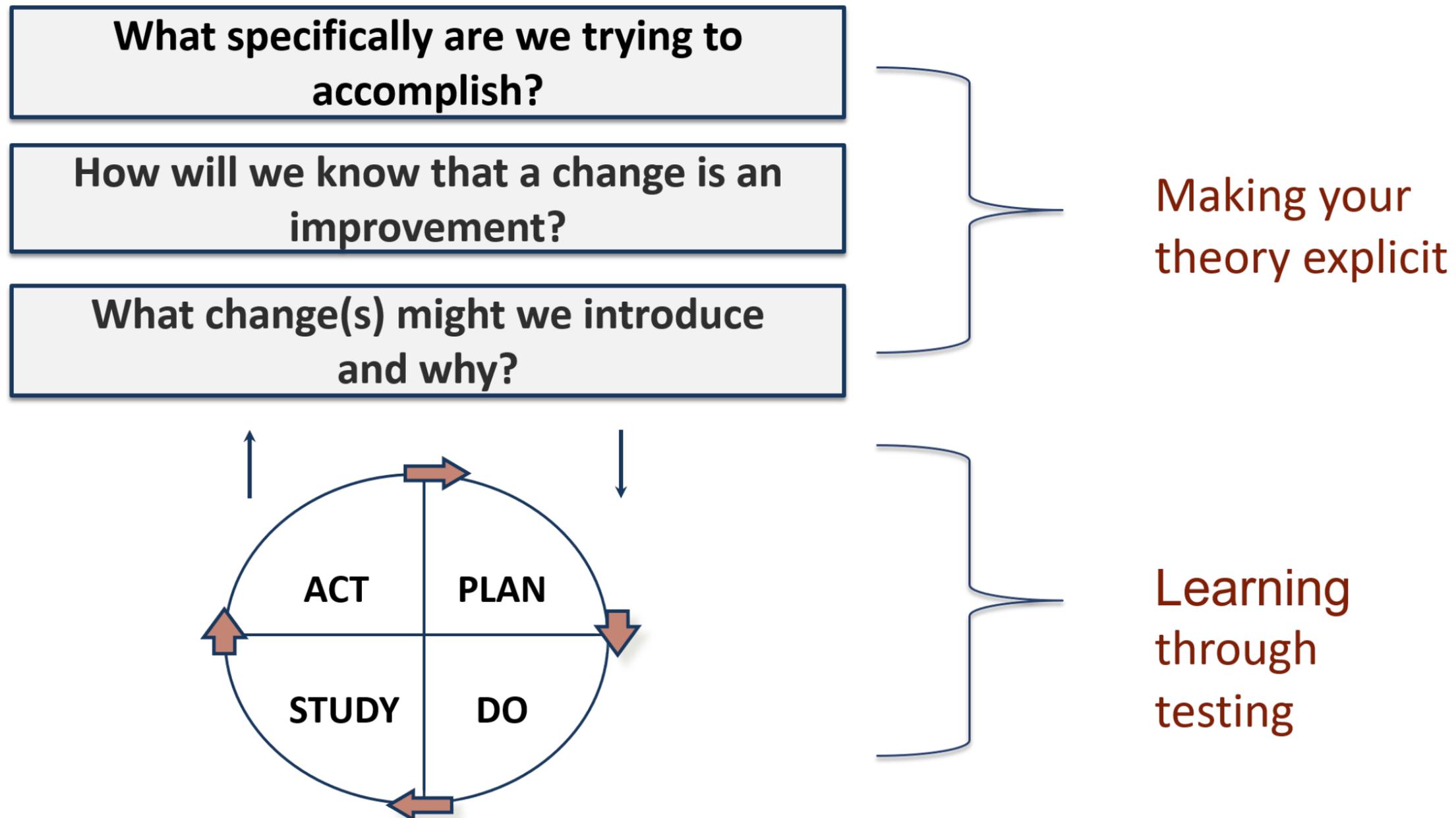


Improvement Science Cheat Sheet

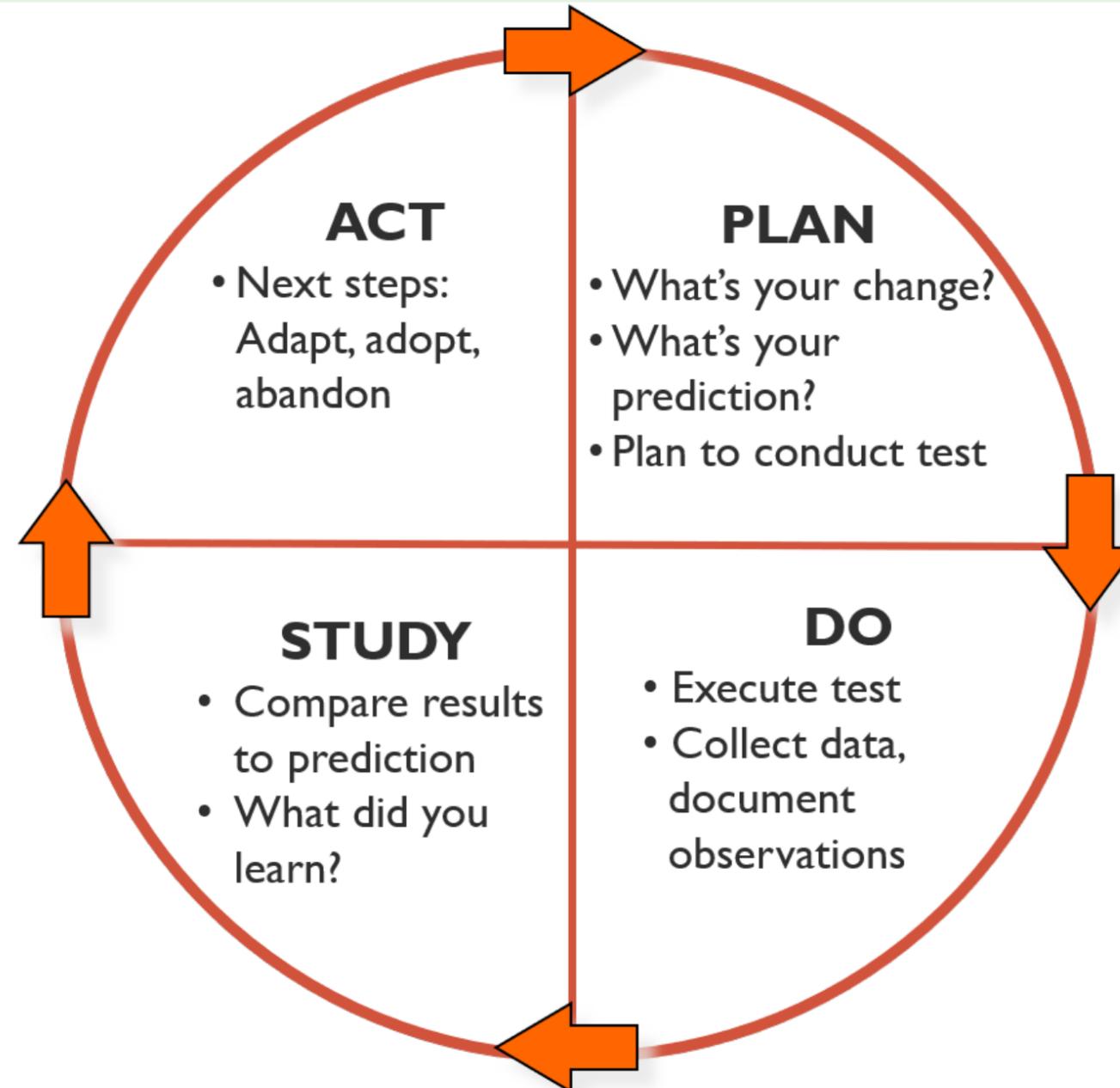


Model for Improvement

From *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance*



Engine for Learning: The Plan-Do-Study-Act (PDSA) Cycle



Mr. Potato Head



Hi! You will run a series of PDSA cycles to learn how to build me quickly and accurately. You will also practice some networked learning.

Simulation: Building a Potato Head

What, specifically, are we trying to accomplish?

For our entire network to reconstruct Mr. PH accurately and quickly

What change(s) might we introduce and why?

Your changes will be based on your group's theory of how to build Mr. PH accurately and quickly

How will we know that a change is an improvement?

You will track accuracy and time

Mr. Potato Head Wants to Look His Best

When you finish building Mr. P. H., he should look like this.
Accuracy is important.



Roles

- **Time Keeper:** Uses a device to keep time (seconds)
- **Quality Inspector:** Assigns accuracy score
- **Note-taker:** Fills out PDSA tracker – someone who has done Level 1
- **Data-tracker:** Records data on data recording sheet

Data and Measures

Accuracy

Score	Criteria
4	All depicted pieces are on Sam, in the correct place, and oriented correctly.
3	All depicted pieces are on Sam, but not all oriented correctly.
2	All depicted pieces are on Sam, but not all in the correct place.
1	One or more depicted pieces not on Sam.

Time

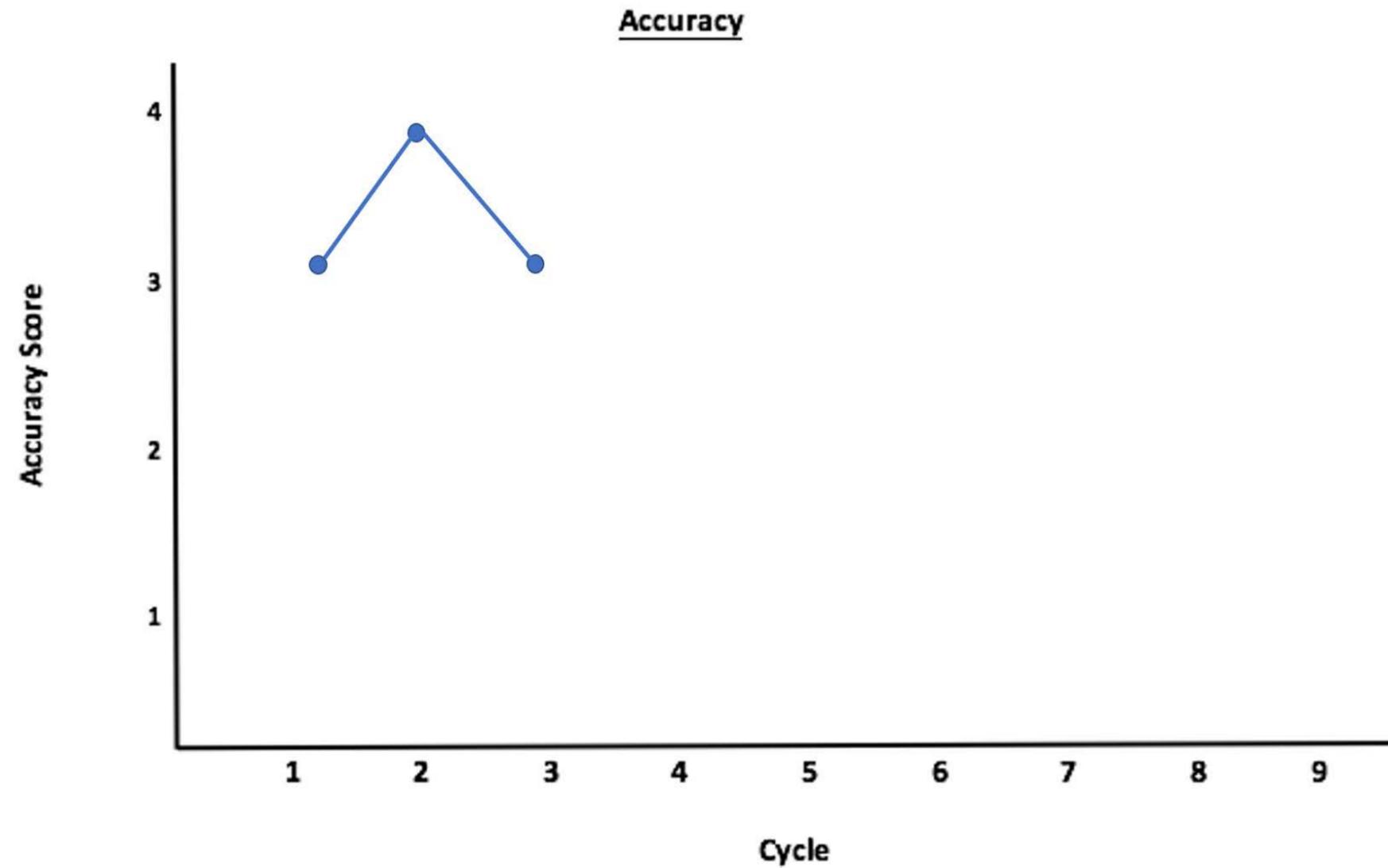
Start:

When the time keeper says "Go"

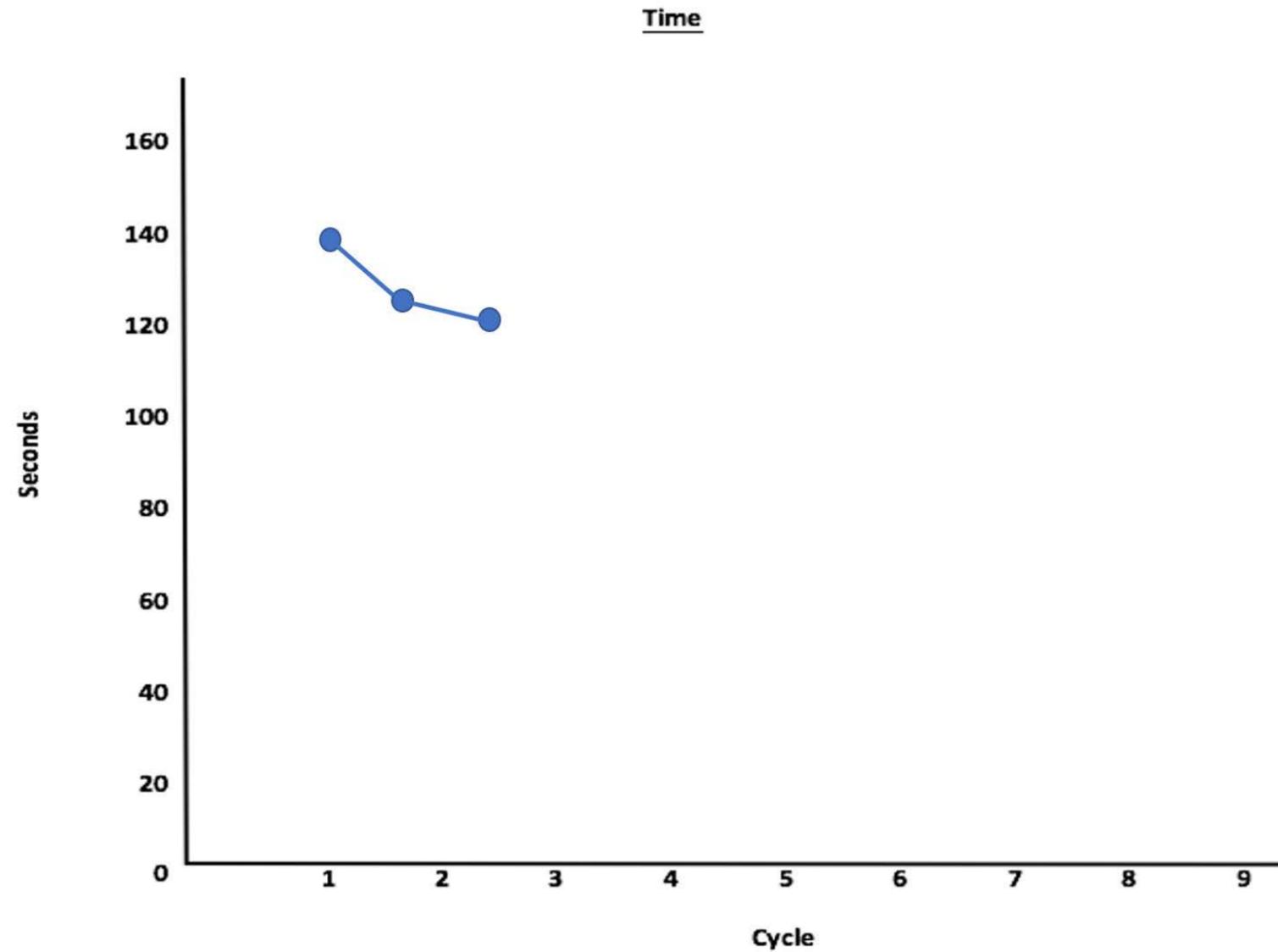
Stop:

When the builder
REMOVES HANDS
and says
"DONE!"

Accuracy Data Run Chart



Time Data Run Chart



Overview of the Activity

- Part 1: Baseline Test
 - Collect baseline data on ONE test
- Part 2: Build a collective theory of improvement
- Part 3: All tables run tests
 - Assign roles
 - Identify change idea & make predictions
 - Run test cycles and fill out the PDSA tracker
- Part 4: Network learning
 - Share learnings
 - Run test cycle and fill out the PDSA tracker
- Part 5
 - Discussion & debrief

Part 1: Baseline test

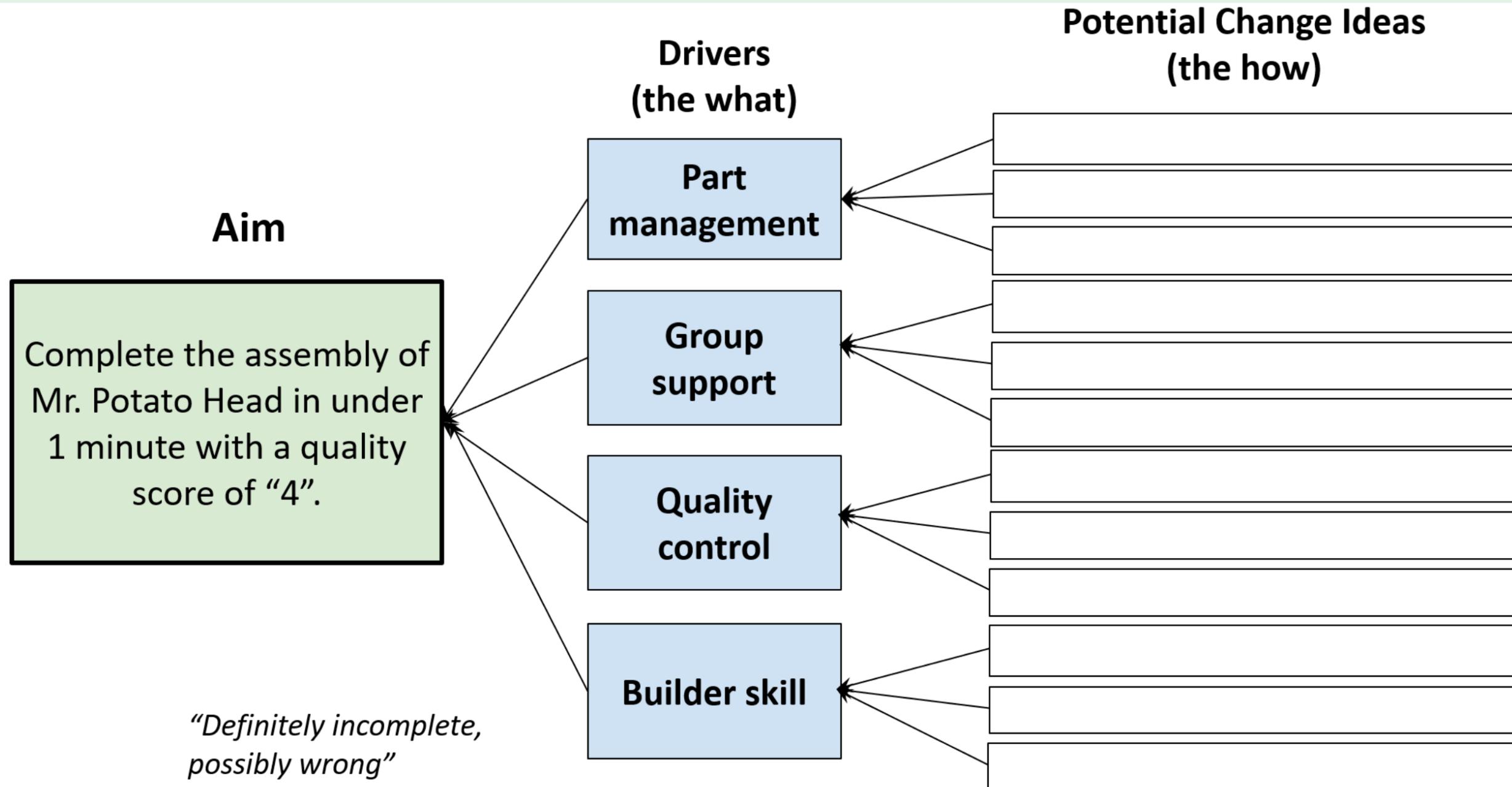
- We will quickly run ONE cycle for baseline data
 - Need volunteers for
 - a) Time Keeper
 - b) Quality Inspector
 - c) Builder
- Predictions
 - i. Time
 - ii. Accuracy
 - iii. Other

Rules

1. Reconstruct Sam as shown in the picture.
2. Start only after the time keeper says “Go!”
3. Stop the timer only after a builder removes hands from all parts AND says “Done!”

Part 2: Develop a shared theory

Driver Diagram for Mr. Potato Head Assembly



Part 3: Run tests, try to improve (1)

Mr. Potato Head TESTING TRACKER

Mr. Potato Head TESTING TRACKER		BASELINE DATA:	Accuracy: Time (secs):	
Cycle	What change idea are you going to try?	Prediction	Results	What did you learn?
1		Accuracy: Time (secs):	Accuracy: Time (secs):	
2		Accuracy: Time (secs):	Accuracy: Time (secs):	
3		Accuracy: Time (secs):	Accuracy: Time (secs):	
4		Accuracy: Time (secs):	Accuracy: Time (secs):	
5		Accuracy: Time (secs):	Accuracy: Time (secs):	
6		Accuracy: Time (secs):	Accuracy: Time (secs):	
7		Accuracy: Time (secs):	Accuracy: Time (secs):	

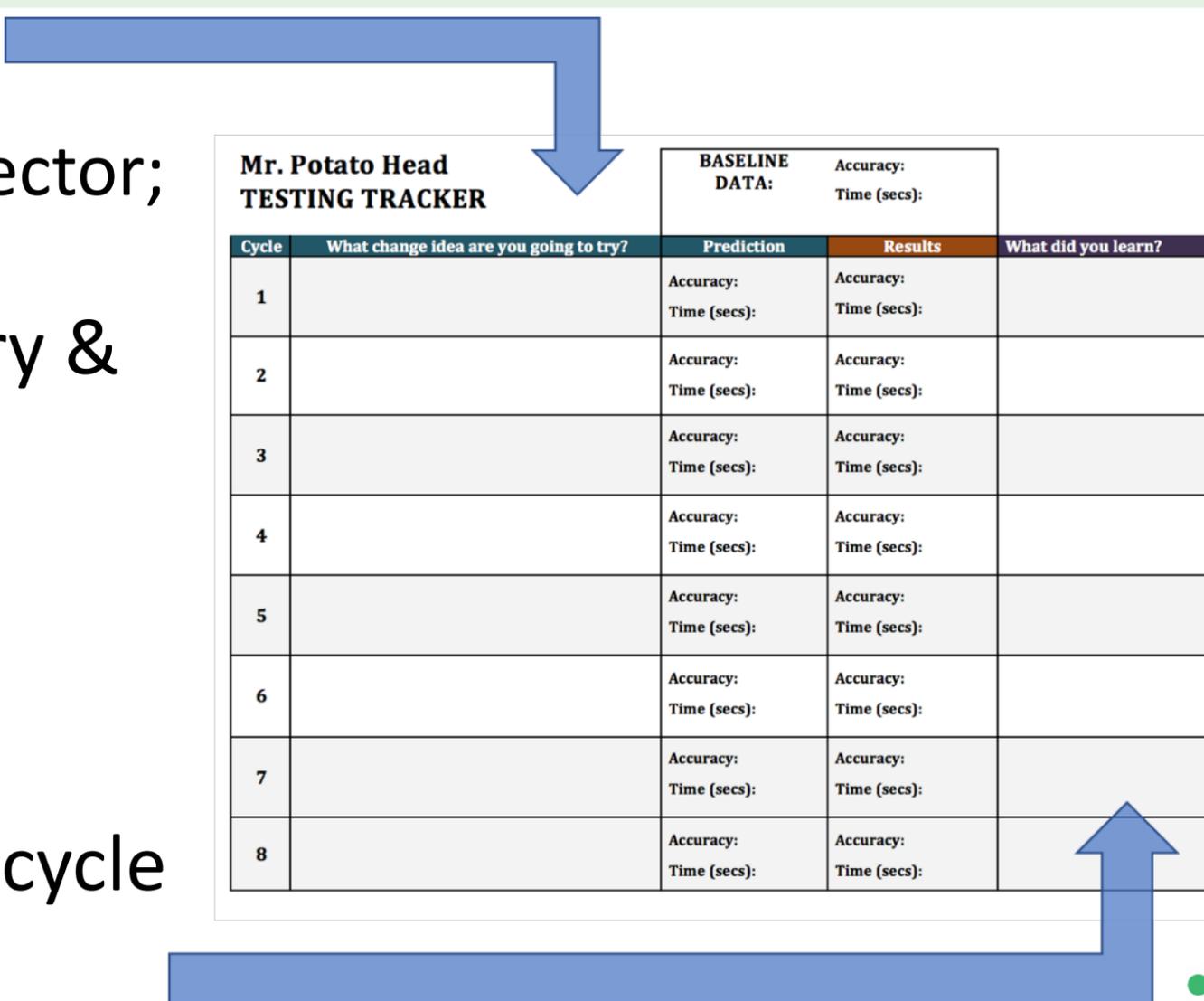
Part 3: Run tests, try to improve (2)

BEFORE you build Mr. Potato Head:

- Assign roles (time keeper; quality inspector; note-taker; data tracker)
- Identify what **change idea** you will try & your **predicted** accuracy & time on “Testing Tracker”

AFTER you build Mr. Potato Head:

- Record your results
- Identify what you learned from that cycle
- Plan the next cycle

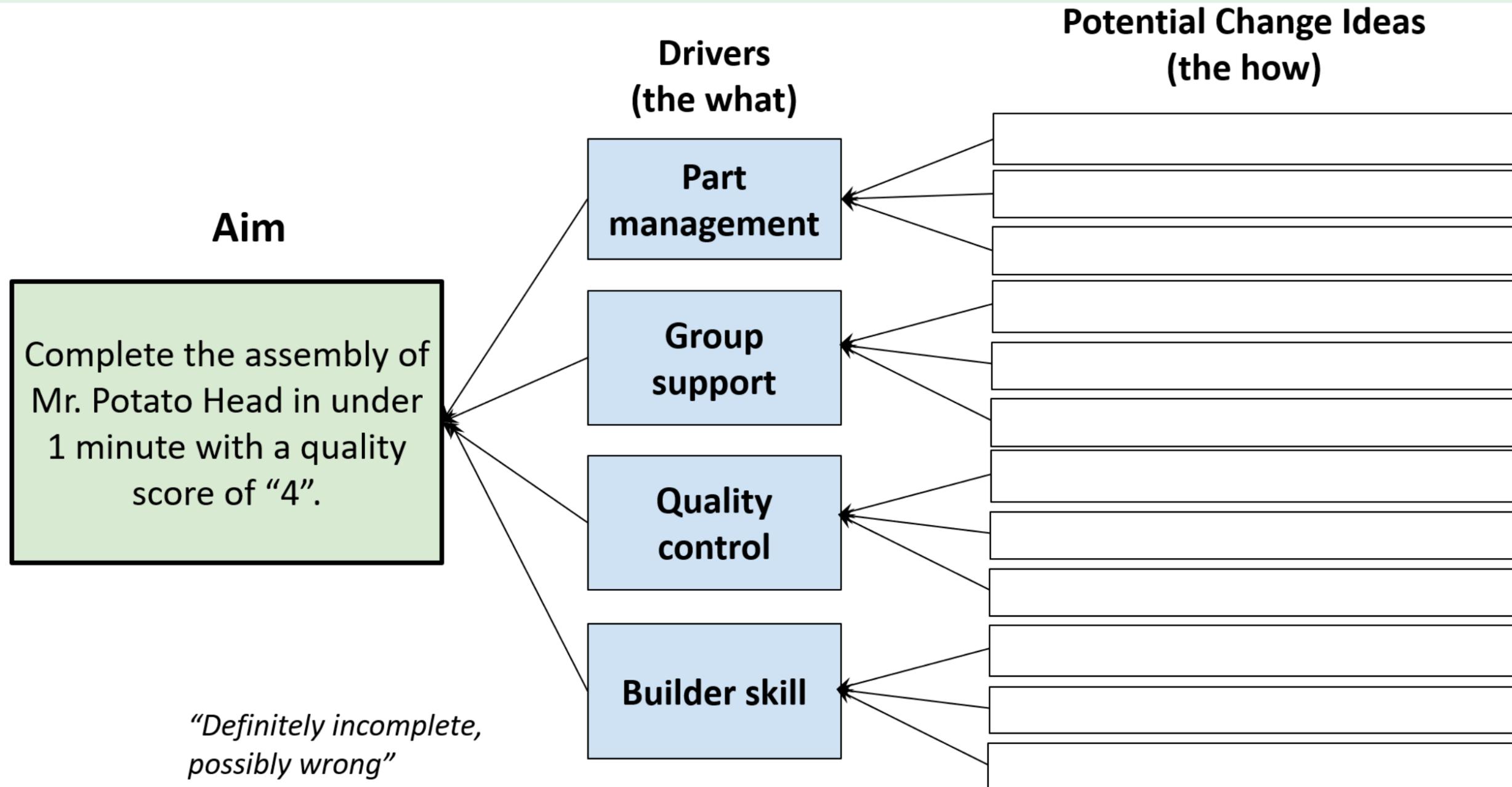


Mr. Potato Head TESTING TRACKER		BASELINE DATA:		Accuracy:	Time (secs):
Cycle	What change idea are you going to try?	Prediction	Results	Accuracy:	Time (secs):
1		Accuracy: Time (secs):	Accuracy: Time (secs):		
2		Accuracy: Time (secs):	Accuracy: Time (secs):		
3		Accuracy: Time (secs):	Accuracy: Time (secs):		
4		Accuracy: Time (secs):	Accuracy: Time (secs):		
5		Accuracy: Time (secs):	Accuracy: Time (secs):		
6		Accuracy: Time (secs):	Accuracy: Time (secs):		
7		Accuracy: Time (secs):	Accuracy: Time (secs):		
8		Accuracy: Time (secs):	Accuracy: Time (secs):		

STOP!

Part 4: Revisions to a shared theory?

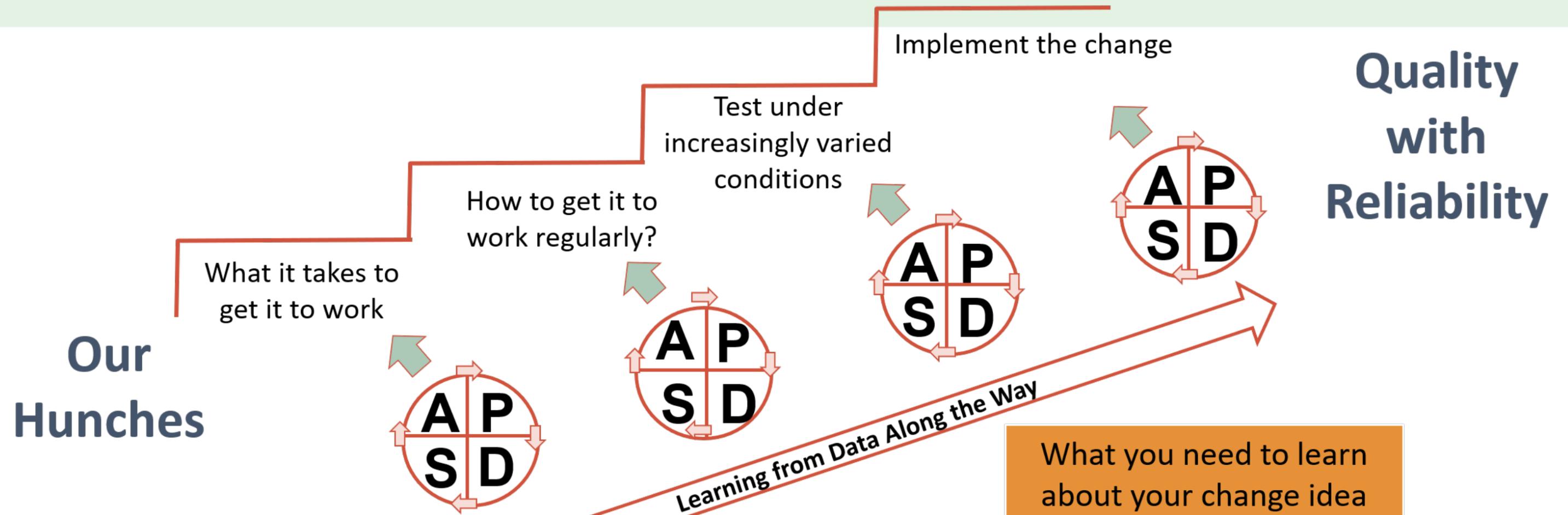
Driver Diagram for Mr. Potato Head Assembly



Part 5: Discussion

1. What happened in your team?
2. What did you learn about building Mr. Potato Head?
3. What did you learn about PDSA cycles?
4. What did you notice about this approach to improvement?

Learning Our Way to Improvement



What you need to learn about your change idea shifts over time. Your tests evolve to help you learn how to enact a change idea with quality and reliability.

Determining the Size of the Test

Current Situation		Resistant	Indifferent	Ready
LOW Confidence that current change idea will lead to Improvement	Cost of failure large	<u>Very Small Scale Test</u>	<u>Very Small Scale Test</u>	<u>Very Small Scale Test</u>
	Cost of failure small	Very Small Scale Test	Very Small Scale Test	Small Scale Test
HIGH Confidence that current change idea will lead to Improvement	Cost of failure large	Very Small Scale Test	Small Scale Test	Large Scale Test
	Cost of failure small	Small Scale Test	Large Scale Test	Implement



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The Regional Educational Laboratory West (REL West) at WestEd provides scientifically valid research findings that help meet the education needs in Arizona, California, Nevada, and Utah.

Our staff draw from existing high-quality research, as well as conduct research and development projects and experimental studies. We also help stakeholders interpret evidence and build their own research capacity.