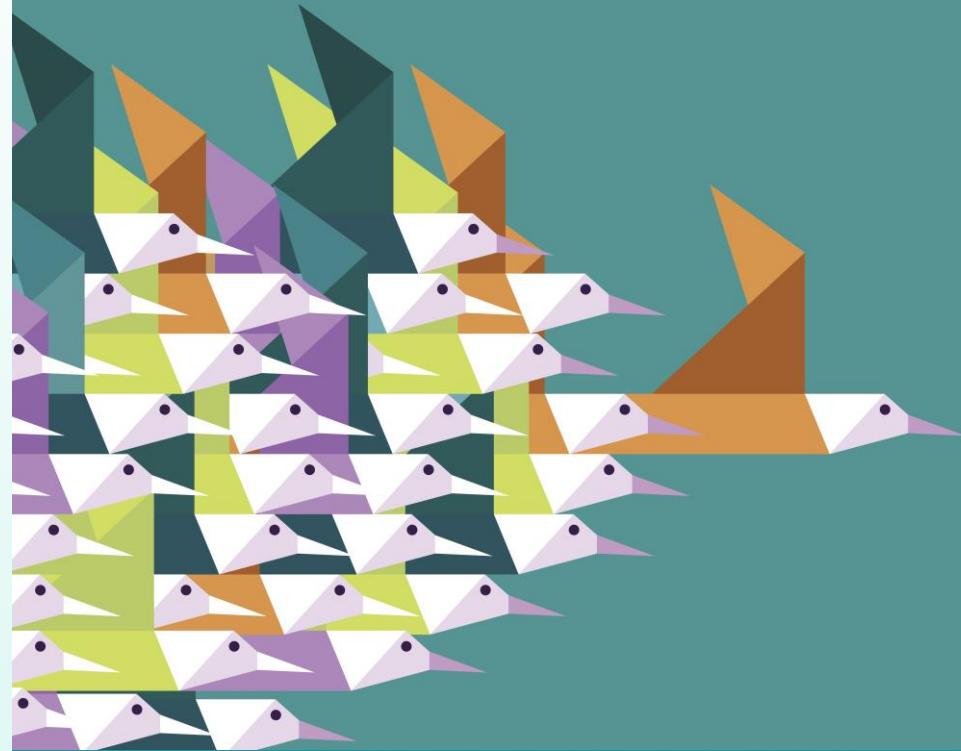


BUILD ADAPTATION INTO YOUR SAFETY DNA

Practices for Creating Safety Capacity

Dr. Martha Acosta

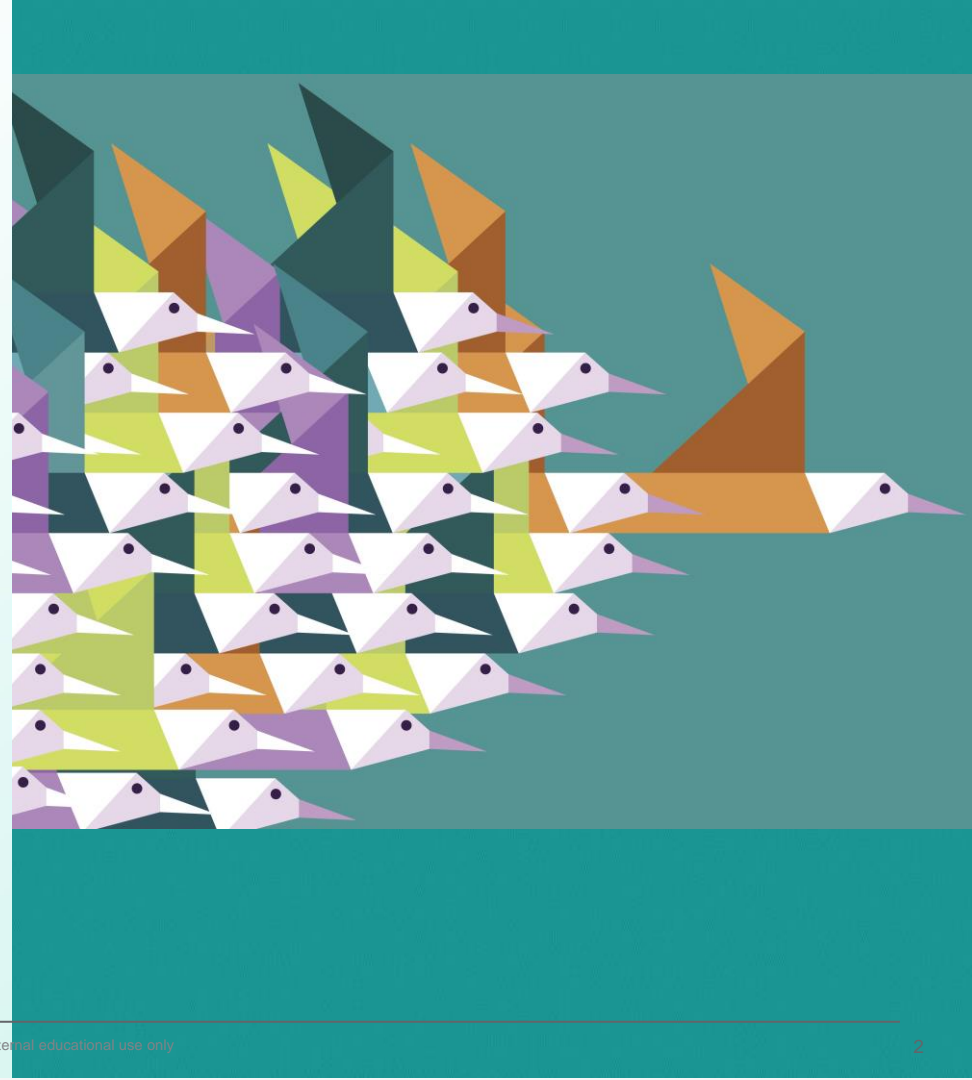


AGENDA

What is safety capacity?

Why does prevention fail as a safety strategy?

What 4 practices must leaders continually do to build and maintain safety capacity?





Dr. Todd Conklin

Author

Former Sr. Advisor to
the Associate Director,

Los Alamos National
Laboratory

**Safety is not about PREVENTION...
it's about BUILDING CAPACITY for risk
and failure.**

FAILURE IS INEVITABLE... BAD OUTCOMES ARE NOT

APOLLO 13

3 days from oxygen tank failure to successful landing

Columbia Space Shuttle

16 days from foam strike failure to disaster upon reentry

San Jose Mine

17 days between collapse of mine and survival aid to miners

69 days between collapse and successful rescue

SAFETY CAPACITY



CHILEAN MINING COLLAPSE 2010

On August 5, 2010, **700,000 tons** of some of the hardest rock in the world collapsed in Chile's century-old San José mine, burying **33 miners** at a depth of **over 600 meters** (2,000 feet)



Source: Harvard Business School Case study

CHILEAN MINING COLLAPSE 2010

- Complicated public/private system of Chilean mines
- San José, was private and loosely regulated
- Mine safety practice varied widely
- The Chilean mining industry averaged 34 deaths per year
- San José mined since 1889
- Produced \$22,000 of copper daily
- Held gold reserves worth a billion dollars.



Source: Harvard Business School Case study

CHILEAN MINING COLLAPSE 2010

- The San José mine was in an earthquake prone region.
- Maps of the 16 kilometers of tunnels were outdated.
- Disorganized dynamiting, drilling and extractions diminished the mine support structure.
- Escape ladders in ventilations shafts were missing.
- There were no back-up exits.
- Safety refuge supplies were not kept stocked.



Source: Harvard Business School Case study

CHILEAN MINING COLLAPSE 2010

- Miners paid 30% more than the competitive wage
- Dodging falling rocks and avoiding debris slides was considered a skill
- Shutdown in 2007 due to death of a geologist

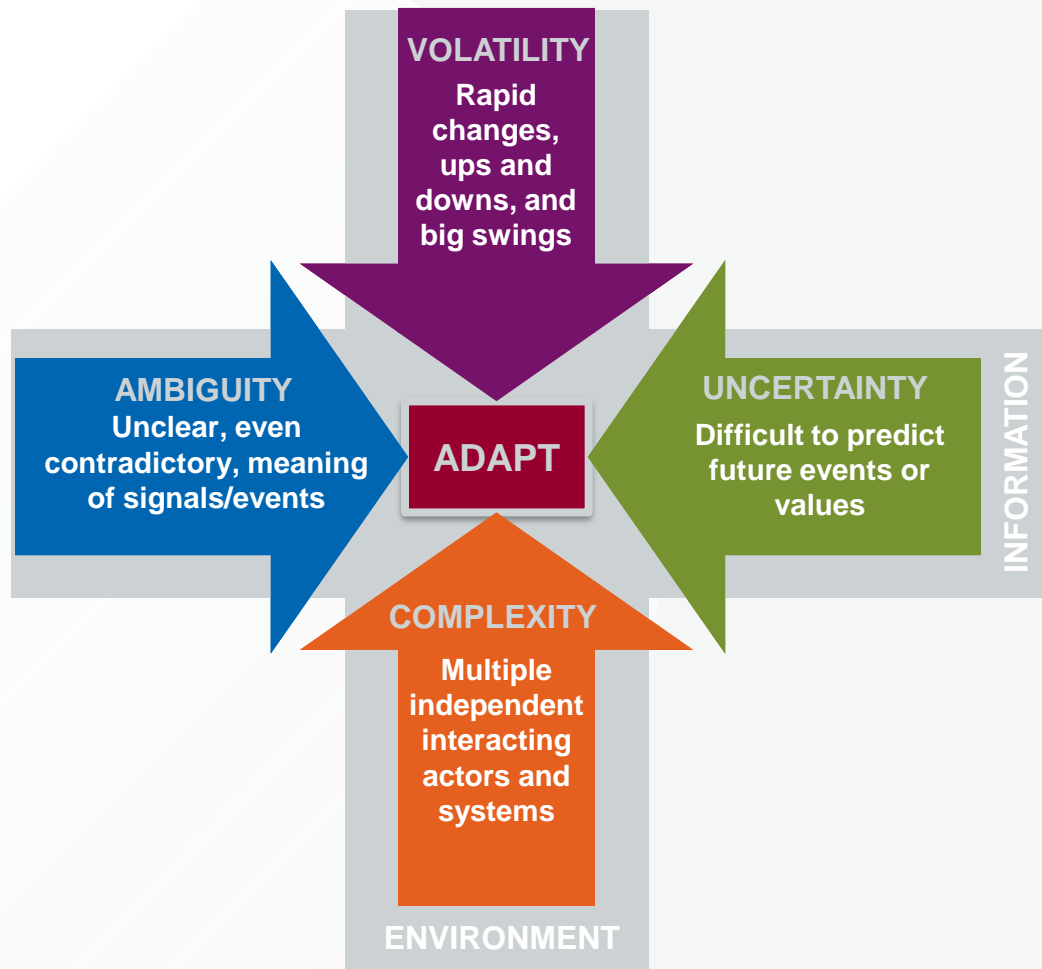


Source: Harvard Business School Case study

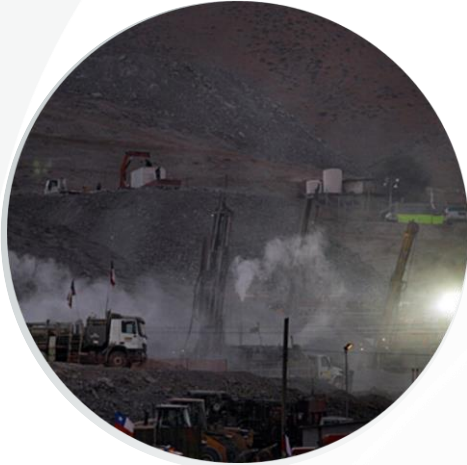
VUCA



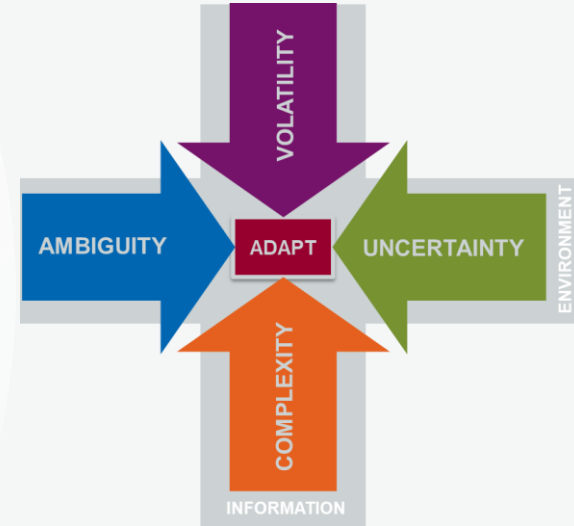
Source: US Army War College



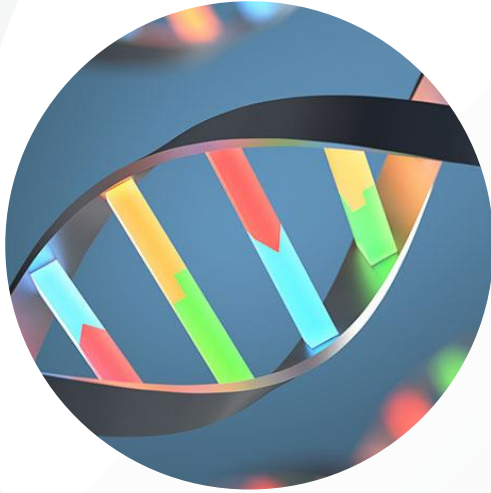
CHILEAN MINING COLLAPSE 2010



- Continued seismic activity and no monitoring equipment.
- Unknown if the miners were alive and where they were
- A rescue at this depth had never been attempted before and the technology did not exist to do it
- The role of the government in the rescue effort was unclear and unprecedented



Source: Harvard Business School Case study



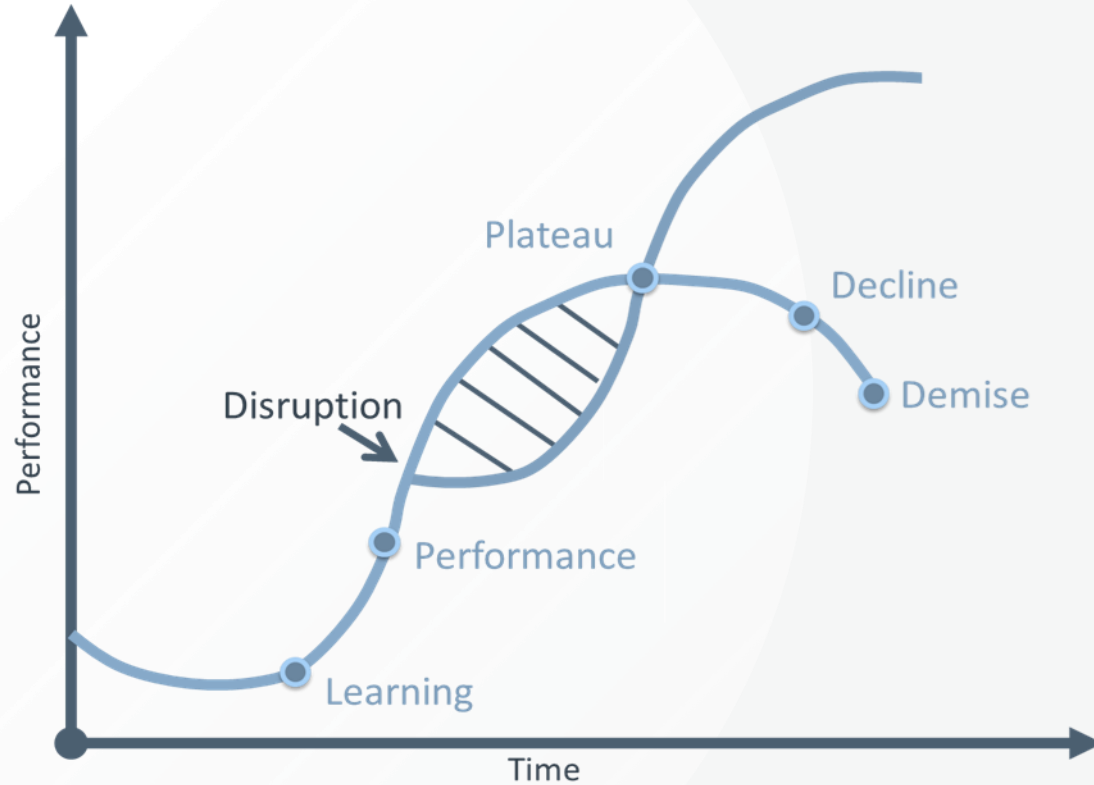
**ADAPTATION =
DIVERSITY + LEARNING**

DISRUPTION

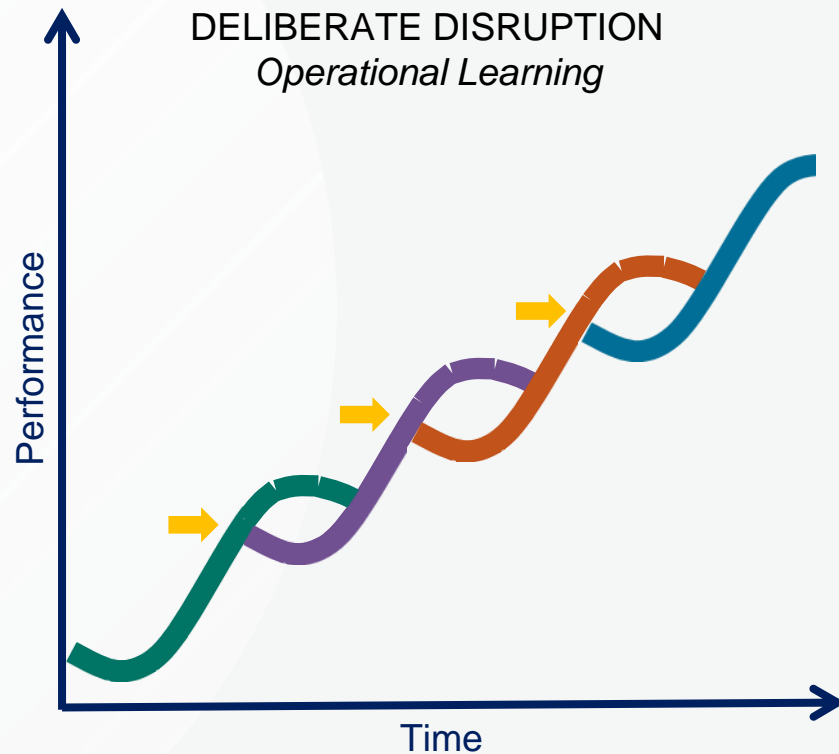
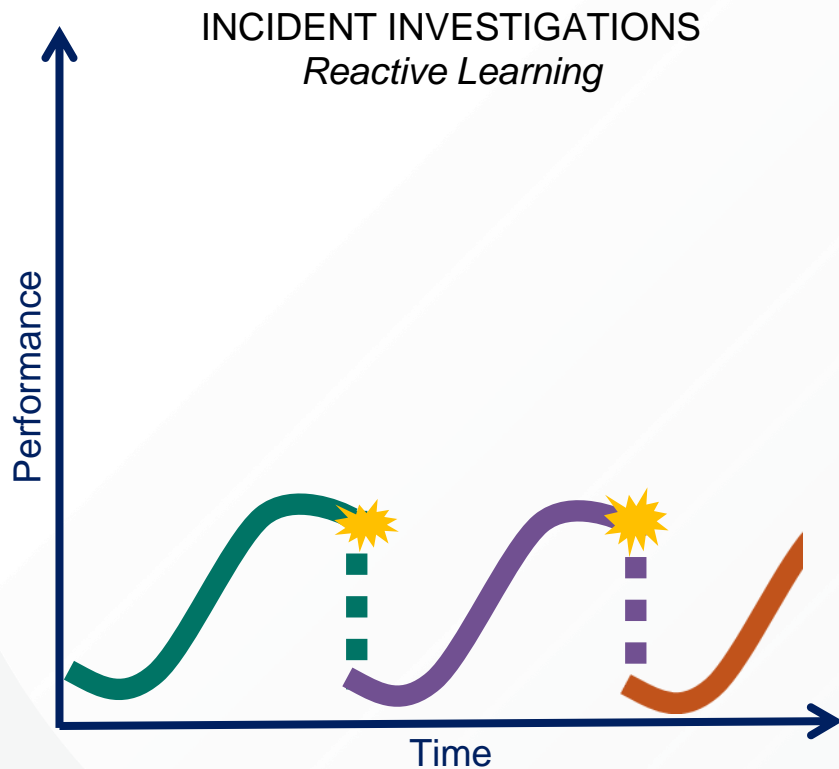


Whitney Johnson

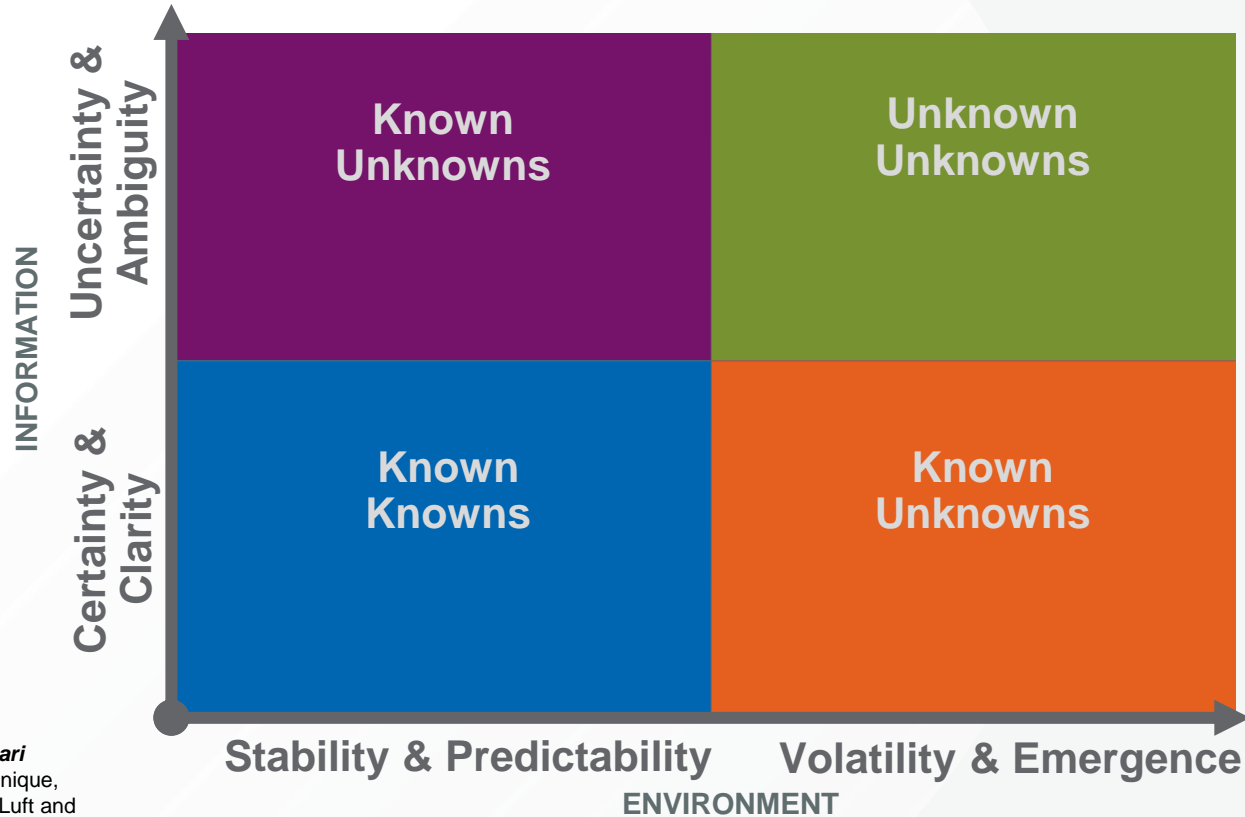
CEO
Disruption Advisors



FAIL FORWARD

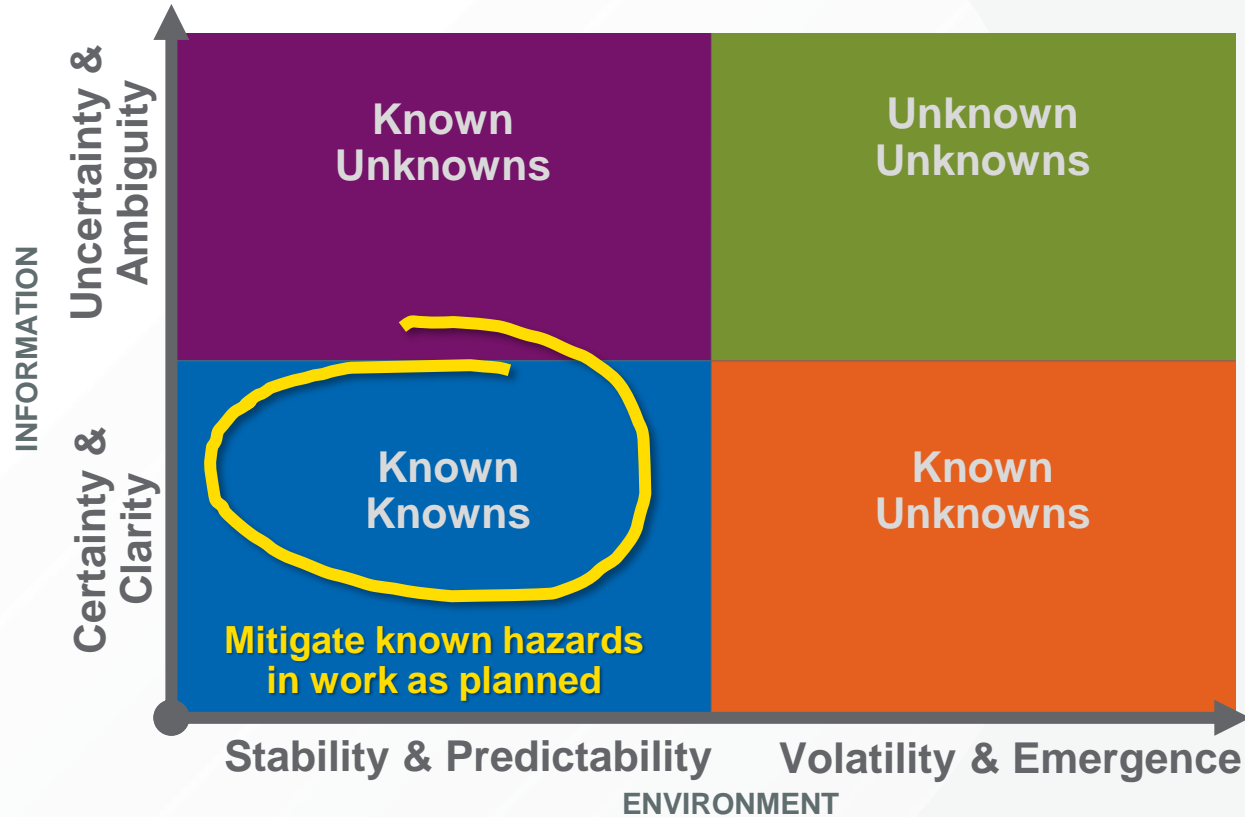


FRAMEWORK FOR NAVIGATING VUCA



Adapted from the **Johari Window** analysis technique, developed by Joseph Luft and Harrington Ingram

FRAMEWORK FOR NAVIGATING VUCA



NORMALIZATION OF HAZARDS



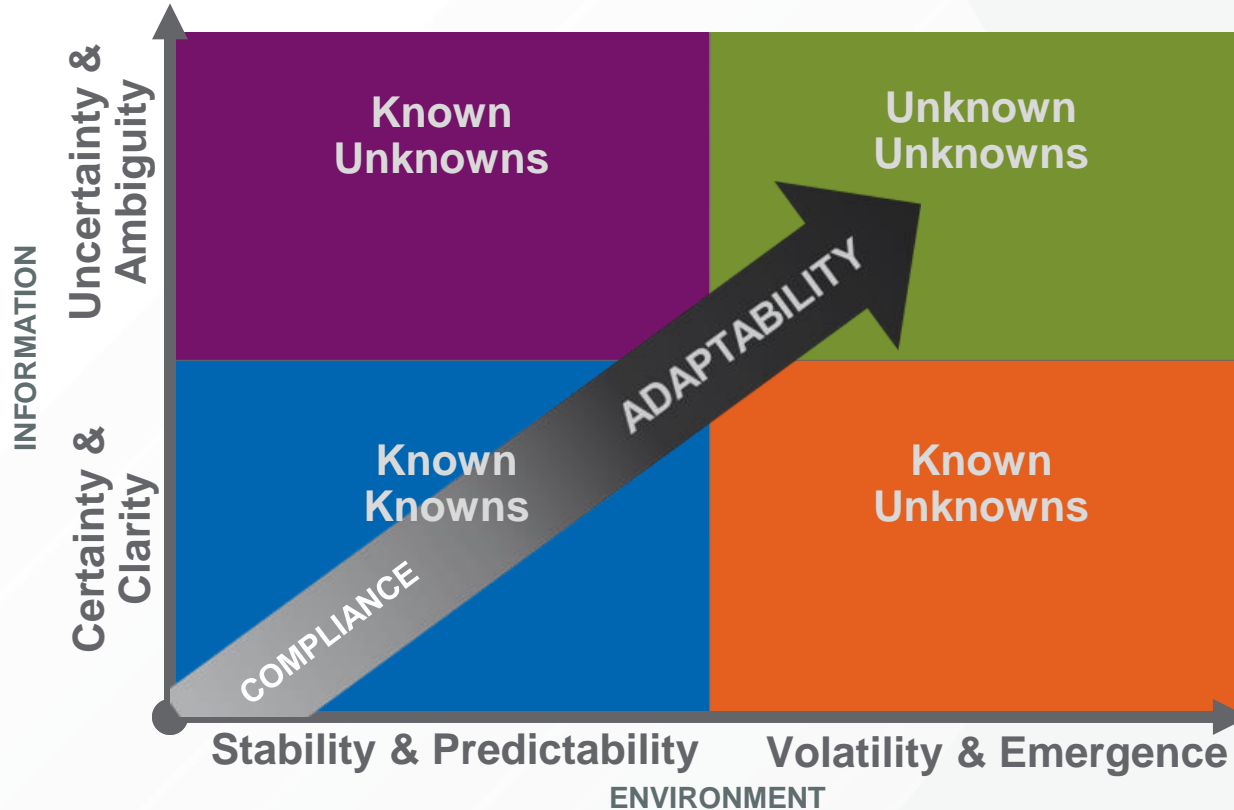
When NASA lost the 7 astronauts of the Columbia, the organization's TRC (total recordable case injury) rate was **600%** better than the DOE.

And yet, on launch day 3,233 critical hazards* had been waived.

** Component failures which could result in loss of the orbiter and crew*

Source: Harvard Business School Case: *NASA After Challenger: Restoring an Image*

BUILD CAPACITY FOR LEARNING

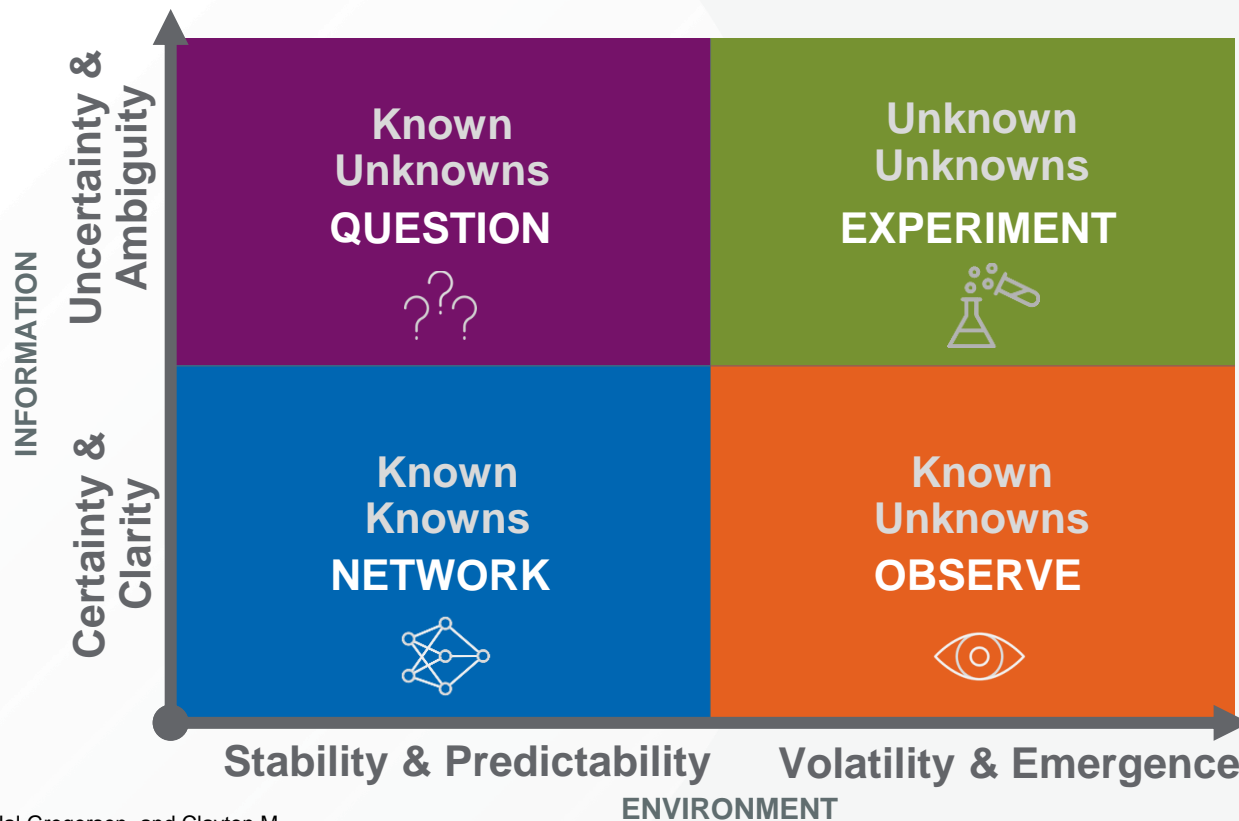


CAPACITY BUILDING PRACTICES



**Clayton
Christensen**

Kim B. Clark
Professor of Business
Administration
Harvard Business
School



Adapted from: [The Innovator's DNA](#), by Jeff Dyer, Hal Gregersen, and Clayton M. Christensen, [Harvard Business Review](#)

CHILEAN MINING RESCUE 2010



33 miners trapped 2,000 feet underground in a refuge of **50 square meters** with little food

Chilean Carabinos Special Operations Group could not reach them via existing shafts

Available drills had a precision of **5%**: drill could hit anywhere in a base area of **3,850 square meters**

Chance that any drill hole could hit the refuge was worse than **1 in 80**

Engineers were able to reach the miners in **17 days**, a feat that should have taken a minimum of 3 months.

Source: Harvard Business School Case study

ACCESS TO EXPERTISE AND RESOURCES

- Rescue team from various companies, agencies, countries and professions
- Drilling precision collaboration between geologist/entrepreneur and an Australian Software company
- Rescue capsule collaboration between the Chilean Navy and NASA
- Drilling executed by American military drillers stationed in Afghanistan to drill wells
- Breakthrough idea from a 24-year-old field engineer

NETWORK

Broaden your perspective by interacting with people from diverse backgrounds, industries, roles, and expertise.



Source: Harvard Business School Case study

DIVERSITY OF PERSPECTIVES

“My inner reaction was ‘You want me to do *what?*’ I mean, keep in mind I was just a 24-year-old giving my opinion.”

Igor Proestakis, Field Engineer
Driller Supply International

Source: Harvard Business School Case study

NETWORK

Broaden your perspective by interacting with people from diverse backgrounds, industries, roles, and expertise.

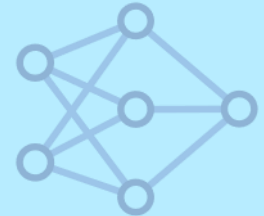


DIVERSITY OF PERSPECTIVES

Reflect on a time when an outside perspective, from a novice or someone outside your function or industry, provided a valuable insight that helped solve a problem.

NETWORK

Broaden your perspective by interacting with people from diverse backgrounds, industries, roles, and expertise.



CURIOSITY AND OPENNESS

- Gathering drilling data for 3D mapping
- Researching past mining accidents
- Inviting others from previous accidents to share their experiences and perspectives

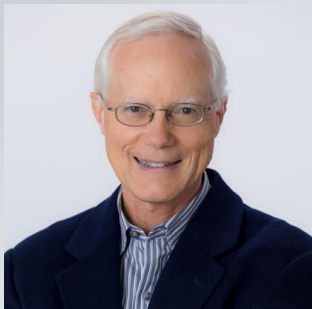
OBSERVE

Watch operations, workers, controls, and hazards with curiosity and without preconceptions.



Source: Harvard Business School Case study

WATCH WITHOUT PRECONCEPTIONS



Scott Cook

Founder
Intuit

“Often the surprises that lead to new business ideas come from watching other people work and live their normal lives. You see something and ask, ‘Why do they do that?’”

OBSERVE

Watch operations, workers, controls, and hazards with curiosity and without preconceptions.



Source: The Innovator's DNA, Harvard Business Review

CULTIVATE CURIOSITY AND OPENNESS

Describe when you observed a familiar operation, process, user behavior etc., as if you were seeing it for the first time. Why did you do that? How did you do that? And what did you learn?

OBSERVE

Watch operations, workers, controls, and hazards with curiosity and without preconceptions.



CHALLENGE ASSUMPTIONS

- President Piñera bucked the politically safe practice and didn't leave the owners of the San José mine to conduct a rescue alone
- If rescuers questioned the assumptions that proper procedures were followed.
- Drillers and engineers challenged their assumptions about drilling trajectories

QUESTION

Challenge assumptions and the status quo, ask why, what for, and what might be.



INVITE DISSENT



Jim Bagian

**Former Shuttle
Astronaut**
NASA

“At senior levels, during the 1990s, dissent was not tolerated, and therefore, people learned if you wanted to survive in the organization, you had to keep your mouth shut.”

QUESTION

**Challenge
assumptions and the
status quo, ask why,
what for, and what
might be.**



INVITE DISSENT

Describe a situation where you felt you had to disagree, dissent or share bad news. Did you have fears or concerns before doing so? How did others react? What was the outcome and what did you learn?

QUESTION

Challenge assumptions and the status quo, ask why, what for, and what might be.



CHILEAN MINING RESCUE 2010

- Recognized the novelty and opacity of the situation
- Testing multiple hypotheses
- Gathering data
- Modelling and prototyping
- Using failure as better information

EXPERIMENT

**Test hypotheses to
create knowledge**



BUILD SAFETY CAPACITY

In the past month, which of these three experimental behaviors have you done?

1. Try new and varied experiences
2. Take apart equipment, processes, and ideas
3. Test predictions through pilots and prototypes

How did these activities build capacity?

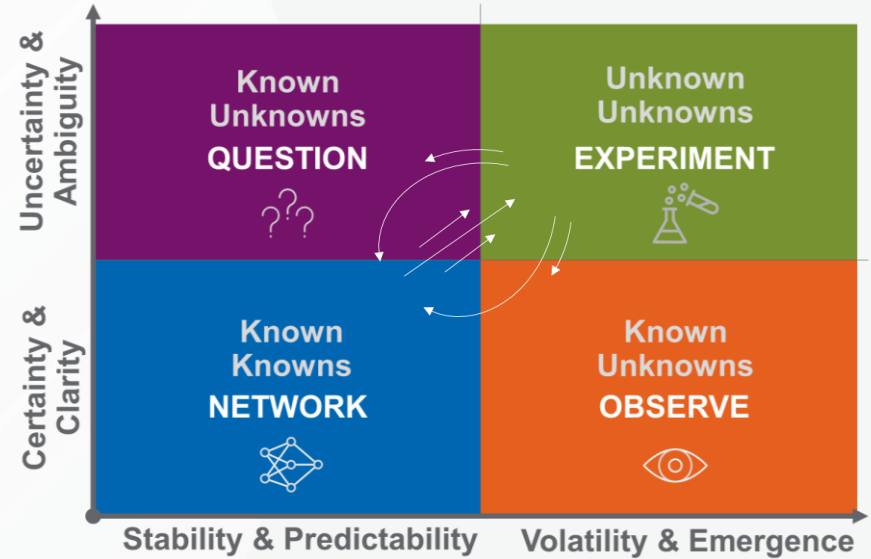
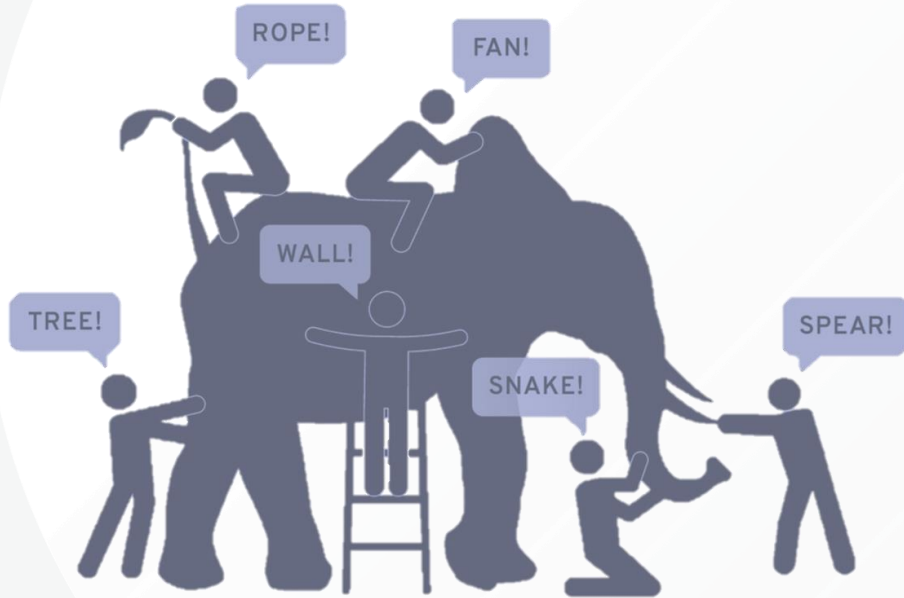
EXPERIMENT

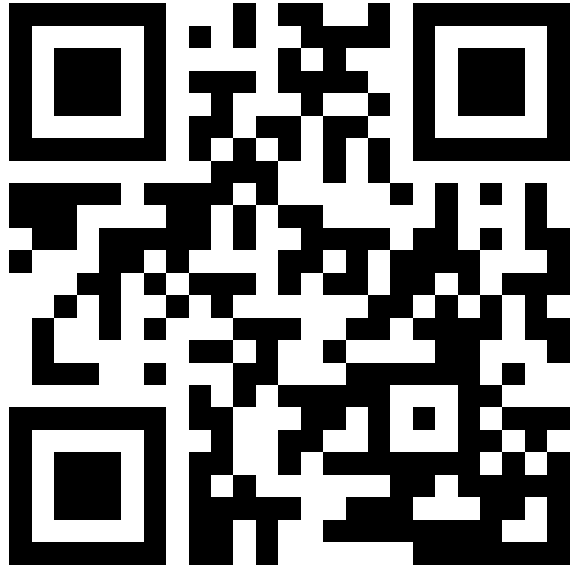
Test hypotheses to create knowledge



Source: The Innovator's DNA, Harvard Business Review

BLIND MEN & THE ELEPHANT





THANK YOU!