FAST Problem Solving for the Frontline

Solving Problems Rapidly….but not Recklessly

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Problem Solving is Hard!

Watch me on YouTube

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What is a “Problem?”

Definition of PROBLEM

Merriam-Webster

1 **a :** a question raised for inquiry, consideration, or solution

2 **a :** an intricate unsettled question

b : a source of perplexity, distress, or vexation

A PROBLEM **is**

…a *gap* between an *actual* condition and a *standard* (or target condition) that we are striving for

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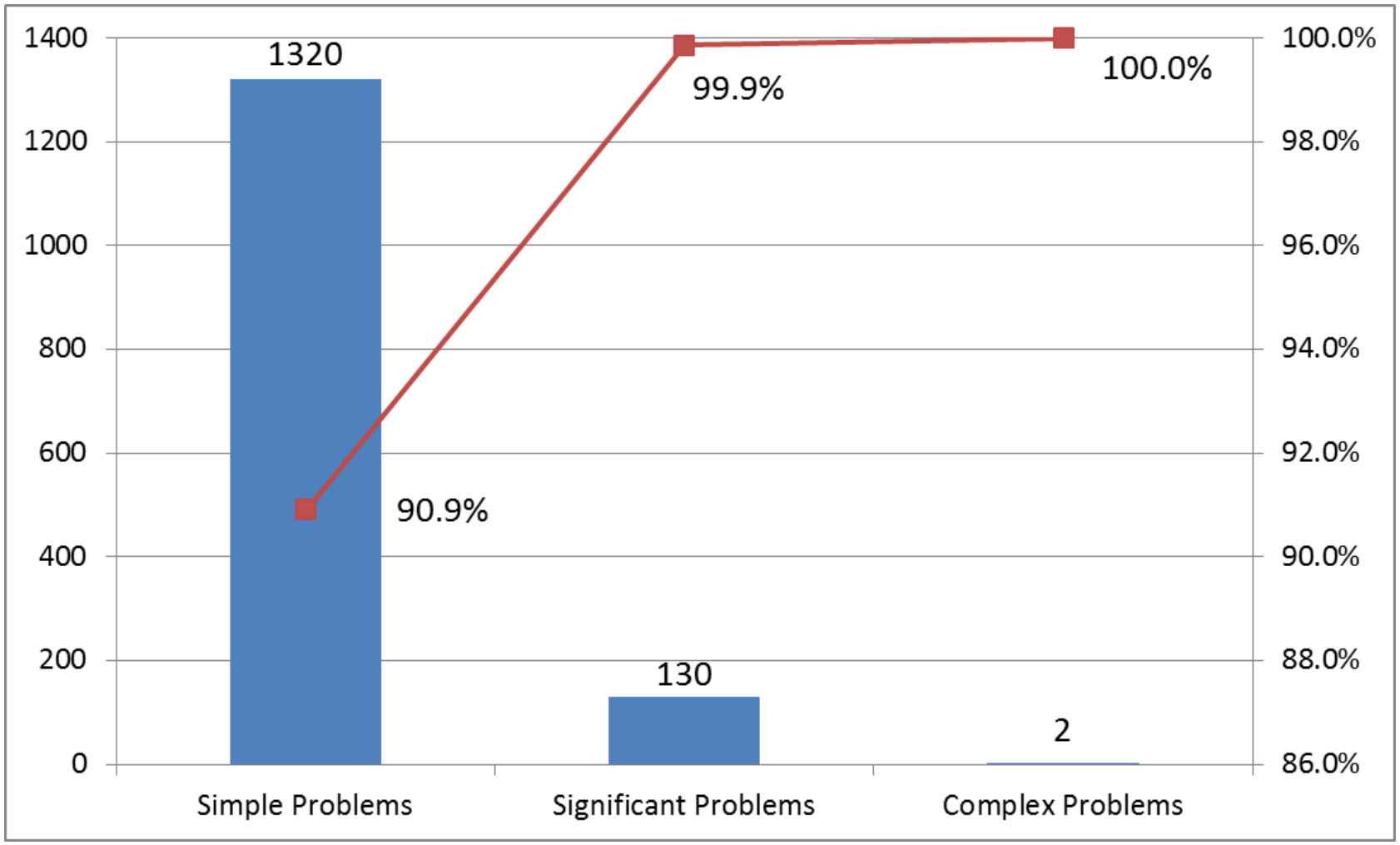
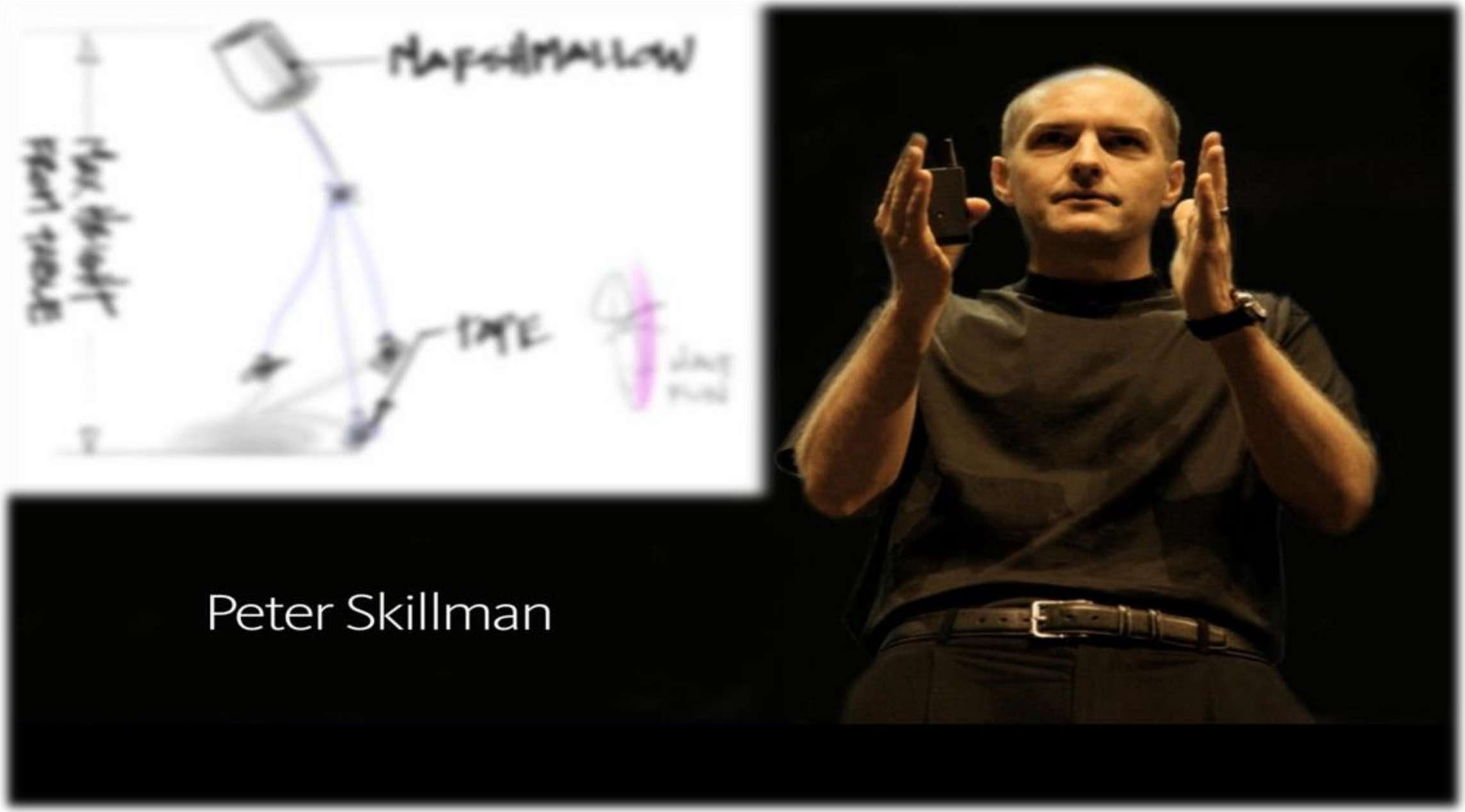
Key Lessons of "Problem Solving"



Teach basic problem solving at EVERY level of an organization!

“Houston we’ve had a problem.”

Microsoft Stream


Peter Skillman

The Challenge

May only use the supplies below

Build the tallest free-standing structure

Marshmallow entirely supported on top

18 Minute time limit!

20 sticks of spaghetti + one yard tape + one yard string + one marshmallow

Typical Progress

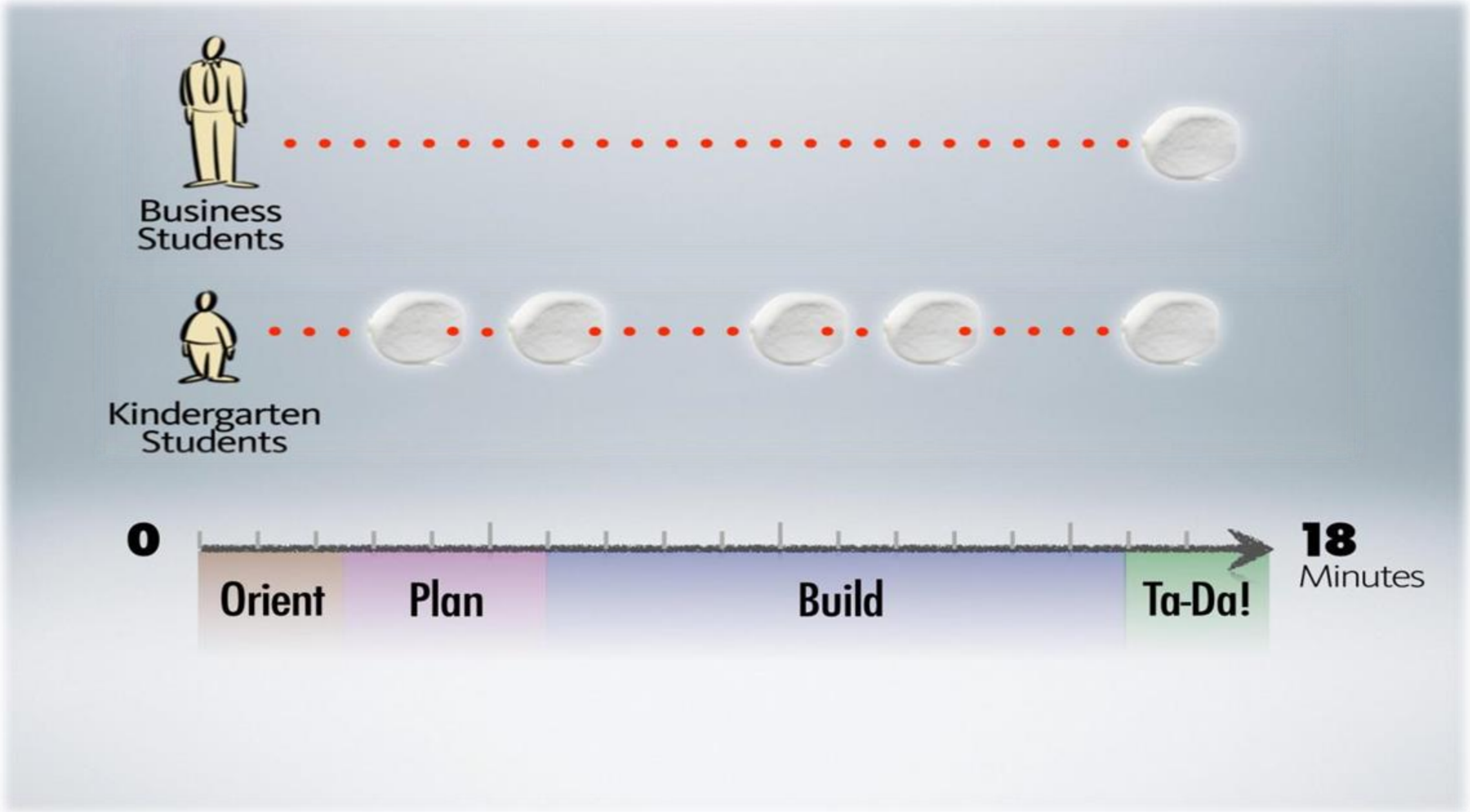
Recent Business School Graduates

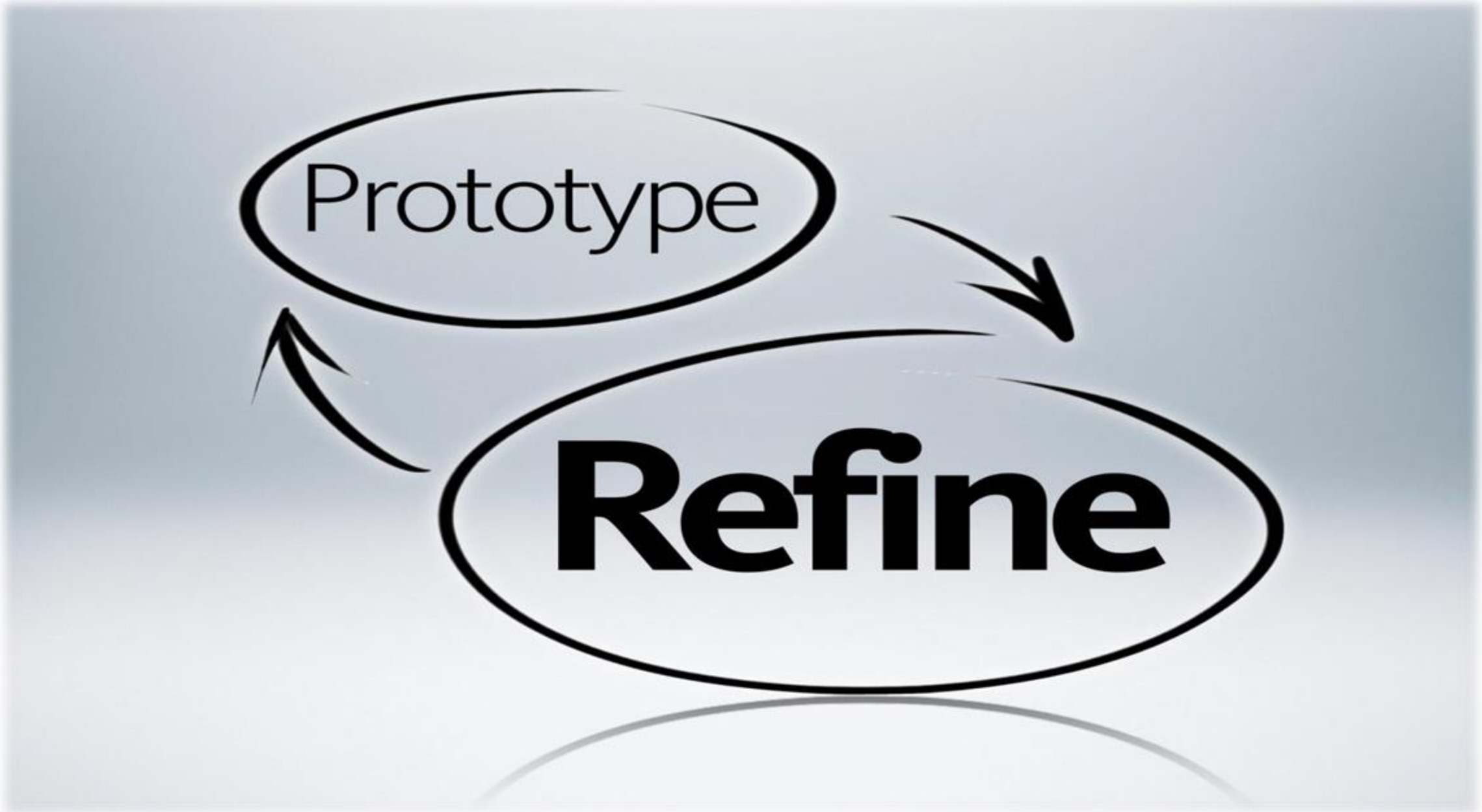
Who Consistently Performs Poorly?

Who Consistently
Performs
Well?

Why?

Recent Kindergarten School Graduates


Business Students
Kindergarten Students
0
Orient
Plan
Build
Ta-Da!
18
Minutes


Prototype
Refine

What's the Difference?

"Problem Solving"

VS

"Firefighting"

SLOW Problem Solving

Schedule *(a meeting)*

Lose *(a week or more)*

Obsess *(over the trivial)*

Wait *(for it to go away…)*

Solving problems rapidly…but not recklessly

FAST PROBLEM SOLVING

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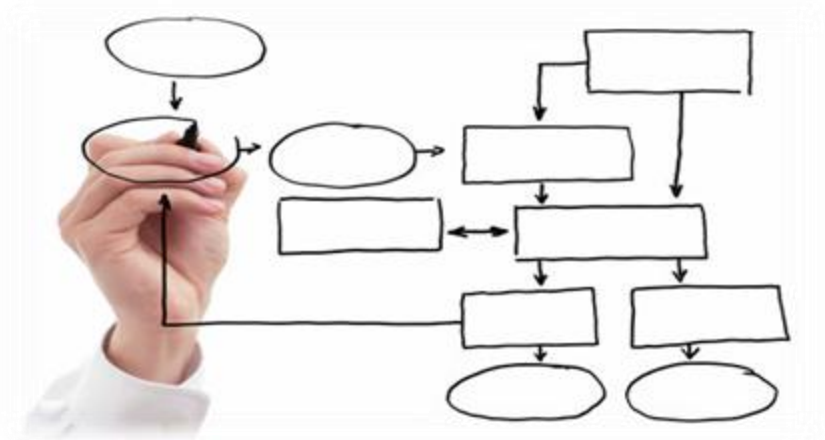
Find the *real* problem!

Find the *real* Problem

…Follow the "Actual" rule by going to the Gemba



Find the *real* Problem

...Problem statement based on standards

Without standards, there can be no improvement.

Taiichi Ohno, Founder of the Toyota Production System

Find the *real* Problem

…The Problem Statement

The purpose of the Problem Statement is simply to describe what is wrong

---

Target/Standard, Actual Situation, and Gap or Discrepancy (TAG)

Find the *real* Problem

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FAST PROBLEM SOLVING

Owner	Team	Start Date

F	A	S	T
F**ind** (the real problem)	A_____(for root causes)	S_____(a countermeasure)	T_____(and refine)

Actual Data vs. Standards

The 5 "Why's"

Why?	Because...

Why?	Because...

Potential Countermeasures

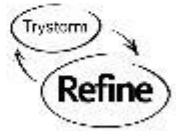
Action Plan

Action	Owner	✓

Problem Statement

Team Consensus

Verify Countermeasure



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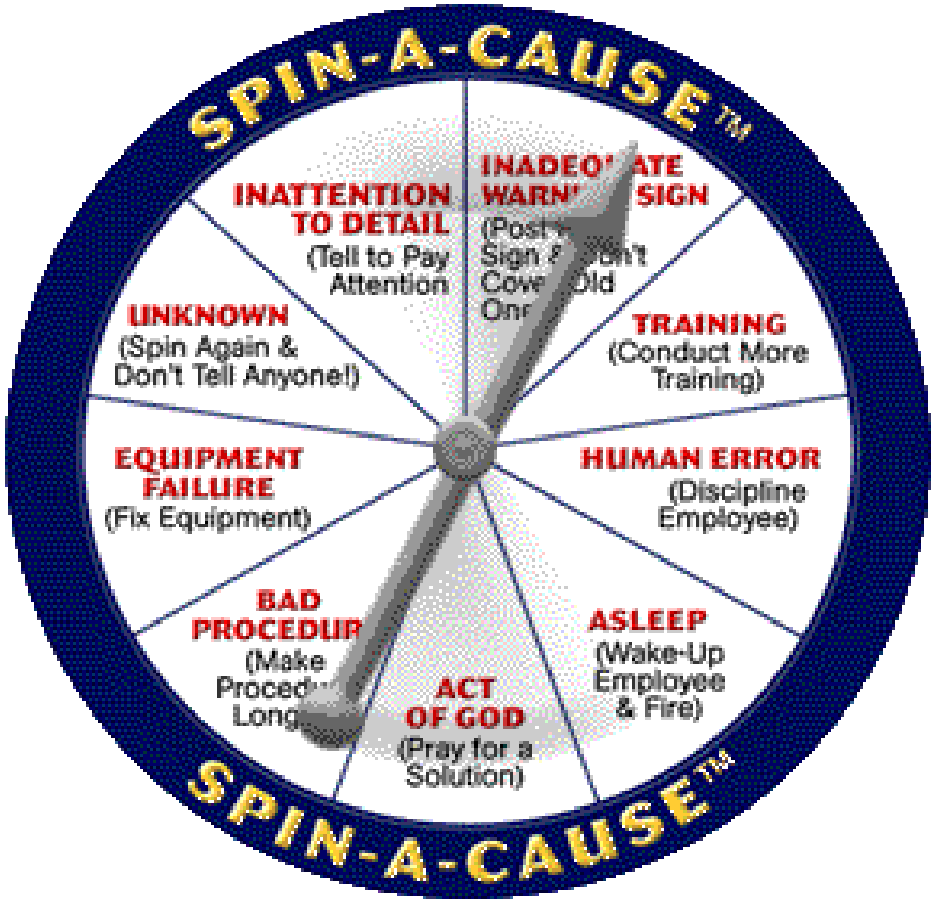
Assess for Root Causes



Analysis Paralysis

over-analyzing (or over-thinking) a situation so that a decision or action is never taken.

Assess for Root Causes

…Ask the "5 Whys"

Level of problem	Action Taken
• There is a puddle of oil on the shop floor.	• Clean up the oil.
• Because the machine is leaking oil.	• Fix the machine.
• Because the gasket has deteriorated.	• Replace the gasket.
• Because we bought gaskets made of inferior material.	• Change the gasket specifications.
• Because we got a good price on those gaskets.	• Change the purchasing policy.
• Because the buyer is evaluated on short-term cost savings	• Change the evaluation process of the buyer

Source: Jeffrey Liker, *The Toyota Way*, McGraw-Hill, 2004

Assess for Root Causes

Caution…check your assumptions with “Gemba evidence”

Assess for Root Causes

…Jim Lovell on Apollo 13

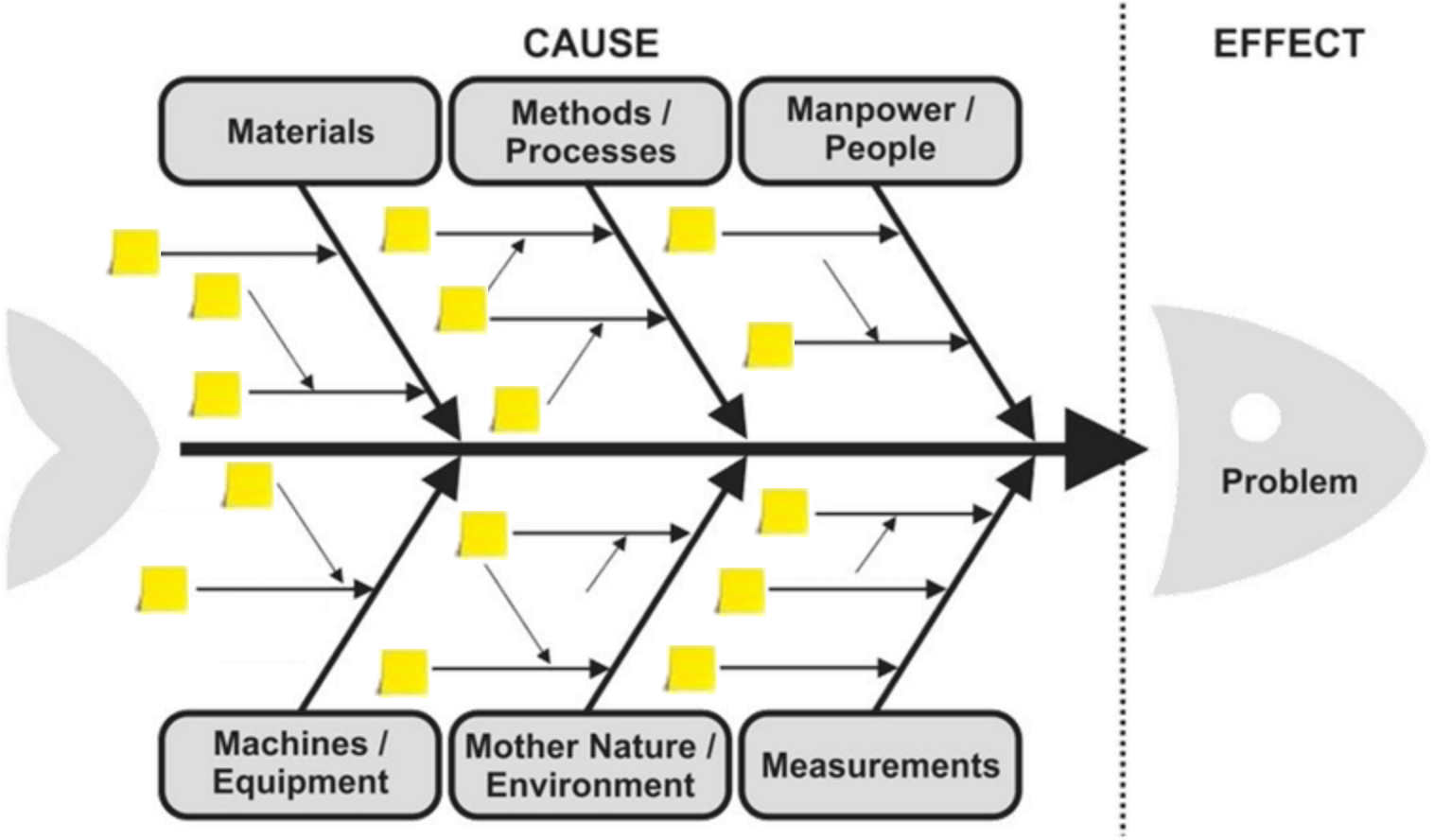
Gemba Evidence:

One fact per Post-It™

Video Link

Assess for Root Causes

…the "Fishbone" (Ishikawa or Cause/Effect Diagram)



An explosion occurred aboard the Apollo 13 Spacecraft 200,000 miles into a 500,000 mile journey to the moon and back, creating a 300,000 mile gap

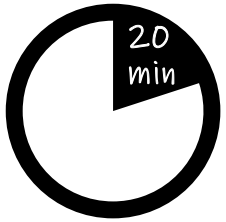
Be cautious using a fishbone…it doesn't give you a ROOT cause, just a point of cause (a place to start)

Assess for Root Causes …5 Why Breakout Teams

1. Using Gemba evidence from your Post It™ notes, choose the most relevant facts and arrange them in a causal chain

2. From that chain of facts, develop a 5-why on your handout to drive to a root cause for the explosion

3. Answer is a 2nd 5-why needed?



Why?	Because...
Why was there an explosion on the Apollo 13 spacecraft?	

3. Ask "Why?" the problem occurs, and answer with "because..." Keep asking "why?" as many times as needed to determine a root cause

4. Repeat the 5-whys for other causes (if needed)

Assess for Root Causes

…the 5 whys

Problem Statement

An explosion occurred aboard the Apollo 13 Spacecraft 200,000 miles into a 500,000 mile journey to the moon and back, creating a 300,000 mile gap to be closed

Why?	Because…
Why was there an explosion on the Apollo 13 spacecraft?	Because an oxygen tank exploded
Why did the oxygen tank explode?	Because it had been damaged by the heater system after the countdown demo
Why did the heater system damage the tank?	Because temperatures in the tank rose to a dangerous level (300 to 400 degrees F)
Why did temperatures rise to a dangerous level?	Because the thermostat contacts were welded together and didn't shut off the power
Why did the thermostat contacts get welded together?	Because the 28 volt thermostat wasn't compatible with the 65 volt ground power

Why?	Because…

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Assess for Root Causes …the 5 whys

Why it happened

Why it was missed

Problem Statement

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Why?	Because…
Why didn't they know the thermostat used 28 volt instead of 65 volt power?	Because the tank mfg. didn't change the thermostat to 65 volt as directed
Why didn't the tank manufacturer change the thermostat to 65 volt?	Because they failed to comply with a directive from the spacecraft manufacturer
Why didn't the spacecraft manufacturer know they failed to comply?	Because they missed the failure to implement the directive
Why was the failure to implement the directive missed?	Because the spacecraft manufacturer lacked a process for verifying compliance

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Assess for Root Causes

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Potential Countermeasures

Team Consensus

Action Plan

Action	Owner	✓

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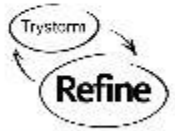

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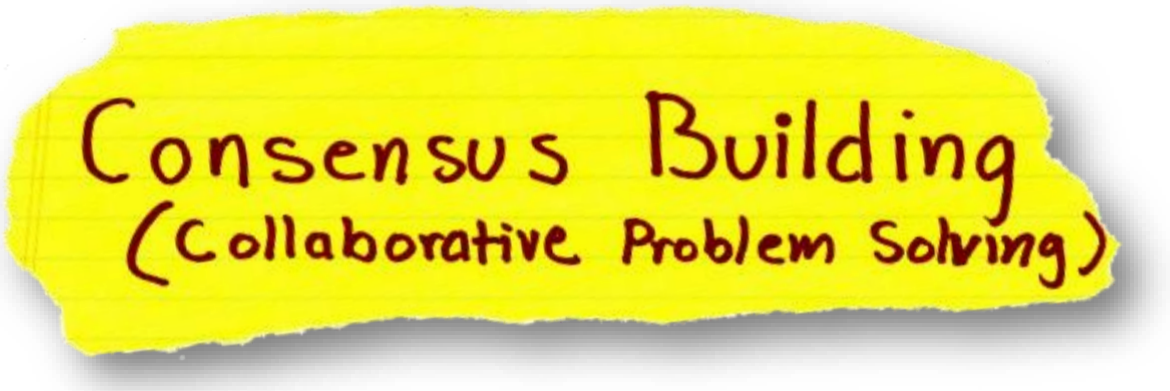
Select a Countermeasure

What is a Countermeasure?

Countermeasure: An action taken to address a *root cause* that serves to 1) protect the customer, and 2) close a performance gap

Select a Countermeasure

Brainstorm with the team…



Seek consensus on ONE countermeasure to try…
Then follow up FAST (same or next day)

Be careful not to expand the scope and turn it into SLOW problem solving!

Select a Countermeasure: Error Prevention Techniques

Study on the underlying causes of human error:

Byrne (Rice University) & Davis (University of Texas), 2006

Which of these is the most effective means of preventing human error?

1. ~~Reprimand~~
2. ~~Retraining~~
3. ~~Praise & Incentives~~
4. Written Procedures
5. ~~Re-Sequencing Tasks~~

None of the "motivational" or retraining methods reliably improved performance speed or accuracy. The group that consistently outperformed the others was the one that followed a written procedure.

Select: Error Prevention Techniques

Written Procedures / Checklists: Procedural tasks lists that are accurate, available, and enforceable.

OPW
a DOVER company

Single Point Lesson

Modified By: Casey Glenn
Date Modified: 5/18/2020
Related Documents: None

How do I use the Epsilon kitting board?

Using the kitting board for visual management and completion of bins

The kitting board is used to set up 1-piece workflow to assembly from the kitting area, based upon each BIN being filled for completion.

Kitting Board Key:

- **30 total bins**-15 yellow/ 15 blue-each represents 1 shift of work
- **4 columns**:
  - **Bucket**-Bins used to place 1-piece flow kitting orders into for assembly
  - **Work In Process**-Work in process-current BIN being used to place parts in for orders
  - **Complete**-BIN order that has been kitted and ready for assembly
  - **TAKT Time**-The Interval at which BINS are completed
- **Stockouts** - Area of board to place OOS parts-notify the buyer

Kitting Checklist: Retrieve most current pull sheet from clip on kitting board

- ☐ Place first BIN marker into WIP
- ☐ Pull all required parts from racks/bins based on pull sheet
- ☐ Place parts in bin with completed paperwork and certs
- ☐ Update kitting board to reflect changes
- ☐ Proceed to next bin and repeat until all pulls are complete

Uncontrolled Copy: For Reference Only

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A3 Problem Solving Audit Checklist
Revised 07/02/2021

Objective: Evaluate the effectiveness of "A3 thinking" and the use of the A3 form

DEFINE THE PROBLEM

Problem Statement
- ☐ Is the problem statement clearly stated in terms of TAGS? (Trend, Actual performance, Gap, and Standard)
- ☐ Does the run chart display TAGS in the same units of measure as the problem statement?

Rationale & Containment
- ☐ Does the rationale state customer, financial, strategic, and/or urgency of solving the problem?
- ☐ Is a containment action identified to immediately protect the customer from negative impacts?

INVESTIGATE TO DRIVE TO ROOT CAUSE

Pareto Charts-Breaking Down the Problem
- ☐ Does the 1st Pareto chart give insight on *WHERE* the problem is occurring (POO) by breaking the problem down in a meaningful way?
- ☐ Does the 2nd Pareto chart give insight on *WHY* the problem is happening (POC) by identifying data-driven potential causes?
- ☐ Do the Pareto charts include a cumulative % of gap (not total quantity), even if the cumulative % adds up to more than 100%?
- ☐ Are the charts easy to understand, with clearly labeled axis and key points highlighted with comments?

5 Whys & Root Causes
- ☐ Do each of the 5-Whys chains correspond to the causes identified in the Level 2 Pareto chart?
- ☐ Is the progression of the "Why-Because-Why" sequence logical and free from assumptions?
- ☐ Is each step of the 5-Why supported by observable/verifiable Gemba evidence?
- ☐ Does the 5-Why progression end once an actionable root cause is identified?
- ☐ Are root causes clearly stated, actionable, and within the control of the problem-solving team?

VERIFY & IMPLEMENT COUNTERMEASURES

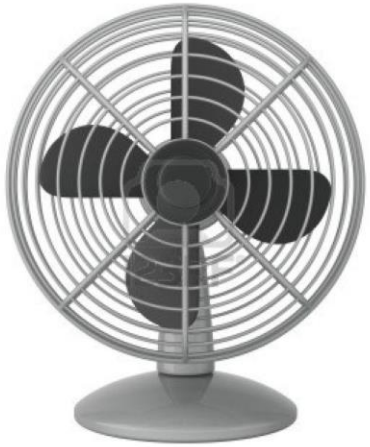
Countermeasures
- ☐ Have short-term/temporary and long-term/permanent countermeasures been defined for each root cause? (in some cases, a temporary CM may also become a permanent CM)
- ☐ Do short-term/temporary countermeasures protect the customer (internal and external) through immediate corrective action?
- ☐ Do long-term/permanent countermeasures focus on process changes focused on prevention (not just correcting or training)?
- ☐ Has an owner and timing for implementation been identified for each countermeasure?
- ☐ Is an estimated impact on the gap identified for countermeasures, and is the impact in the same unit of measure as the problem statement gap?
- ☐ Does the "Status % Complete" accurately indicate the countermeasure implementation stat

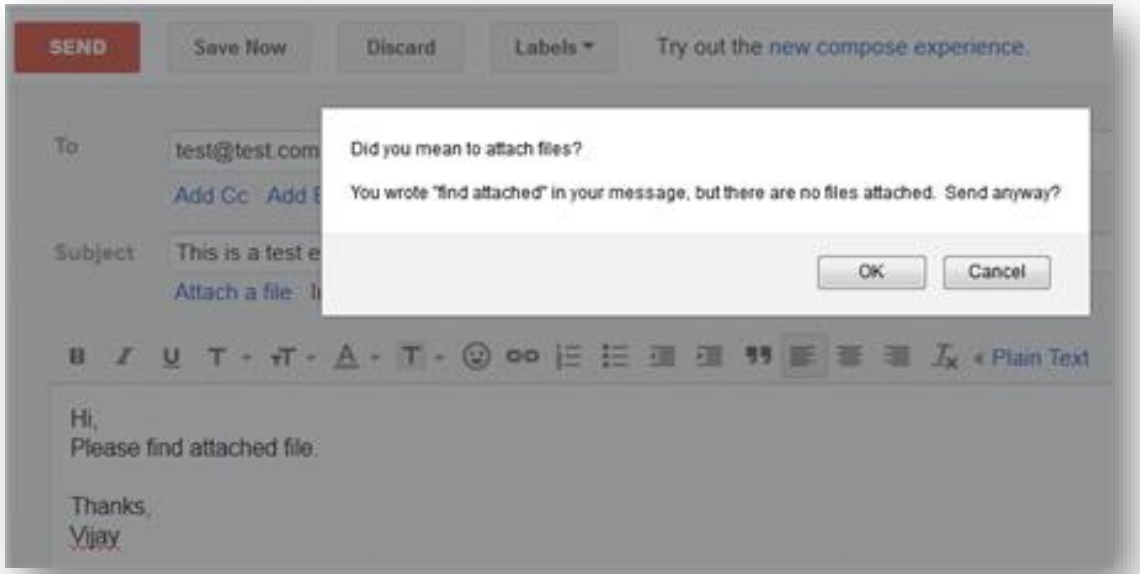
ENSURE SUSTAINMENT

Sustainment Methods
- ☐ Has a sustainment method been identified for each countermeasure?
- ☐ Are sustainment measures robust (more than "follow up" or "monitor")?
- ☐ Do sustaining measures identify how the long-term effectiveness of a countermeasure will be verified?
- ☐ Has clear ownership and timing of sustainment methods and processes been identified?

Select a Countermeasure: Error Prevention Techniques

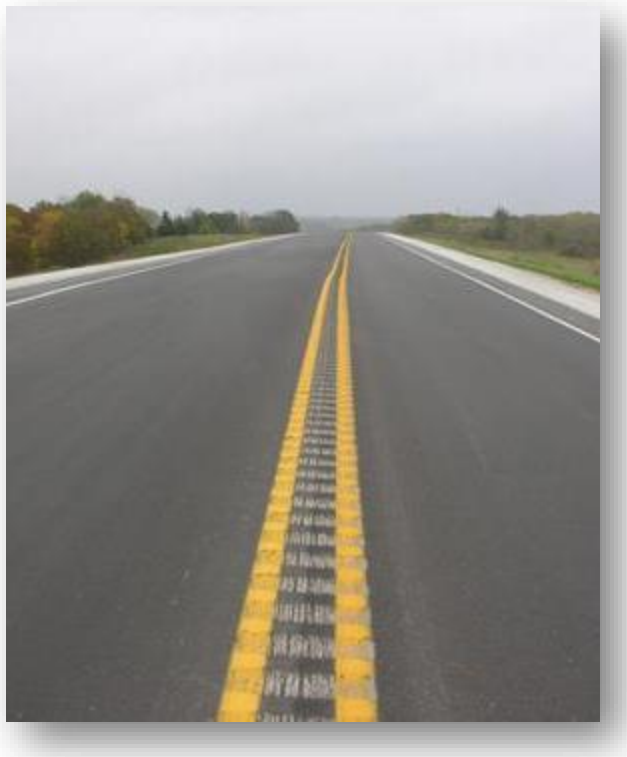
Mistake Proofing (Poka Yoke): A mechanism in any process that helps a person avoid mistakes. Ideally, a good Poka Yoke makes doing the process the wrong way nearly impossible.





Select a Countermeasure: Error Prevention Techniques

Visual Simplification: visual tools designed to prevent cognitive overload that creates attention and memory failures.



Verify machine is operating at 102 – 150 psi +18 /- 12 psi

or…

Select a Countermeasure

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Actual Data vs. Standards

Problem Statement

The 5 "Why's"

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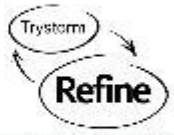

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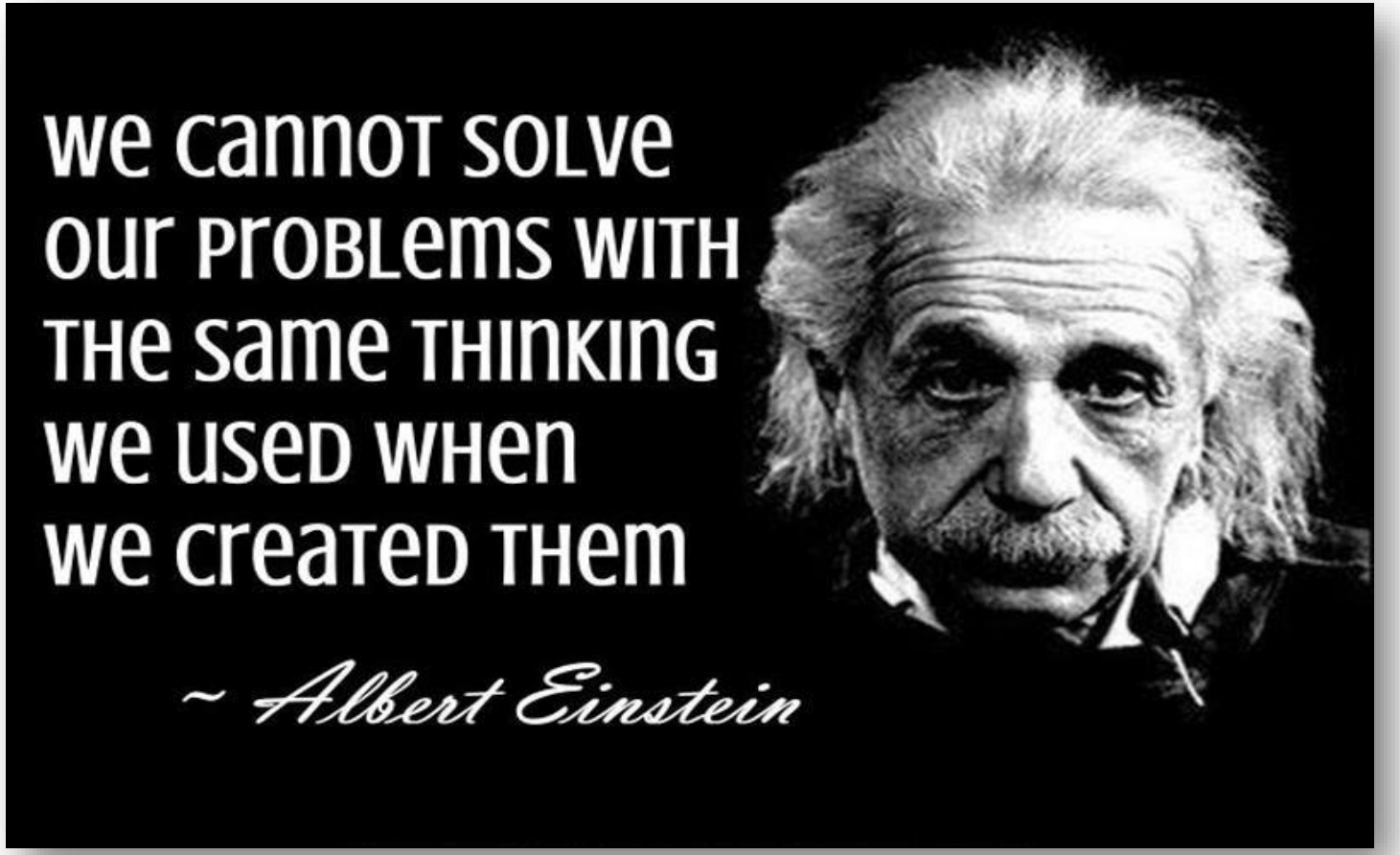
Try-storm and Refine

Try something <u>new</u>…not try harder!



Try-storm and Refine

"But that's the way we've always done it!"

Story based on an experiment conducted by G.R. Stephenson in 1967

Microsoft Stream

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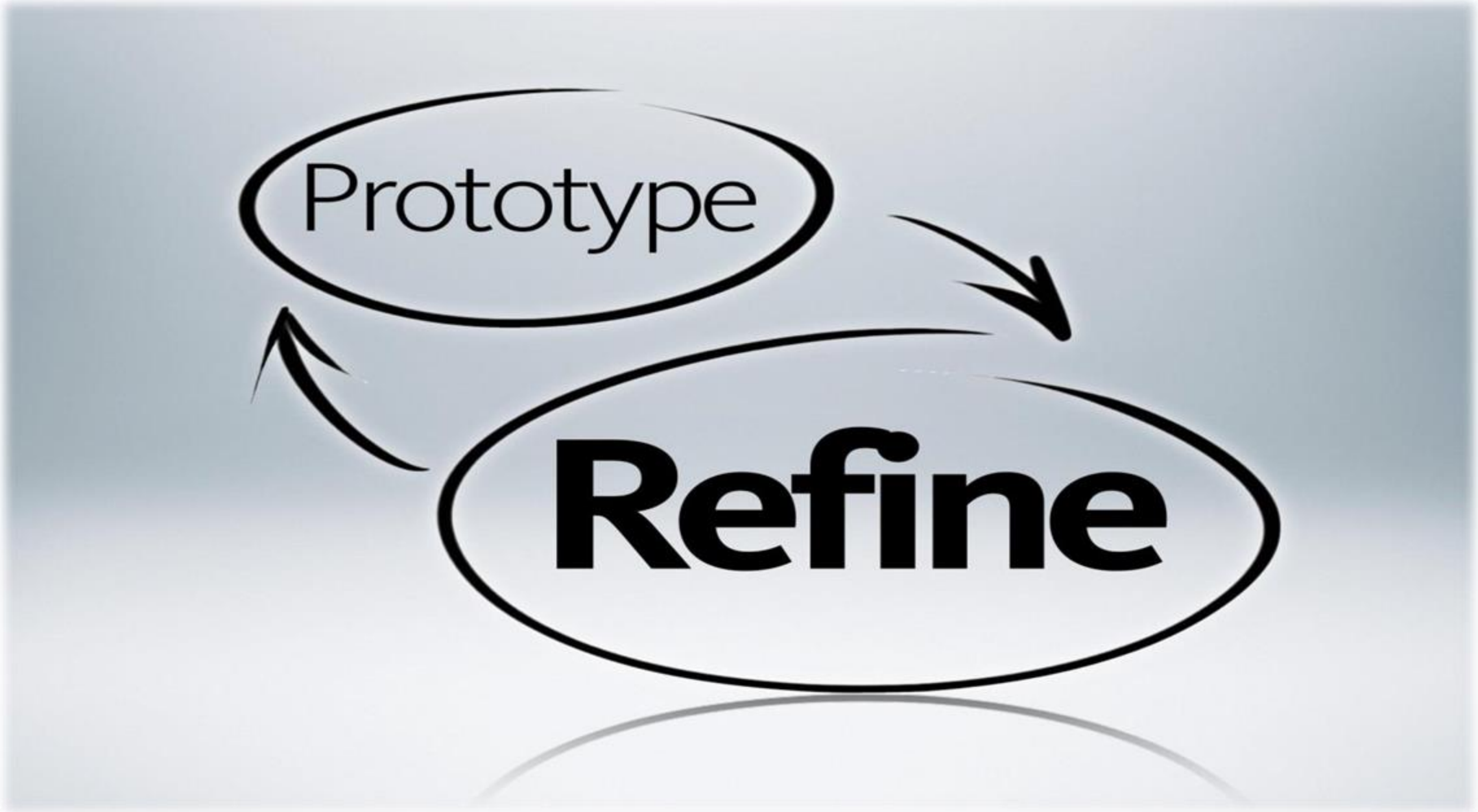
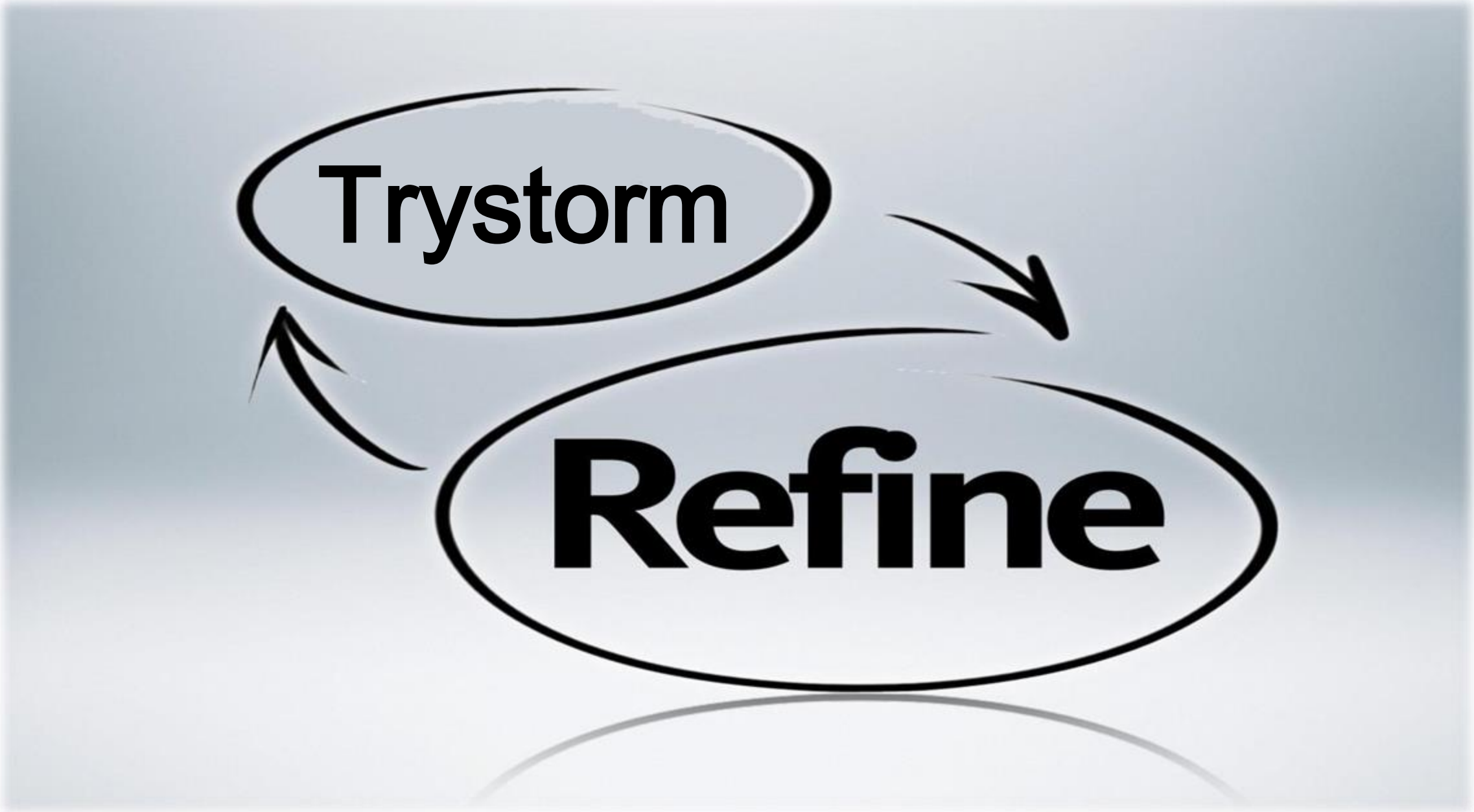

Prototype
Refine


Trystorm
Refine

Principles of Trystorming

Trystorming is a PDCA method where ideas are quickly generated and tested

Three principles of Trystorming

1. Creating perfect solutions is not the goal
2. Be action-oriented
3. Keep countermeasures simple

Benefits

Learn by doing
Tests concepts
Increases creativity
Energizes people through action
Builds confidence
Generates improvements
Improves communication

Ten Rules for Effective Trystorming

1. Discard conventional fixed ideas for the way we do things
2. Think of how to do it, not why it cannot be done
3. Don't make excuses. Start by questioning current practices
4. Don't seek perfection. Do it right away even if only for 50% of the target
5. Correct mistakes at once
6. Don't spend excessive money for trystorming. "Quick and simple"
7. Wisdom is brought out when faced with hardship
8. Ask "Why?" five times and seek root causes
9. Seek the wisdom of ten people rather than the knowledge of one
10. Trystorming ideas are infinite!

Trystorming: Using Kaizen Events to Drive PDCA

Try-storm and Refine

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FAST PROBLEM SOLVING

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Find (the real problem)	Assess (for root causes)	Select (a countermeasure)	Trystorm (and refine)

Actual Data vs. Standards

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Why?	Because...

Potential Countermeasures

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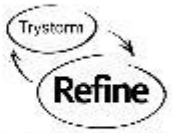

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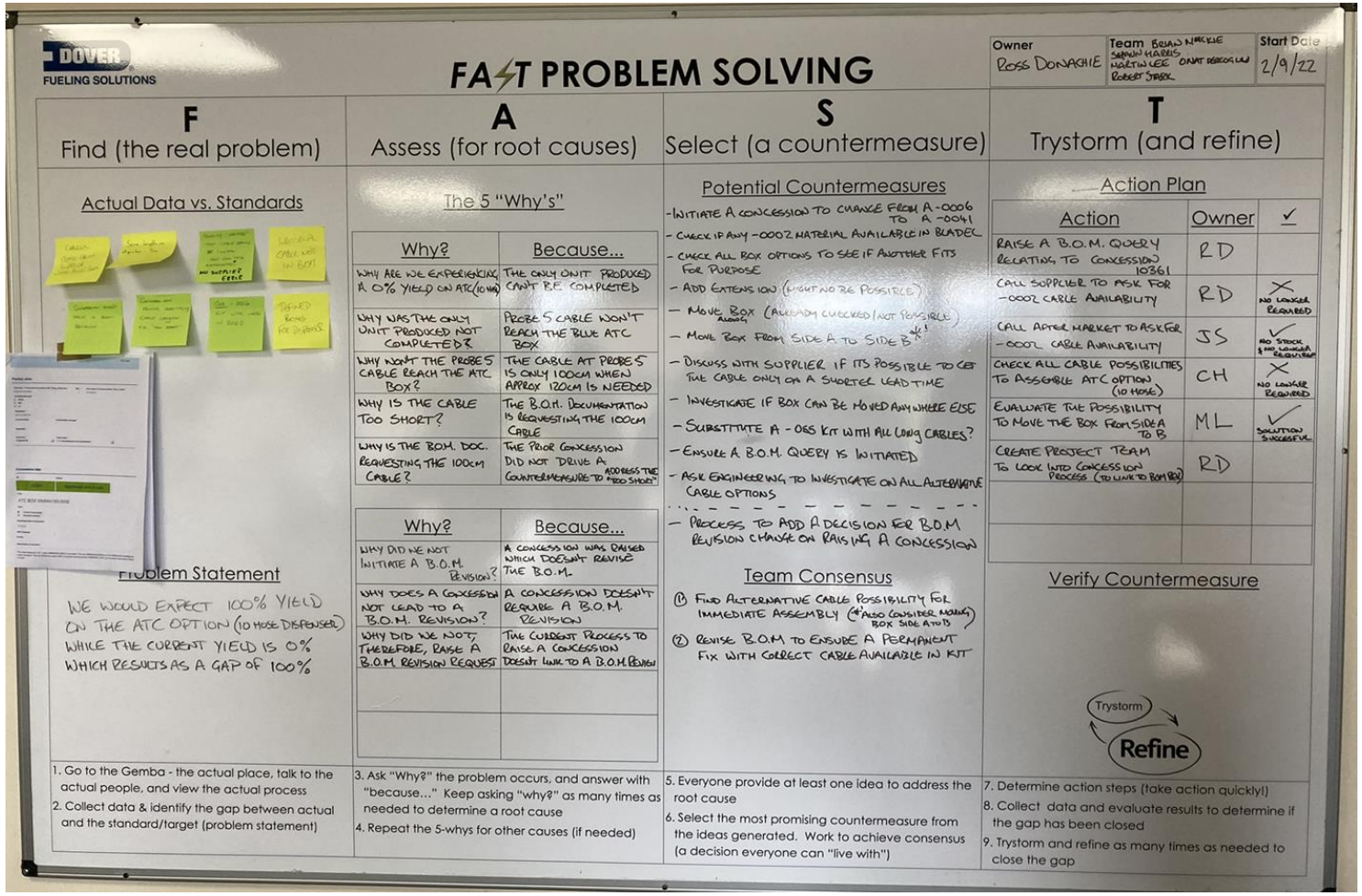
FAST Problem Solving

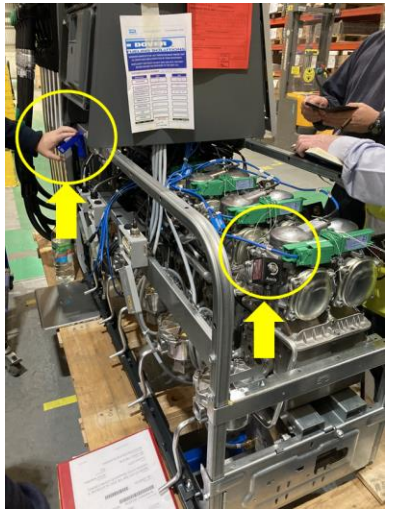
Ken Mattingly (and a crew of other astronauts) try-stormed and refined re-entry procedures until power consumption didn't exceed available power…

FAST Problem Solving

FAST Case Study: DFS-Dundee Dispenser Quality

10 hose ATC dispenser option on-hold 3 days due to wiring quality concern
FAST in 3 hours from Gemba to Root Cause to Countermeasure implemented!





Click here to see more FAST Problem Solving Case Study Examples on the Dover OpEx Sensei Center

Let’s Go Trystorm some Countermeasures!

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