UMaine Extension

INNOVATION ENGINEERING®

Mission: To **change the world** through **systems that enable** innovation and problem solving by **everyone, everywhere, every day** resulting in increased SPEED and decreased RISK.

Goals

- Revisit Roadmap Work
- Ideas generated will be used in planning and changes in Extension
  - The process will continue
- Testing and data gathering will be used to gain knowledge and confidence about ideas
  - Data driven - idea/process

The Process

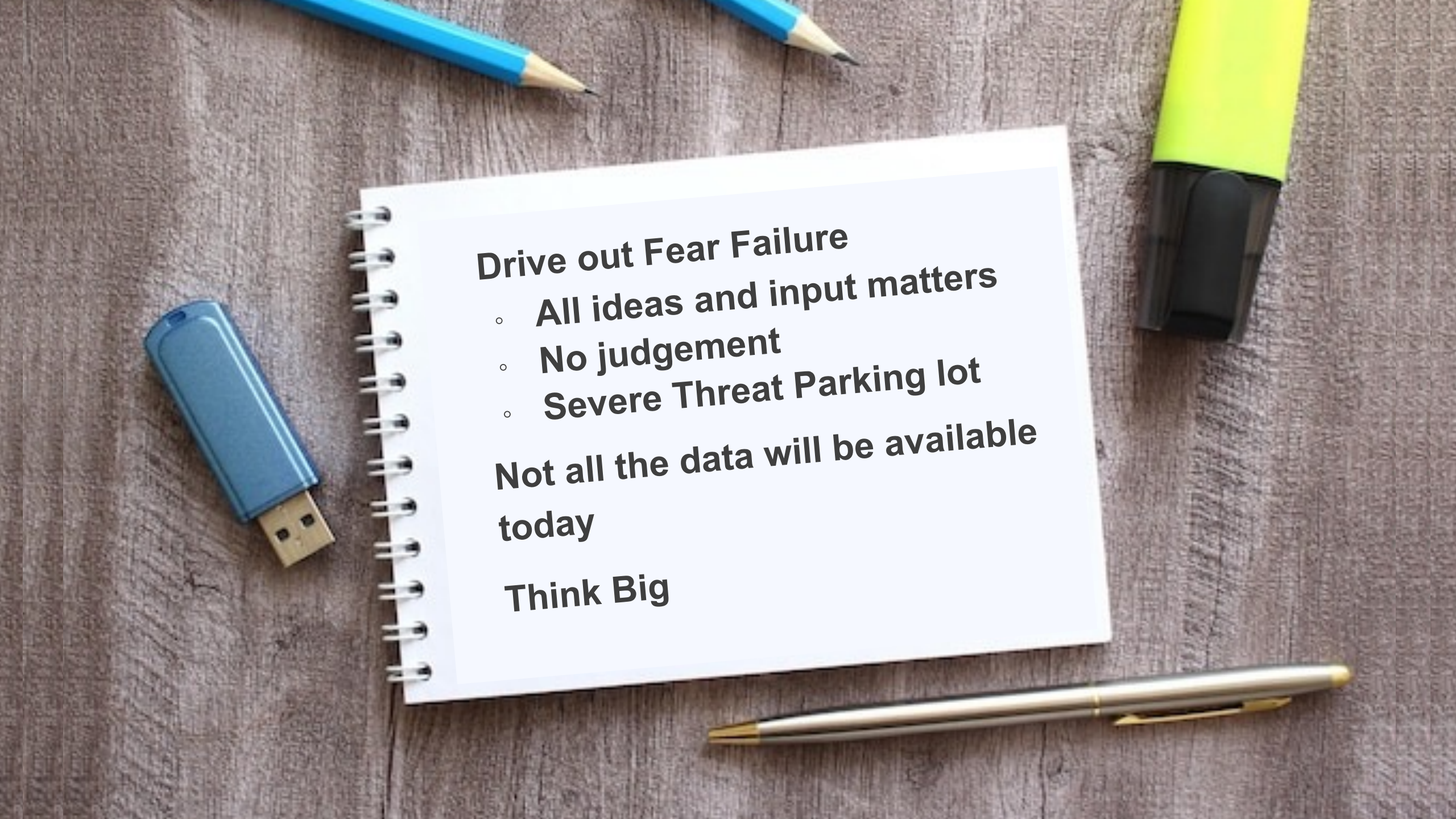
Know your current system

Identify Opportunity and/or Problem

Ideation – Idea tools

Identify Severe Threats

Determine a plan to test severe threats and gain confidence


Drive out Fear Failure
All ideas and input matters
No judgement
Severe Threat Parking lot
Not all the data will be available today
Think Big

System Opportunities for Extension

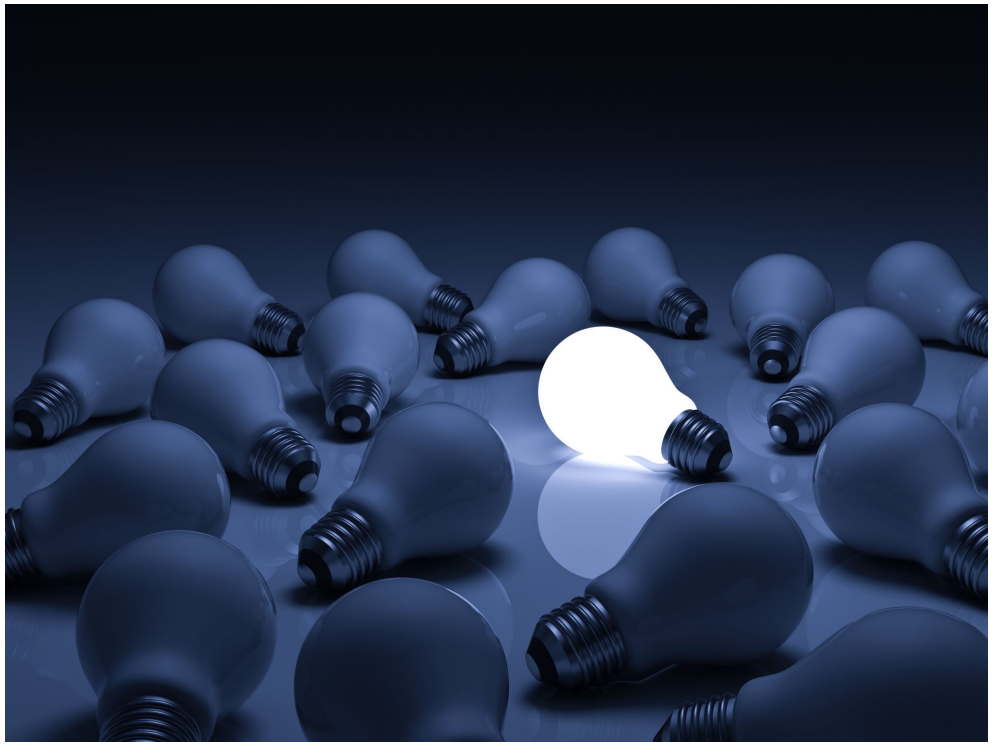
Roadmap work

Ways of Working: How do we see collaborations across geographic and programmatic areas**?**

UMaine Extension Structure: What structural and organizational changes will contribute to improved management/supervision/representation/advocation/

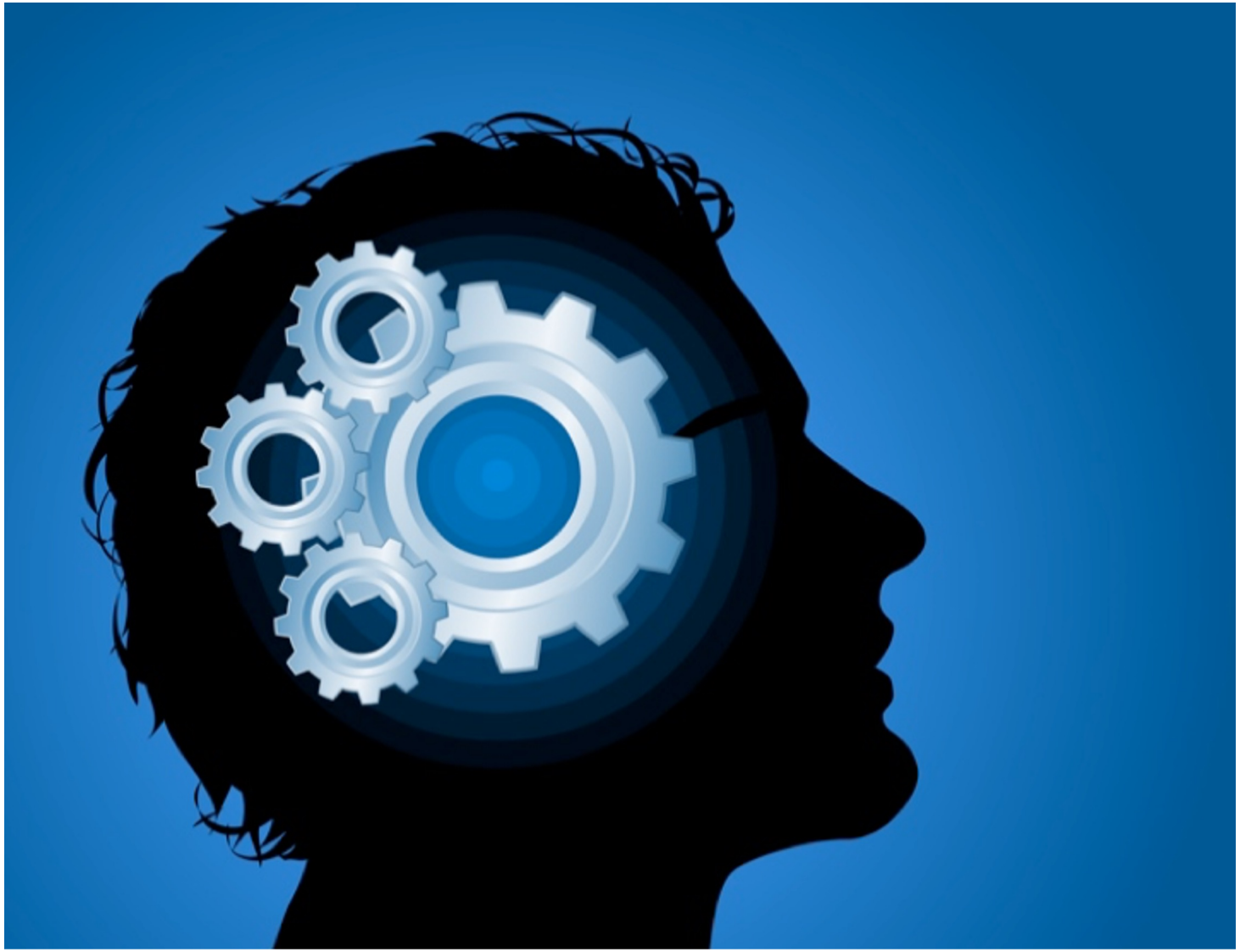
Future of Programming: From live and in person to asynchronous and virtual, how does Extension best meet its mission and stakeholder needs?

How can Extension become one of the Top 10 places in Maine to work?



INNOVATION ENGINEERING®

EUREKA! RANCH®



It’s about an ENGINEERING MINDSET

Disciplined, Systems Thinking

Data Informed Decision Making

Innovation Engineering

Define the Need

Very Important Opportunity/System

IE CREATE

IE COMMUNICATE

IE COMMERCIALIZE

programs

processes

services

$$MUI = \frac{S}{F}^{D}$$

- Capture Existing
- CREATE New

Ideas

Concept
- Customer/Stakeholder
- Problem
- Promise
- Proof

Math Model
(Impact & Costs)

Death Threats
(unknowns)

Define

1/3

5% $

Fail Fast / Fail Cheap

Smart Kill

1. Plan
2. Do
3. Study
4. Act

Discover

2/3

95% $

Milestones to Build Out Details

1. Plan
2. Do
3. Study
4. Act

Develop

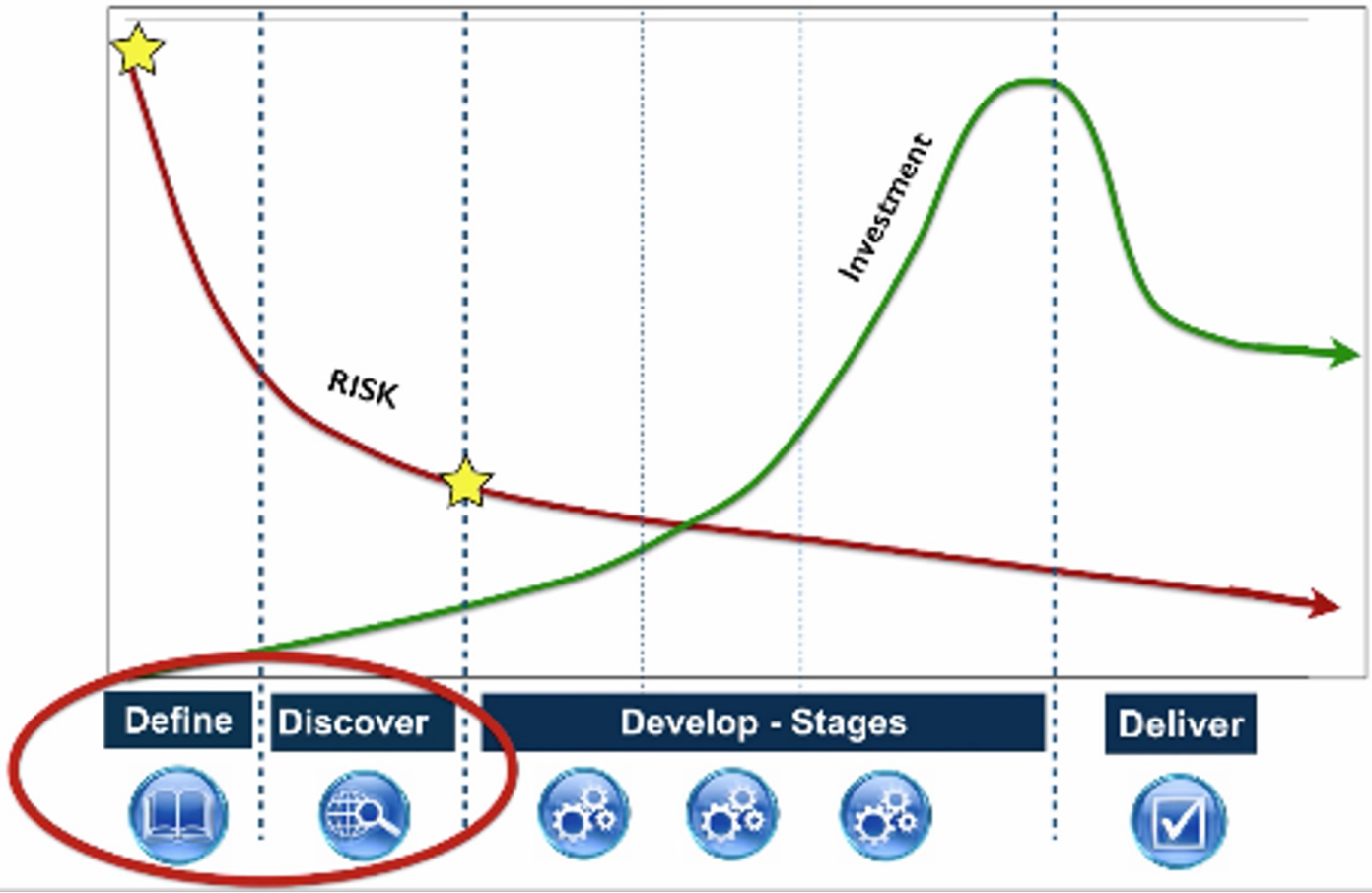
!

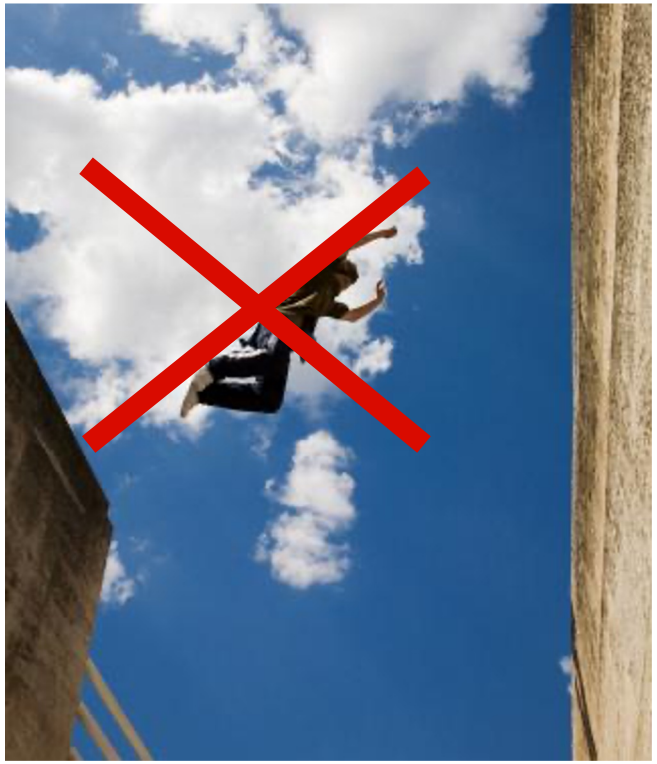
- Faster (up to 6x)
- Less Risk (30-80%)

Deliver

Weekly Project Coaching :: Monthly System Summits :: Quarterly Strategy Summits

System Aim: Decrease Risk Before Making Investment





Scary Leap Innovation
“All or Nothing”

Fail Fast, Fail Cheap

Dissolve Risk with Small Steps

Also known as ”Learn Fast, Learn Inexpensively”

Making Ideas Real

Systems Thinking

Dr. W. Edwards Deming

American engineer, statistician, professor, author, lecturer, and management consultant

The W. Edwards Deming Institute

"We must preserve the power of intrinsic motivation, dignity, cooperation, curiosity, joy in learning, that people are born with."

— Dr. W. Edwards Deming

The W. Edwards Deming Institute

"It would be better if everyone worked together as a system, with the aim for everybody to win."

— Dr. W. Edwards Deming

Have an idea already?

Yellow Card – idea capture tool

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Yellow Card

- Clearly communicate your idea

INNOVATION ENGINEERING®

Yellow Card®

A framework for clearly communicating innovations.
Start from the front or back side of card. Fill in all that you can.

Innovation Name: _____
NAME that is suggestive of the benefit the innovation delivers.

NEWS HEADLINE: *In a sentence - what makes your innovation MEANINGFULLY UNIQUE. The first... , the only...*

_____

_____

_____

_____

CUSTOMER / STAKEHOLDERS: *WHO is the Customer who benefits most from this innovation? For system innovations, who are the Stakeholders who will be most affected?*

_____

_____

Customer PROBLEM: *WHAT Customer / Stakeholder PROBLEM does this idea address?*

_____

_____

_____

Benefit PROMISE: *Make a SPECIFIC or numeric PROMISE to the Customer / Stakeholders to SOLVE the problem listed above.*

_____

_____

_____

_____

_____

WHAT the Innovation is and **HOW** it can deliver this promise is on the BACK of CARD.

PROOF: *WHAT is the Innovation we are offering to the Customer / Stakeholder & WHAT makes it possible for us to deliver on what we Promised?*

_____

_____

_____

_____

Customer PRICE: *First estimate / goal for price.*
System Innovations - also consider costs in terms of time and energy investments.

_____

This is a good value when you consider: _____

_____

PASSION: *This project is important to the organization and to me because...*

_____

DEATH THREATS: *Major challenges or risks associated with this innovation.*

1. Death Threat _____

   DO to learn more: _____

2. Death Threat _____

   DO to learn more: _____

Optional Invention Sketch or Math Game Plan

Inventor's Autograph: _____ Date_____

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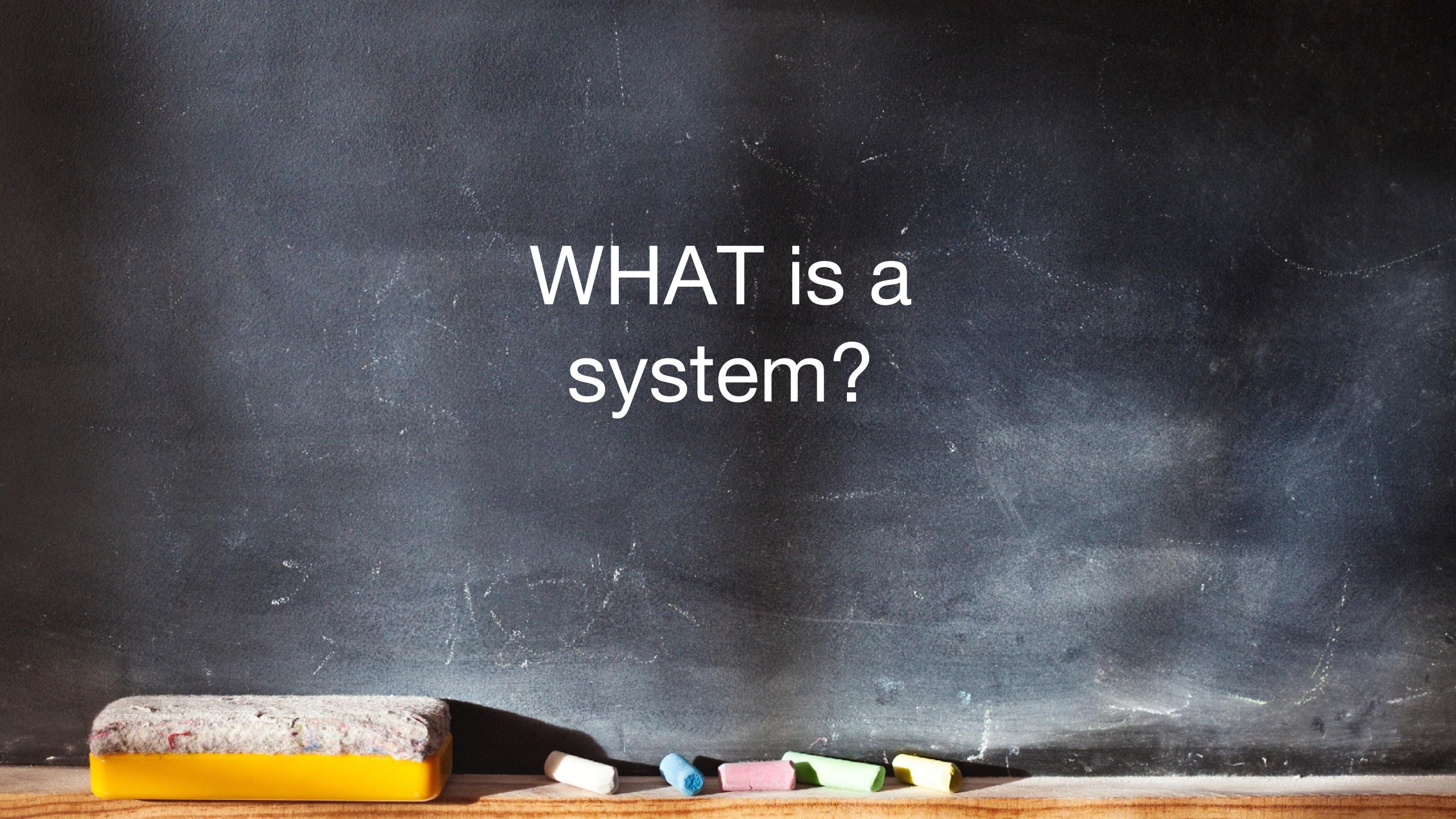

WHAT is a
system?

System Innovation

PRINCIPLES

1. Appreciation for a System
2. Knowledge about Variation
3. Psychology
4. Theory of Knowledge (PDSA)

Appreciation for a System

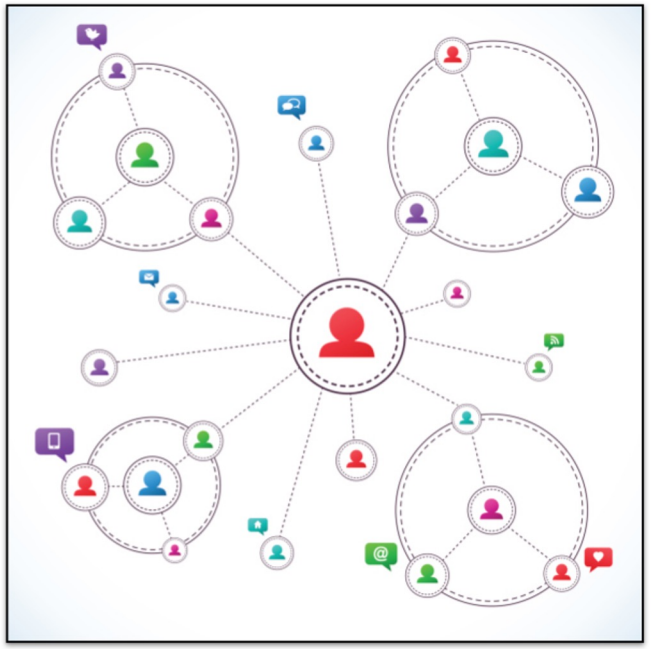
"A SYSTEM is two or more parts that work together to accomplish a SHARED AIM"

Dr. W. Edwards Deming

A PROCESS doesn't require different groups or departments to work together.

Appreciation for a System

System results are the product of interactions.



Appreciation for a System

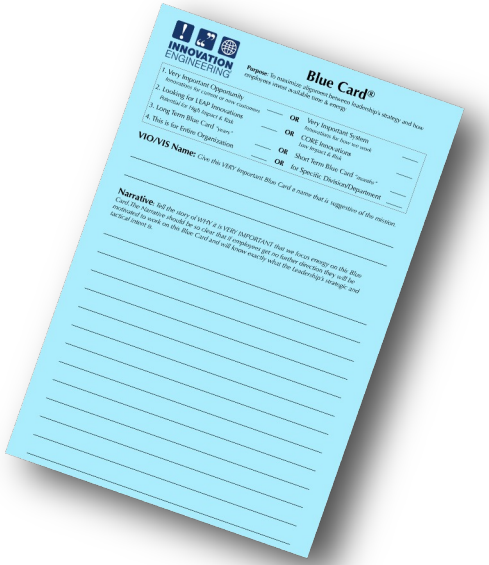
Optimizing the parts does not necessarily make a better whole.

You need to think about the interactions of the parts.

Credit: UNESCO UNITWIN

ALIGNMENT

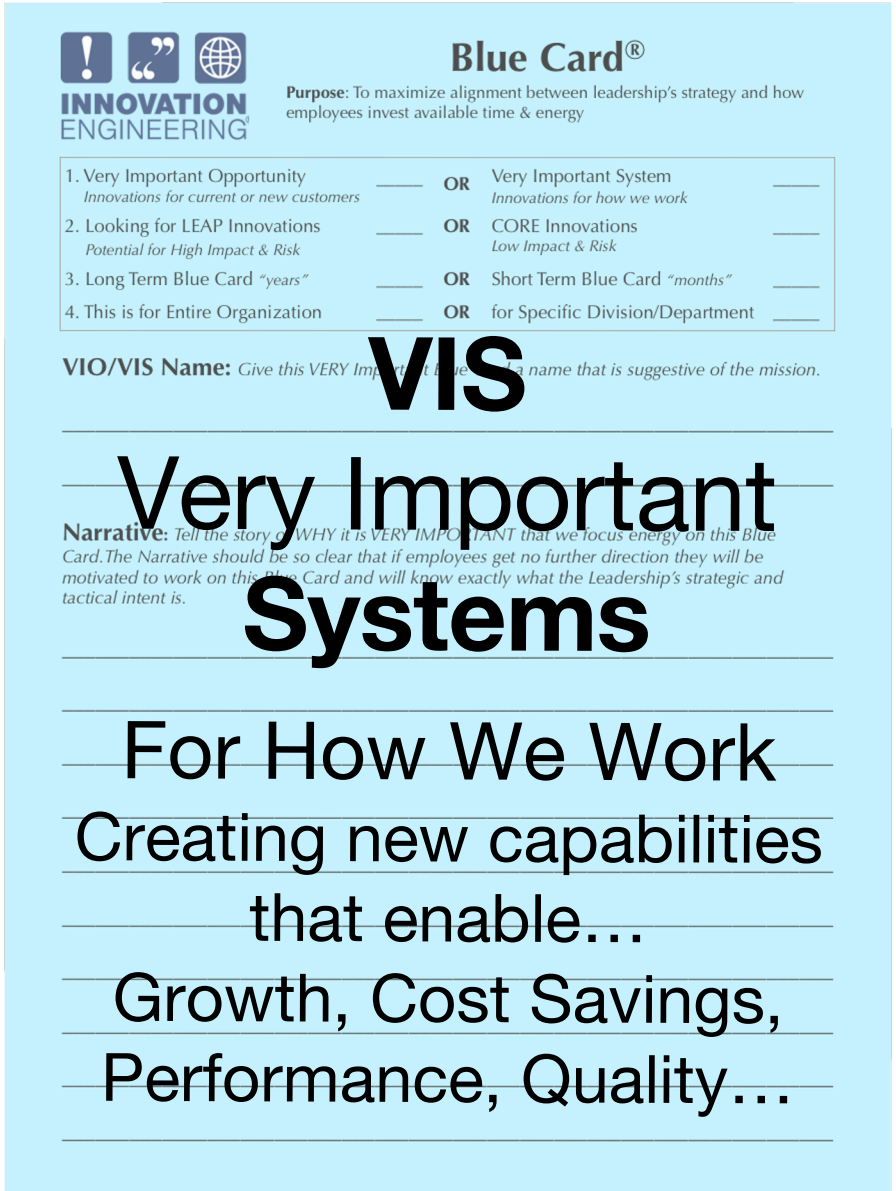
Defining Strategy



WHAT we need

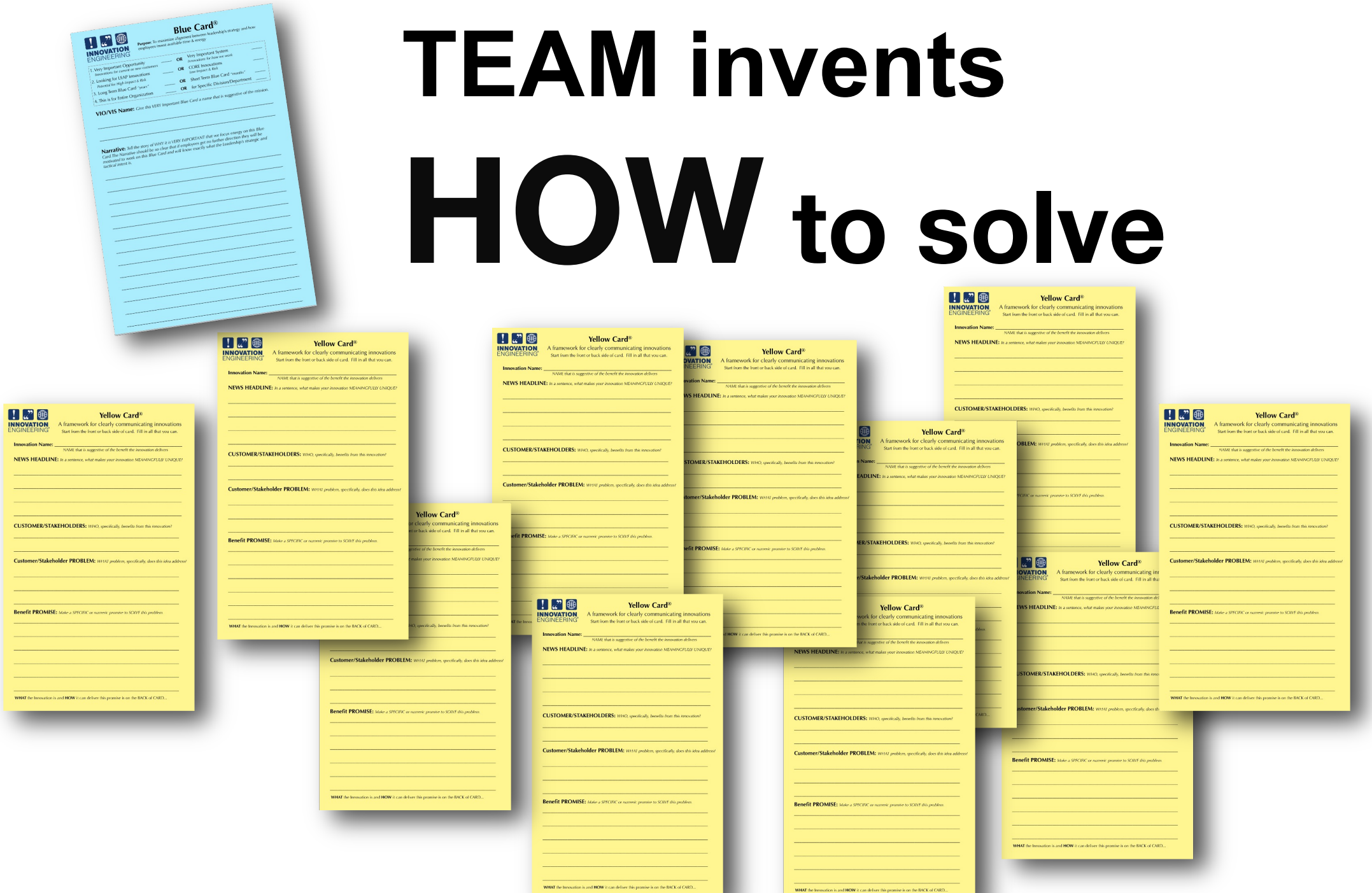
& WHY we need it

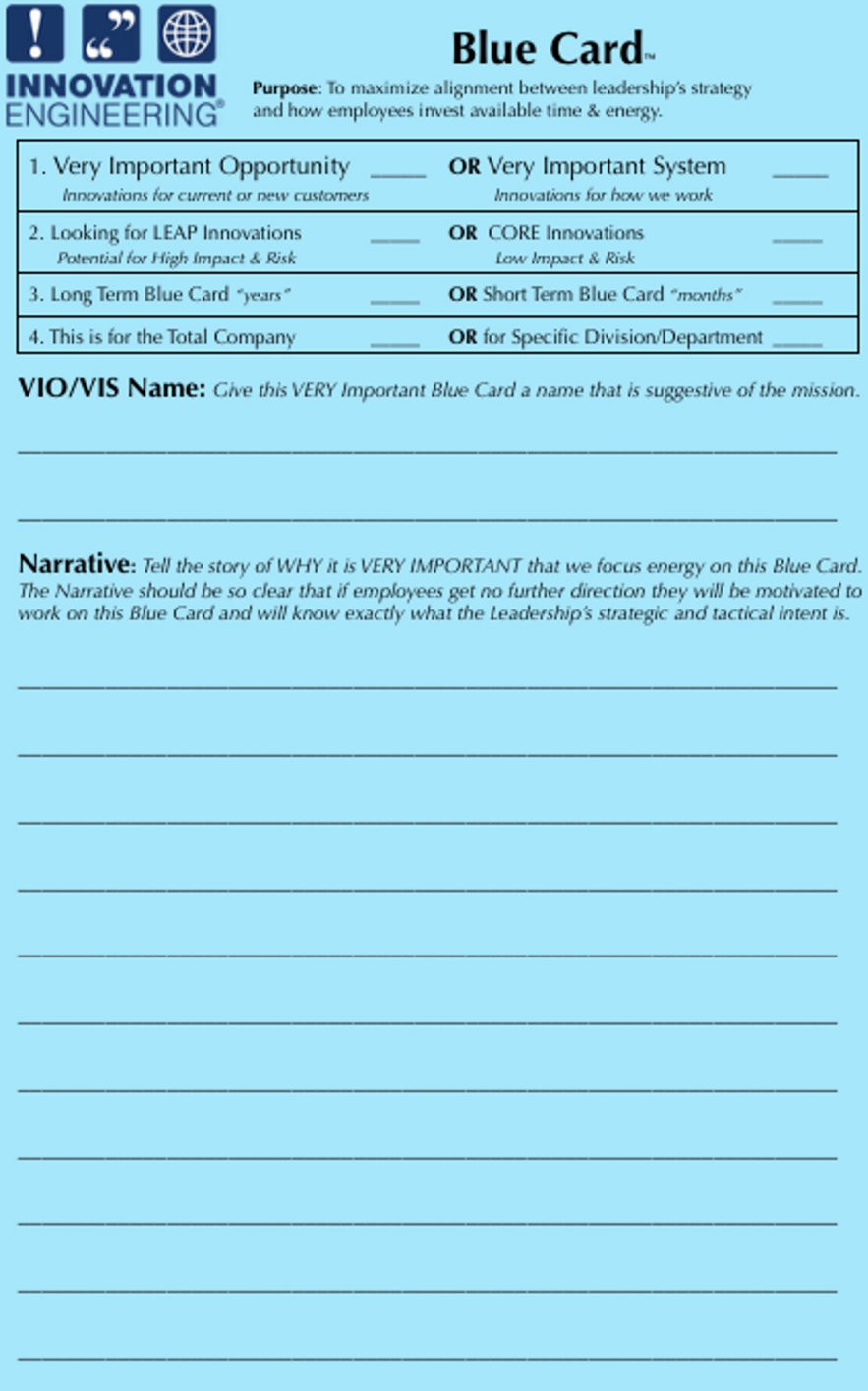
LEADERSHIP Defines



TEAM invents

HOW to solve





INNOVATION ENGINEERING®

Blue Card™

Purpose: To maximize alignment between leadership's strategy and how employees invest available time & energy.

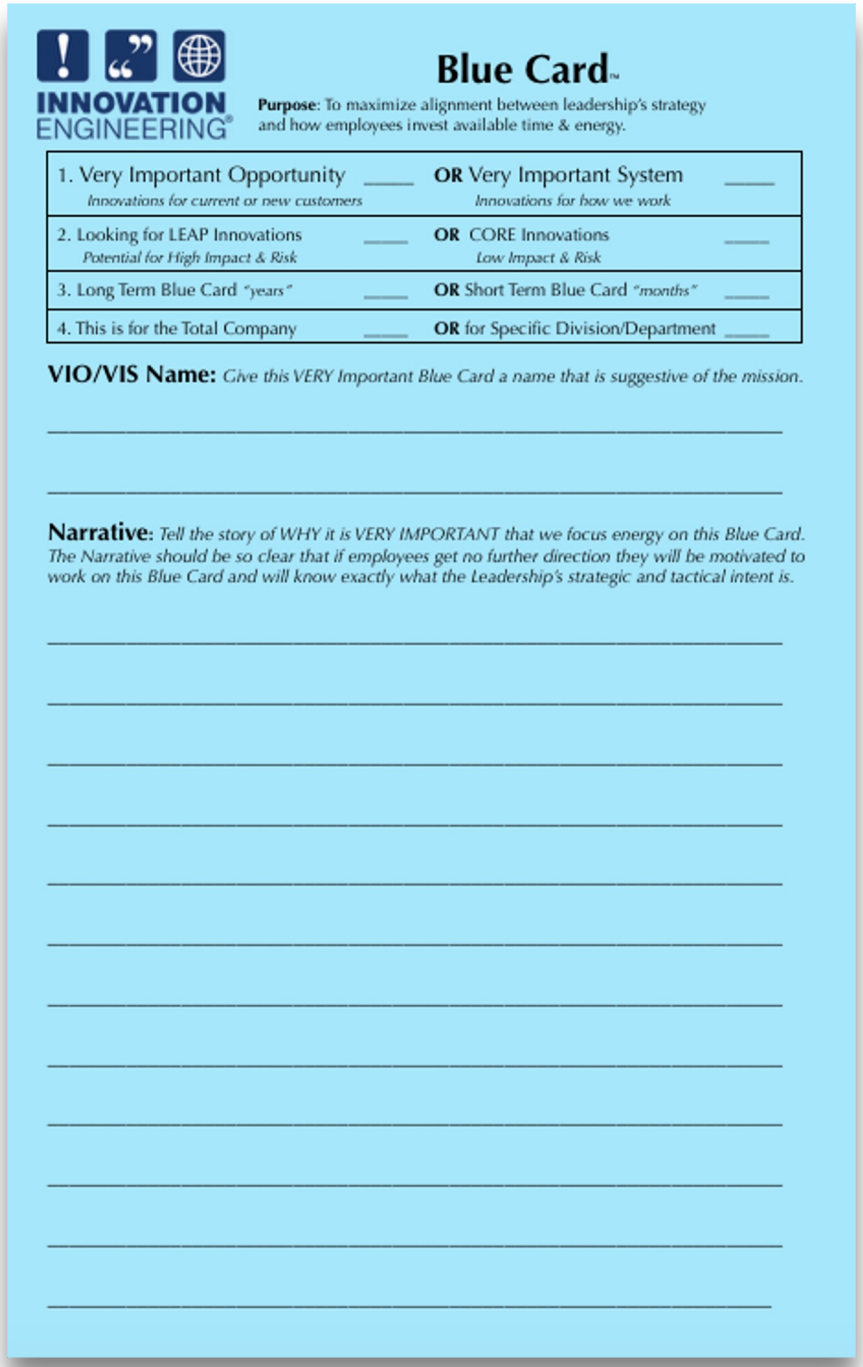
1. Very Important Opportunity *Innovations for current or new customers*	____	**OR** Very Important System *Innovations for how we work*	____
2. Looking for LEAP Innovations *Potential for High Impact & Risk*	____	**OR** CORE Innovations *Low Impact & Risk*	____
3. Long Term Blue Card *"years"*	____	**OR** Short Term Blue Card *"months"*	____
4. This is for the Total Company	____	**OR** for Specific Division/Department	____

VIO/VIS Name: *Give this VERY Important Blue Card a name that is suggestive of the mission.*

Narrative: *Tell the story of WHY it is VERY IMPORTANT that we focus energy on this Blue Card. The Narrative should be so clear that if employees get no further direction they will be motivated to work on this Blue Card and will know exactly what the Leadership's strategic and tactical intent is.*

What is VERY important?

- **Define**
  - CORE/LEAP
  - Long / Short-Term
- **Narrative** *(motivates team)*
- **Strategic Mission** *(real & clear vision)*
- **Boundaries**
  - **Strategic Exclusions** *(what not doing)*
  - **Tactical Constraints** *(reality check)*
- **Exploration Areas** *(where to start)*



Narrative

A compelling explanation of why this strategy is important.

It should be so clear that if no further direction was given, people will understand the leader's intent and be motivated to work on the strategy.

1) what is the problem/opportunity?
2) How big is the problem?
3) What are the consequences if you don't solve the problem?

Strategic Mission:

“Finish the sentence with ONE Mission. “We need ideas for _____”

"I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth."

- President Kennedy
- May 25, 1961

Strategic Mission: *Finish the sentence with ONE mission, “We need ideas for _____”*

Strategic Exclusions: *Ideas or types of ideas that we are NOT interested in.*

Tactical Constraints: *Design, time, resources, investment, regulations, people, etc., etc.*

Exploration Areas: *Areas for stimulus mining when working to accomplish the mission including any relevant live project work that is already going on.*

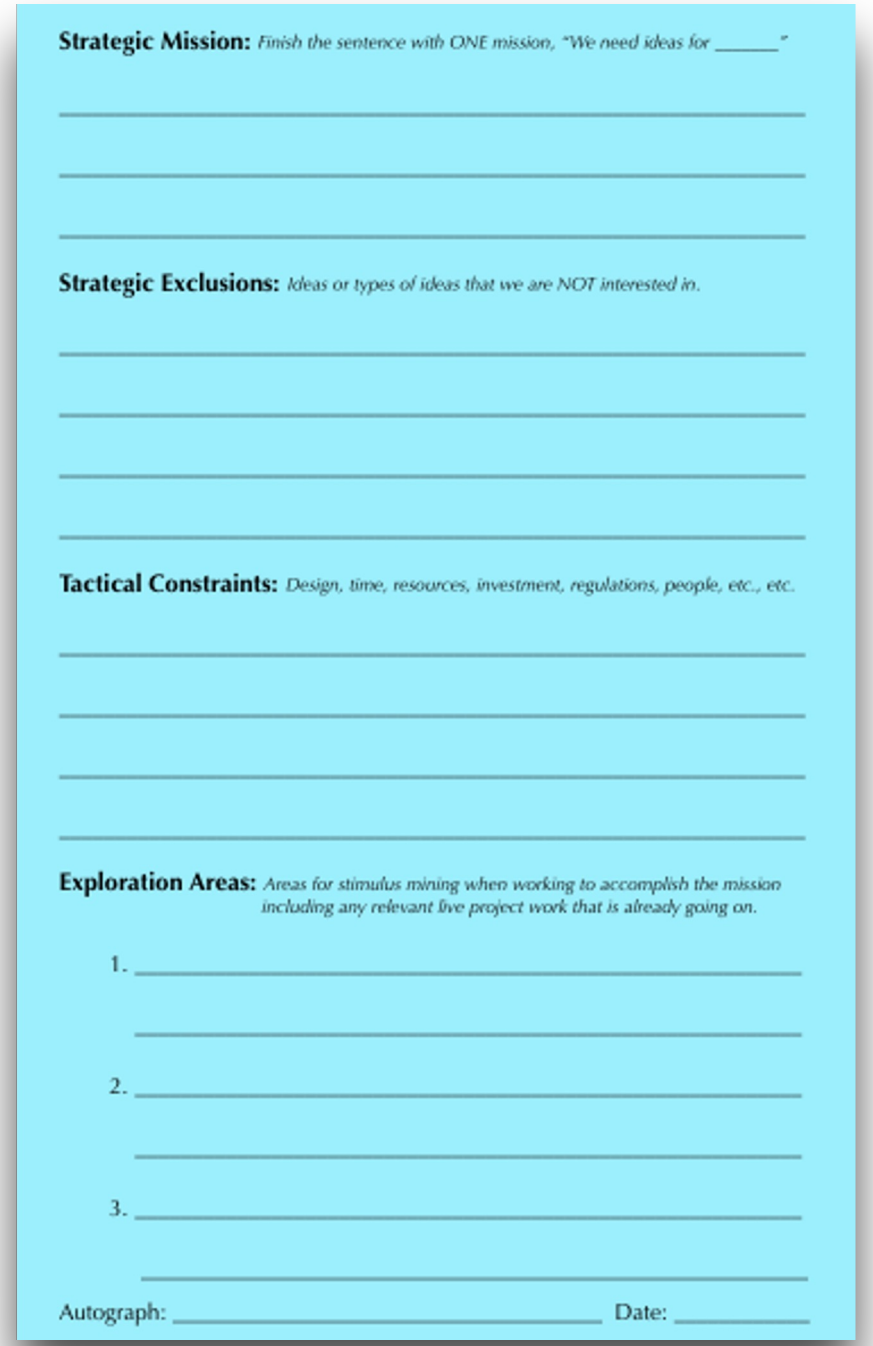
1.

2.

3.

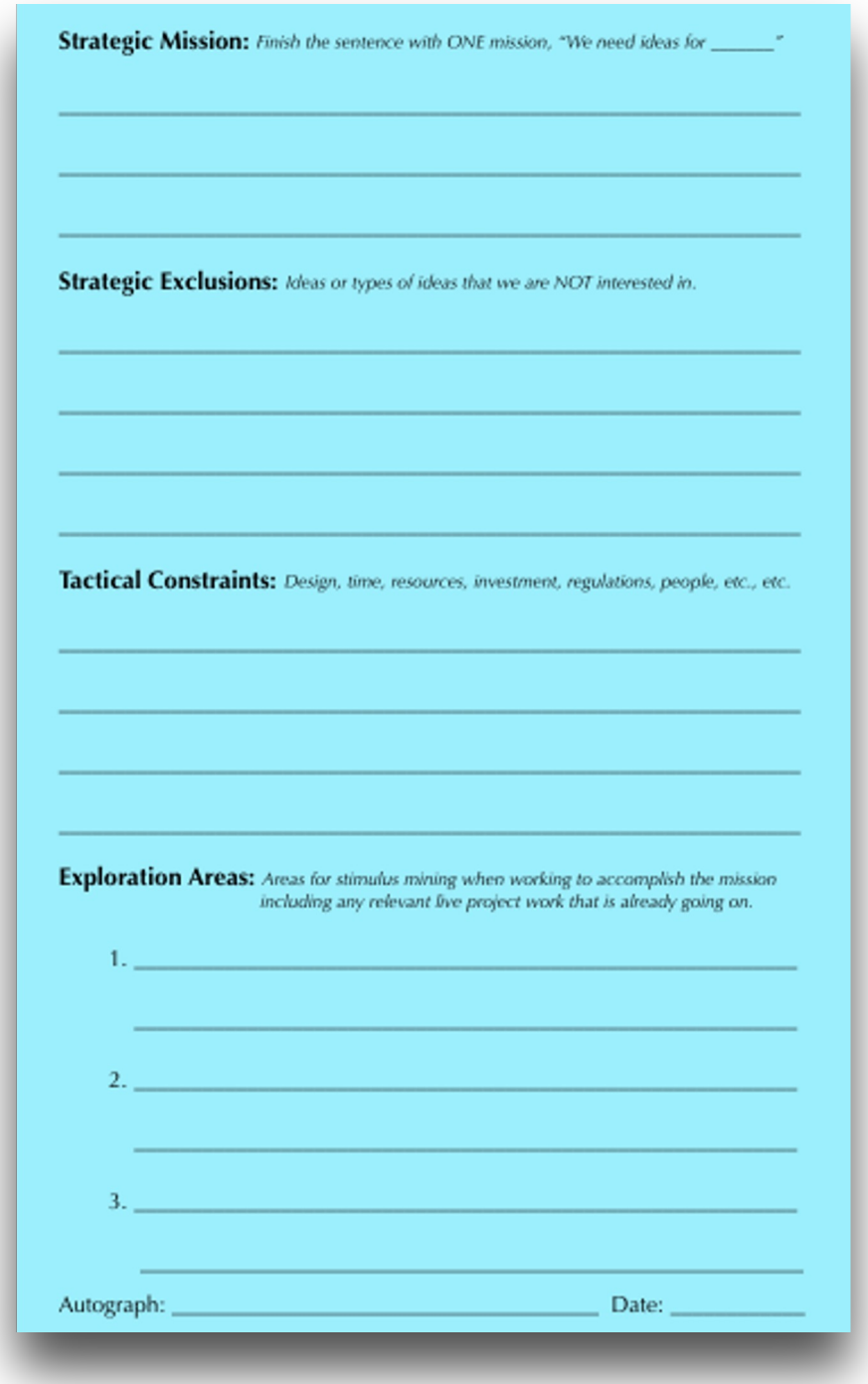
Autograph: _____ Date: _____

<u>Strategic</u> Exclusions: Ideas or types of ideas that you are NOT interested in.

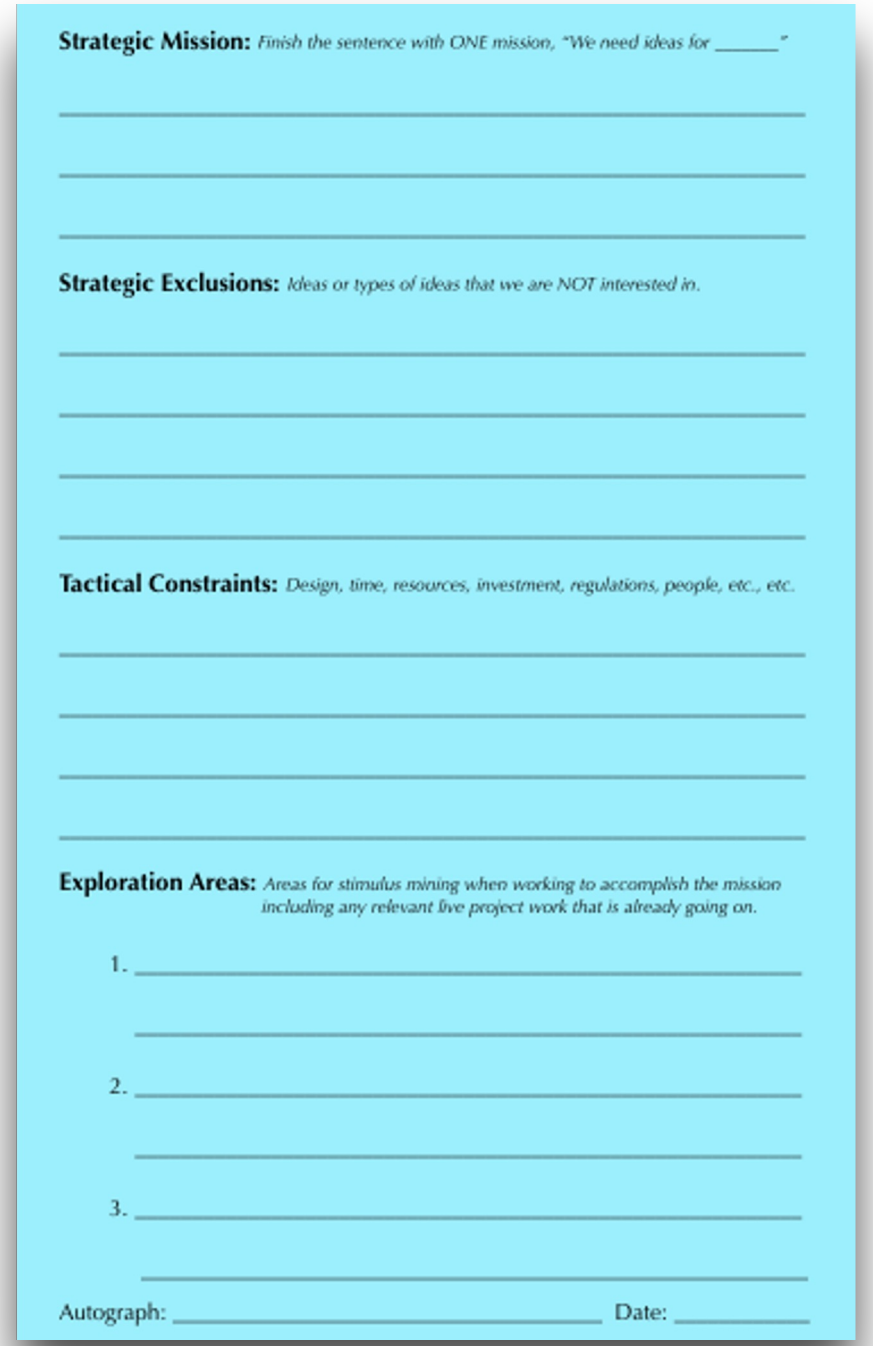


Tactical Constraints:

Design, time, resources, investment, regulations, people, etc., etc.



Exploration Areas: Areas for research (stimulus mining) when working to accomplish the mission including any relevant live project work that is already going on.

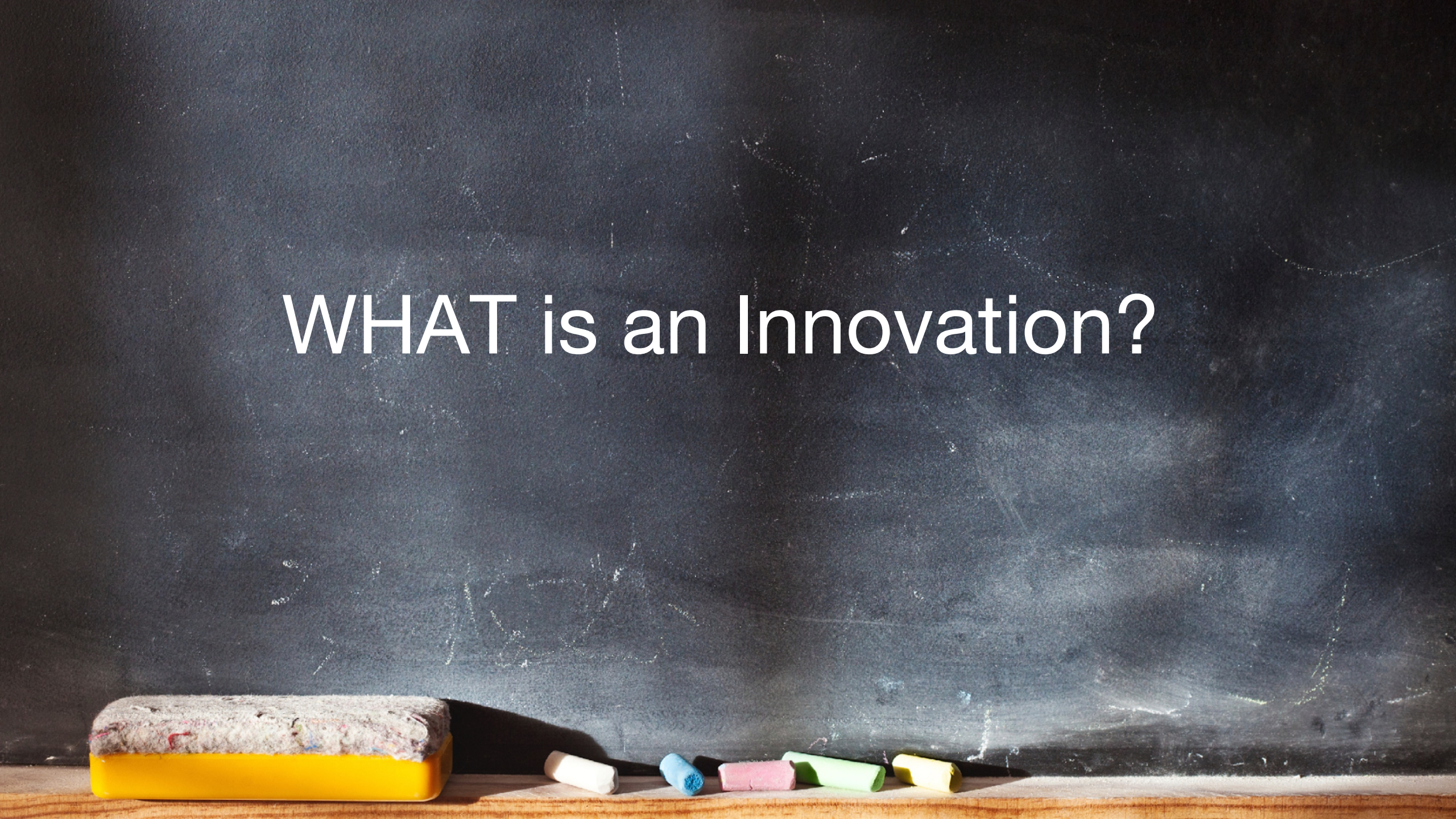


Group Blue Card

- New Blue Card

OR

- Modify an existing Blue Card


WHAT is an Innovation?

Meaningfully Unique Innovations

Solve Problems

Relevant
Purposeful
Valuable

Meaningful

Unique

Novel
Non-obvious
Unexpected

If you are not

Meaningful

Unique

you better be cheap

Really Cheap

A **Product** or **Service** is **Meaningfully Unique** when…..

Customers/Clients are willing to change behavior and/or pay more money for it.

A SYSTEM **Innovation is <u>Meaningfully</u> <u>Unique</u> when…**

Your Co-workers & Organization are willing to Invest Time, Energy, and Money to implement

TIME

ENERGY

MONEY

HOW to Innovate?

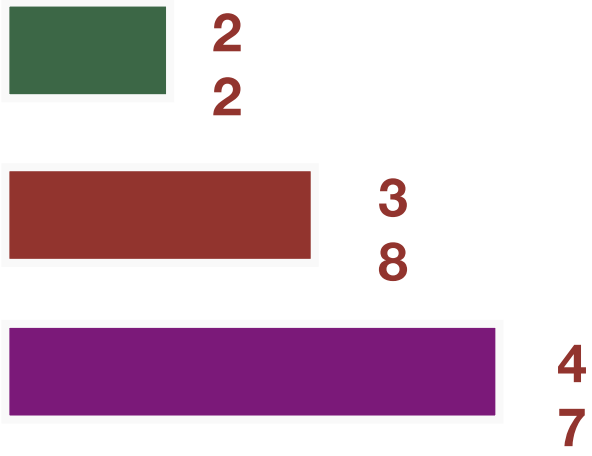
Meaningfully Unique ideas = (Eureka! ideas)

$$\frac{\text{Explore } \textbf{Stimulus}^{\text{Leverage } \textbf{Diversity}}}{\text{Drive out } \textbf{Fear}}$$

Value of Stimulus

Stimulus feeds the brain

Stimulus Available	# of practical ideas invented
Low Stimulus	2 2
Medium Stimulus	3 8
High Stimulus	4 7



Diversity means people who think differently from you

Mindset

Backgrounds

Culture

Maybe Even Who You Disagree With

Traditional Model

Individual “~~Brainstorming~~ Draining”

Before

After

Suck Method

Uses Your Brain Like a Library

Think of your brain like a

COMPUTER

Stimuli → → EUREKA

Stimuli → → EUREKA

Stimuli → → EUREKA

Stimuli → → EUREKA

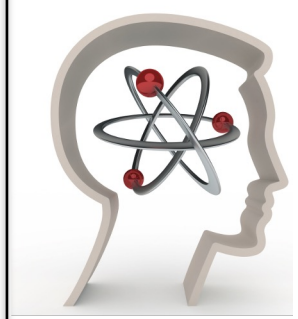
Stimulus sets off a CHAIN Reaction!!!

Stimulus Mining

Filling your brain

So that you can make more connections

6 Categories for Stimulus Mining



WISDOM
Mining

TECH
Mining

MARKET
Mining

INSIGHT
Mining

FUTURE
Mining

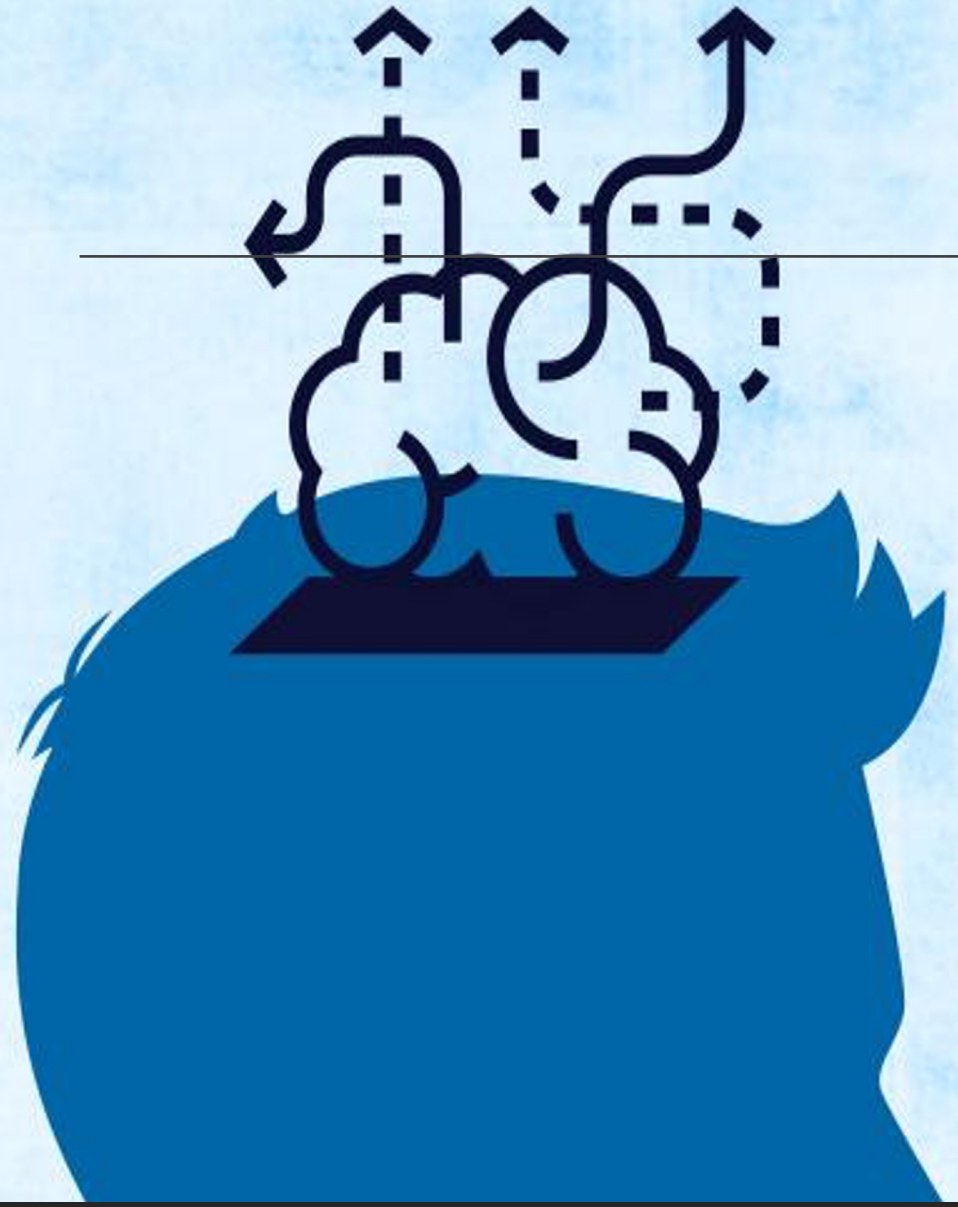
UNRELATED
Mining

Tech Mining

Classic Mining

Stretch Mining

Help us get to LEAP ideas



Innovation Tools

Stretch Mining

Matrix Mixing, Po, Analogy,
Take Over Time

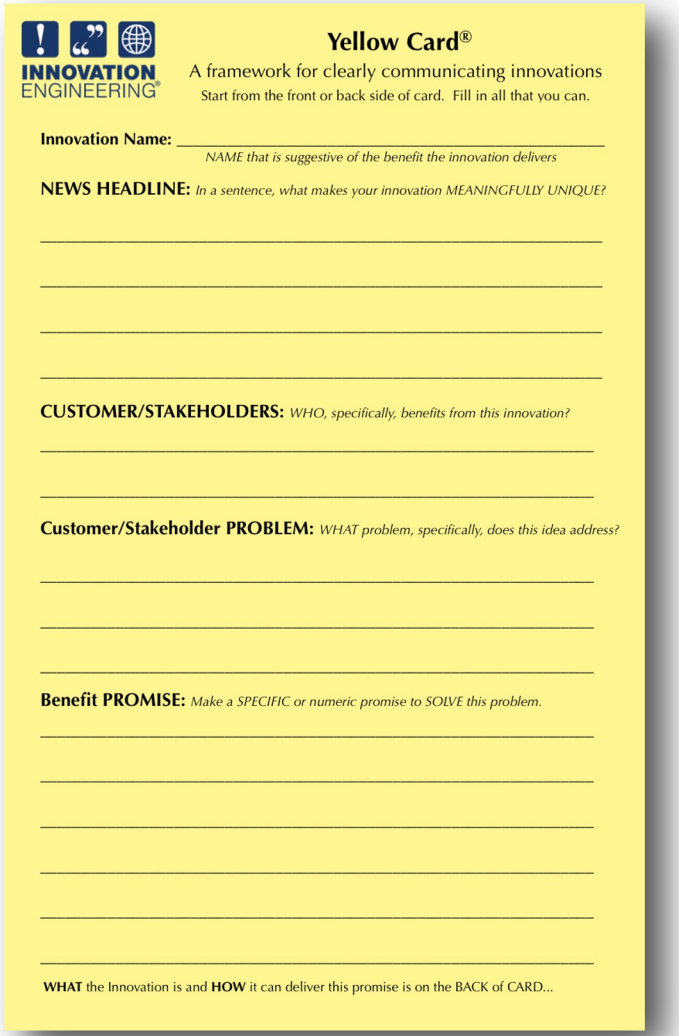
Future mining

Read about or imagine possible or predicted MEGA SHIFTS related or unrelated to your Industry

- Possible or Predicted MEGA SHIFTS in Demographics
  Ex: shift to in stakeholder age
- Possible or Predicted MEGA SHIFTS in Laws, Regulations
  Ex: Green energy in all state or federal buildings
- Possible or Predicted MEGA SHIFTS in Societal, Cultural, or Stakeholder Behavior
  Ex: Only social media educational resources ie: TikTok videos
- Possible or Predicted MEGA SHIFTS in Technology
  Ex: VR becomes dominate way to learn

For each Mega Shift.

1. Consider the possible CONSEQUENCES of that shift occurring in the future.
2. Consider the OPPORTUNITIES for innovation should that shift occur.



Yellow Card

Clearly defining your idea or innovation

Define Your Idea

Build confidence by making the unknown known

Define the idea from the customer's perspective

Problem

Meaningfully Unique Innovations

solve

Customer or

Stakeholder

problems

Problems that **MATTER**

Problems that are **REAL**

Problems that are **SPECIFIC**

Promise

What benefit will the stakeholder receive, enjoy/see value, experience in exchange for their time, energy and money?

Features are NOT benefits

Feature: Stabilization Control

Promise: Reduces rollover risk and loss of traction

Proof

Tell a story:
How are you able to deliver on the promise?

Hints:

Be clear – no jargon, explain how a smart person not in your field would understand it

Be specific – explain how it works in simple language (recipe logic)

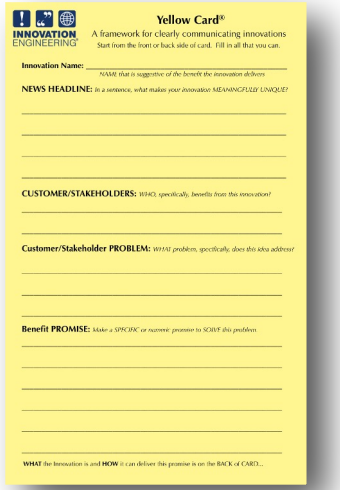
Quantify your benefit and/or proof: specific numbers help customers visualize and understand the benefit and how it works

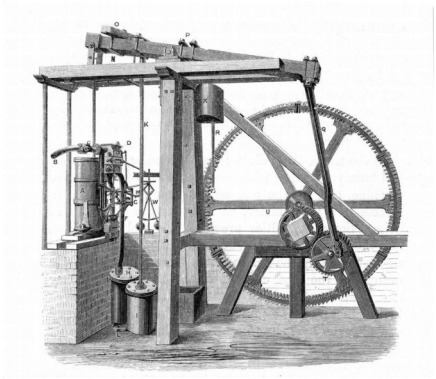
Research finds that you should

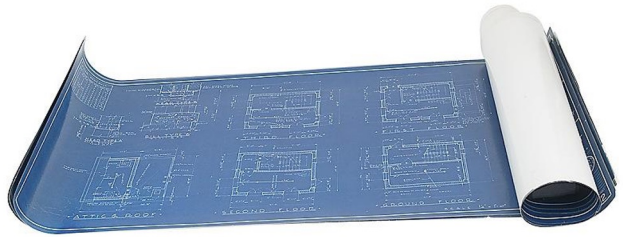
Write so that a fifth grader can understand your idea

Translating ideas into a written concept

Is the FASTEST & CHEAPEST prototype on Earth.

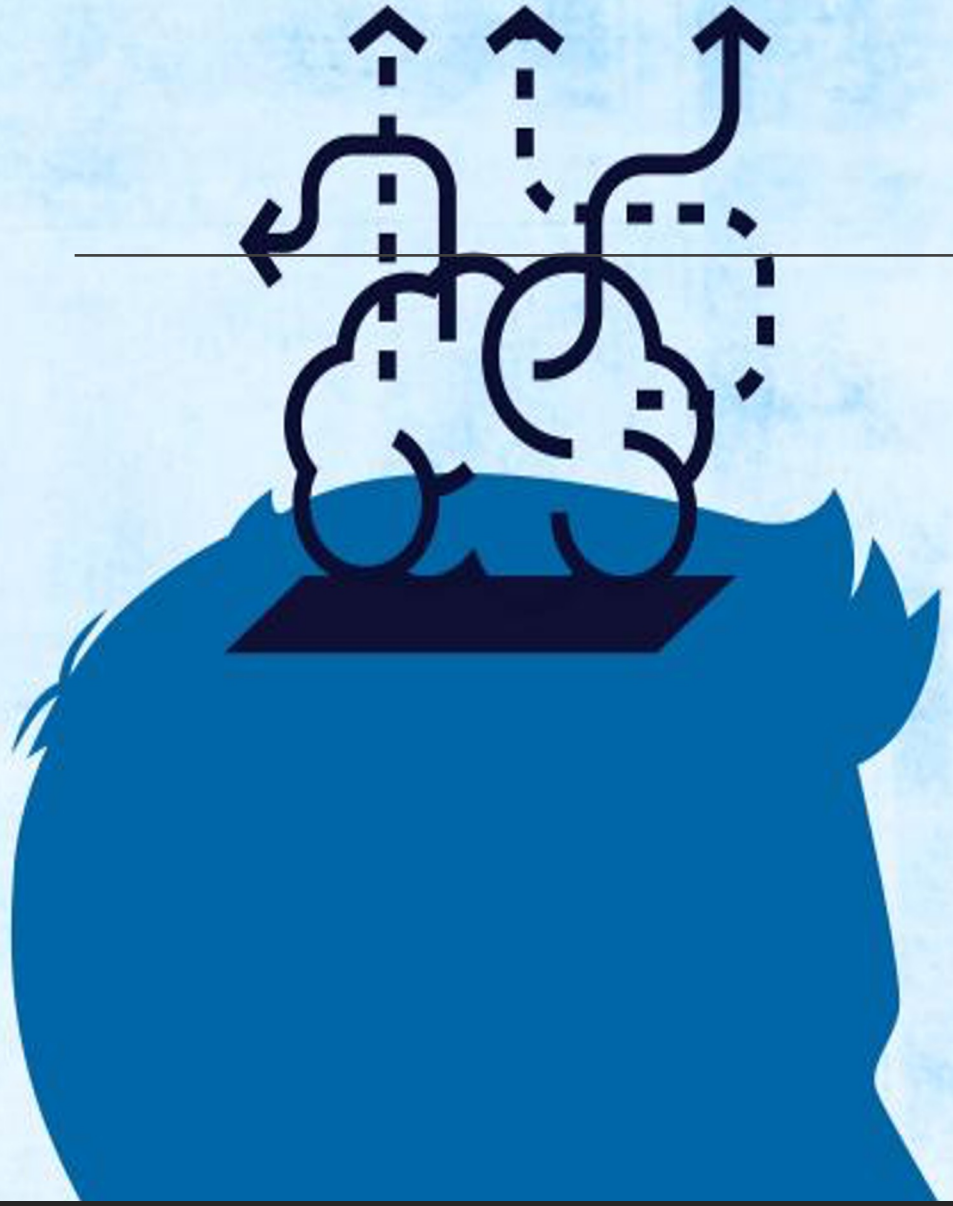






Value Proposition

Benefit Promise + why your solution is better than other solutions



Commercialization

Reduce risk early in the process

Fermi Estimation

Gain confidence by rapidly
understanding the numbers

Why Estimating?

- Makes the Unknown Known
- Reduce Uncertainty
- Build Confidence
- Provides Focus

Why Estimating?

- Makes the Unknown Known
- Reduce Uncertainty
- Build Confidence
- Provides Focus

Fermi Estimation Process

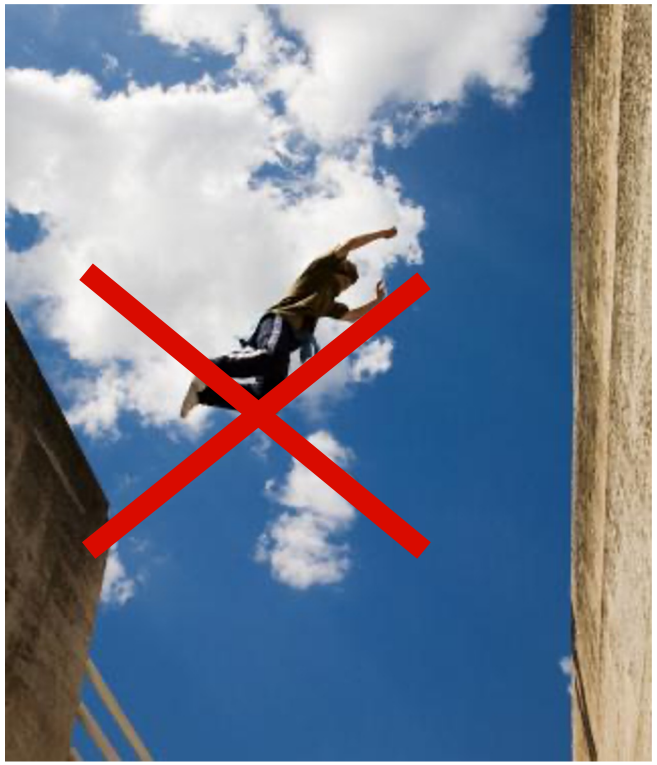
Estimating when you don't know much

Calculated approximation, which is useful even if the data is incomplete and uncertain

Step 1: Deconstruct Challenge into a few Key Factors You Can Estimate

Step 2: Estimate Factors & Document Your Reasoning

Step 3: Do Simple Math & REPEAT with the help of Mining



Scary Leap Innovation
“All or Nothing”

Fail Fast, Fail Cheap

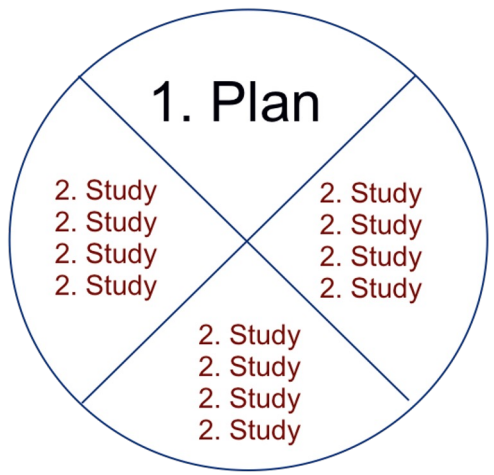
Dissolve Risk with Small Steps

Making Ideas Real

Old World

“Proper & Mature”
FEAR Reduction System

Expensive & Slow



New World

Plan-Do-Study-Act

Fail FAST Fail CHEAP

Fail Fast, Fail Cheap Principles

Rapid Cycles of Learning

Focus on the Biggest Problems First

Simultaneous Engineering

Build Courage

By Making It
EASY… to Run

Experiments

Making Ideas Real

Focus on Severe Threats

Small Problem

Small Problem

Small Problem

Results in idea failure
Severe Threat

Focus on Severe Threats

“Teams like to address easy issues first. At P&G we have flipped the sequence. Teams must identify so-called ‘killer issues’ - problems that must be solved for the innovation to succeed.”

A.G. Lafley

Retired CEO

Making Ideas Real

Results in idea failure
Severe Threat

Manageable Threat

Experiments that can be run in one week or less
Fail FAST, Fail Cheap

Simultaneous Engineering

Innovation is about “Whack-a-Mole”

PLAN: What does success look like for this cycle?

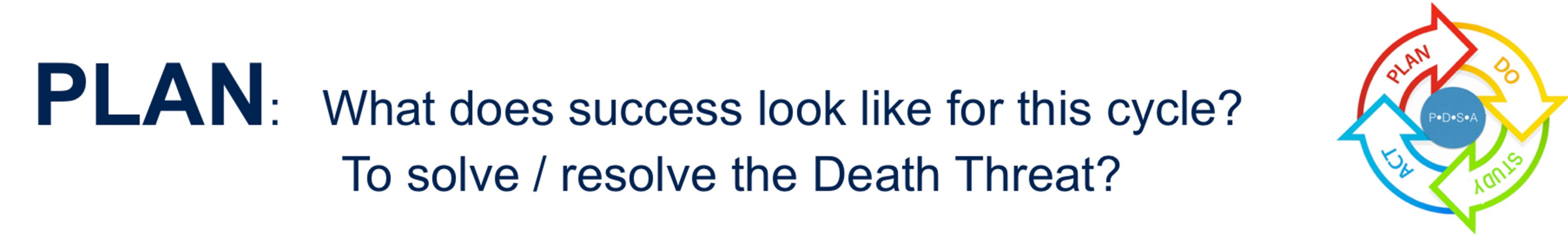
DO: A specific activity to accomplish the PLAN.

STUDY: Stop and Think, what did you learn?

ACT: What is next?

PLAN: What does success look like for this cycle?

To solve / resolve the Death Threat?



What do we want to achieve?

Where are we going?

How will we know we got there?

What is our organization's standard?

What is the desired end state for the

PDSA Cycles we will be completing?

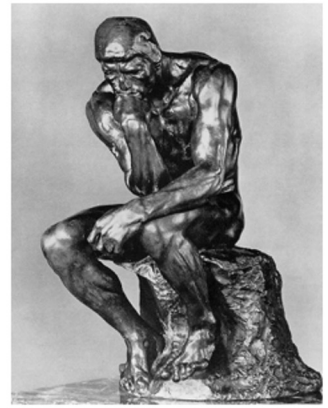
DO: a specific activity to accomplish your plan

We believe that doing the following work will help us address the PLAN.**When will we stop and STUDY results?**

- ***Describe the work, activity, or experiment that will help to address this Death Threat or Milestone.***
- ***What specific tasks do you need to accomplish to reach your desired outcome?***

STUDY: Stop and Think, what did you learn?

What did we learn?



THINK

First Answer is YES or NO

Did We Achieve/Solve/Resolve Plan

Second Answer is MORE IMPORTANT

WHY Did it work? WHY Didn't it work?

STUDY: Stop and Think, what did you learn?

- Document LEARNING versus the PLAN
- Not "ACTIVITIES" in the abstract
- Study the actual result the real NUMBERS
- Compare versus the PLAN

ACT: What is next?

“Based on what was learned…”

INNOVATION ENGINEERING®

Yellow Card™

A framework for clearly communicating innovations.
Start from the front or back side of card. Fill in all that you can.

Innovation Name: _____
NAME that is suggestive of the benefit the innovation delivers

NEWS HEADLINE: *In a sentence - what makes your innovation MEANINGFULLY UNIQUE.*

CUSTOMER / STAKEHOLDERS: *WHO, specifically, benefits from this innovation?*

Customer/Stakeholder PROBLEM: *WHAT problem, specifically, does this idea address?*

Benefit PROMISE: *Make a SPECIFIC or numeric promise to SOLVE this problem.*

WHAT the Innovation is and **HOW** it can deliver this promise is on the BACK of CARD...

Change **Idea or Yellow Card** to…

Change **Math** to…

Critical

Plan, Do Study, Act

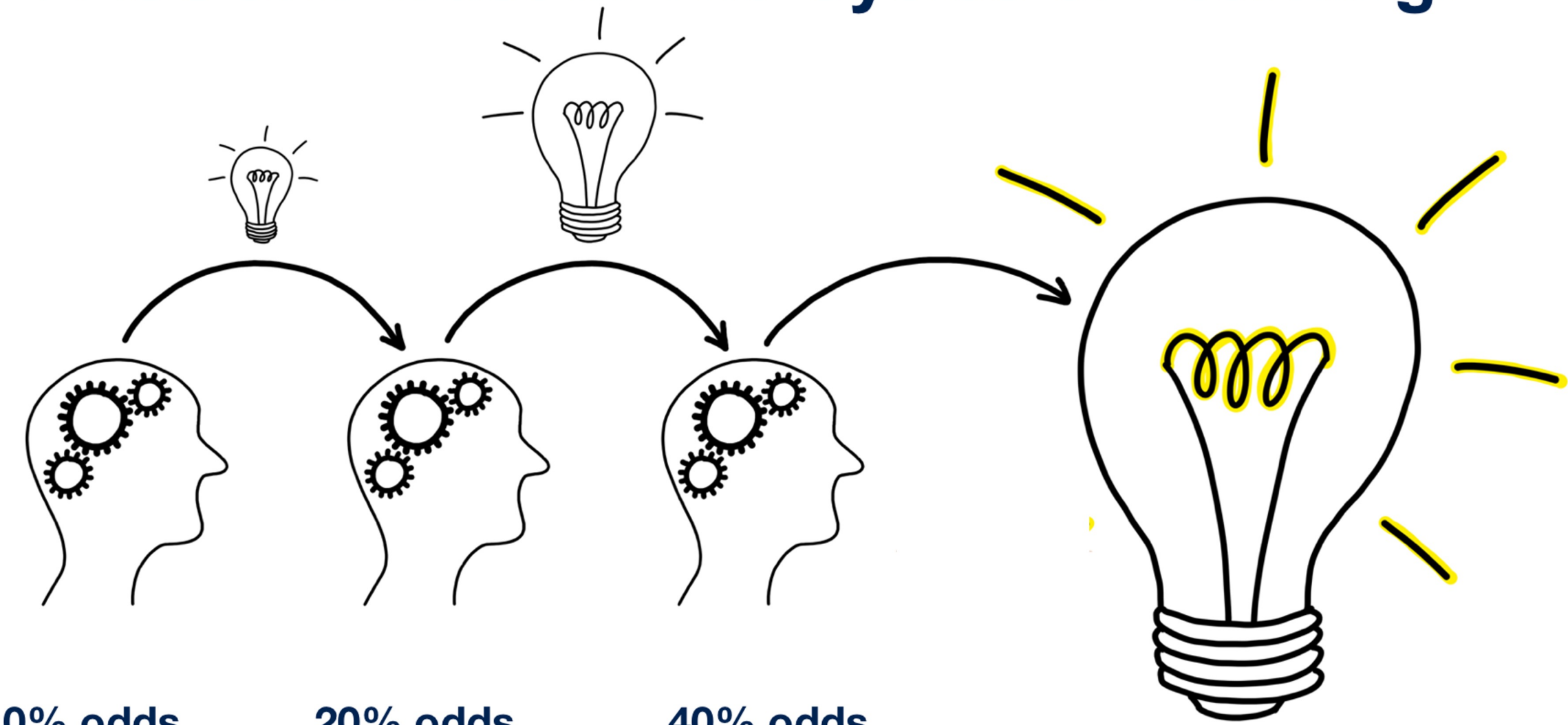
Documentation

Builds Collective Brainpower

First Learning Cycle Is Often to Determine If the DEATH THREAT is really a Death Threat

Because the idea is new
we often over react
thinking there is a problem
when in truth there isn't.

LESSON: Trust In The Cycles of Learning.



10% odds

You fail but get twice as smart.

20% odds

You fail but get twice as smart.

40% odds

You fail but get twice as smart.

80% odds

You WIN!