Personalized Learning Summit 2017

The Role of Collaborative Technology and Data Analytics in Networked Improvement Communities

How to Learn Fast and Implement Well

Jojo Manai & Hiro Yamada

@jmanai & @hryamada

Agenda

1. Introduction:
    - Getting to know each other
2. Why Improvement Science?
3. High Leveraged Problem:
    - Remedial Math Education
4. NILS
5. Q&A

The Carnegie Foundation

Who are we?

Jojo Manai

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Hiro Yamada

Director of Analytics

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Analytics & **C**ollaborative **T**echnology

Why the Carnegie Foundation for the Advancement of Teaching?

- Chartered in 1906 by an act of Congress
- Policy and research center
  - Founded Teachers Insurance and Annuity Association (TIAA)
  - Published the Flexner Report on medical education
  - Created the Carnegie Unit
  - Founded the Educational Testing Service
  - Developed the Carnegie Classification of Institutions of Higher Education
  - Supported the development of Pell Grants
  - Led a renewal in the scholarship of higher education
  - Now working to develop the field of **Improvement Science** and support **Networked Improvement Communities**

Carnegie Staff

Life at Carnegie

This Workshop

Who are you?

Getting to know your table

Getting to know the room

or

Are you more inclined toward…

Details — *or* — Big Picture

Are you more inclined toward…

Answers — *or* — Questions

Are you more inclined toward…

Logic —— *or* —— Feeling

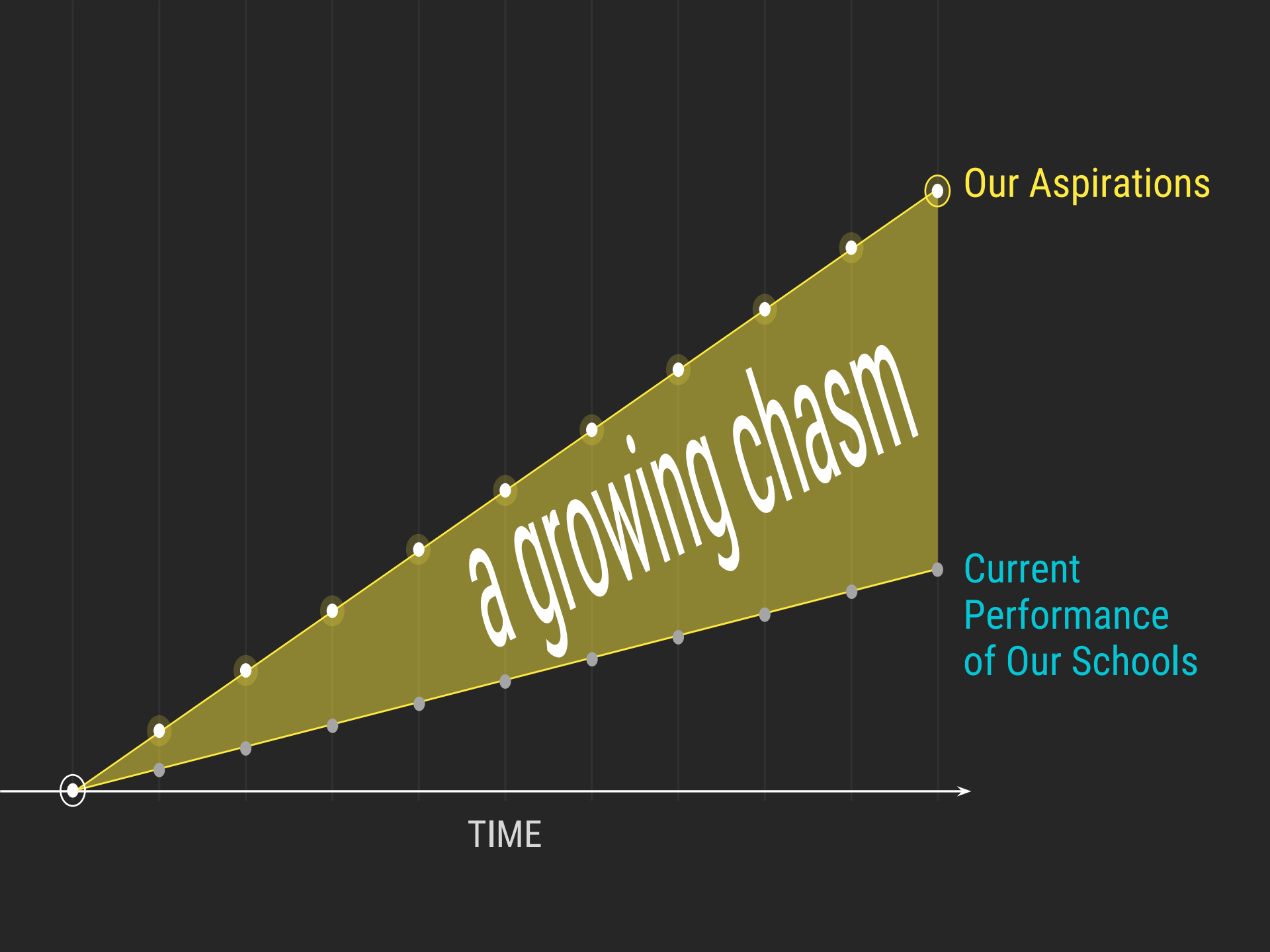
Are you more inclined toward…

Convergent —— *or* —— Divergent

Are you more inclined toward…

Problem Finding — *or* — Problem Solving

Why Improvement Science?


Our Aspirations
a growing chasm
Current
Performance
of Our Schools
TIME


IDEA

Last Decade: Performance Management Using Accountability to

Abs	Tardy	Home Language	Y @ H	MAP Math Δ	MAP Reading Δ	Ward	ELL	MEPA	Has IEP	Afterschool
4	11	Portuguese	5	+14 (176 => 190)	+8 (152 => 160)	6	Yes	R15 / W12	Yes	B&G
6	0	English	4	+9 (157 => 166)	+20 (219 => 239)	3	Yes	R16 / W23	No	B&G Comm Schl
1	9	Spanish	4	+34 (232 => 266)	+8 (231 => 239)	6	No		Yes	B&G
1	8	Portuguese	6	+20 (252 => 272)	+1 (258 => 259)	5	No		Yes	Mystic B&G
8	19	English	6	+6 (165 => 171)	+0 (256 => 256)	4	Yes	R21 / W22	No	B&G
6	2	English	5	+6 (230 => 236)	+1 (185 => 186)	5	Yes	R13 / W19	No	B&G Comm Schl
10	11	Portuguese	4	+24 (204 => 228)	+4 (233 => 237)	5	Yes	R10 / W19	No	Comm Schl
15	4	English	1	+20 (154 => 174)	+15 (234 => 249)	7	Yes	R22 / W15	No	B&G
11	8	Creole(Haitian)	6	+5 (212 => 217)	+14 (189 => 203)	3	Yes	R26 / W13	No	Comm Schl
7	7	English	1	+11 (248 => 259)	+15 (199 => 214)	7	No		No	B&G Comm Schl
1	4	Portuguese	6	+16 (178 => 194)	+10 (242 => 252)	6	Yes	R17 / W18	No	B&G
1	13	Portuguese	6	+7 (153 => 160)	+14 (227 => 241)	3	Yes	R24 / W20	Yes	Peabody
14	15	English	5	+1 (153 => 154)	+13 (234 => 247)	4	No		No	Mystic
16	1	English	6	+9 (249 => 258)	+11 (249 => 260)	7	Yes	R15 / W10	No	Mystic B&G

Set targets

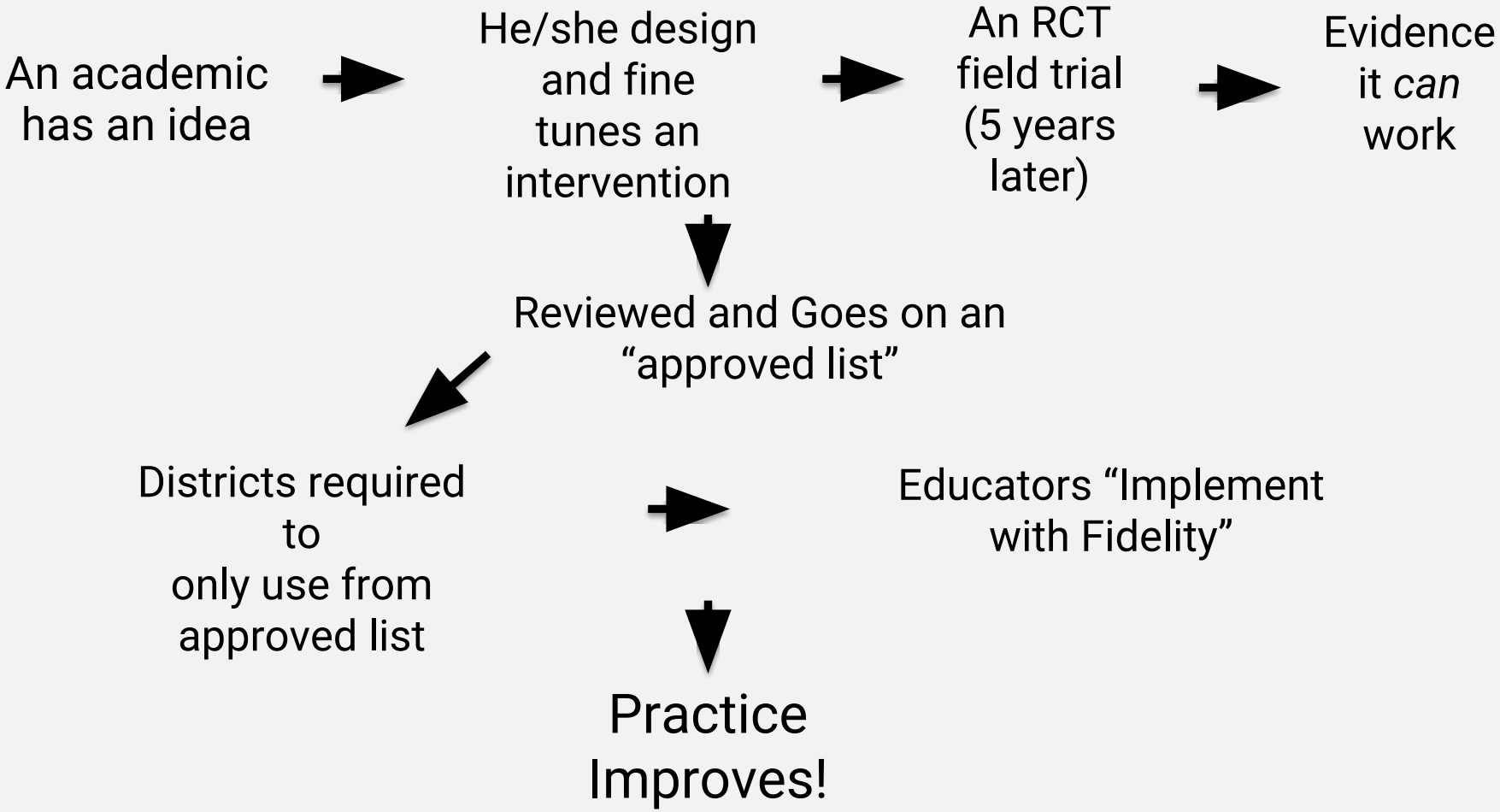
Create incentives

Collect data/dashboards

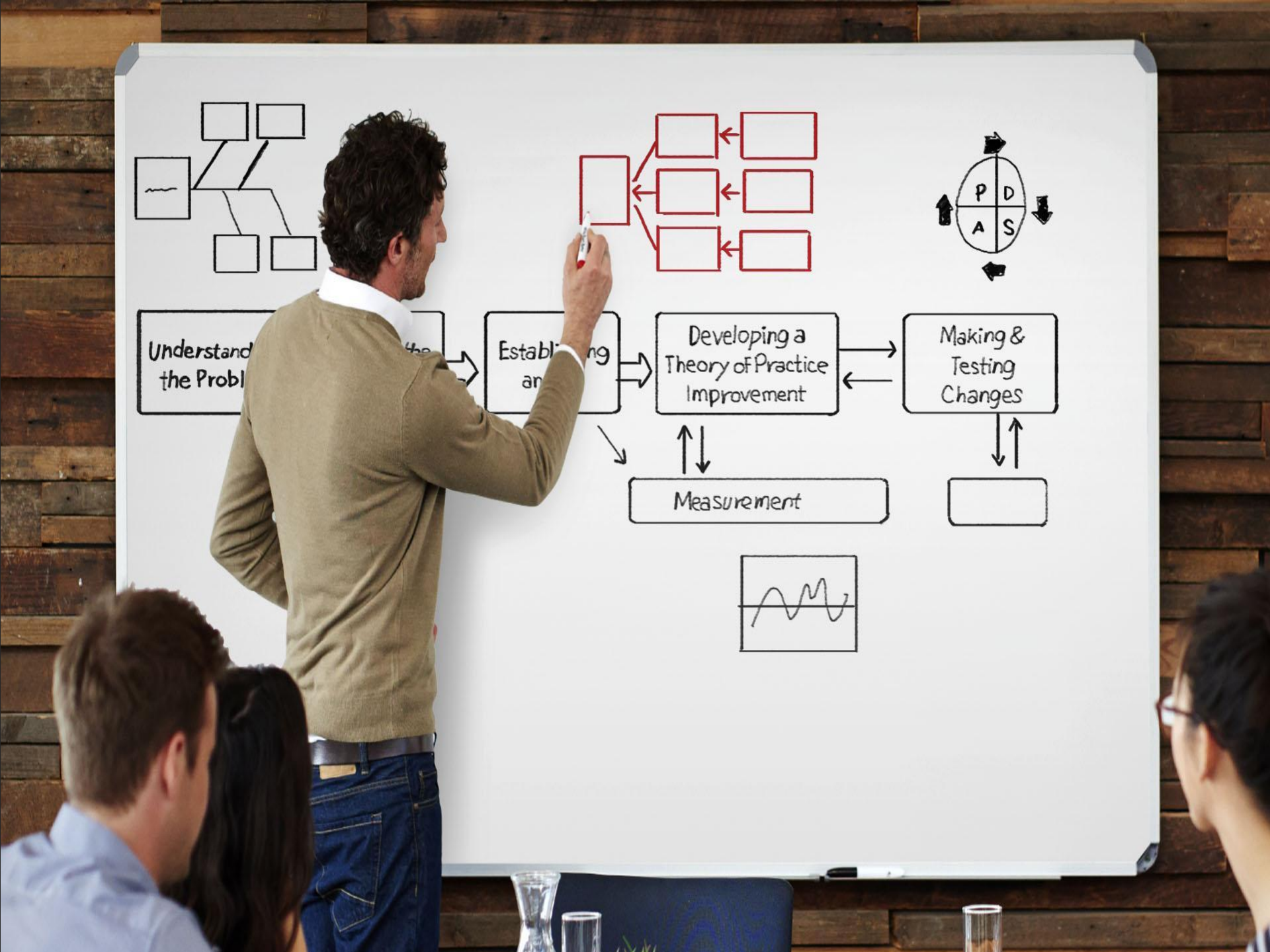
Hold **individuals** accountable

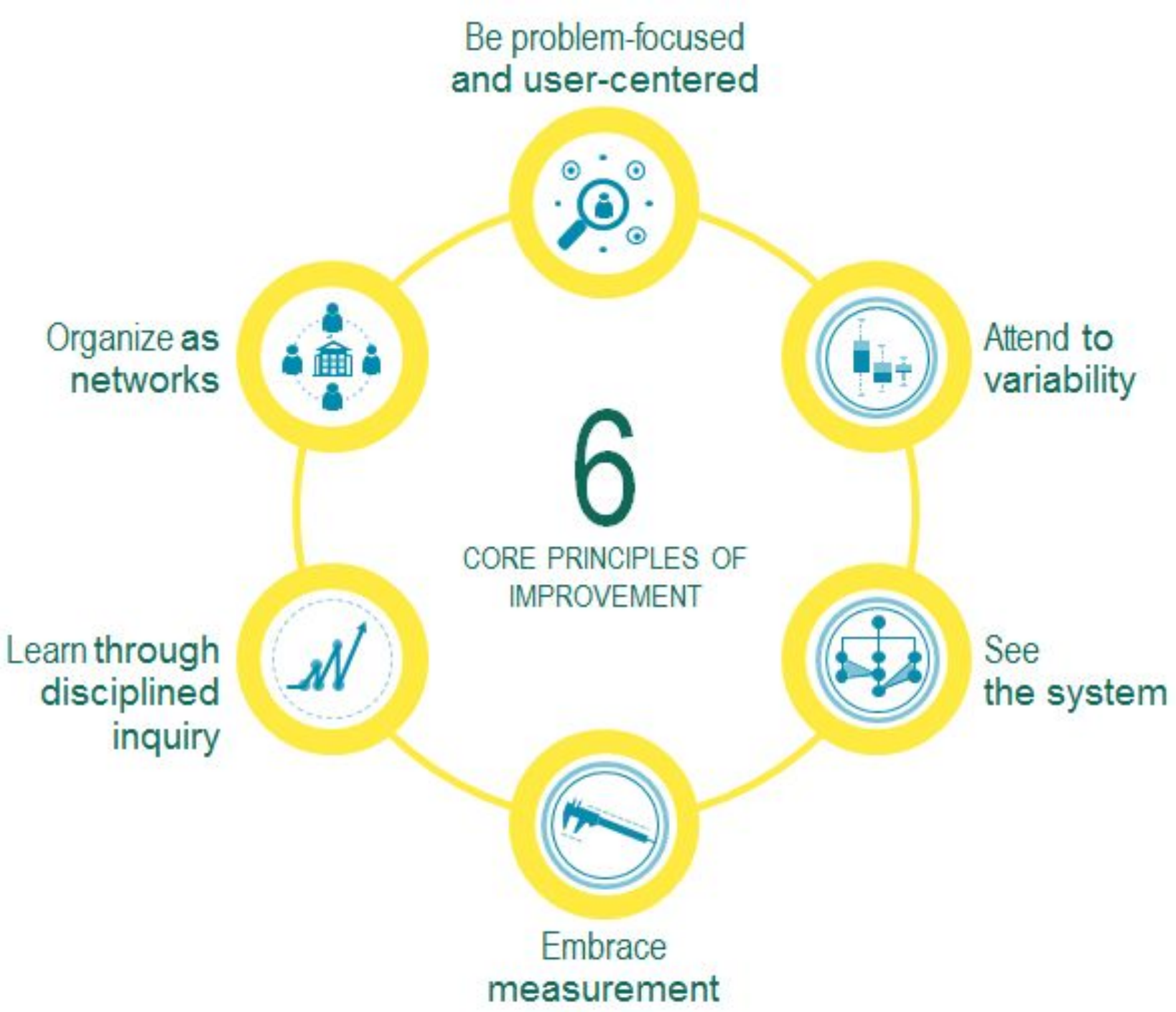
"Go figure it out or else…"

Last Decade: Evidence-based Practice Movement



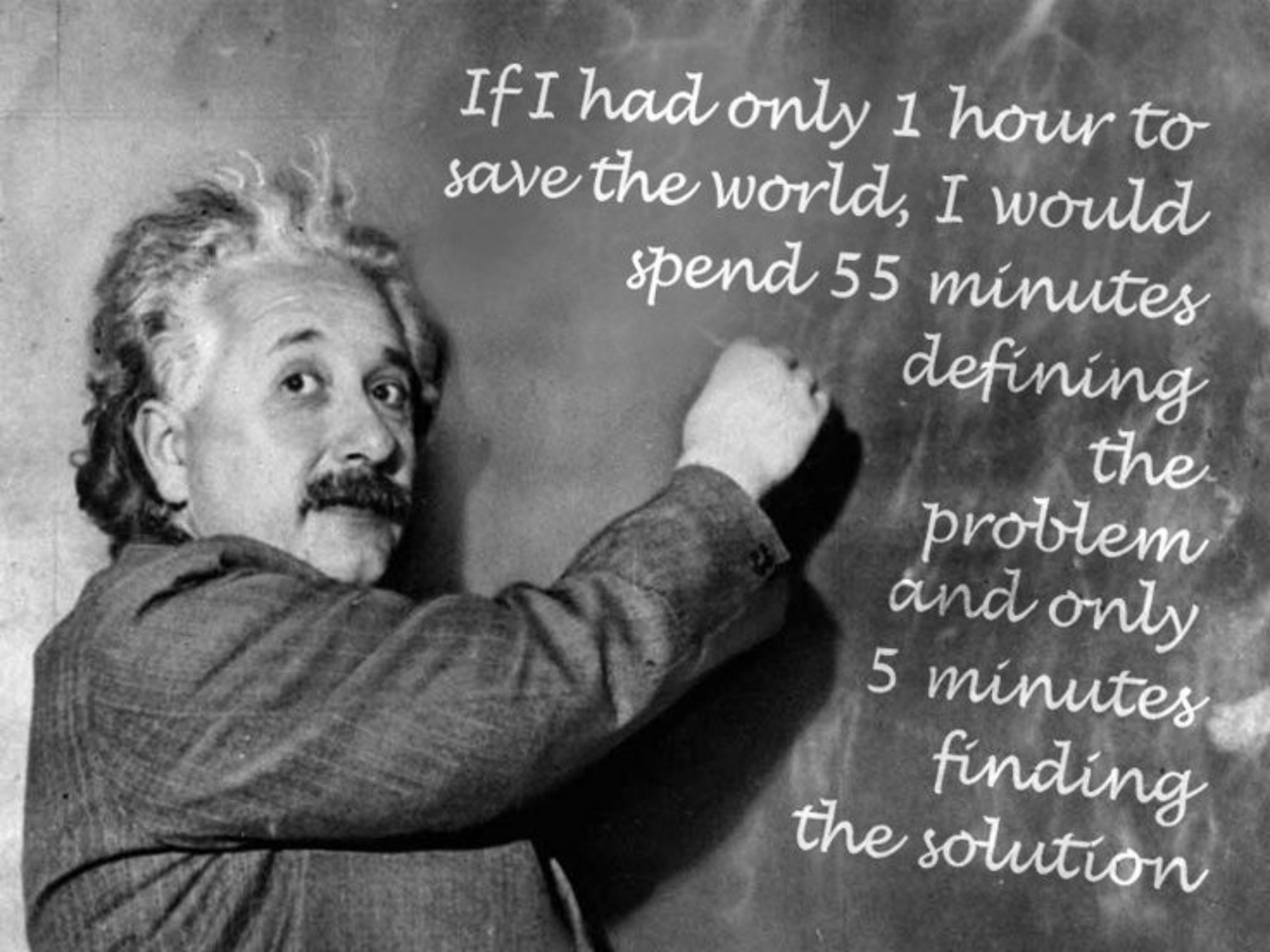
Improvement Principles


P
D
A
S
Developing a Theory of Practice Improvement
Making & Testing Changes
Measurement


Be problem-focused
and user-centered
Attend to
variability
See
the system
Embrace
measurement
Learn through
disciplined
inquiry
Organize as
networks
6
CORE PRINCIPLES OF
IMPROVEMENT

SOLVING PROBLEMS

Be problem-focused
and user-centered


If I had only 1 hour to
save the world, I would
spend 55 minutes
defining
the
problem
and only
5 minutes
finding
the solution

Understanding the Problem: Three Sources of Knowledge

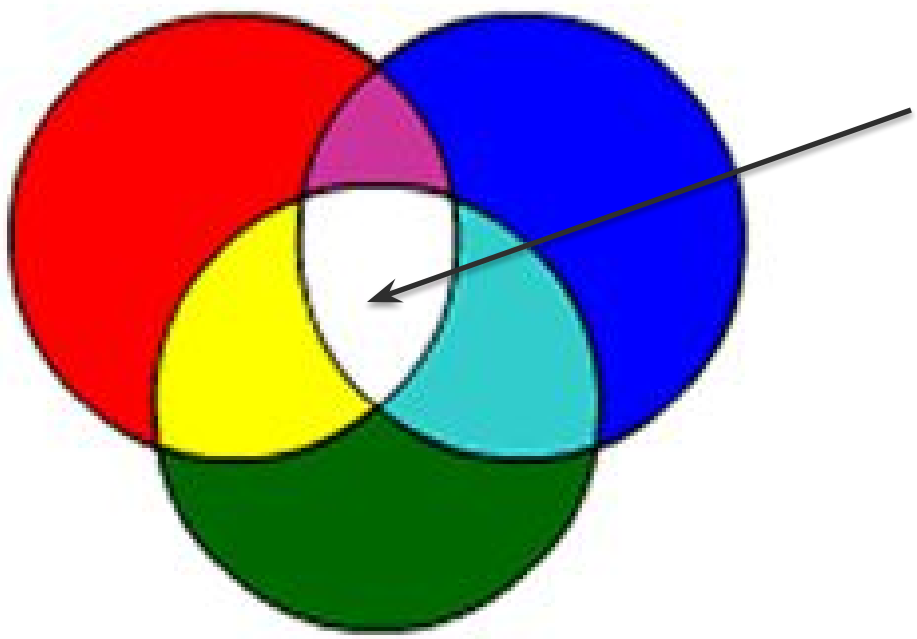
Professional Knowledge: Knowledge of local organizational context, structures, and processes.

Improvement Knowledge: The principles, tools, methods and human and social resources that structure this work

Research Knowledge: About what *can* work and relevant basic scholarship.

Carnegie Foundation
for the Advancement of Teaching

Understanding the Problem: Three Sources of Knowledge



Leverage professional, improvement and research knowledge in combination to deeply understand the problem.

Activity (5 mins)

- Think about one problem at your local context (institution) that you'd like to solve
- Think about the user (Student, Teacher, Administrator etc) this problem affects
- Within what time frame you'd like to solve this problem?

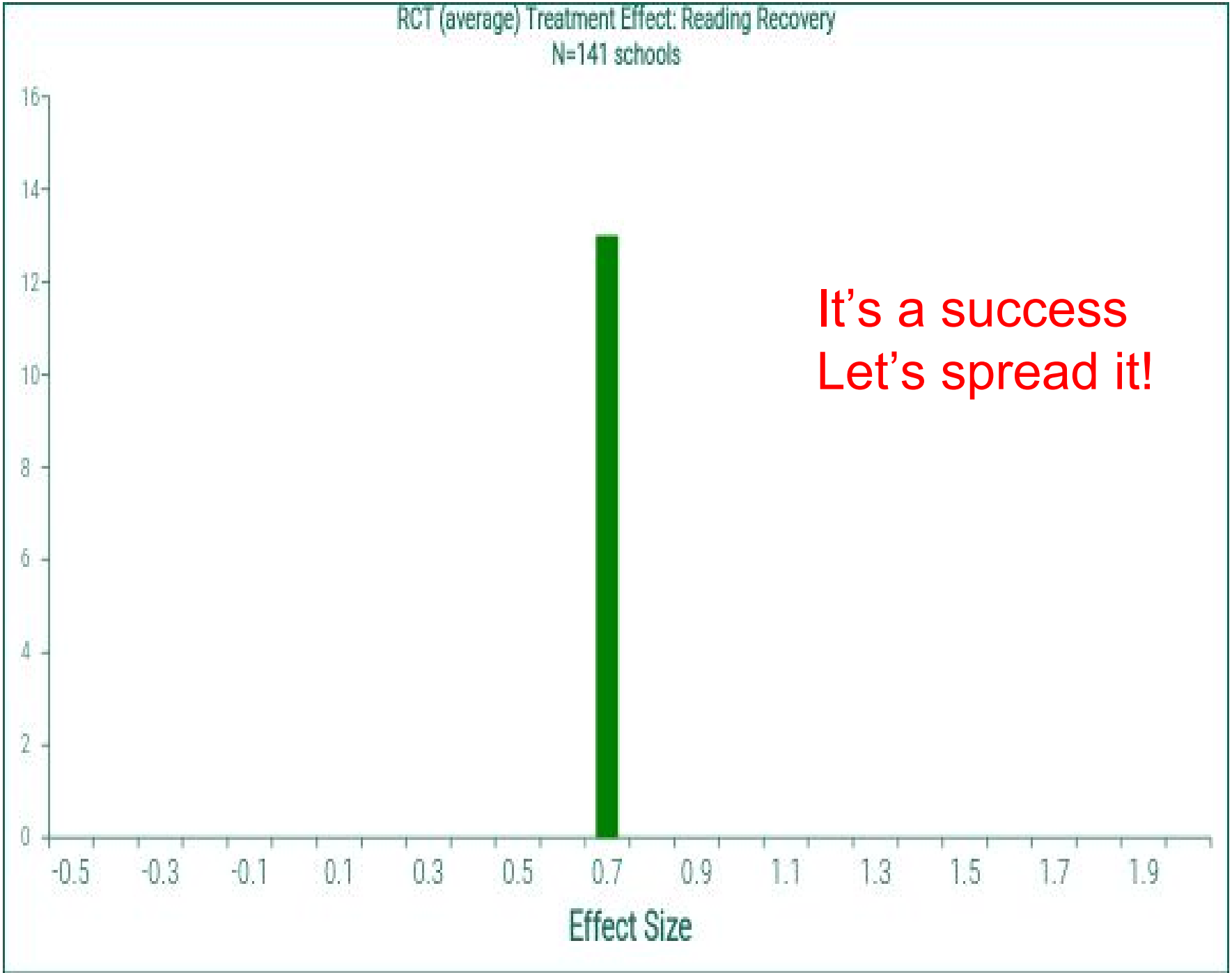
Attend to
variability

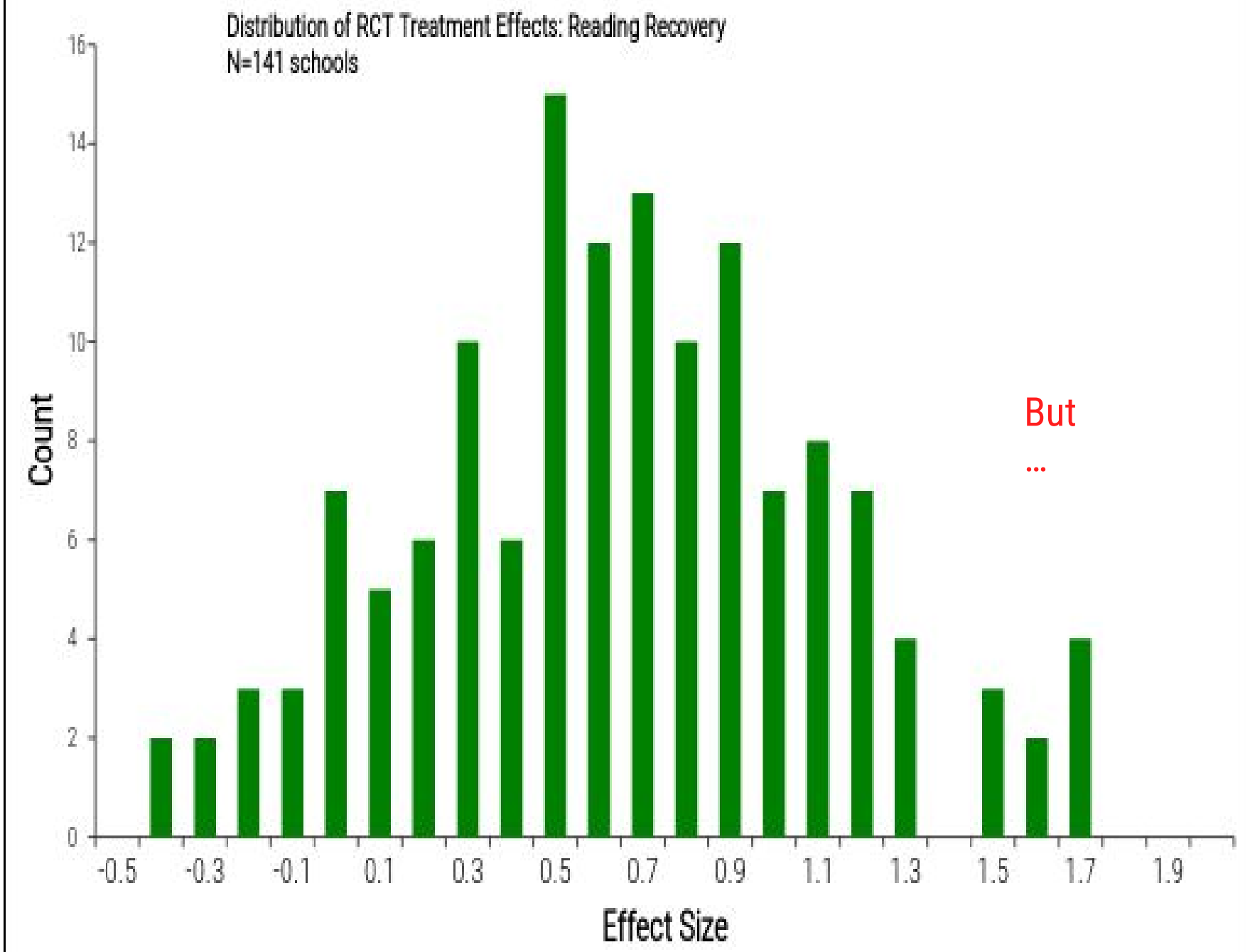
A Case Example

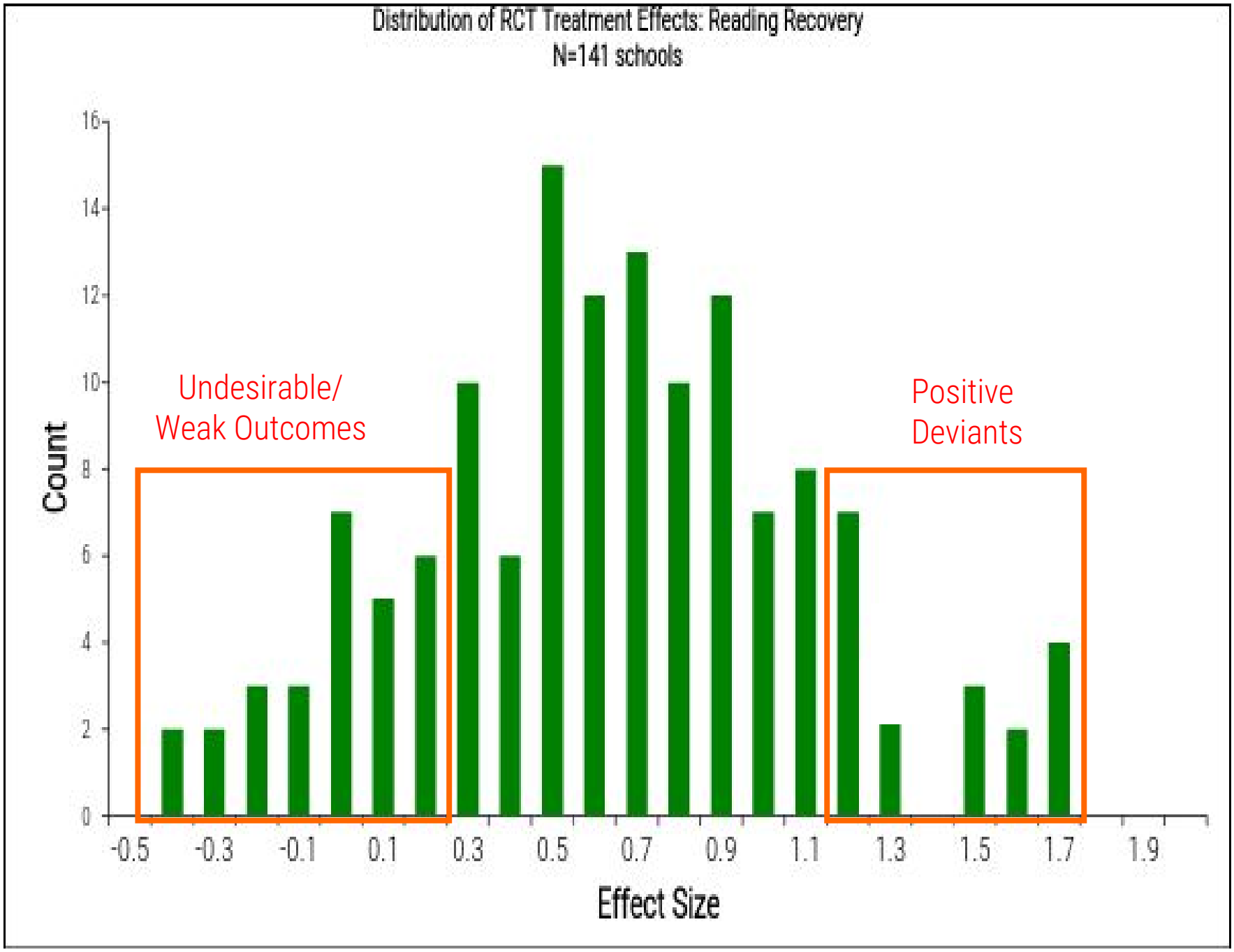
First year results
from a large randomized field trial
of Reading Recovery
(I3 inititative)

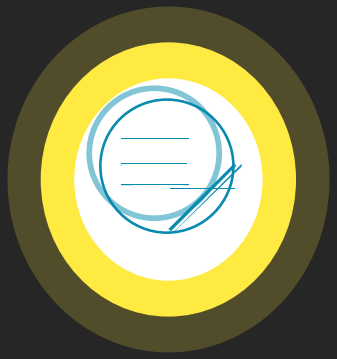
Reading Recovery® Council of North America

We open doors to a literate future for children who initially struggle in learning to read and write.


RCT (average) Treatment Effect: Reading Recovery
N=141 schools
16
14
12
10
8
6
4
2
0
-0.5
-0.3
-0.1
0.1
0.3
0.5
0.7
0.9
1.1
1.3
1.5
1.7
1.9
Effect Size
It's a success
Let's spread it!


Distribution of RCT Treatment Effects: Reading Recovery
N=141 schools
Count
0
2
4
6
8
10
12
14
16
-0.5
-0.3
-0.1
0.1
0.3
0.5
0.7
0.9
1.1
1.3
1.5
1.7
1.9
Effect Size
But
…


Distribution of RCT Treatment Effects: Reading Recovery
N=141 schools
Undesirable/
Weak Outcomes
Positive
Deviants
Count
16
14
12
10
8
6
4
2
0
-0.5
-0.3
-0.1
0.1
0.3
0.5
0.7
0.9
1.1
1.3
1.5
1.7
1.9
Effect Size



See
the system

What’s actually producing the outcomes we observe?

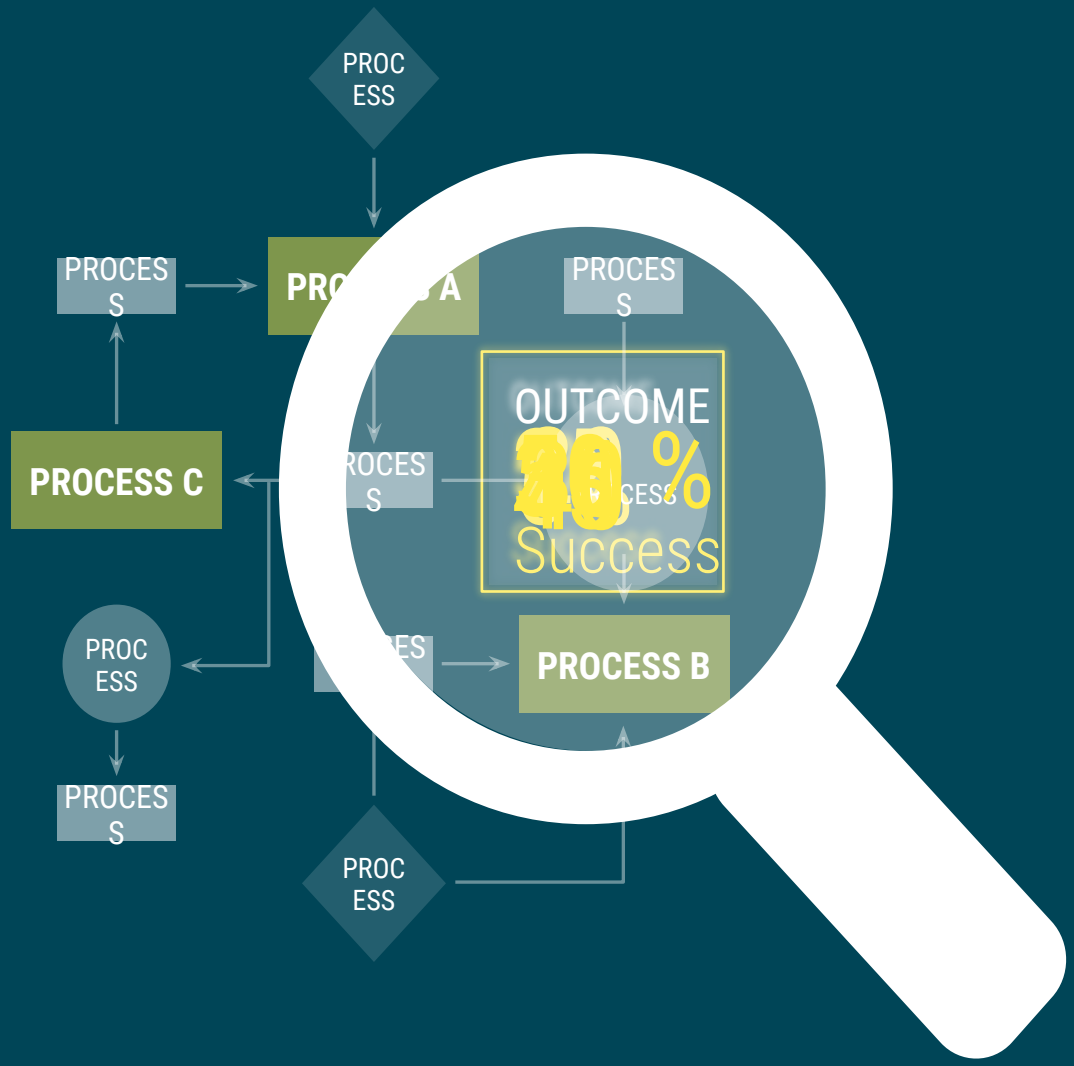
See the system: An argument by analogy from healthcare

See the system

Embrace
measurement

Are we truly improving anything?

Embrace
measurement



Learn
through disciplined inquiry

How can we learn faster to achieve the outcomes we seek?


Welcome
Welcome
Welcome


Welcome
Welcome


Welcome
Welcome
Welcome

AIM


Welcome


Welcome
Welcome


Welcome
Welcome


Welcome

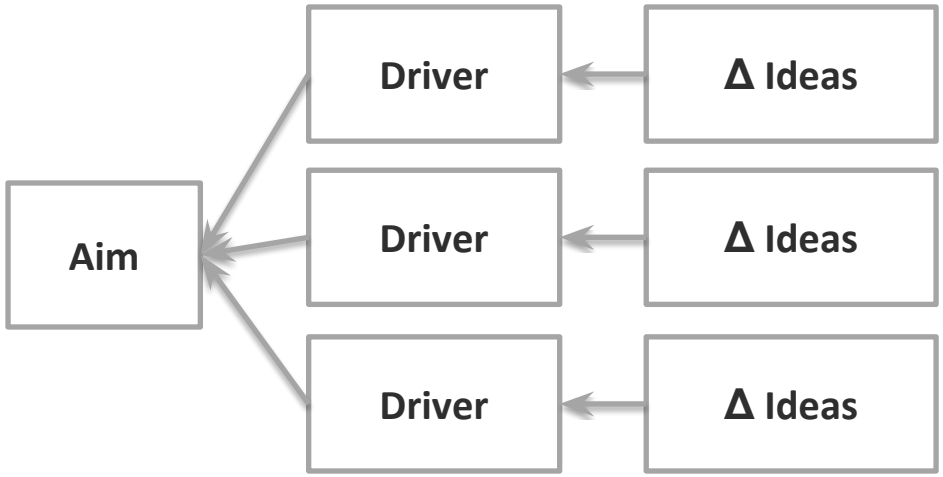
A common methodology for learning

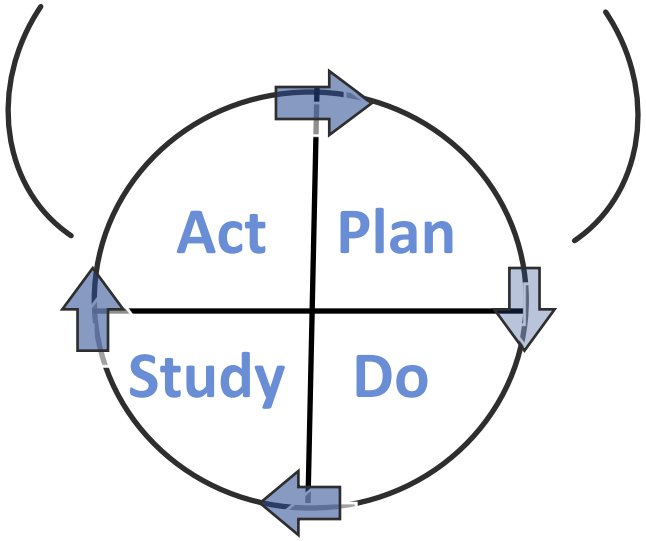
What specifically are we trying to accomplish?

How will we know that a change is an improvement?

What changes might we introduce and why?

A collective theory of improvement





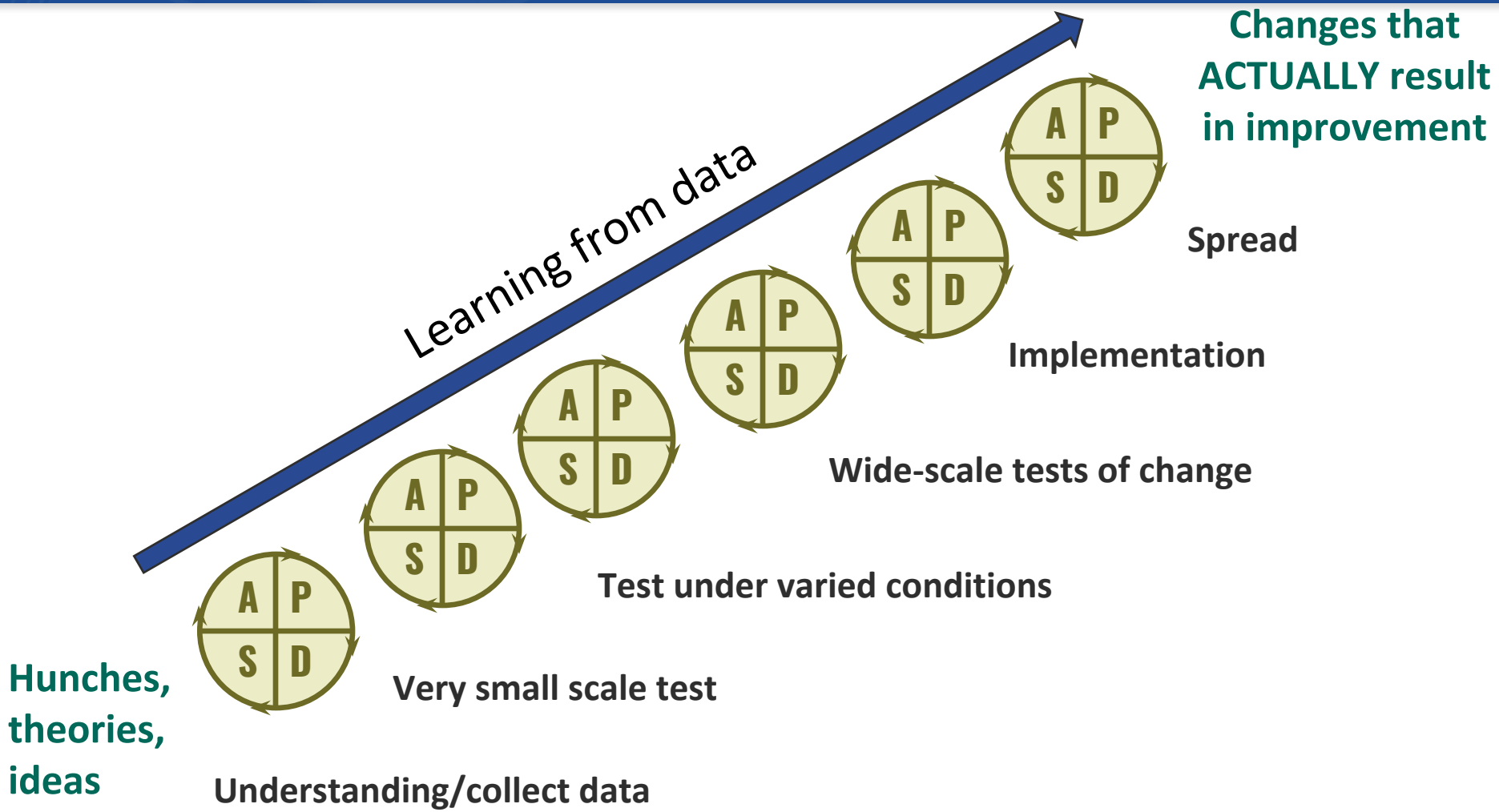
The Model for Improvement Adapted from Associates for Process Improvement

What are some examples from your institution?

How does the model for improvement help to evolve the network theory?

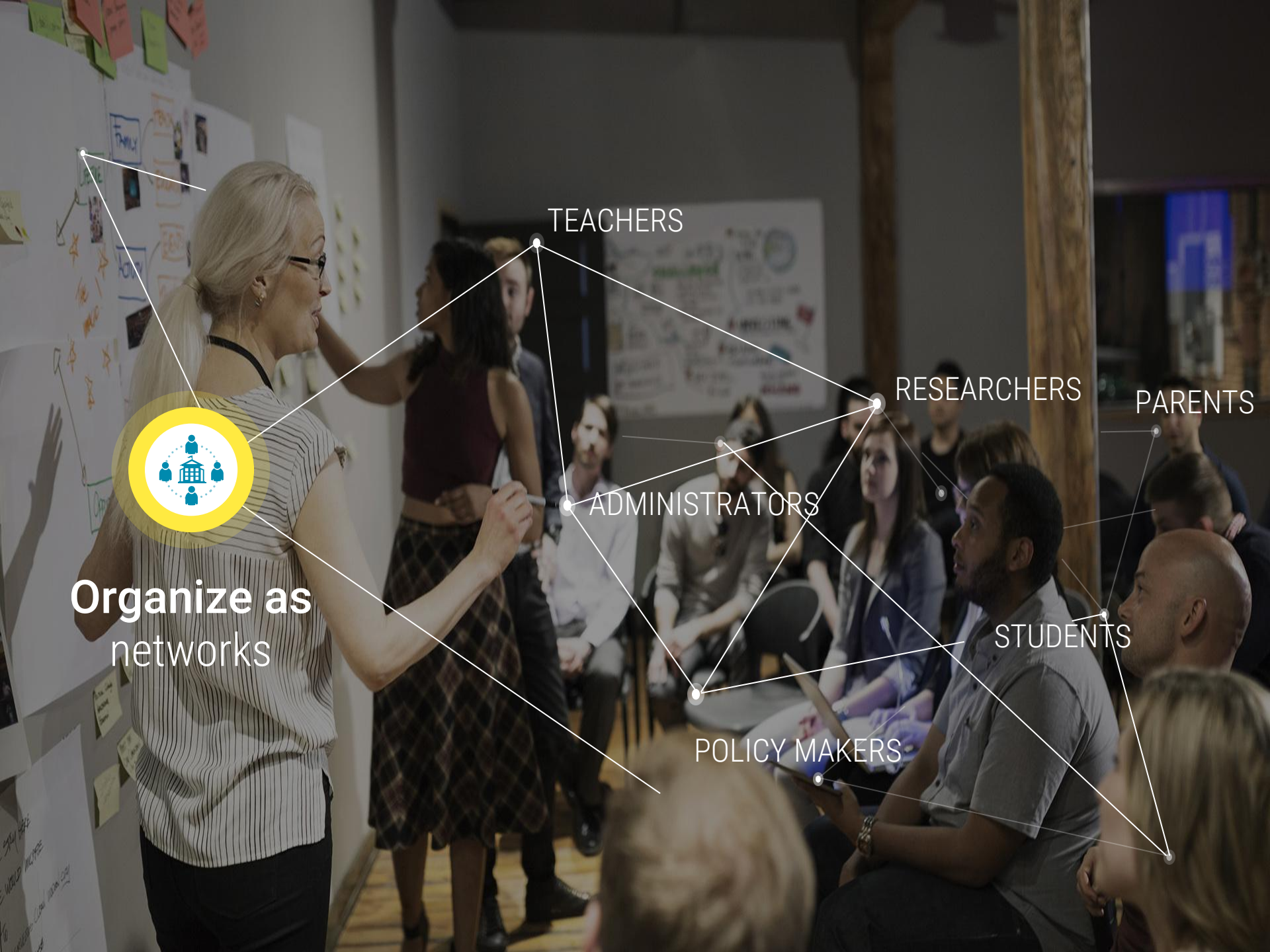
TURN AND TALK

P-D-S-A Ramp



Organize as networks

How can we combine our efforts to make real improvement?


TEACHERS
RESEARCHERS
PARENTS
ADMINISTRATORS
STUDENTS
POLICY MAKERS
Organize as
networks

High Leveraged Problem: Remedial Math Education

Problem: Remedial Math Crisis

60%

of freshman entering community colleges are assigned to developmental math.

Only

20%

of those students continue on to pass a required college level math class.

500,000 STUDENTS

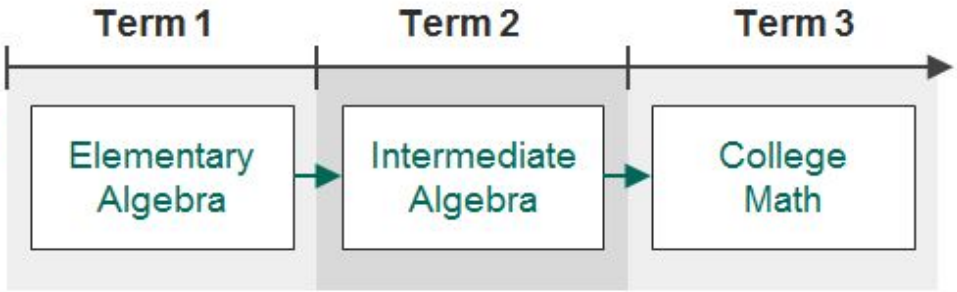
in every cohort will never complete the developmental math requirement.

= 10,000 students

Why are We Getting the Outcomes We are Currently Getting?

Course placement | **Registration** | **Advising** | **Out of class supports**

High School Math



Transfer requirements

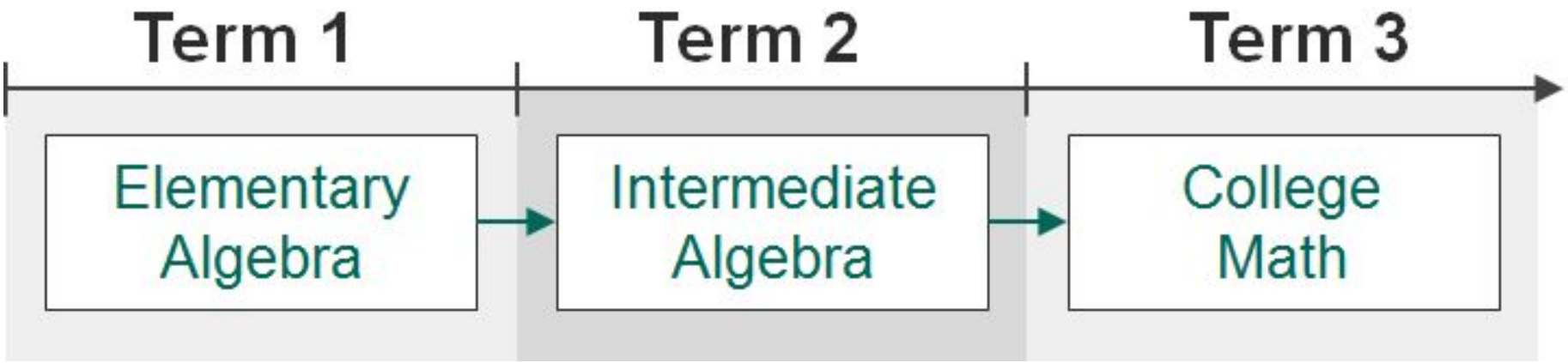
Student beliefs about learning math

$$(x-1)\left(x+3+\frac{3}{x-1}\right)=\left(\frac{4-x}{x-1}\right)(x-1)$$
$$(x-1)(x+3)+3=4-x$$
$$x^2+2x-3+3=4-x$$
$$x^2+3x-4=0$$
$$(x-1)(x+4)=0$$

Faculty beliefs about learning math

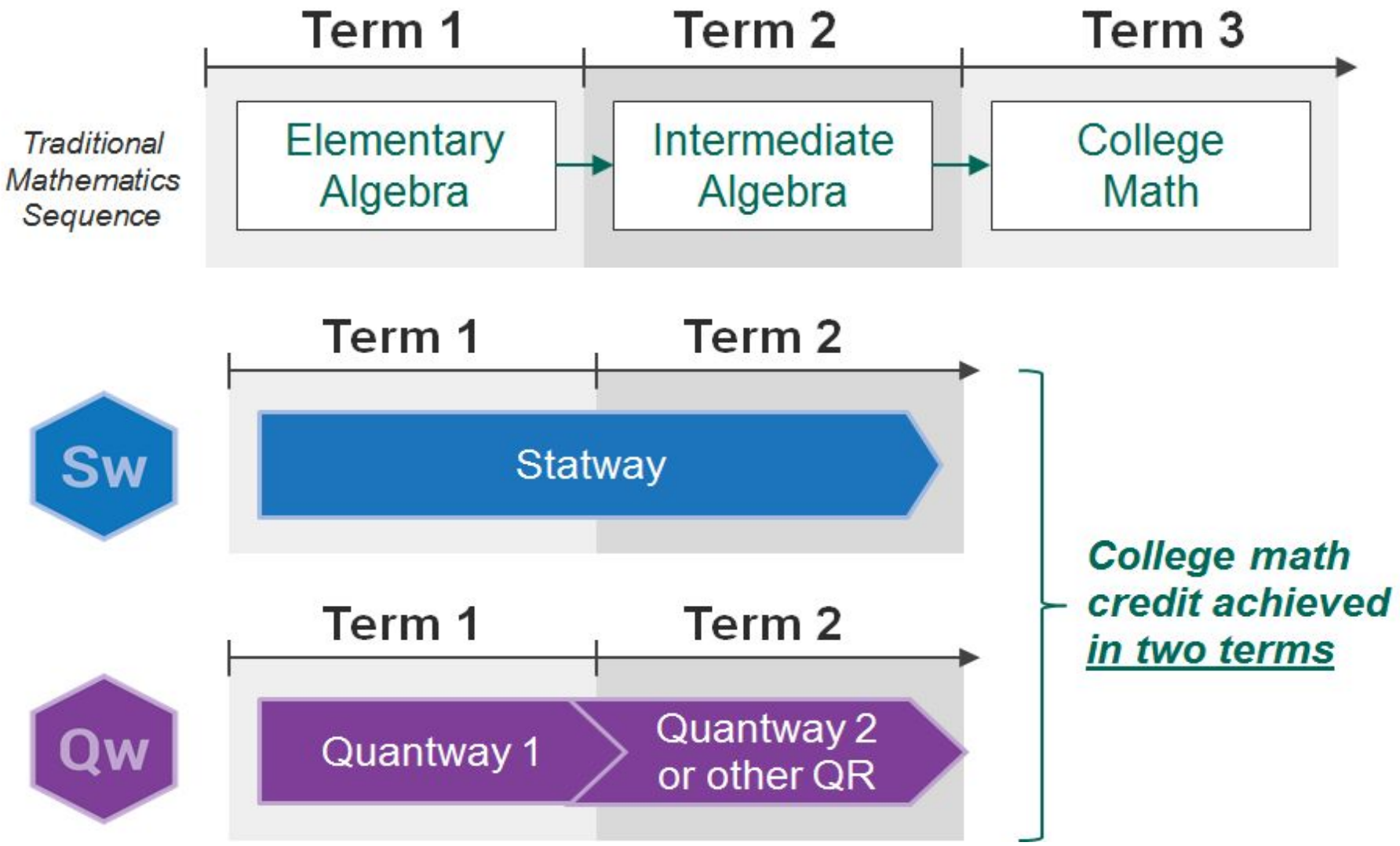
Hiring of faculty | **Faculty assignment** | **Available data** | **Incentives** | **Resources**

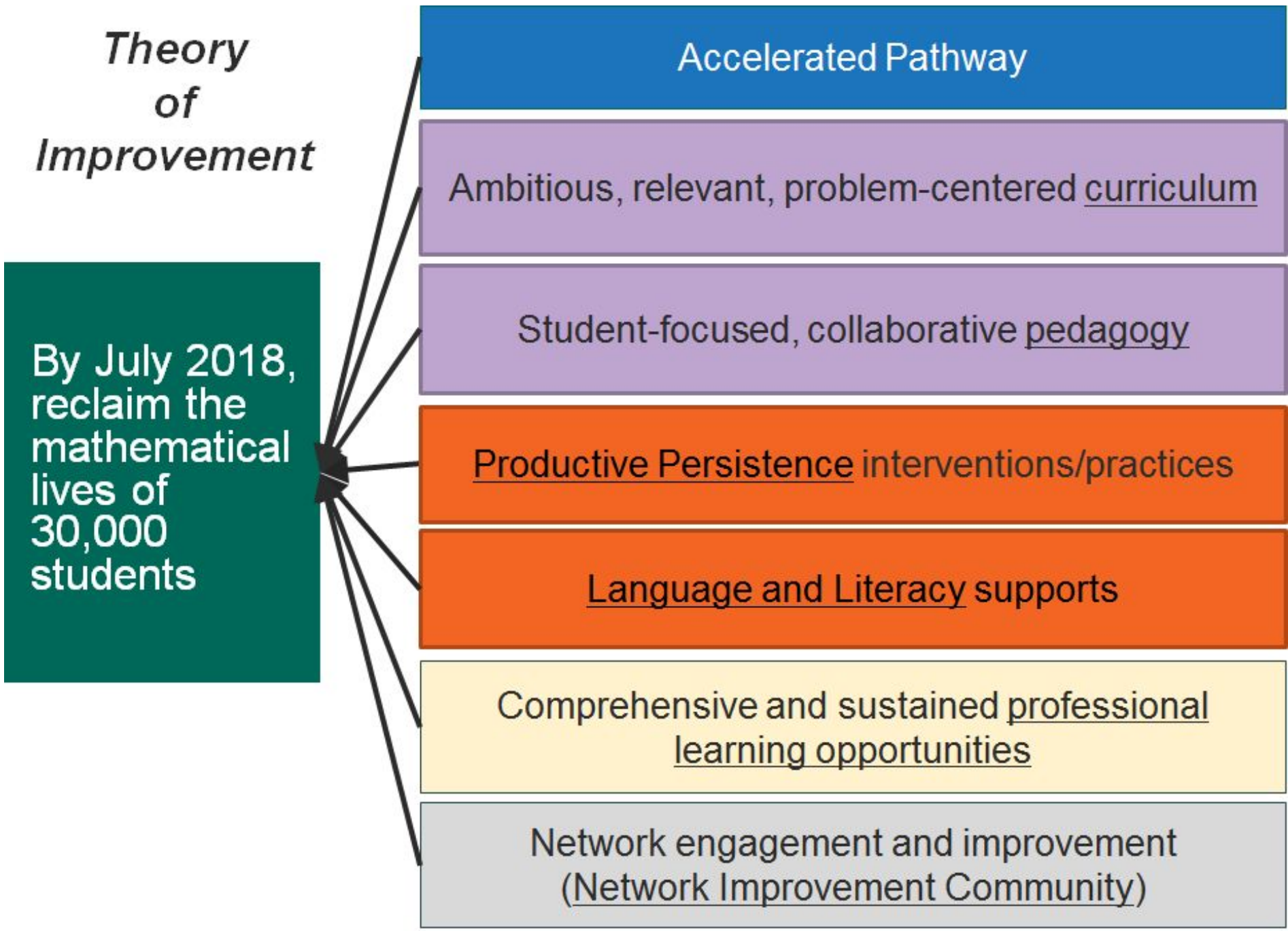
Problem: Traditional Math Sequence



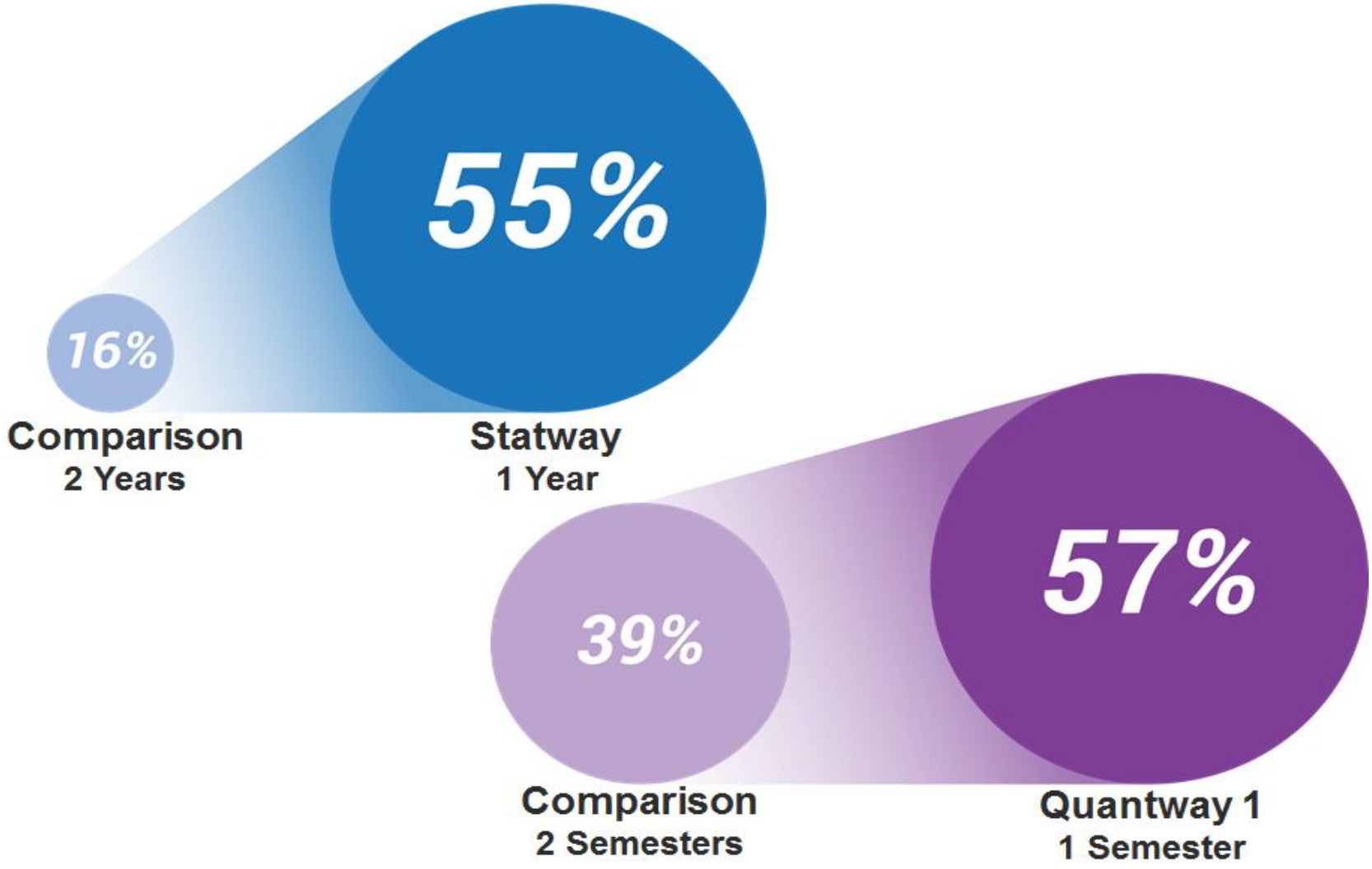
Takes at least 1.5 to 2 years

Solution: Accelerated Pathways



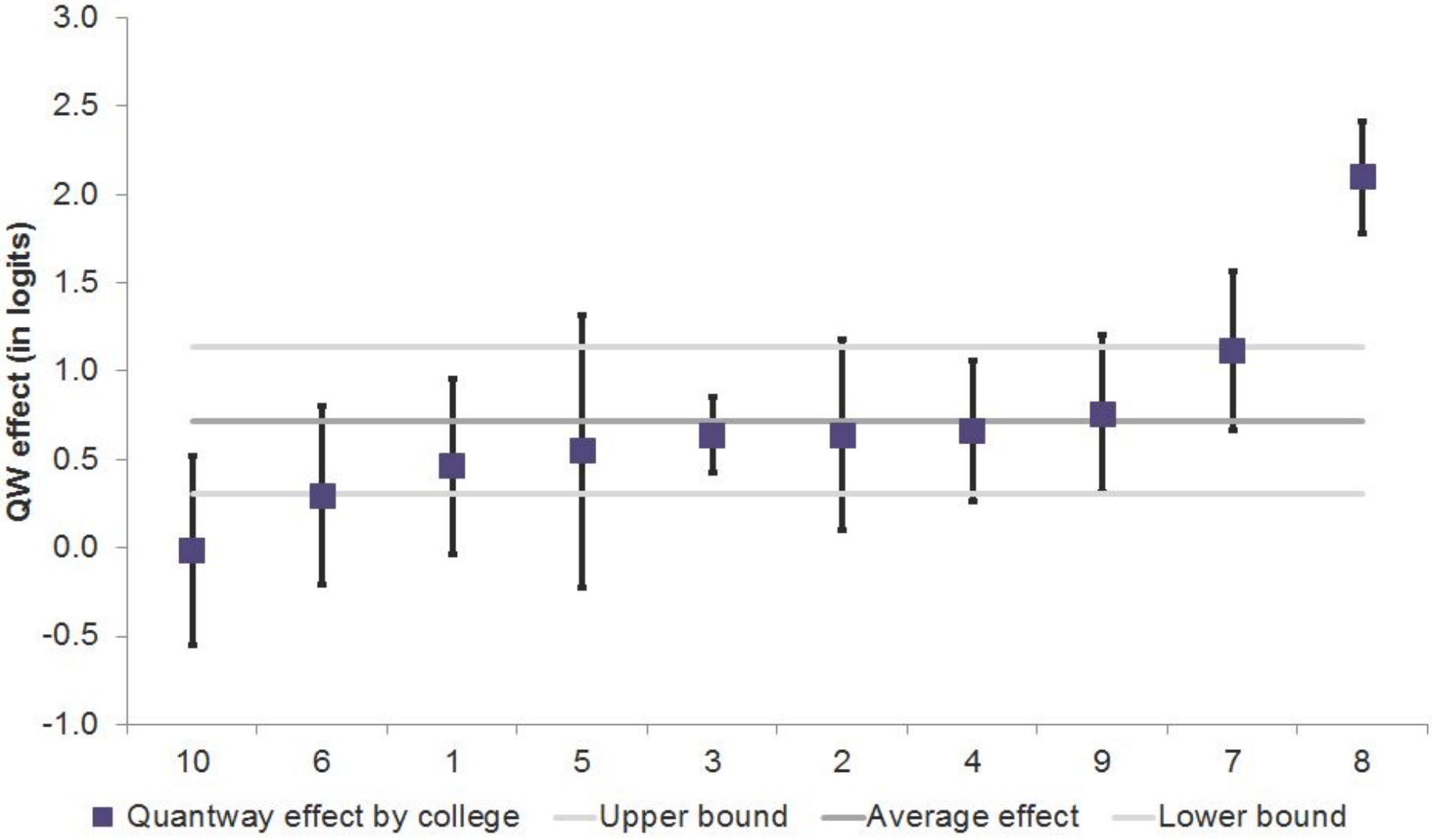

Theory of Improvement
By July 2018, reclaim the mathematical lives of 30,000 students
Accelerated Pathway
Ambitious, relevant, problem-centered curriculum
Student-focused, collaborative pedagogy
Productive Persistence interventions/practices
Language and Literacy supports
Comprehensive and sustained professional learning opportunities
Network engagement and improvement (Network Improvement Community)

Pathways Success

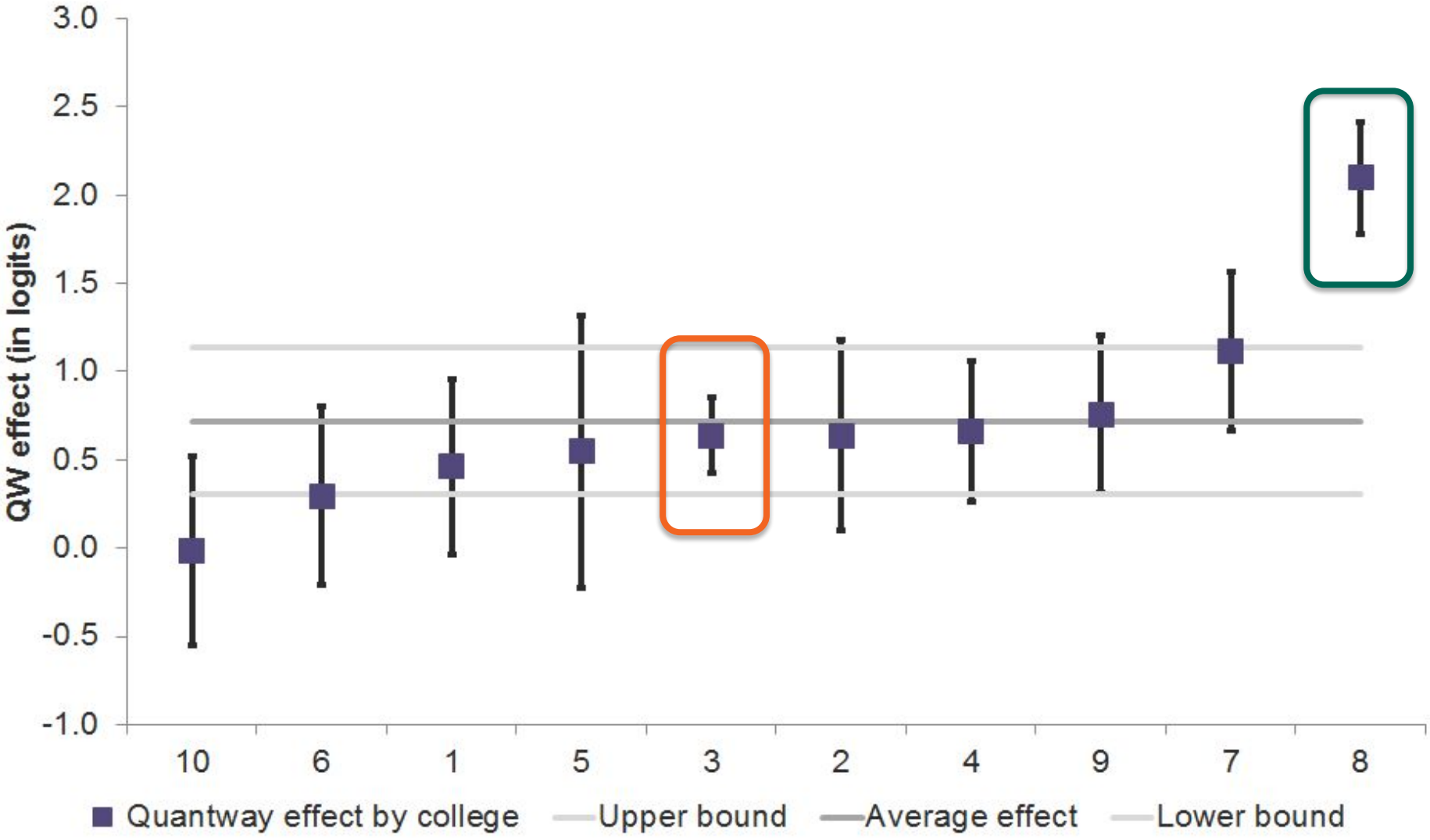


Learning from Variation

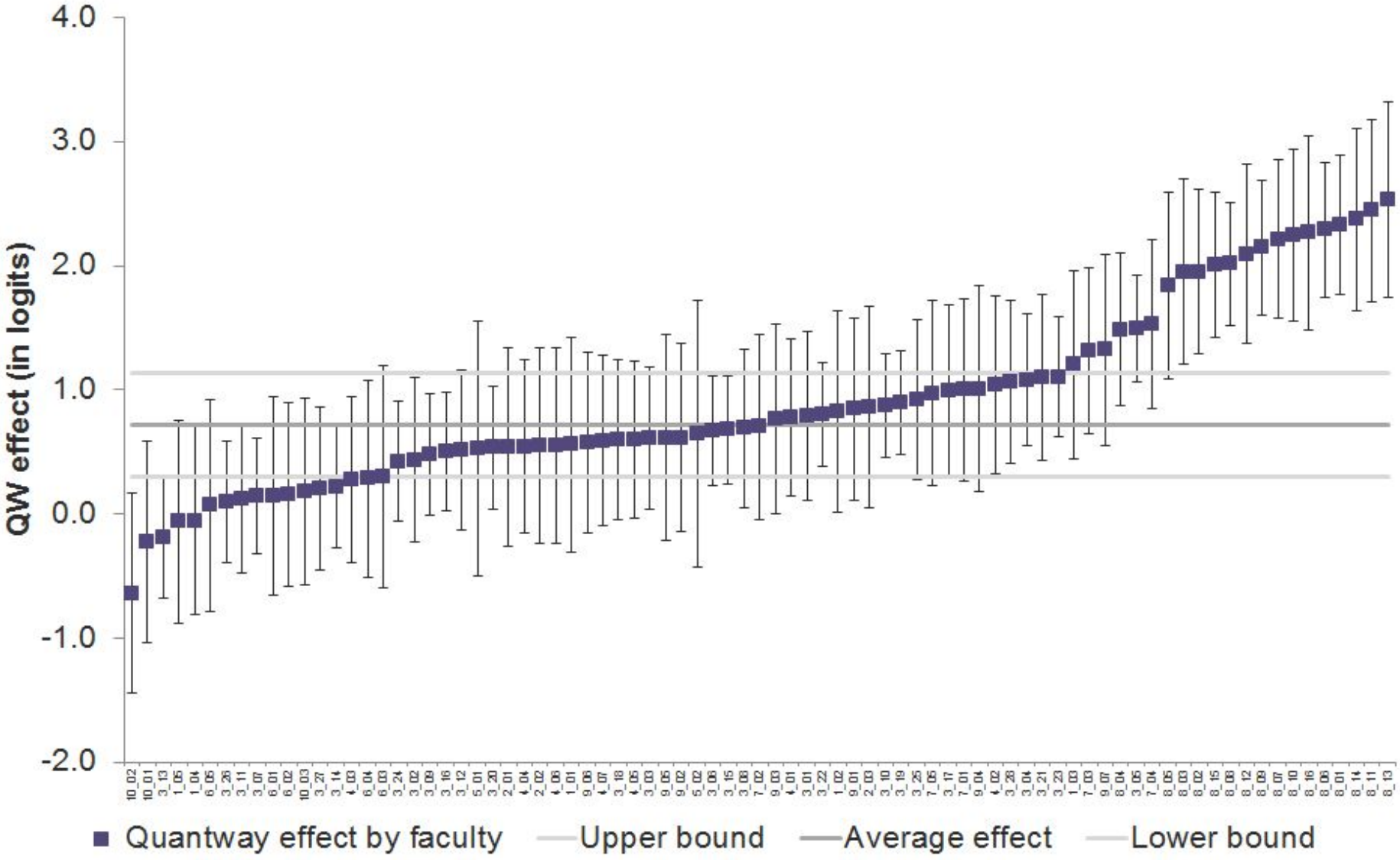
Effects Varied at College Level



Effects Varied at College Level



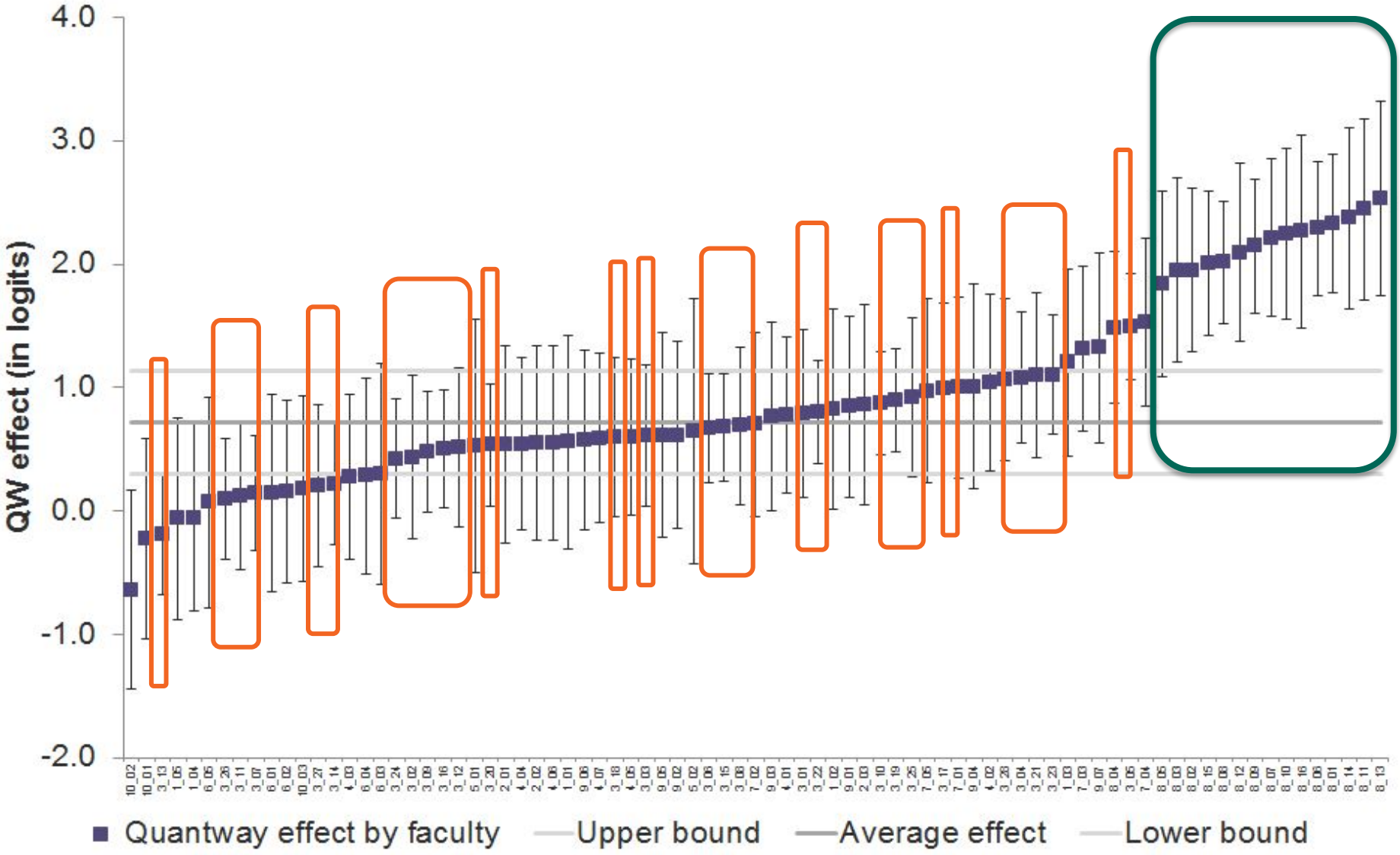
Effects Varied at Instructor Level



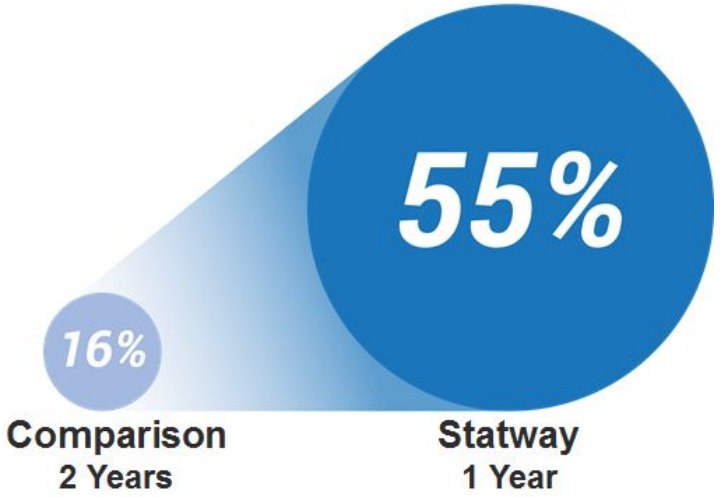
Questions to Yourself

- What do you notice?
- Any actionable insight?
- What action would you take as a next step?
- What else do you want to know to create action items?

Effects Varied at Instructor Level



Data Exercise (Statway Example)

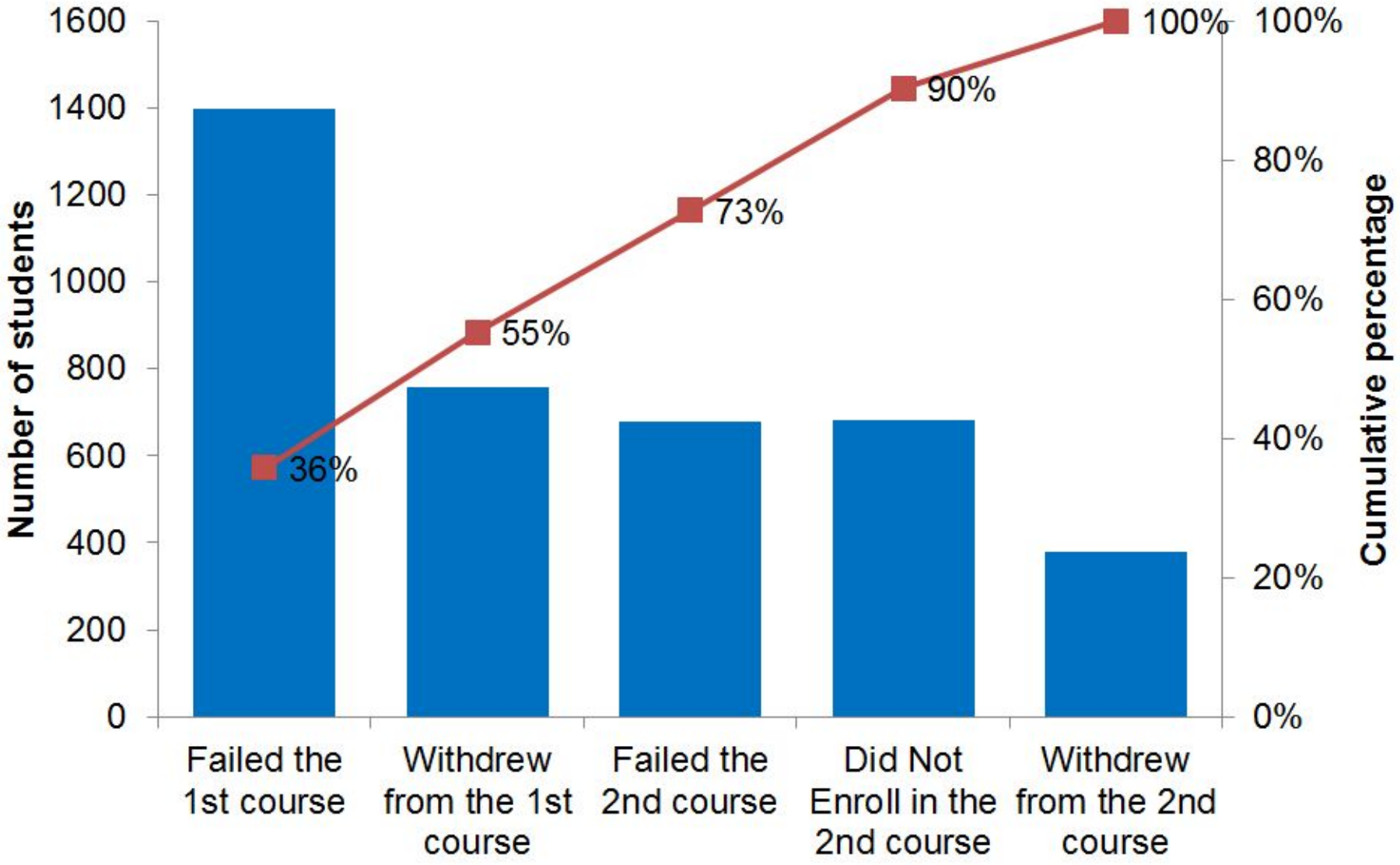


However, there is still room for improving student outcomes

Statway is designed as a 2-course sequence, one course per semester (e.g., Fall to Spring semester)

Data on the other 50% of “non-success” students to illuminate any failure patterns (go to the next slide).

Reasons for Failing the Course Sequence



Questions to Yourself

- What do you notice?
- Any actionable insight?
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Pareto Principle

Five Stages of Grieving over Outcome Data

1. **Denial:** The data are wrong.
2. **Anger:** Why are they picking on me? Don't I have enough to do already?
3. **Bargaining:** My students are needier than everyone else's, my school is different, we have more to work on, I don't agree with the data definitions, etc.
4. **Depression:** I can't do anything about it anyway….
5. **Acceptance:** OK…what can I do to improve the outcomes?

Adapted from Dan Ellsbury, MD, Pediatrix Medical Group

NILS

NILS Overview

Developmental Lifecycle of a NIC

Phase 1 (3-12 mos.)

CHARTERING

1. Build initiation team
2. Build NIC relationships
3. Define and analyze problem in context
4. Define theory of practice
5. Train improvement science capacity
6. Define outcome measures and collect baseline data

Phase 2 (1-2 yrs.)

NETWORK LEARNING

1. Build analytics infrastructure
2. Build improvement science capacity
3. Build NIC collaboration infrastructure
4. NIC knowledge generation
5. Aggregate and synthesize learning
6. Dissemination of learning

NILS

Phase 3 (1-xx yrs.)

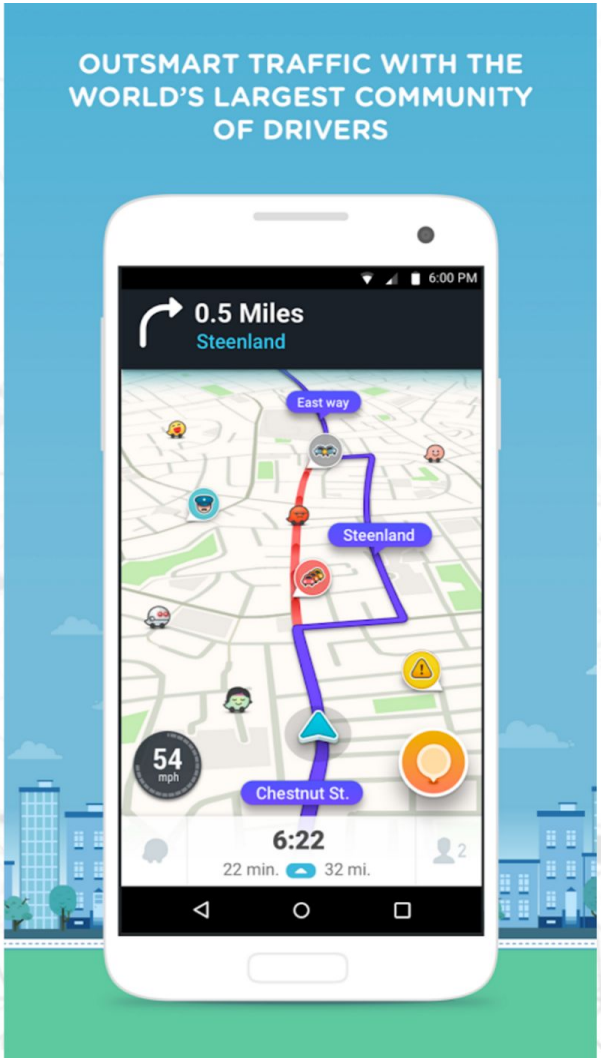
SPREAD

1. Self-driven growth
2. Content management
3. Machine learning driven recommendations and cross-NIC health report


CARPOOLS
ONLY
ELECTRONIC TOLL
PASS AHEAD
TOLL VIOLATIONS
$ 100 MINIMUM FINE


Map
Satellite
San Francisco
Oakland
Daly City
San Mateo
Palo Alto
Sunnyvale
San Jose
The south bay
is heating up
7:02 AM
Google

An Analogy

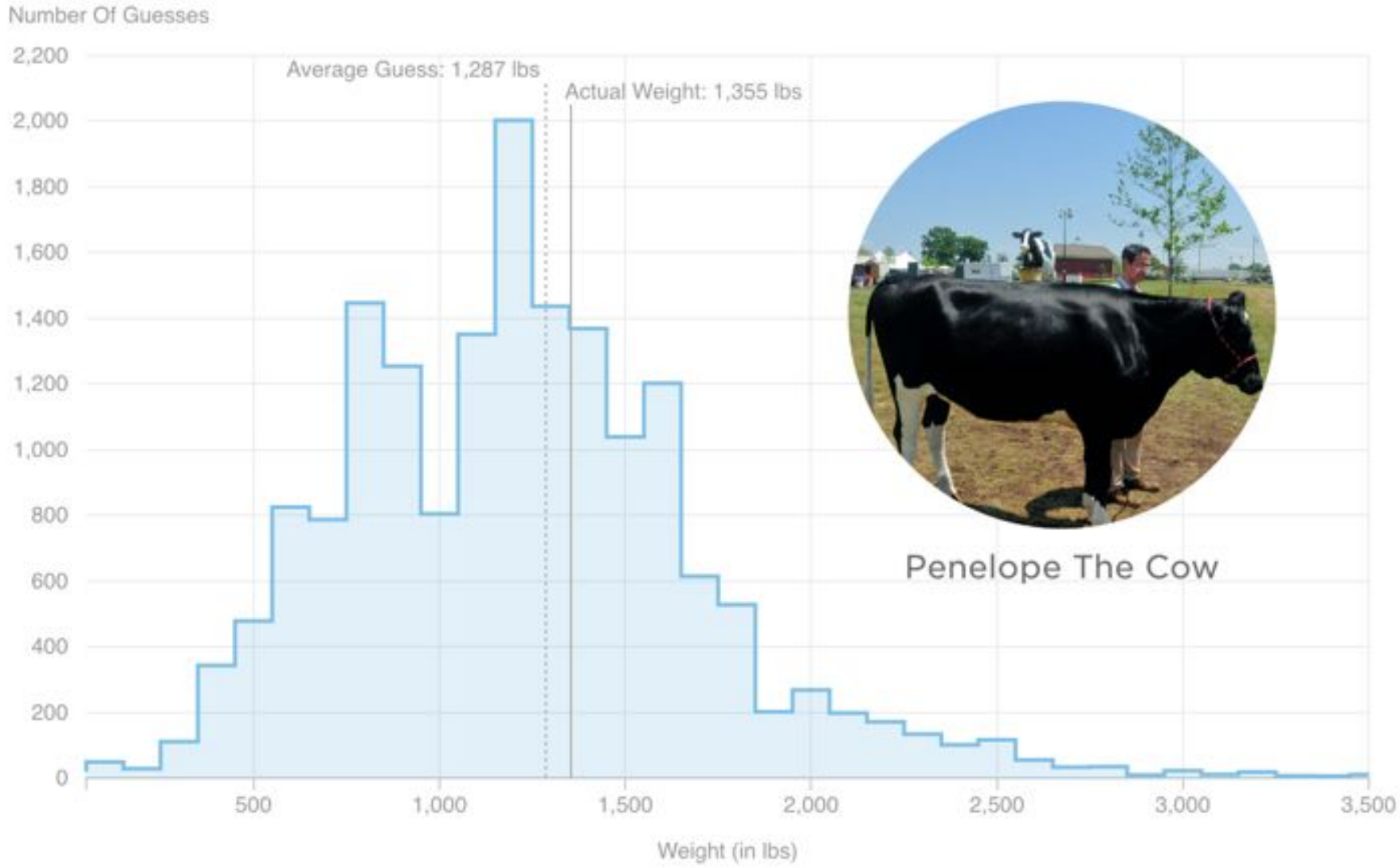

OUTSMART TRAFFIC WITH THE WORLD'S LARGEST COMMUNITY OF DRIVERS
6:00 PM
0.5 Miles
Steenland
East way
Steenland
54
mph
Chestnut St.
6:22
22 min.
32 mi.

The Power of Networks
Meet Penelope...

How Much Does This Cow Weigh?

17,205 People Guessed The Weight Of A Cow. Here's How They Did.

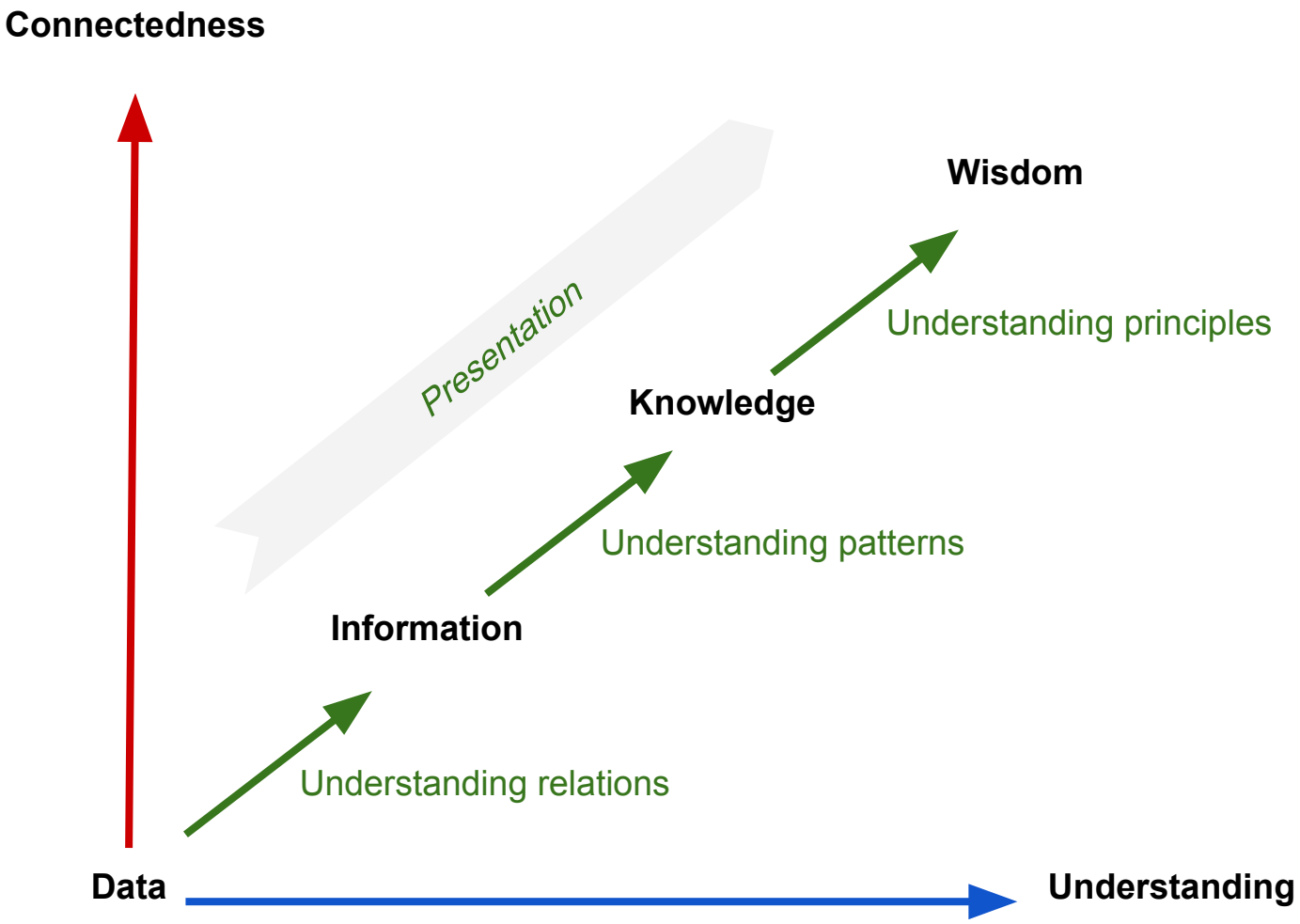
(All People)



Source: The Internet.

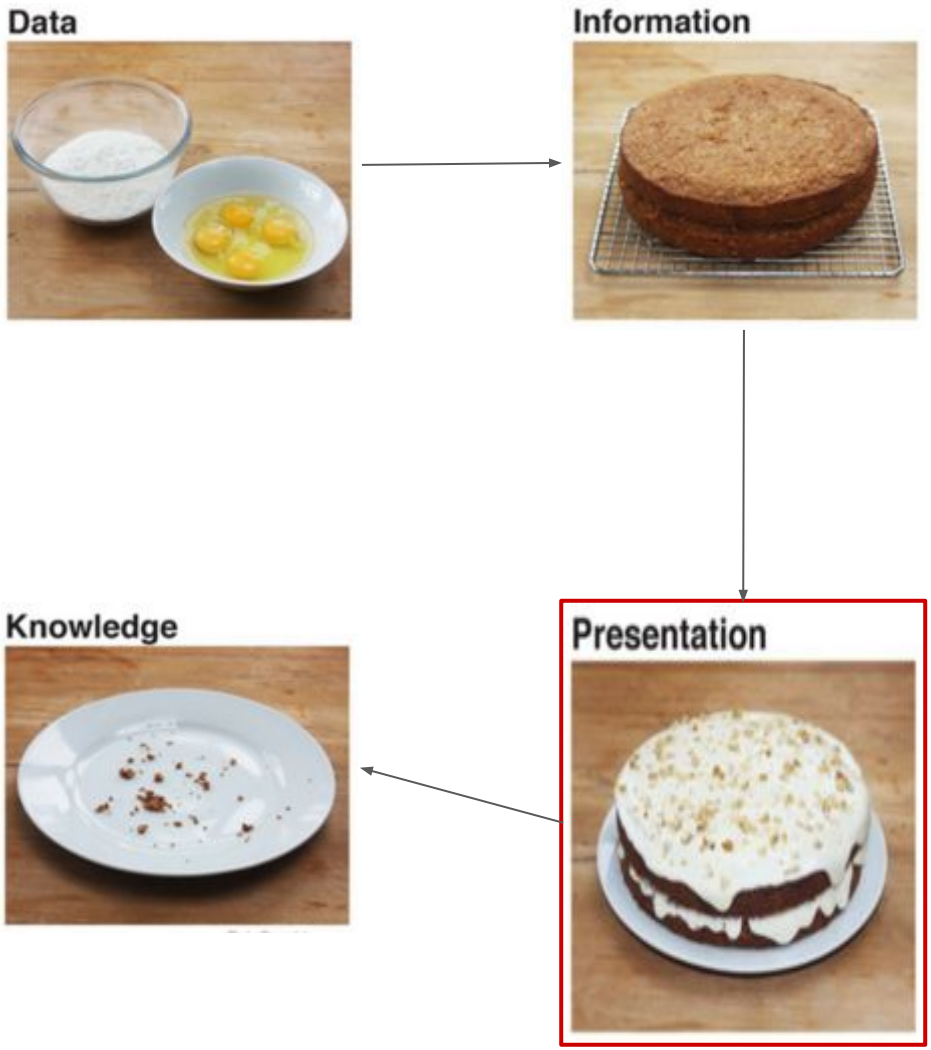
Credit: Quoctrung Bui/NPR

Key Learning

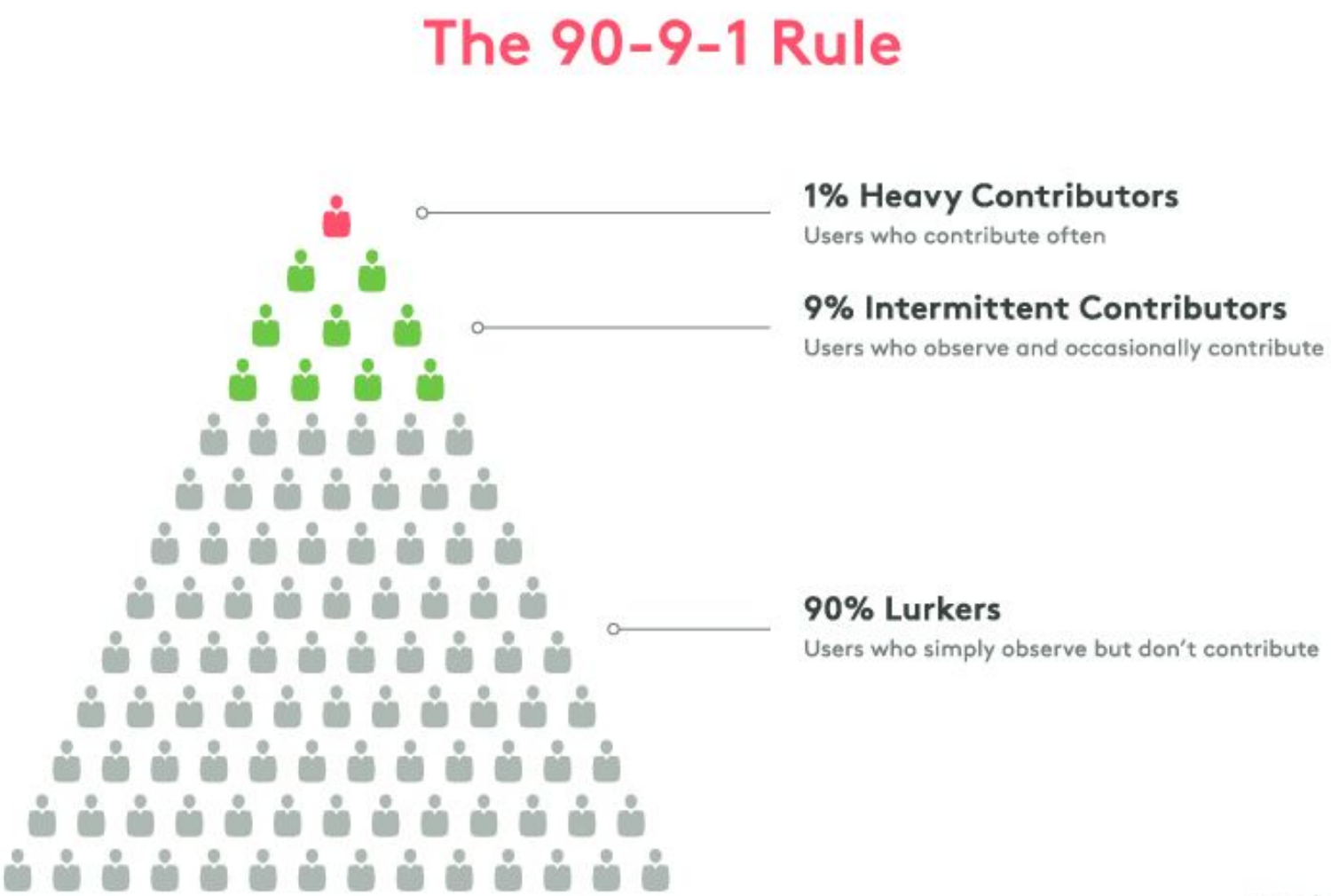


Key Learning

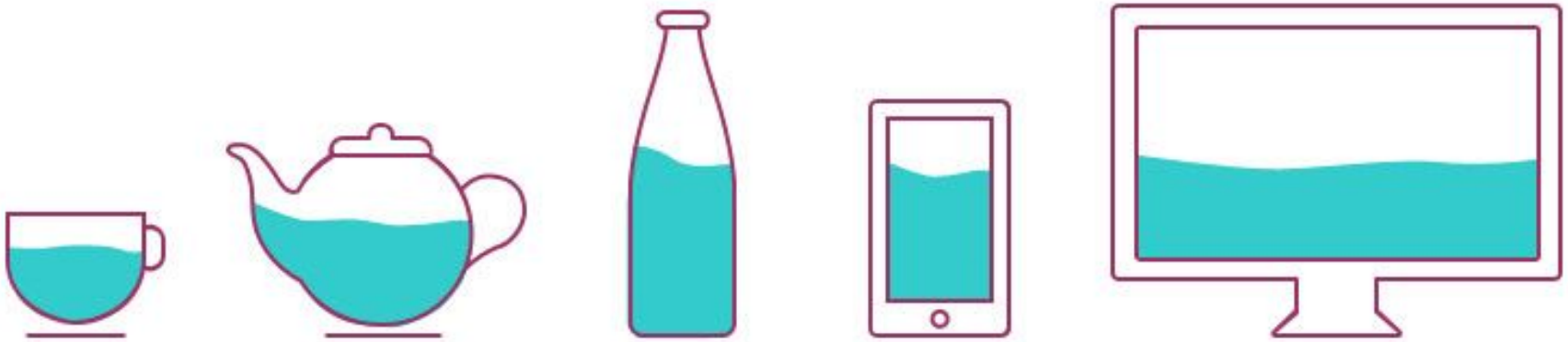
Marie Antoinette
(1755-1793)



Key Learning

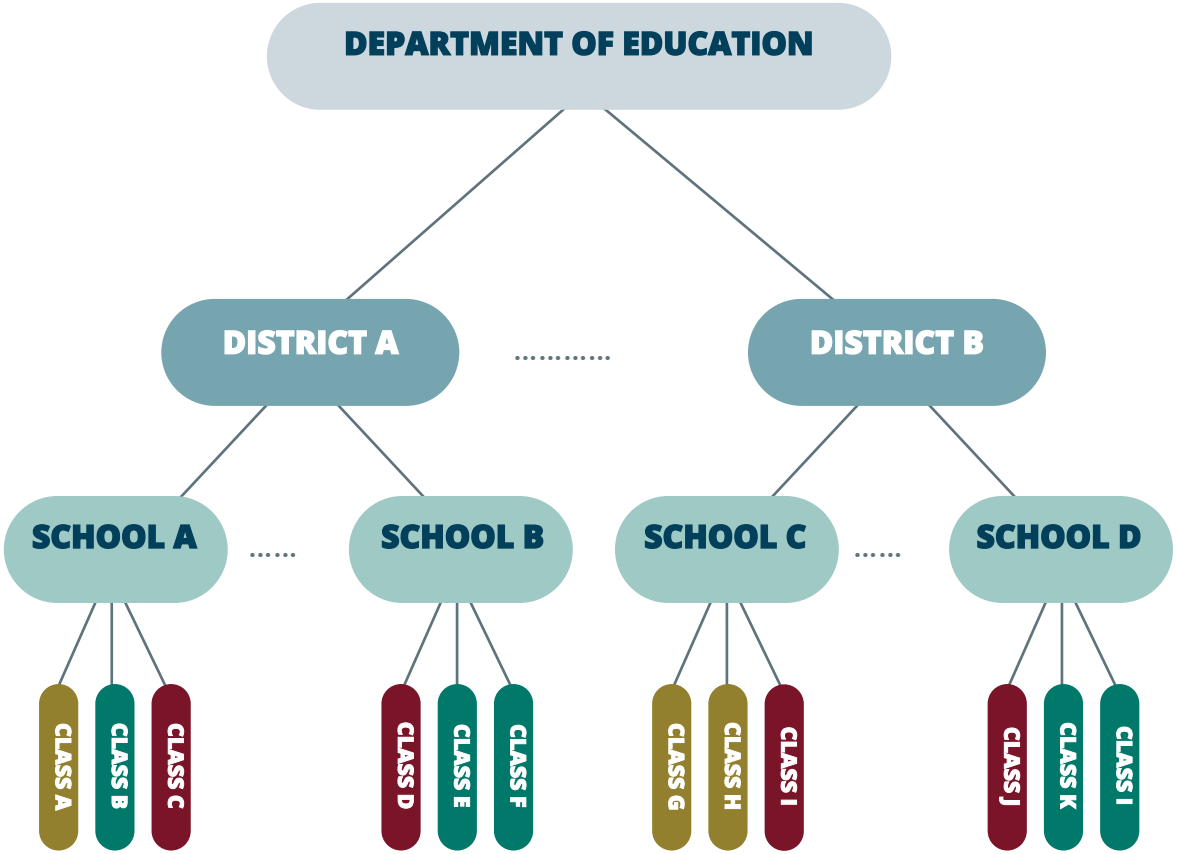


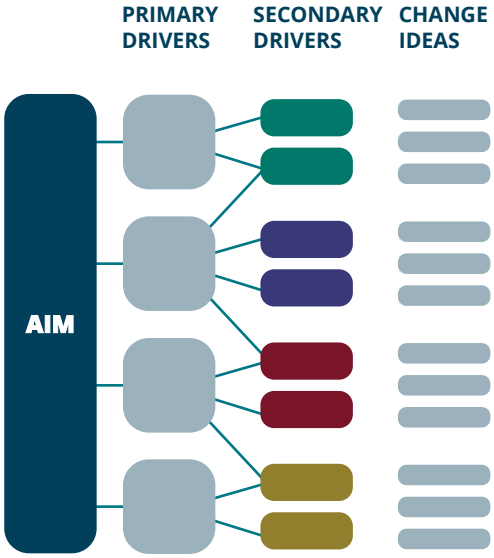
Key Learning



Frictionless Experience For Web And Mobile

Dimensions of Learning*





* Based around Driver Diagram

Carnegie Foundation for the Advancement of Teaching

Networked Improvement Learning & Support Platform:

FEATURES


Collaborative


Mobile


Iterative


Intuitive

ACTIONS

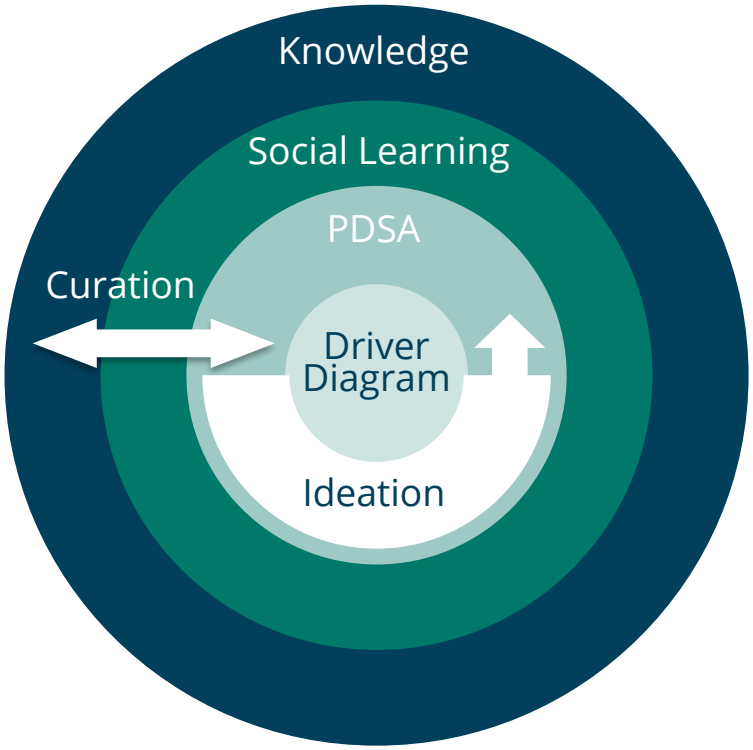

Test Ideas

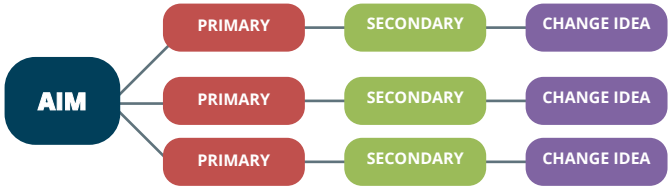
Collect Data


Implement Changes


Share Learning

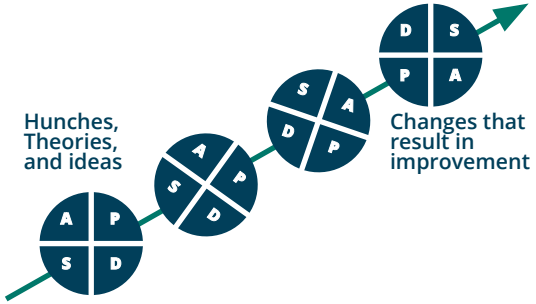
Learning from N.I.L.S





Driver Diagram

PDSA Cycles



Improvement Ramp

Social Learning

Knowledge

Curation

Ideation

N.I.L.S. Driver Diagram

Primary Driver

Aim Statement

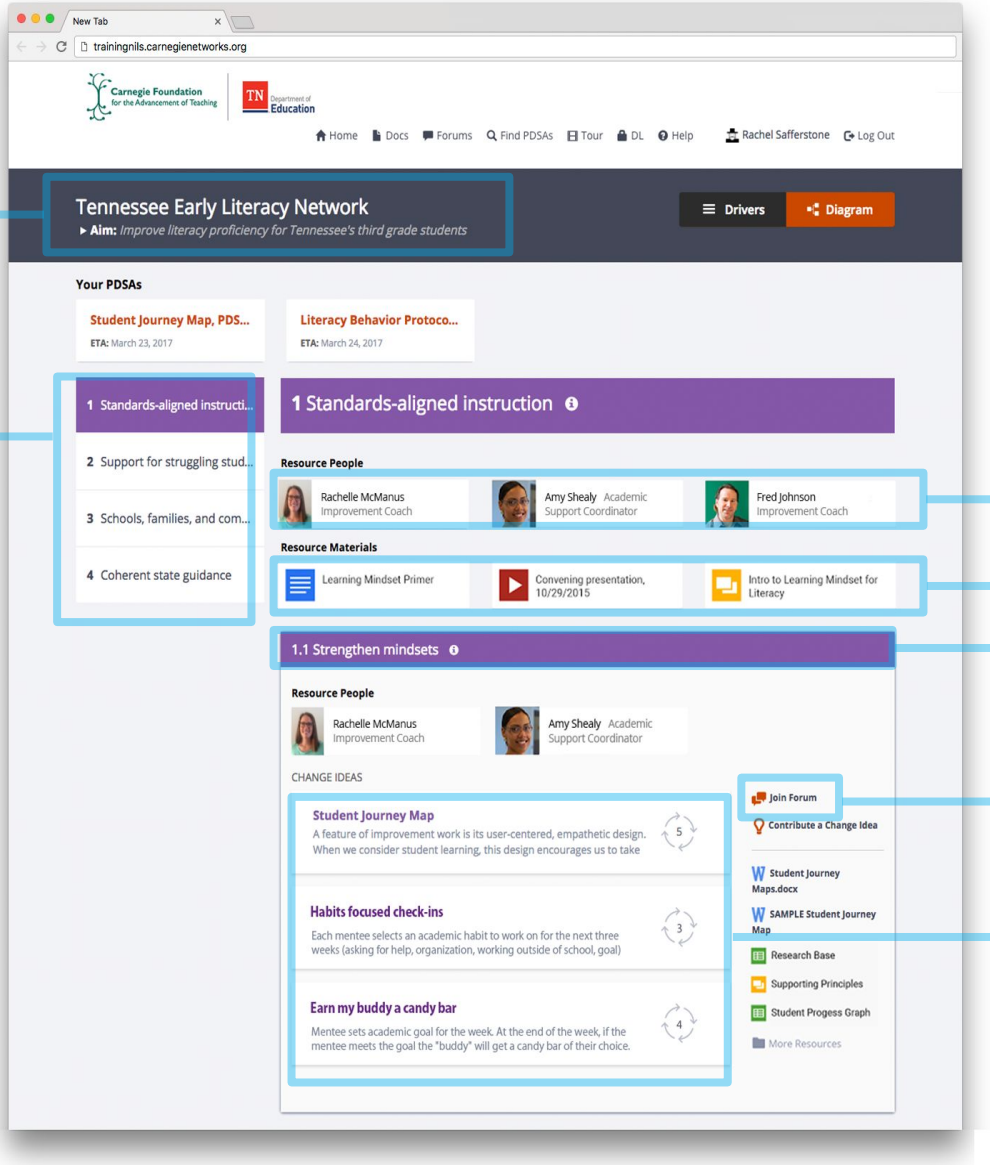
Secondary Driver

Change Ideas

N.I.L.S. Driver

Aim Statement

Primary Drivers



Experts

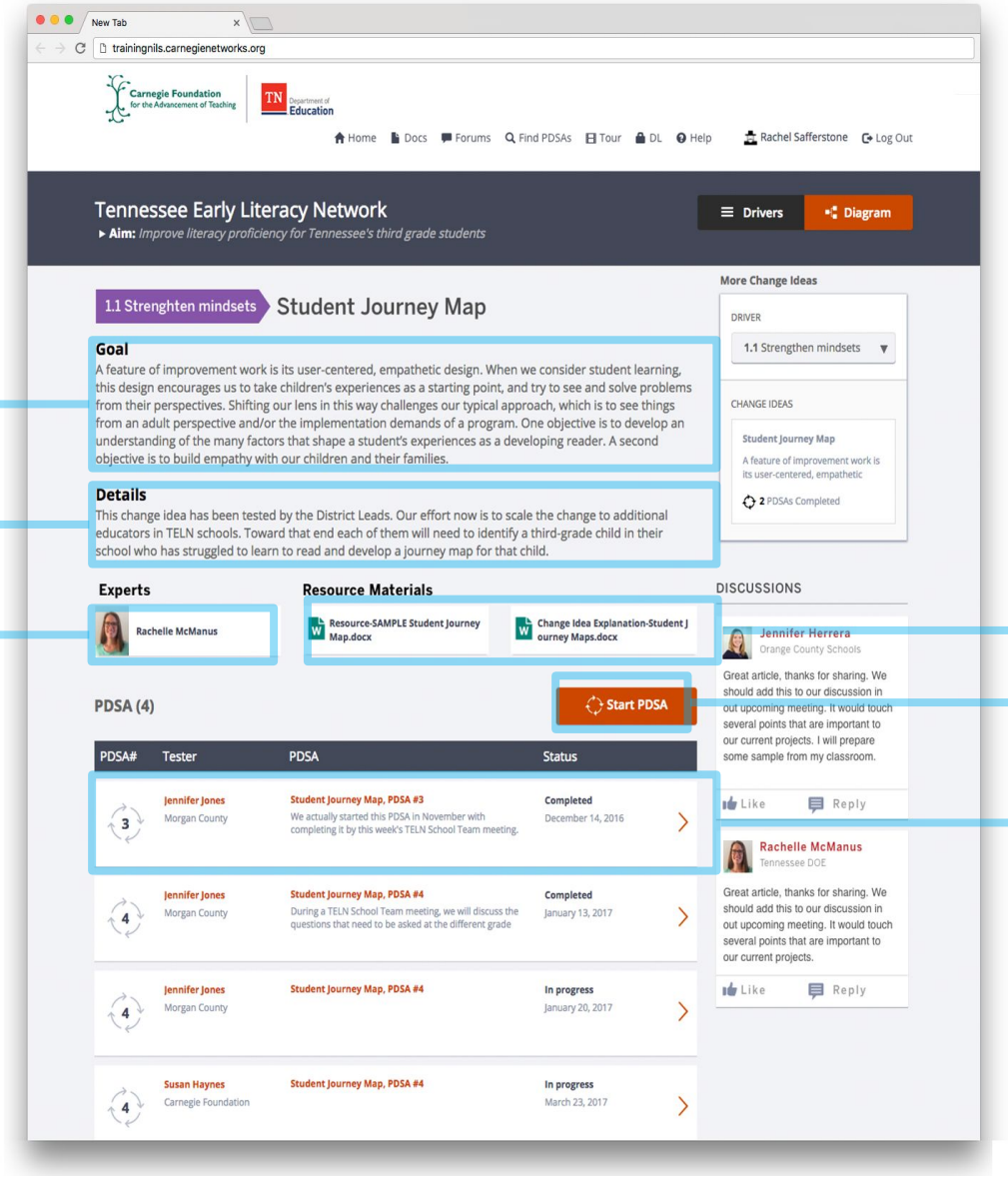
Resources

Secondary Drivers

Forums

Change Ideas

N.I.L.S. - Change Idea



Goal

Details

Experts

Resources

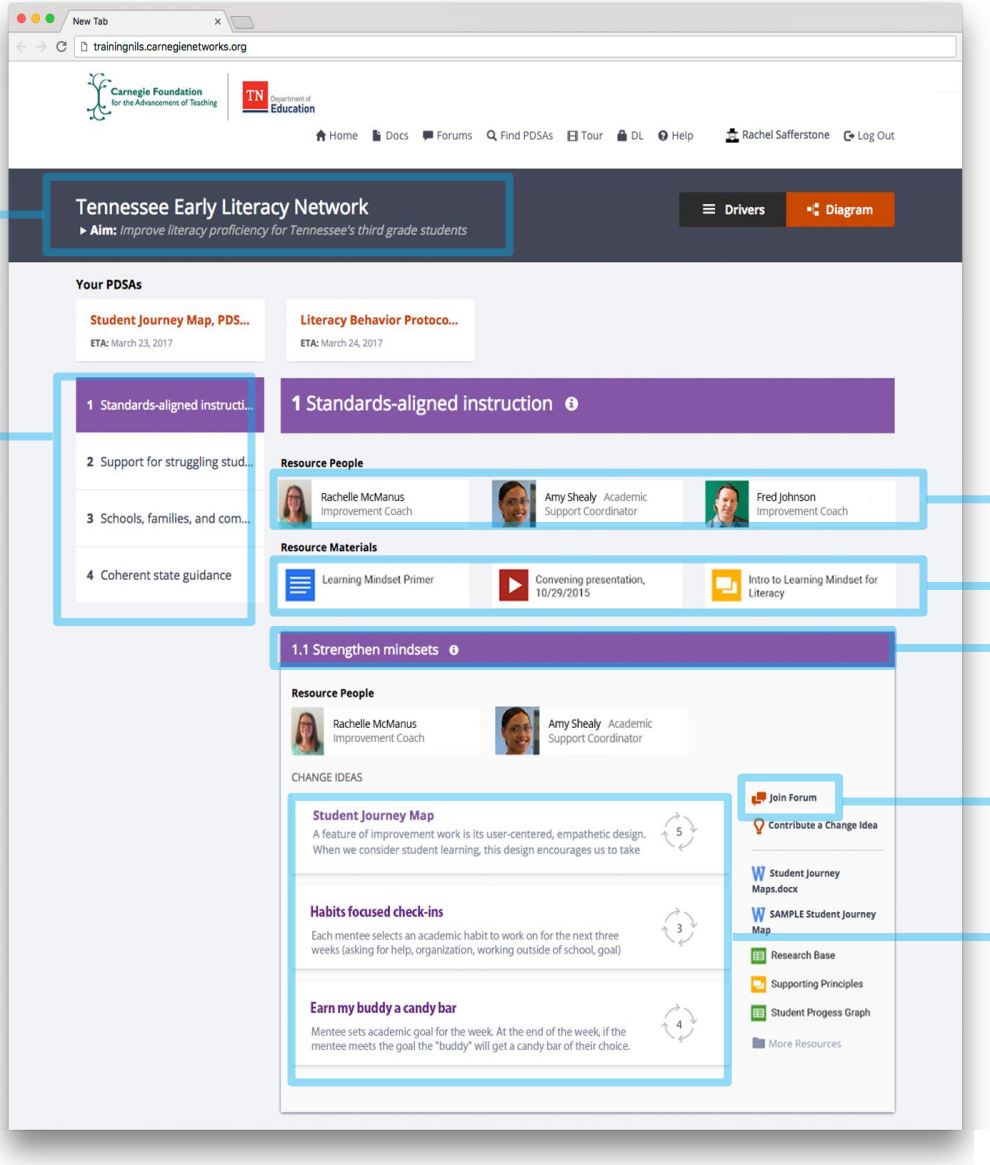
Start PDSA

Current PDSA

N.I.L.S. Driver

Aim Statement

Primary Drivers



Experts

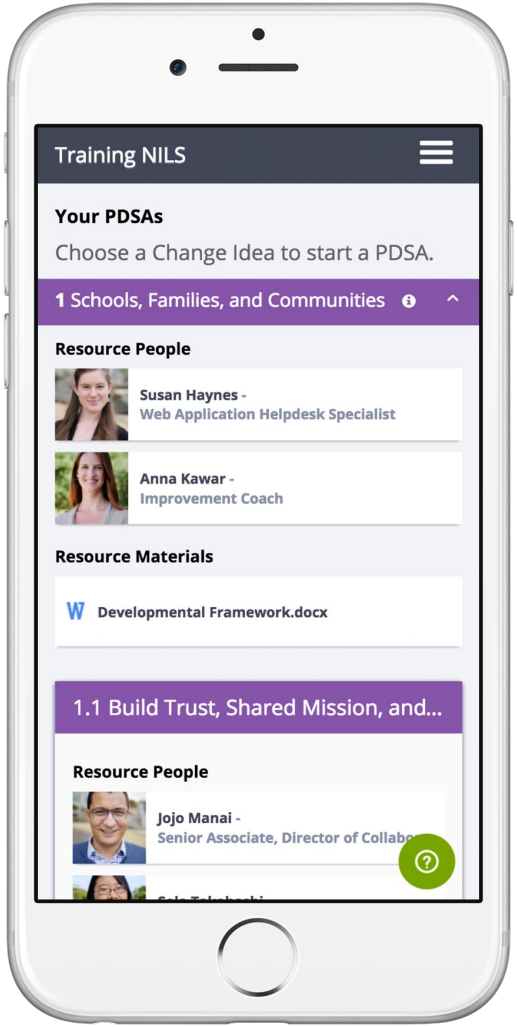
Resources

Secondary Drivers

Forums

Change Ideas

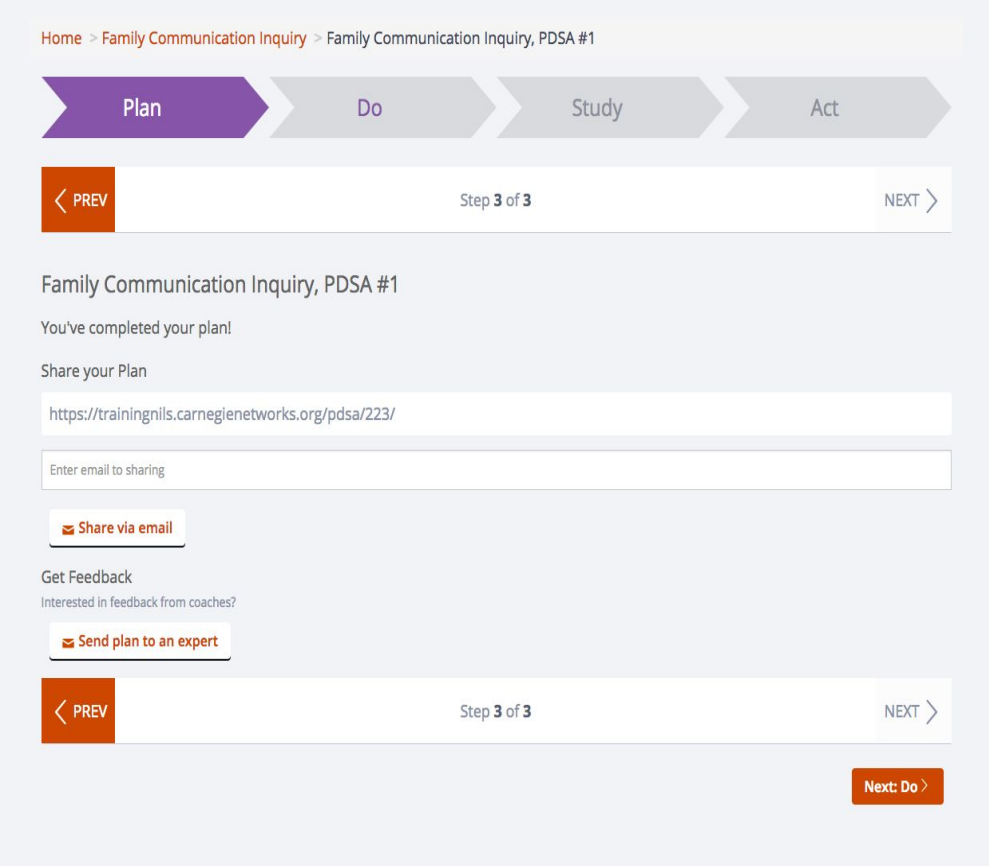
Mobile N.I.L.S.



Plan-Do-Study-Act Cycle (PDSA)

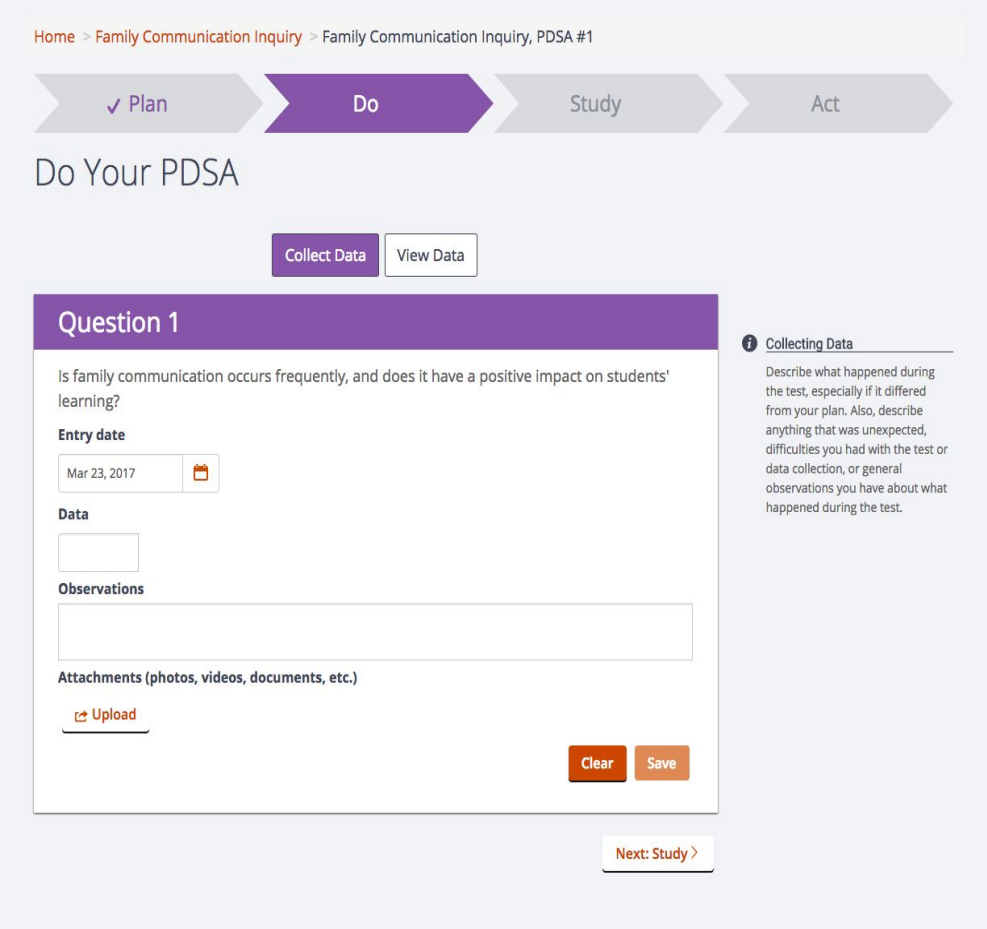
A PDSA cycle is the basic method of inquiry in improvement research. It's a pragmatic scientific method for iterative testing of changes in complex systems.

Running a PDSA



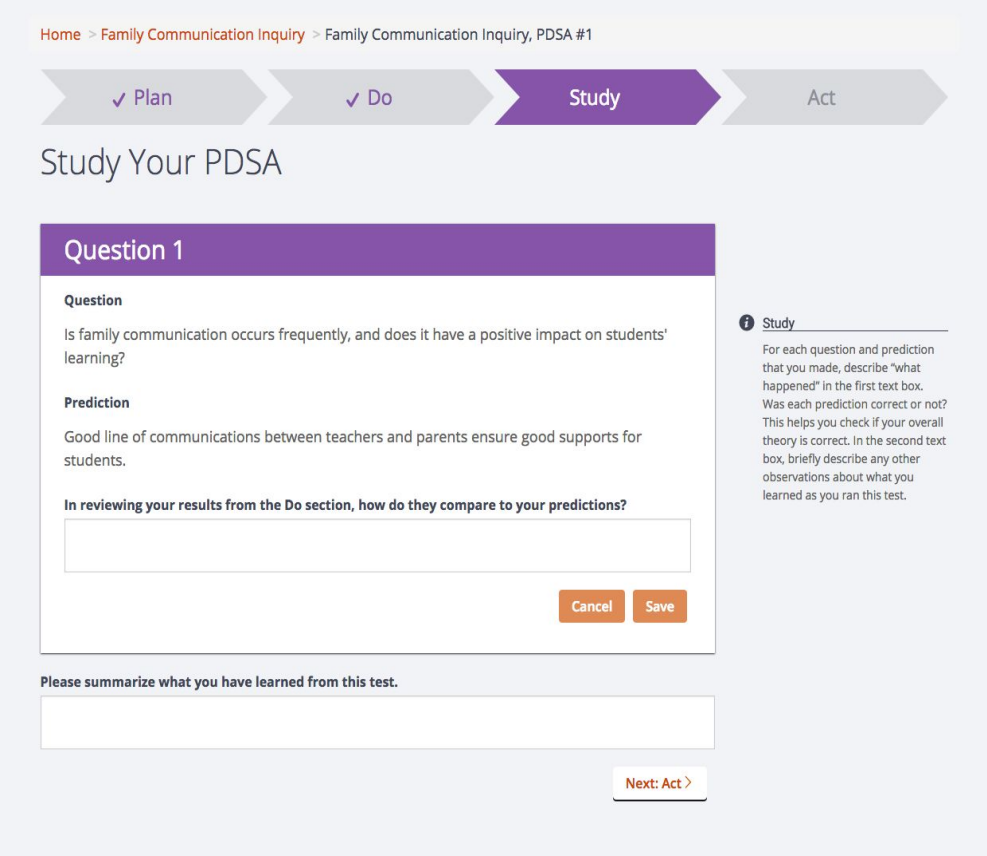
- Learning questions
- Predictions
- Data requirements
- Completion date
- Logistics
- Uploading artifacts
- Sharing PDSAs

Running a PDSA



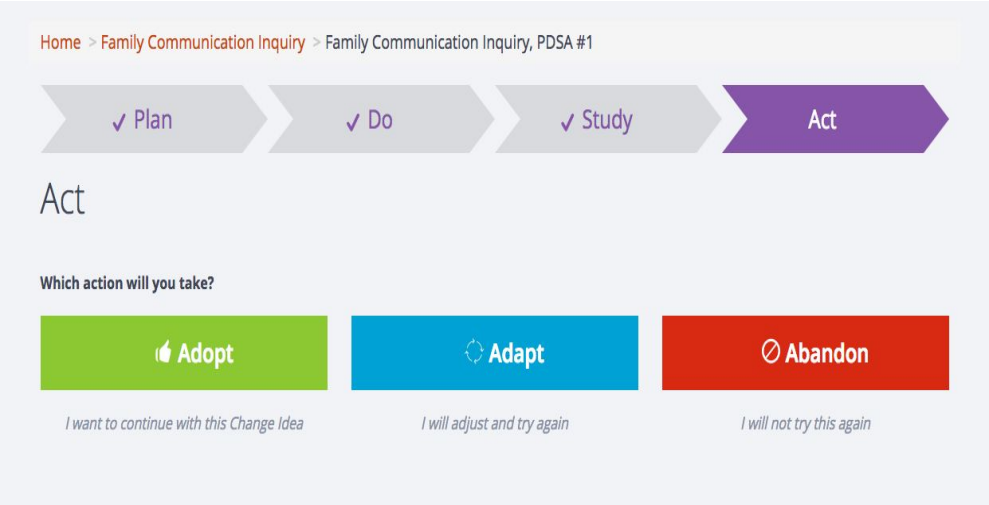
- **Observations**
- **Uploading artifacts**

Running a PDSA



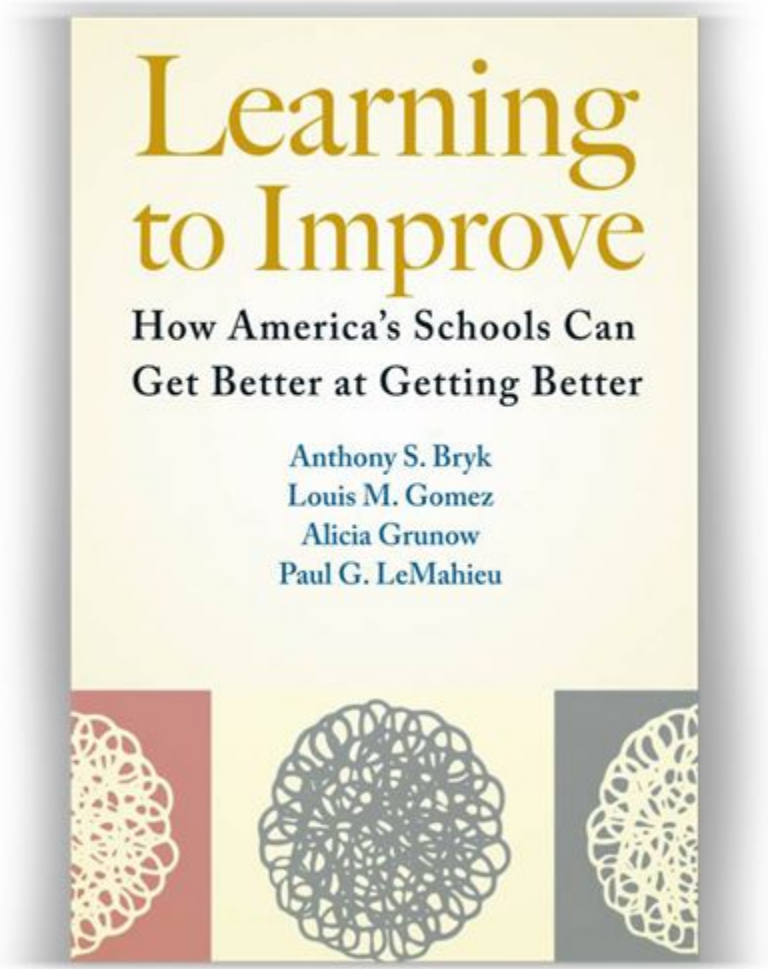
- **Comparing predictions to observed results**

Running a PDSA



- **Adopt a change idea**
- **Adapt a change idea**
- **Abandon a change idea**

Learn more about Improvement in Action!



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#PLSummit

What questions do you have?

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THANK YOU

bit.ly/PLSWorkshopSurvey