AG2PI TEAM SCIENCE TRAINING

Dr. Hannah Love

Dr. Ellen Fisher

Divergent Science LLC

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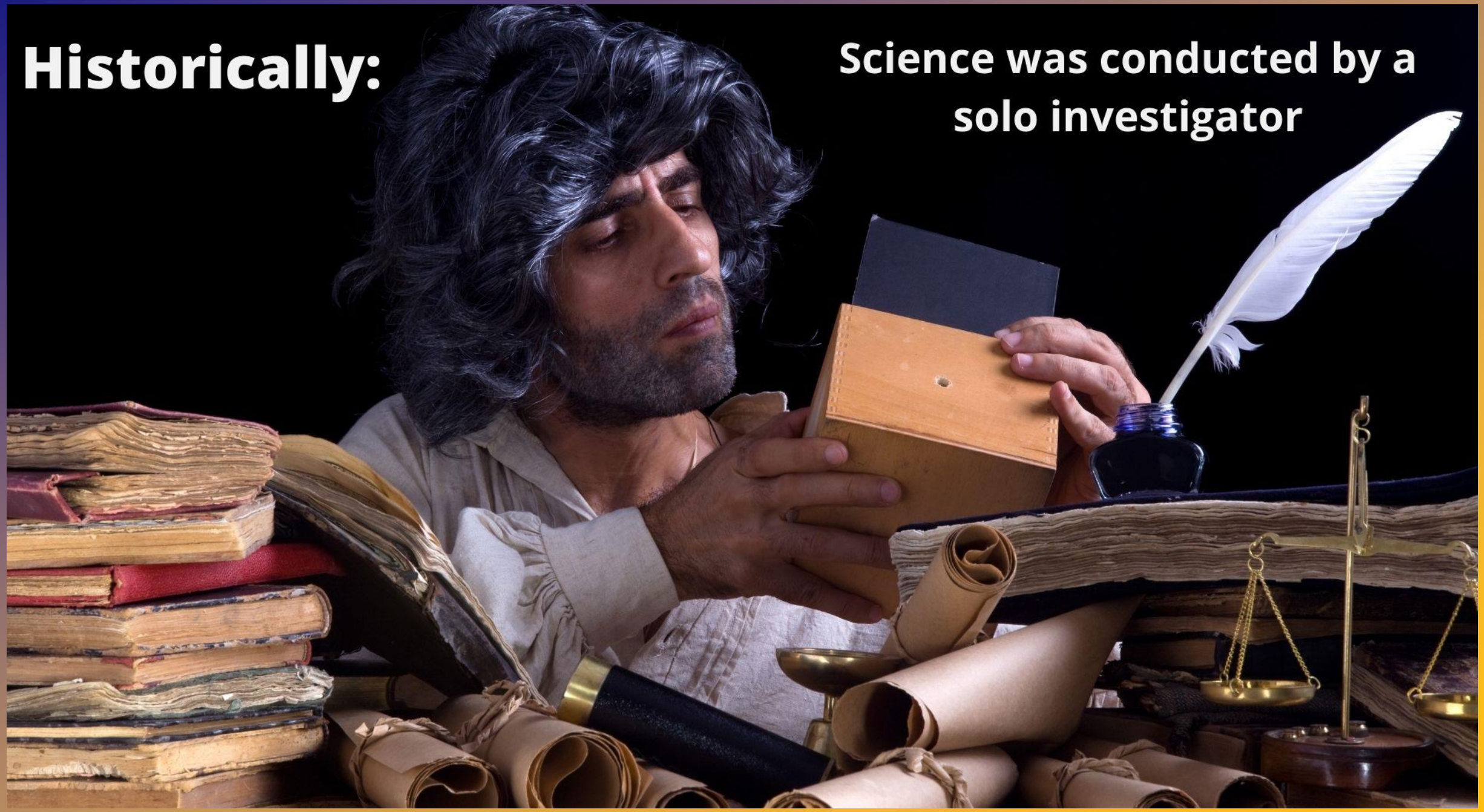
Agenda

- Warm-up
- Google Study
- Roles and Responsibilities
- Turn-taking
- Toolbox dialogue
- Knowledge Convergence Theory and Practice
  - Team Norms
  - Psychological safety
  - Even turn-taking
- Conclusion, Reflection, and Questions


Historically:
Science was conducted by a solo investigator

Today:

To solve large-scale global challenges facing our world, scientists must work together.

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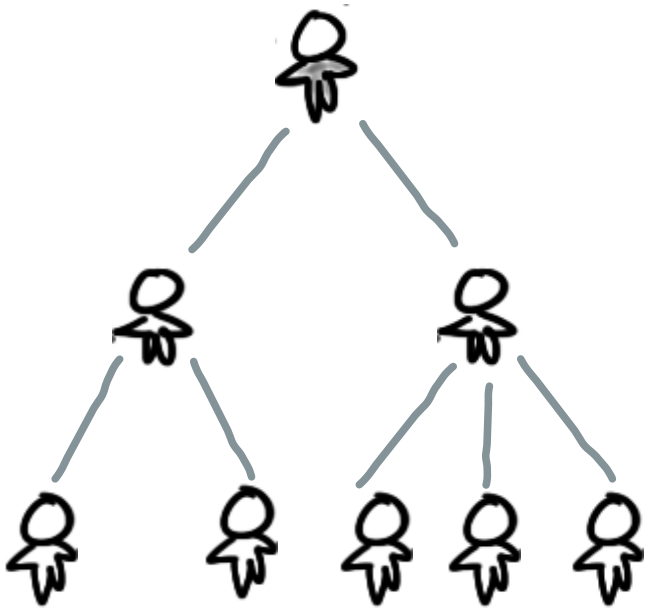
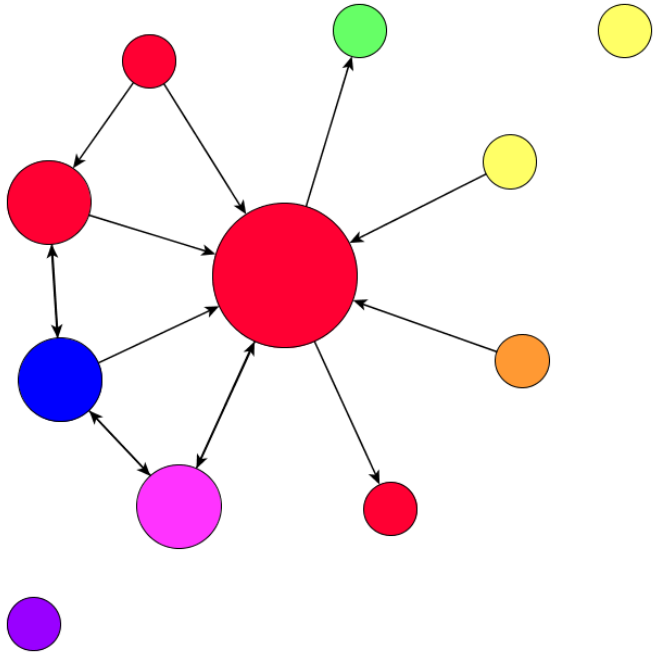
Types of Teams (Spectrum)

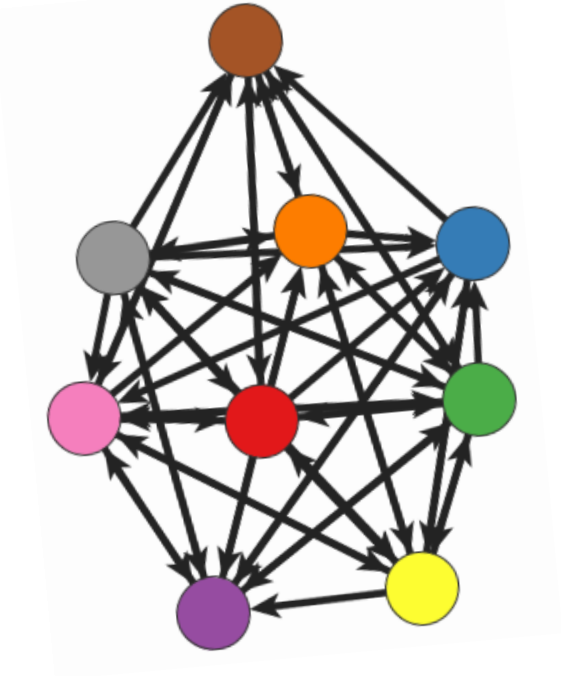
Hierarchical Team



Leader-Centric Team



Integrated Research Team

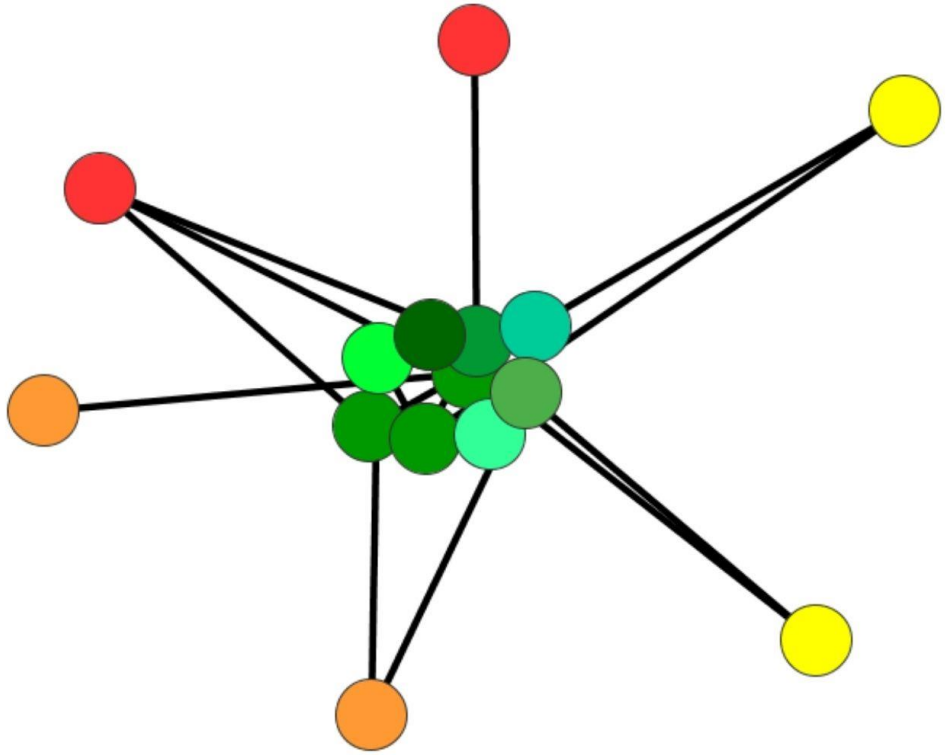


Gold Standard

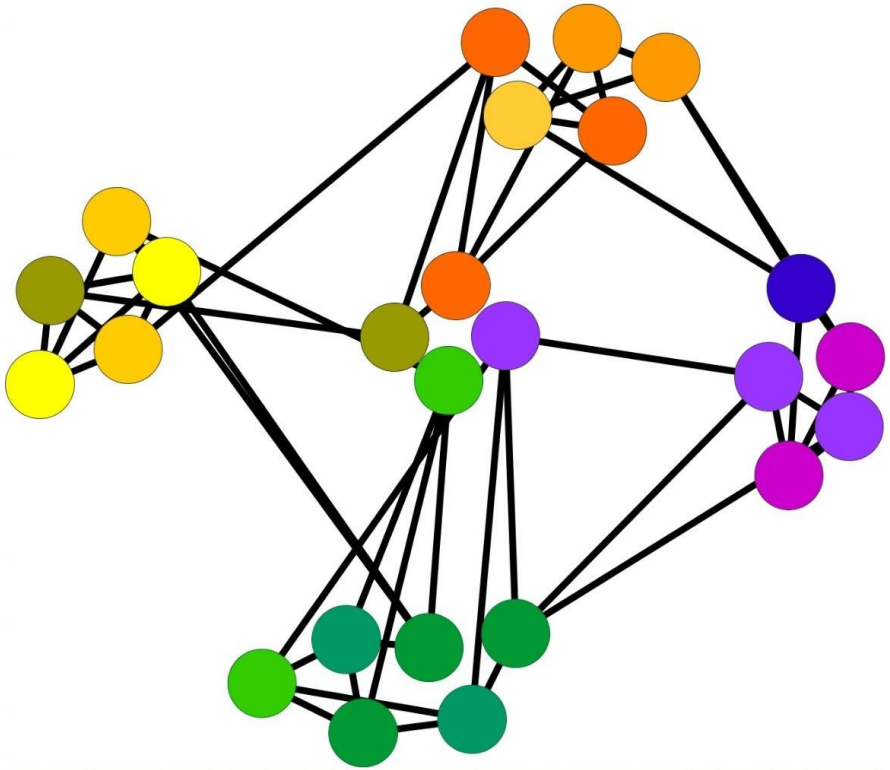
©

Other Large-Team Structures

Core-Periphery Network



Team of Teams



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Divergent Science

Team Science Consultant

Dr. Hannah Love

Team Science Consultant

Dr. Ellen Fisher

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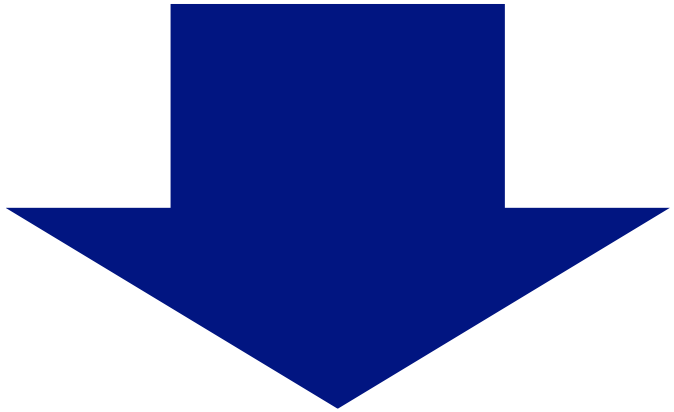
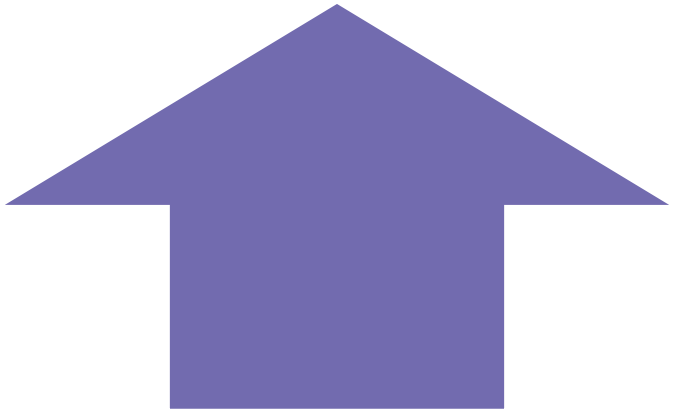


Hannah

- Sociologist
- Prefers small groups, large groups, and basically anything with people
- Full-time for Divergent Science

Ellen

- Chemist
- Prefers small group interactions
- Vice President for Research at the University of New Mexico



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Introductions

Write in Chat

Example:

- Name
- Disciplinary expertise
- Fun Prompt:
  - If a team is _____, then it is _____ because….
  - Examples:
    - If a team is nature, then it is rainforest because….
    - If a team is a superhero, then it is the avengers because….
    - If a team is an animal, then it is an owl because….

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A quick note on icebreakers

1

Don’t have to call them icebreakers

- Call them communication activities or warm-ups

2

Don’t have to ask personal information

- Ask questions that don’t require people to reveal personal information

3

Don’t have to be a waste of time

- Use them to start brainstorming about the meeting
- For example: during a meeting about budgets, have everyone share a budgeting tip

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Icebreaker Pro Tips

At a minimum ask everyone to share their name so you can assign action item

If you create the ice breaker, then you are in control AND you can plan what you will say

Email out the icebreaker ahead of time so everyone has time to prepare

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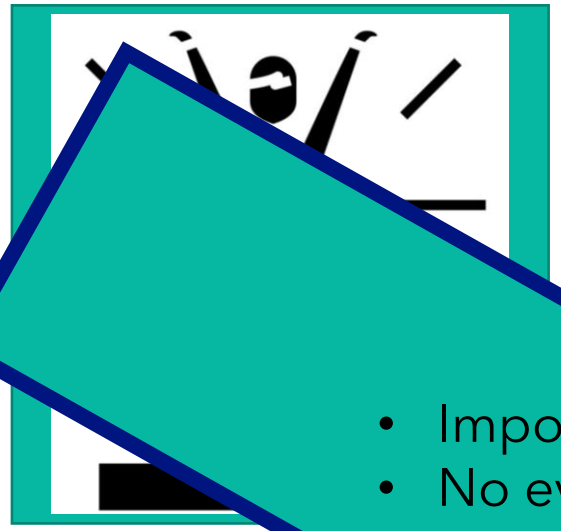
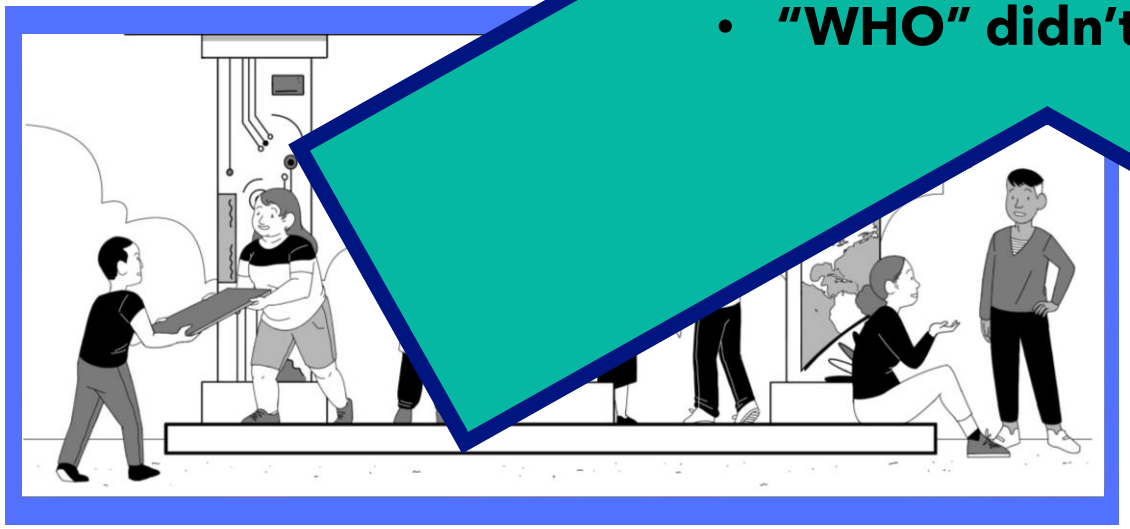
WHAT GOOGLE THOU… …



- Impossible to find patterns
- No evidence team composition important

- **"WHO" didn't matter!**



…eam?
…ople together
…who are friends together
…the introverts together
…onventional wisdom"

…30 teams and looked …ssful" teams:

- …of work
- Educa… …ence background
- Outgoing/…
- Motivation

©

What Google Found……

- Psychological Safety
- Dependability
- Roles/Structure
- Meaning
- Impact

Critical Group Norms

https://www.nytimes.com/2016/02/28/magazine/what-google-learned-from-its-quest-to-build-the-perfect-team.html

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PSYCHOLOGICAL SAFETY

"If I make a mistake on our team, it is not held against me."

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Psychological Safety for Knowledge Convergence

- Diversity of Ideas
- Diversity of Disciplines
- Diversity of Experience
  - Graduate students
  - Community Partners
  - External Collaborators
- And MORE!

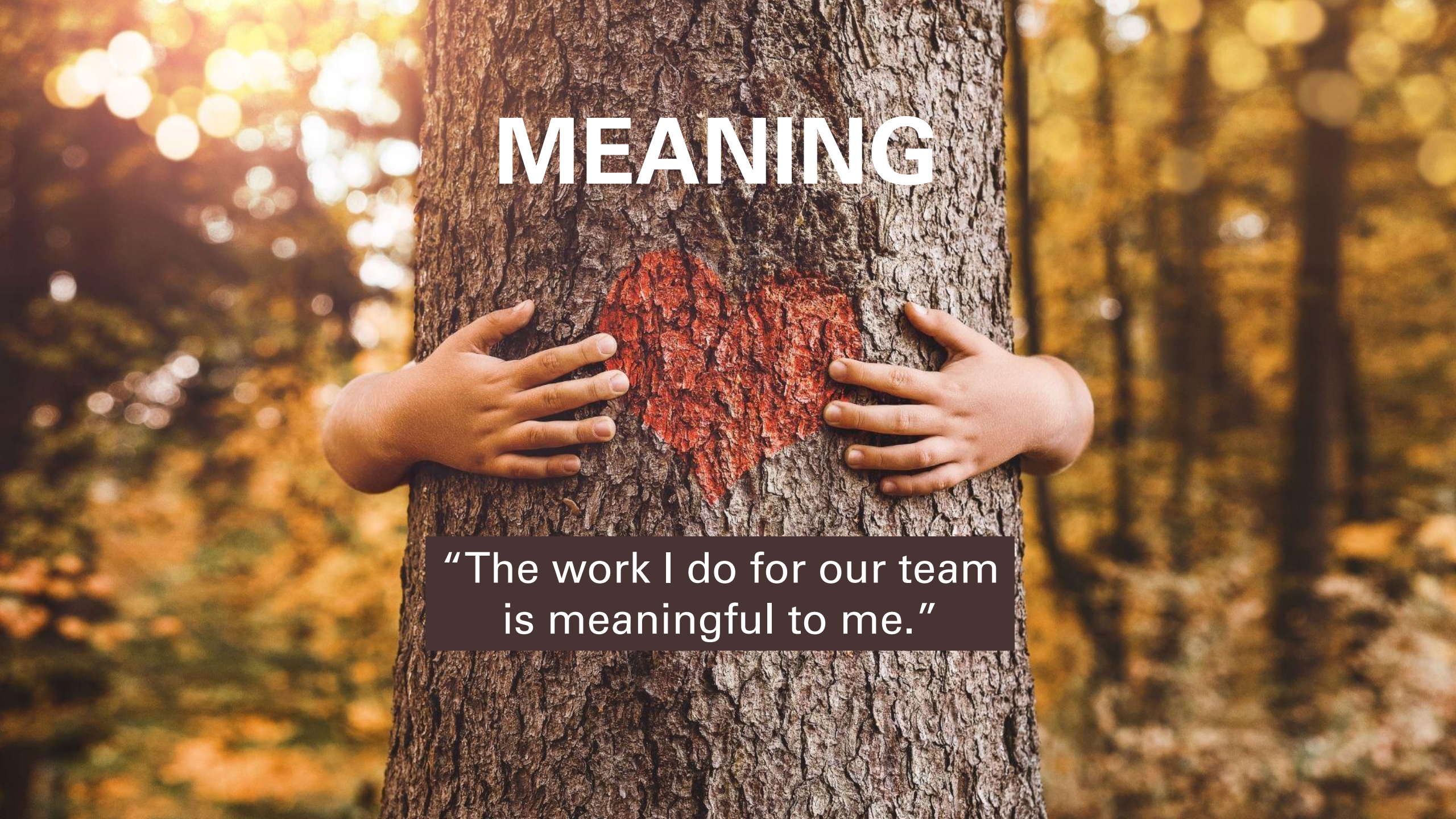
DEPENDABLE
“When my teammates say they’ll do something, they follow through with it.”

ROLES/STRUCTURE

"Our team has an effective decision-making process."

©

MEANING



"The work I do for our team is meaningful to me."

IMPACT

"I understand how our team's work contributes to the organization's goals."

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SUMMARY

...what really mattered was less about who is on the team, and more about how the team worked together.

ROLES AND RESPONSIBILITIES

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ROLES/STRUCTURE

"Our team has an effective decision-making process."

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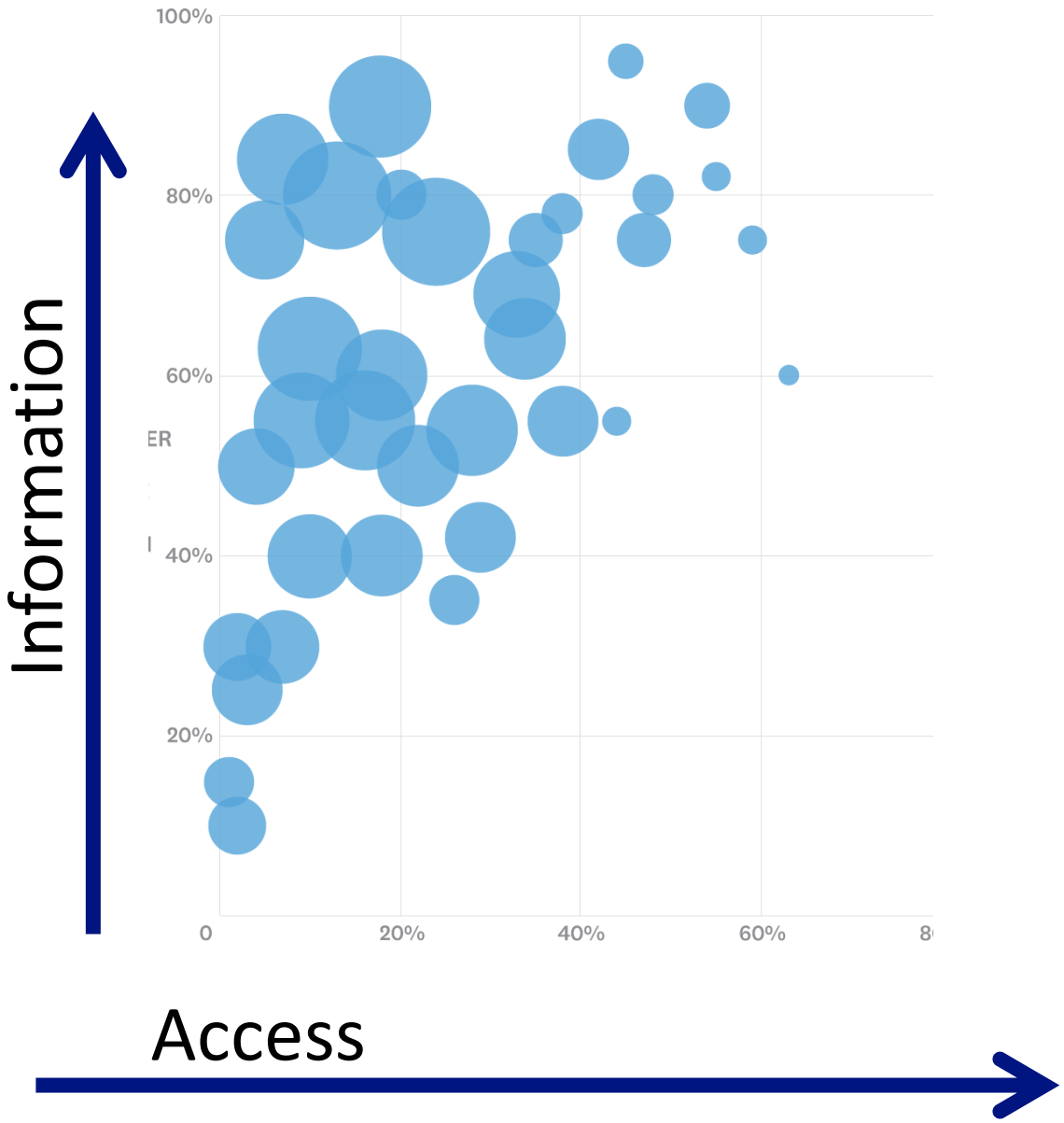

Avoiding Burnout

- Data on leaders across 20 organizations shows that those regarded by colleagues as the best information sources and most desirable collaborators have the lowest engagement and career satisfaction scores, as represented by the size of their bubbles
- e.g smaller bubbles = less job satisfaction

- Cross, R., Rebele, R., & Grant, A. (2016). Collaborative overload. Harvard Business Review, 94(1), 16.

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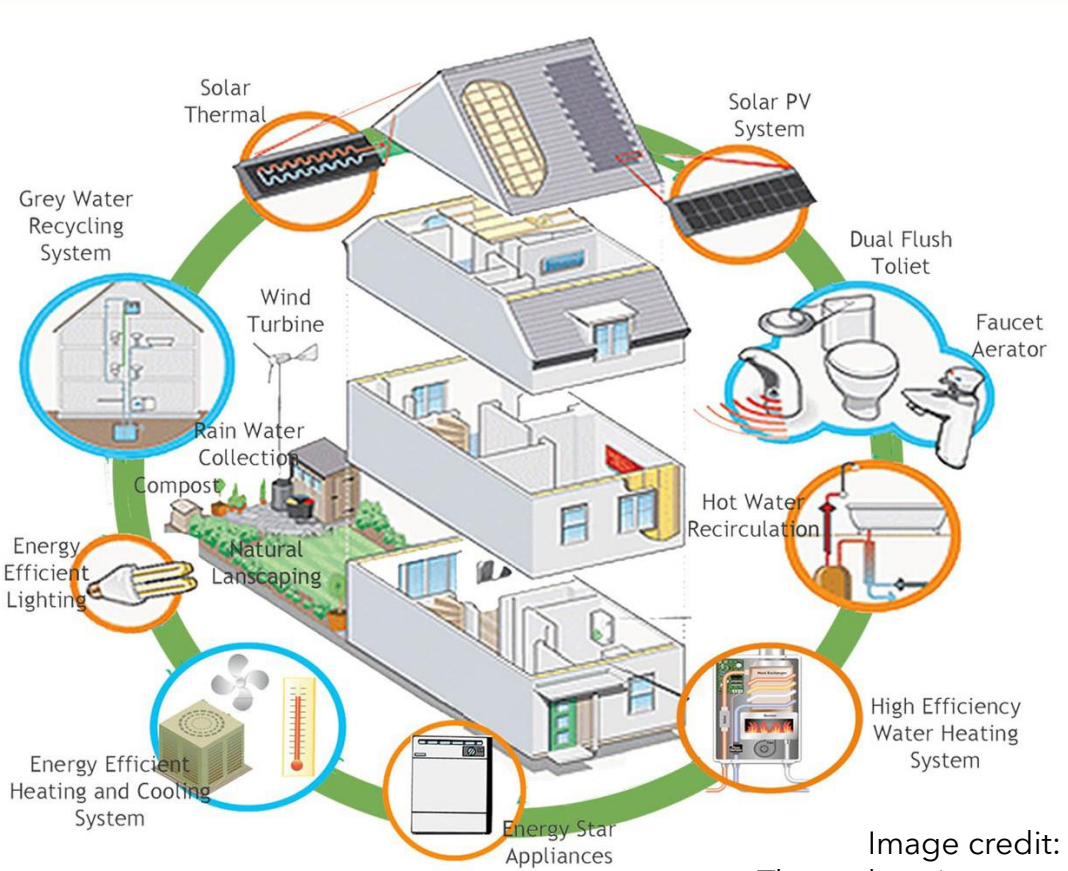

Image credit: Theearthproject.com

ROLES AND RESPONSIBILITY

Why we need roles and responsibilities:

- Everyone knows what to do
- Everything gets done
- Less energy is wasted
- Align individual strengths with the goals of the team i.e. you don't ask the air conditioner to heat the house

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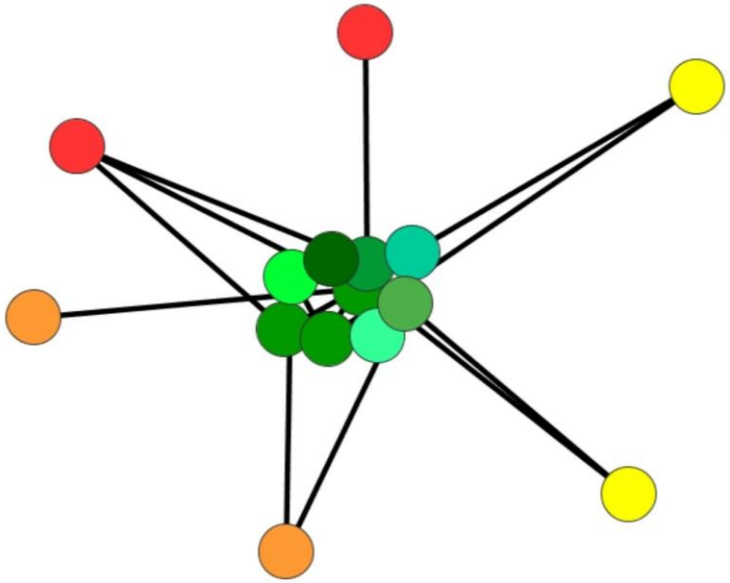
Role Clarity

- Changing Roles
- Duplication of Roles
- Roles aren’t permanent
  - “What issue has my position been created to address?”

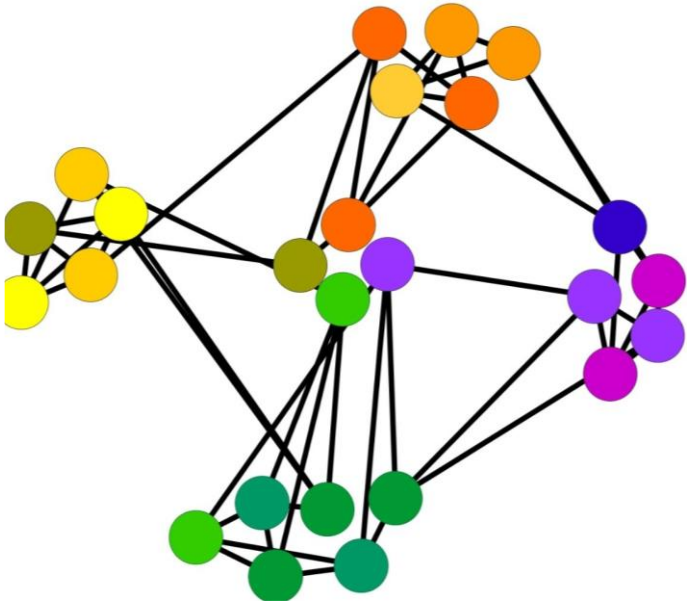
- You CAN:
  - schedule meetings
  - reserve rooms
  - create the agenda etc.

but SHOULD you?

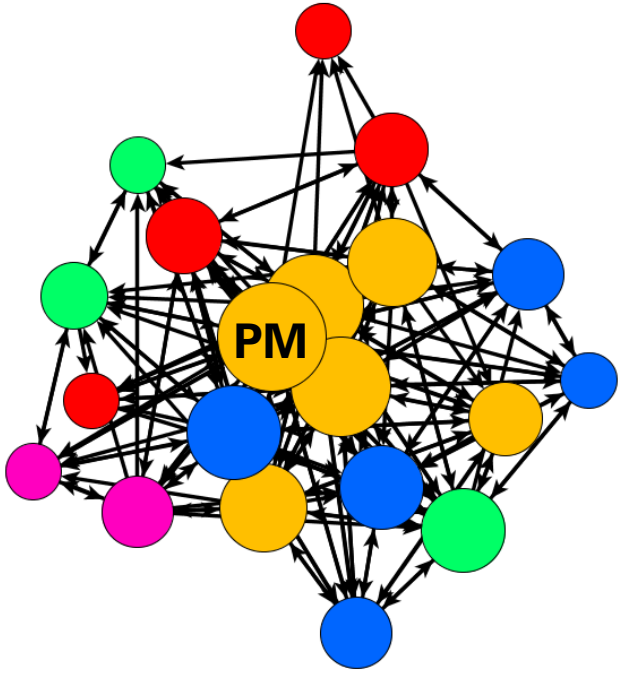
Team Structures



Core-Periphery



Team of Teams



Role of the Project Manager

Delegating Tasks According to Google

- **Look at the goals.** What is the final objective and what results are needed to achieve it? What parts can be delegated?
- **Look at yourself.** What tasks can't you delegate, and why? Which tasks play to your own strengths and weaknesses?
- **Recognize the right person for the work.** Who has the right skills to do the work? How might this task help them develop?
- **Delegate.** Have a conversation with the delegatee:
- **Stay in touch.** Keep in contact with the delegatee and observe the checkpoints you agreed to at the outset. Remember, delegating means letting go.
- **Recognize and reward.** Acknowledge the delegatee for successful completion of the assignment.

https://rework.withgoogle.com/guides/managers-empower-your-team/steps/delegate-effectively/

Assigning Roles and Responsibilities

- Step 1: Who is involved
- Step 2: What are the tasks or deliverables

Reference: https://thedigitalprojectmanager.com/raci-chart-made-simple/#wataru

	FRODO	SAM	GANDALF	ARAGORN	ELROND
Decide on what to do with ring					
Create Fellowship					
Get the ring to Mount Doom					
Distract and defeat enemies					

Reference: https://thedigitalprojectmanager.com/raci-chart-made-simple/#wata

Assigning Roles and Responsibilities

- Step 1: Who is involved
- Step 2: What are the tasks or deliverables
- Step 3: Assign each role and task

Reference: https://thedigitalprojectmanager.com/raci-chart-made-simple/#wataru

Responsible: Doing The Task

- This person or role is responsible for getting the work done or making the decision. It can sometimes be more than one person, but try to minimize the amount of people involved.

Accountable: Owning The Task

- This person or role is responsible for the overall completion of the task or deliverable. They won't get the work done, but are responsible for making sure it's finalized.

Consulted: Assisting

- This person, role, or group will provide information useful to completing the task or deliverable. There will be two-way communication between those responsible and those consulted. This person is often a subject matter expert.

Informed: Keeping Aware

- These people or groups will be kept up to date on the task or deliverable. This could be on progress, or when the task or deliverable is completed. They won't be asked to give feedback or review, but they can be affected by the outcome of the task or deliverable. There should be one-way communication to these roles or groups.

Reference: https://thedigitalprojectmanager.com/raci-chart-made-simple/#watar

©

Key

R=Responsible
A=Accountable
C=Consulted
I=Informed

	FRODO	SAM	GANDALF	ARAGORN	ELROND
Decide on what to do with ring	C	I	A	C	R
Create Fellowship	R	C	A	C	R
Get the ring to Mount Doom	R	C	A	C	I
Distract and defeat enemies	I	R	C	R	I

Reference: https://thedigitalprojectmanager.com/raci-chart-made-simple/#watar

How to assign Roles and Responsibilities

- During the meeting:
  - Identify action items as they arise
  - Put a name next to the action item
  - Add a due date
  - Don’t wait until the end of the meeting to assign action items. Assign action items as you go
- What if no one wants to do the action item?
  - Discuss if it’s worth doing?
  - Discuss who might be missing?
  - Discuss the timeline

Key Roles

Project Manager	**Co-PI**	**Co-PI**	**Research Development**	**Graduate Student**	**PI**

What other roles do you need to add?

©

Key Responsibilities

	A	B	C
1	**Roles and Responsibilities**		
2		**Project Manage**	**Co-PI**
3			
4	**Schedule meetings/send invites**		
5	**Take minutes during a meeting and assign action items**		
6	**Coordinate scientific updates**		
7	**Coordinate lab tours**		
8	**Meeting follow-up: Send around Minutes**		
9	**Meeting follow-up: Calendar updates/invites**		
10	**Meeting follow-up: Make sure action items are complete**		
11	**Create the agenda for the next meeting**		
12			
13			
14			

[What other responsibilities do you need to add?]

©

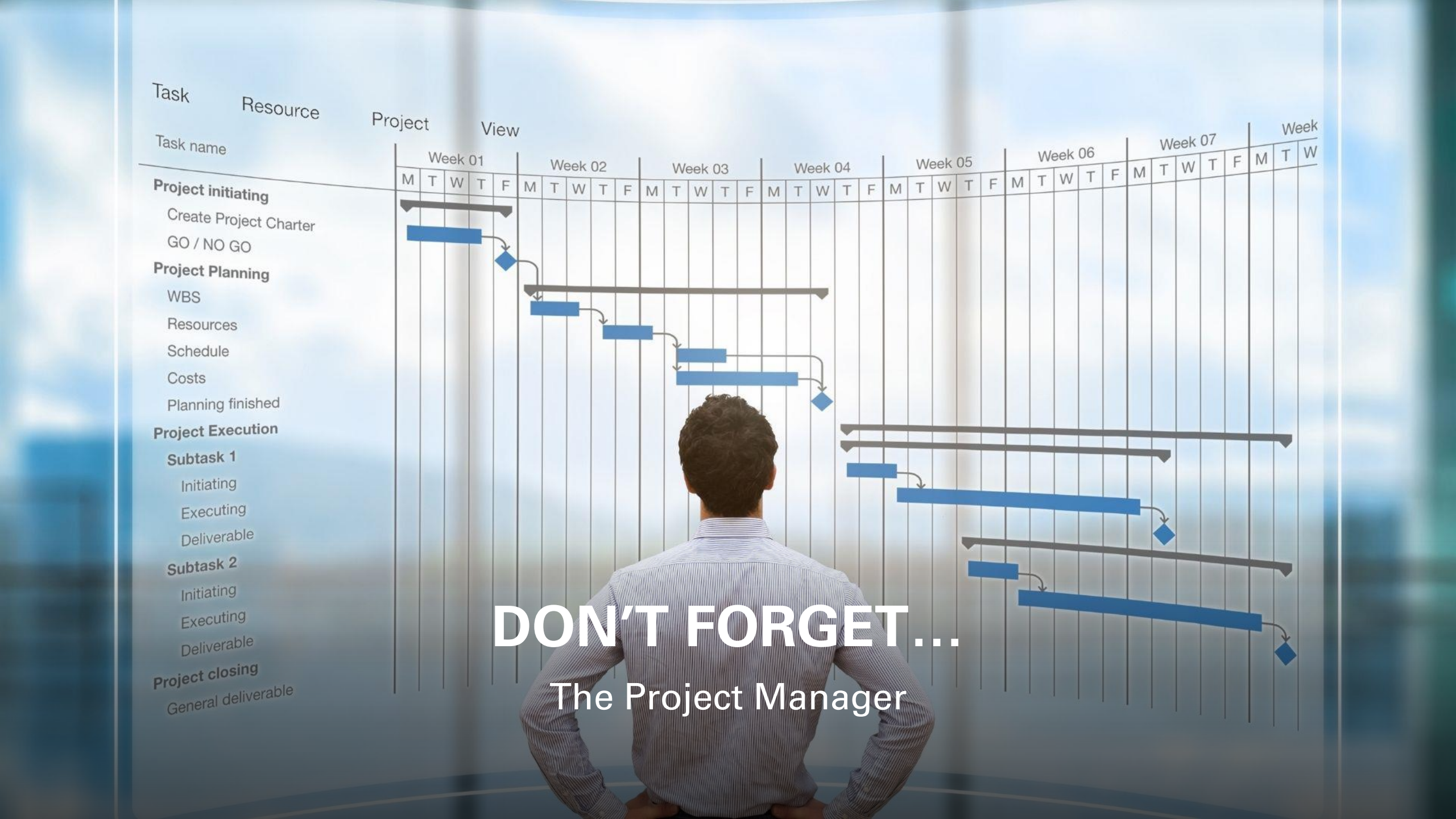
Your Turn

1.) Open the file in chat

2.) Add important meeting roles and responsibilities to sheet 1 and grant writing roles and responsibilities to sheet 2

Report Out

- What roles did you add
- What responsibilities did you add
- Did you notice any patterns about your list?



DON'T FORGET...

The Project Manager

TURN-TAKING

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Even turn-taking

- [more] Even Turn-taking Builds Collective Intelligence (Woolley et al., 2010, p. 688).

©

Conversations are 2-way streets

- It's not a conversation…
  - If only 1 person gets to speak
  - If 2 people speak, but 1 doesn't listen
- *Turn taking is like a complicated dance…*
  - *Timing and cooperation are key*
  - *Regional, ethnic and gender differences*

Longitudinal study on Teams

Development and Process Metrics

- Turn-taking data collection
  - Who spoke?
  - How long?

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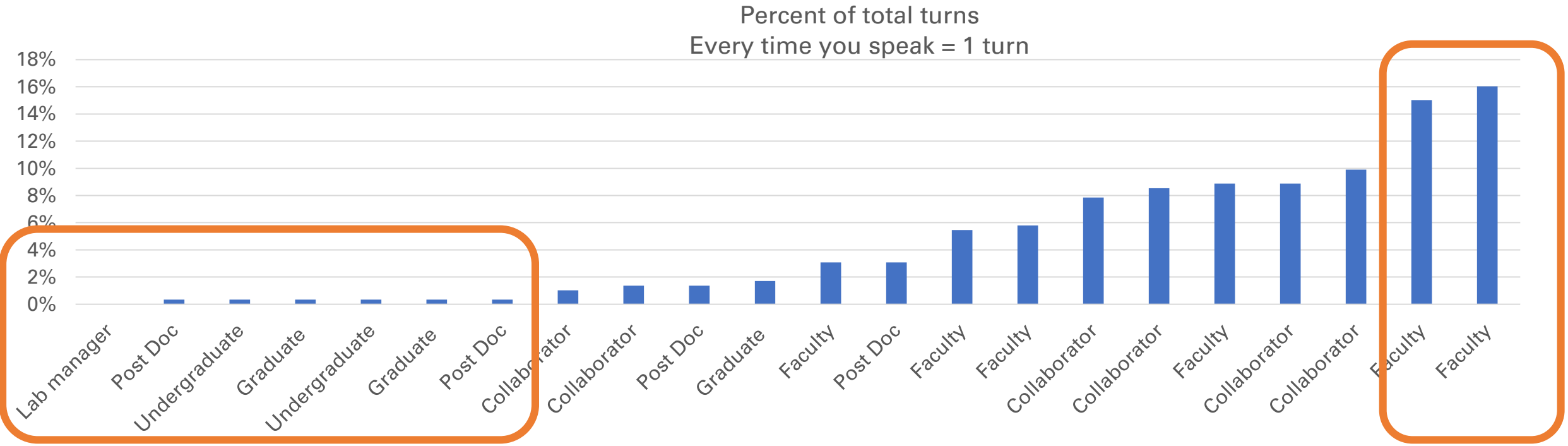
Uneven Turn-Taking



Pre-Intervention

- 7 people barely spoke
- 13 people spoke <5%
- 2 people had 31% of the turns

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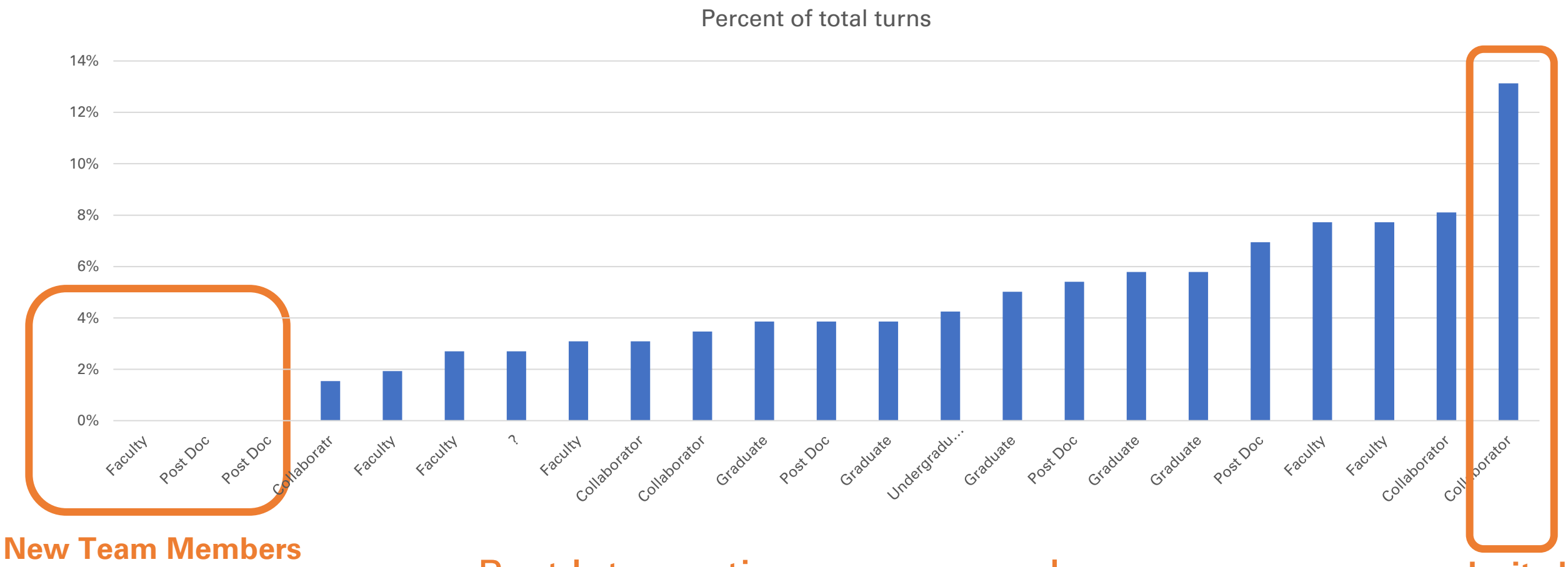
Turn-Taking Interventions



New Team Members

Post Intervention = more equal

Invited Expert

©

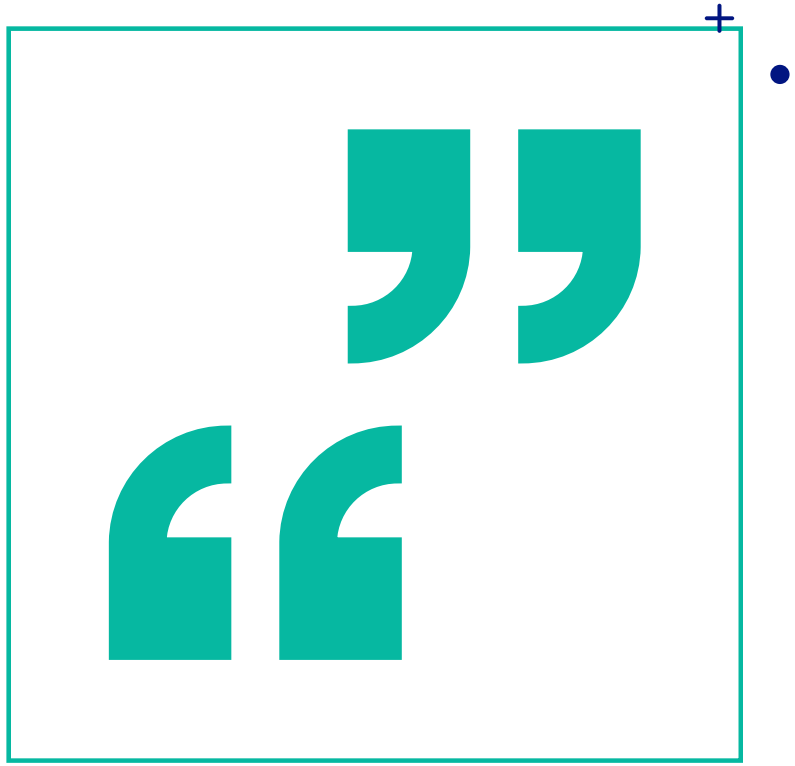
Benefits of even turn-taking

- Turn-taking **increases satisfaction** in meetings (Lehmann-Willenbrock, Allen, & Kauffeld, 2013; Schegloff, 2002).
- Teams with more **functional interactions were more satisfied** with their meetings and had **higher team productivity**. Kauffeld & Lehmann-Willenbrock (2012)
- Turn-taking practices are also linked to both cultural norms and **trust levels** among members of a group (Rawls & David, 2005; Stivers et al., 2009).
- "…groups where a few people dominated the conversation **were less collectively intelligent** than those with a more equal distribution of conversational turn-taking groups" (Woolley et al., 2010, p. 688).

©

How do you practice turn-taking?

- Jamboard link
- Create a sticky note to add your ideas
- If you need ideas – look at other pages on the Jamboard
- If you like an idea and want to add emphasis, drag a star to the sticky note
- Note: all responses are anonymous



Prompts to use during meetings

Everyone participates, share turns, no one dominates etc.

- “Remember the teams ground rules/conflict norms”

Redirect the conversation by saying:

- “Thank you. What do others think about that?”
- “Let's create some space for those of you who have been quieter.”
- “Can we hear from someone else?”
- “Would anyone else like to respond?”

TOOLBOX DIALOGUE

3 Poll Questions

1.) Answer the questions

2.) Jot down your reasons why

3.) Respond to the prompt in ALL CAPS

4.) Example

Technology note: You might have to scroll or progress to the next page (it varies based on Mac, PC, etc.)

©

Example Question

1.) Methodology core question: what methods do you employ in your disciplinary research (e.g. experimental, case study, observational, modeling)?

SCIENTIFIC RESEARCH (APPLIED OR BASIC) MUST BE HYPOTHESIS DRIVEN.

Respond to this prompt:

- (1) Disagree
- (2)
- (3)
- (4)
- (5) Agree
- I don't know
- N/A

Jot down your reason why

©

Toolbox Dialogue Discussion

AREAS OF AGREEMENT

AREAS OF DISAGREEMENT

©

KNOWLEDGE CONVERGENCE THEORY AND PRACTICE

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Definition:
Convergence Research

“Convergence research brings together diverse disciplines to identify solutions to wicked social, ecological, economic, and technical problems” (Peek et. Al. 2020, p. 2).

Definition:
Knowledge Integration

“Integration and Implementation Sciences or I2S is the discipline that underpins integrative applied research and which develops and applies concepts and methods for knowledge synthesis, understanding and managing diverse unknowns and providing integrated research support for policy and practice change” (Bammer, 2013, p. 9).

©

Mentimeter

- Open link in the chat
- Write 3 words to describe “convergence research”
- Come back to the presentation and we’ll show you the results
- https://www.menti.com/g23y5qae4c

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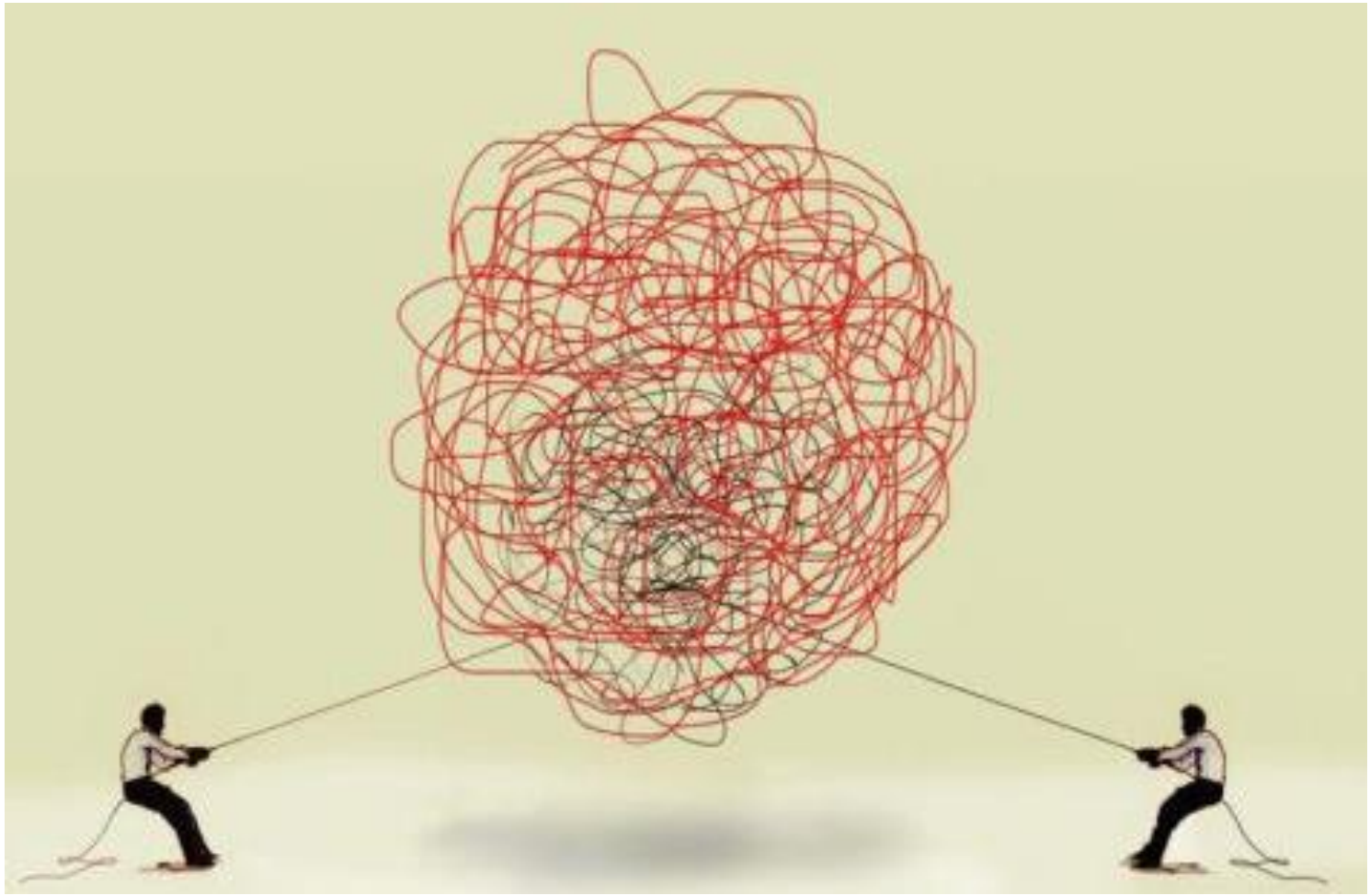
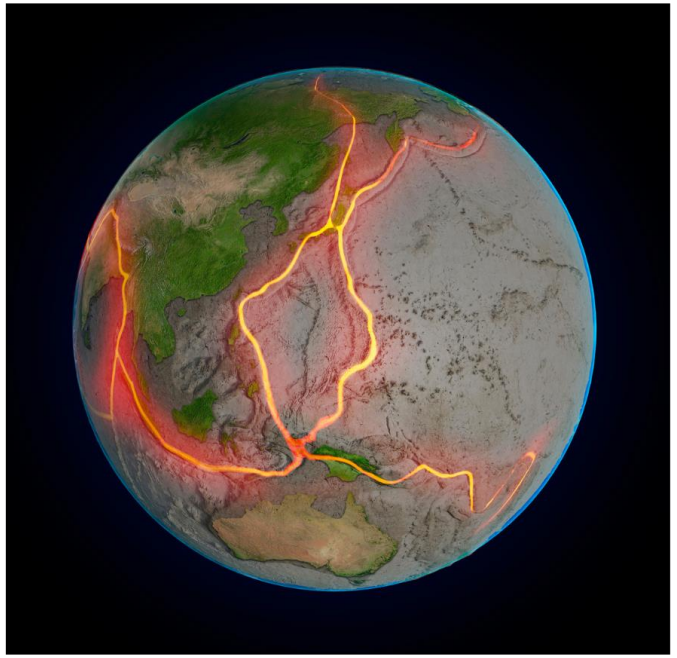


NSF, NIH, USDA, and others Make it sound so easy, but How do you DO "Convergence" Research?

©

A Culture Shift for Institutions and Teams

- Must have expertise in multiple scientific disciplines
  - You can't do your separate parts and staple it together
  - The PI can't write the whole things because it requires expertise in multiple scientific disciplines
  - Existing hierarchies aren't typically functional
  - Reward structure don't always line up with team science objectives
  - Exercise in diversity, equity and inclusion
- Shifting cultures is a wicked problem in of itself
- And MORE!



GOOD NEWS….There's a lot we do know about how to create a team and how teams work.

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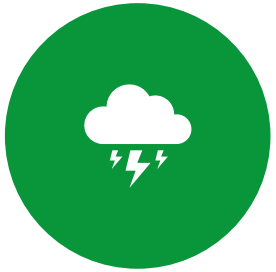
Stages of Group Development (Tuckman 1965)

FORMING



STORMING

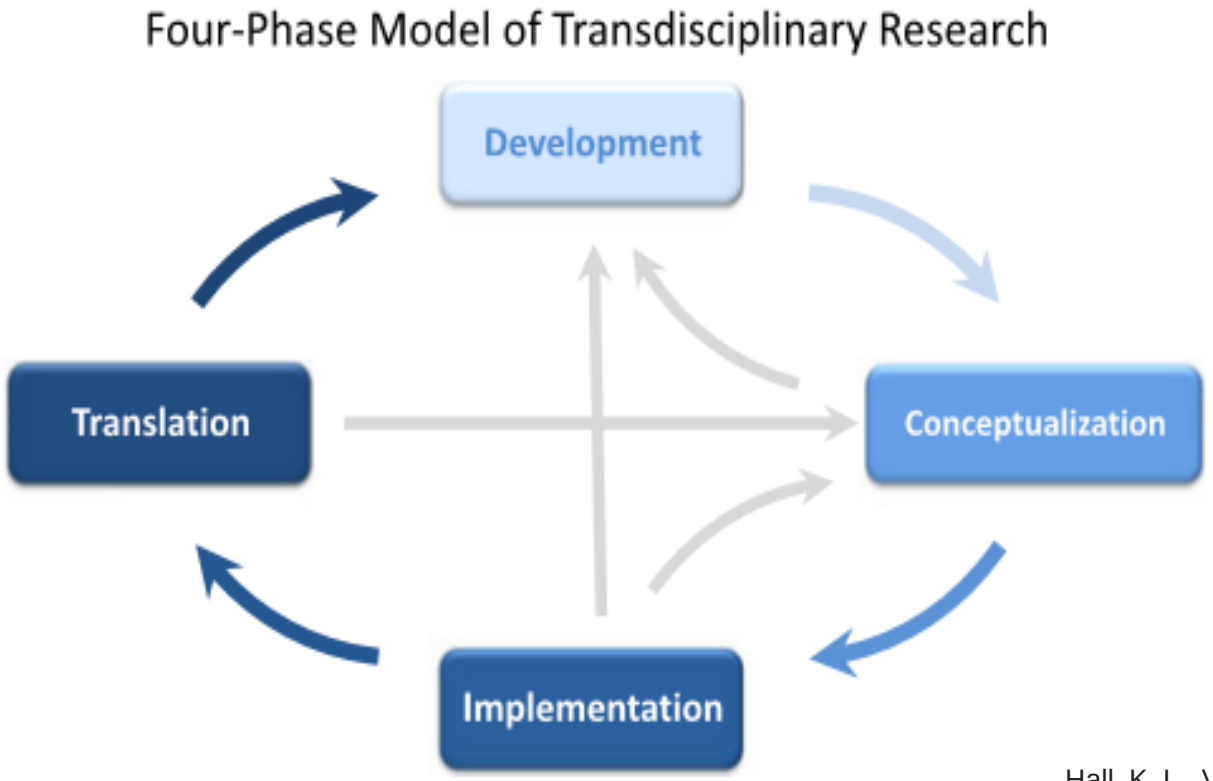
NORMING

PERFORMING

Tuckman (1965)

©

Stages of Development for Scientific Teams



Hall, K. L., Vogel, A. L., Stipelman, B. A., Stokols, D., Morgan, G., & Gehlert, S. (2012). A four-phase model of transdisciplinary team-based research: goals, team processes, and strategies. *Translational behavioral medicine*, *2*(4), 415-430.

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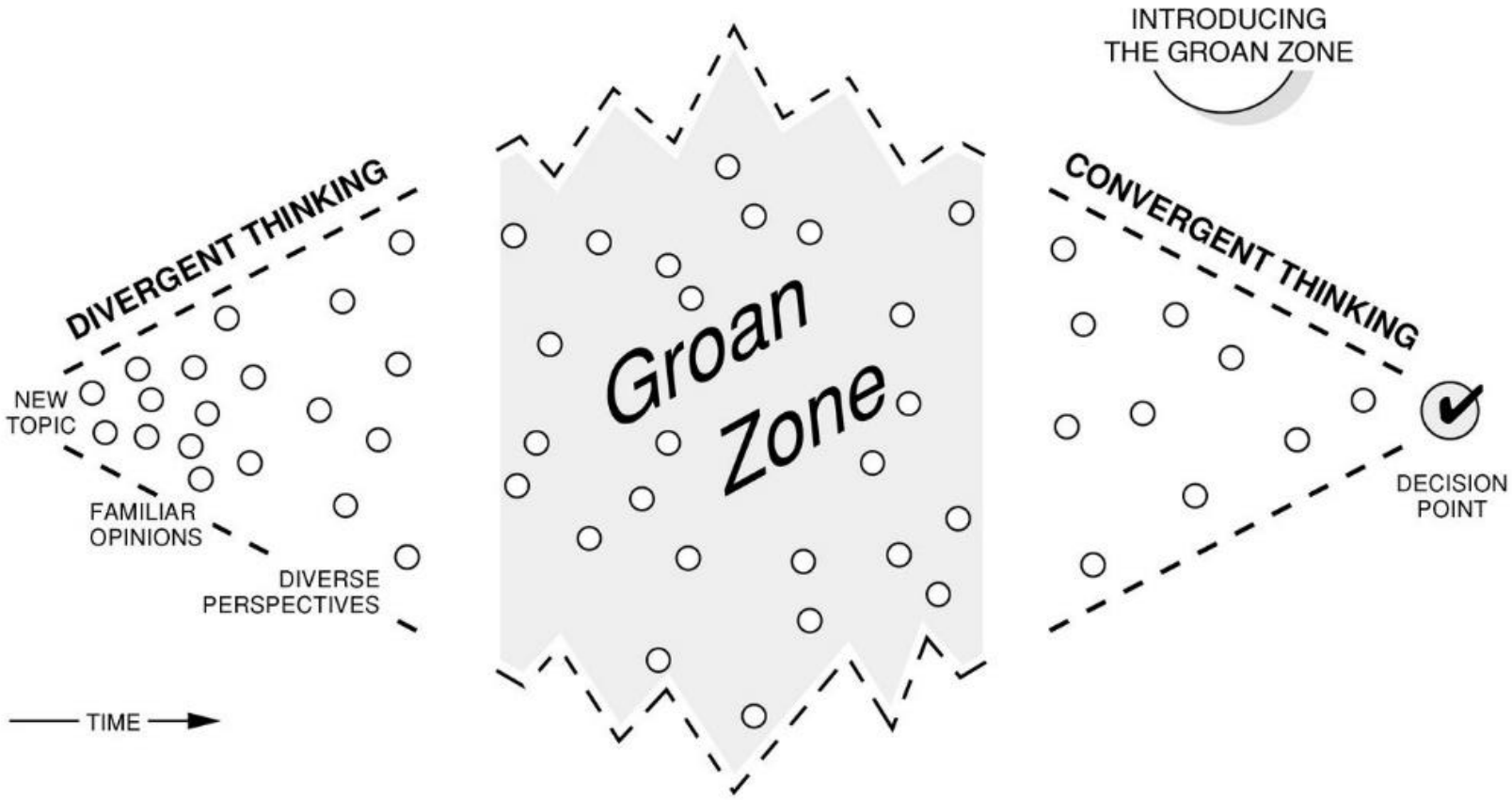
Decision-Making and Innovation



Kaner (2014)

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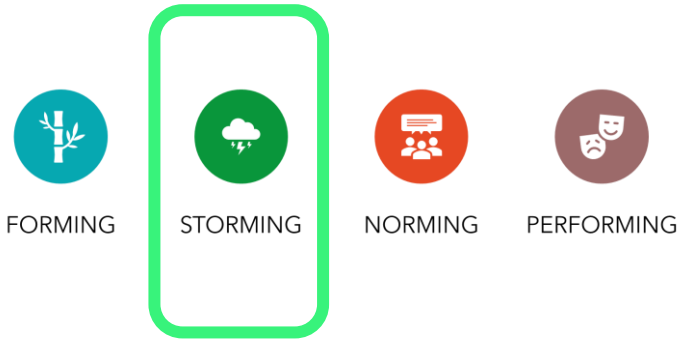
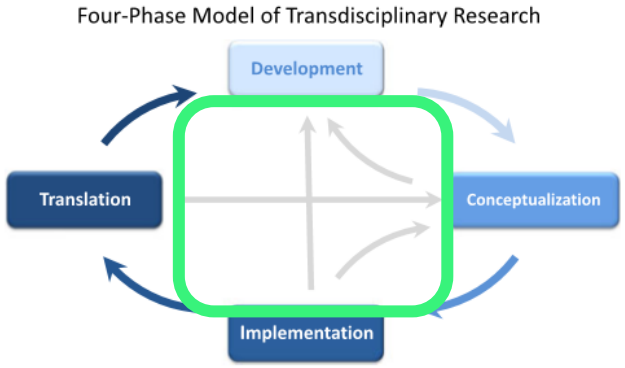
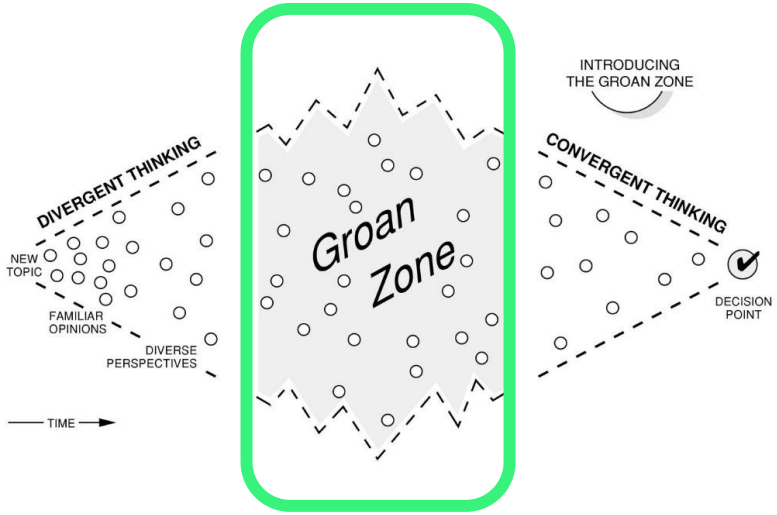
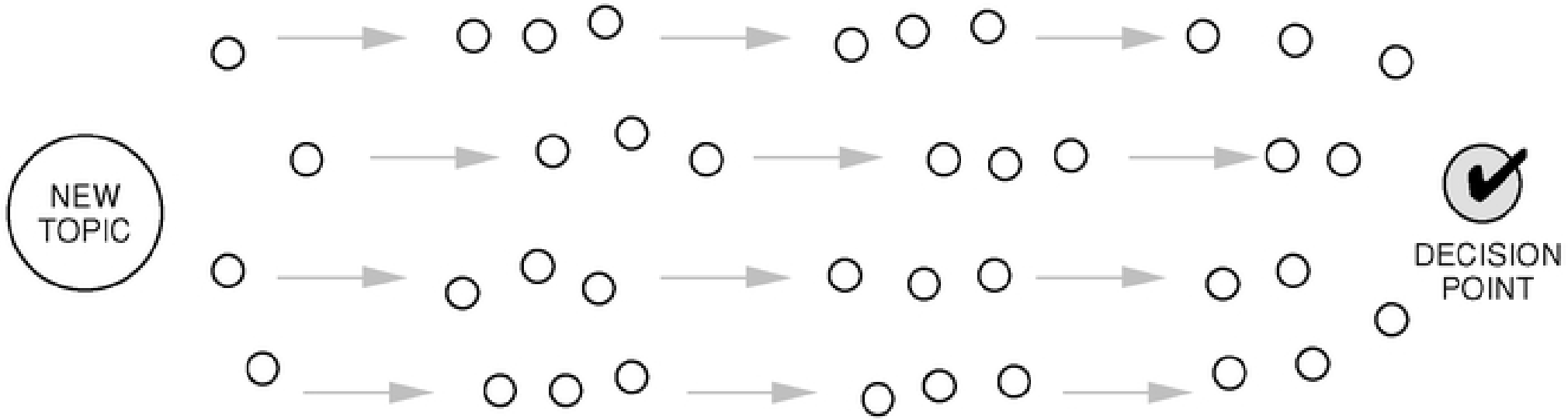
Conflict is inevitable







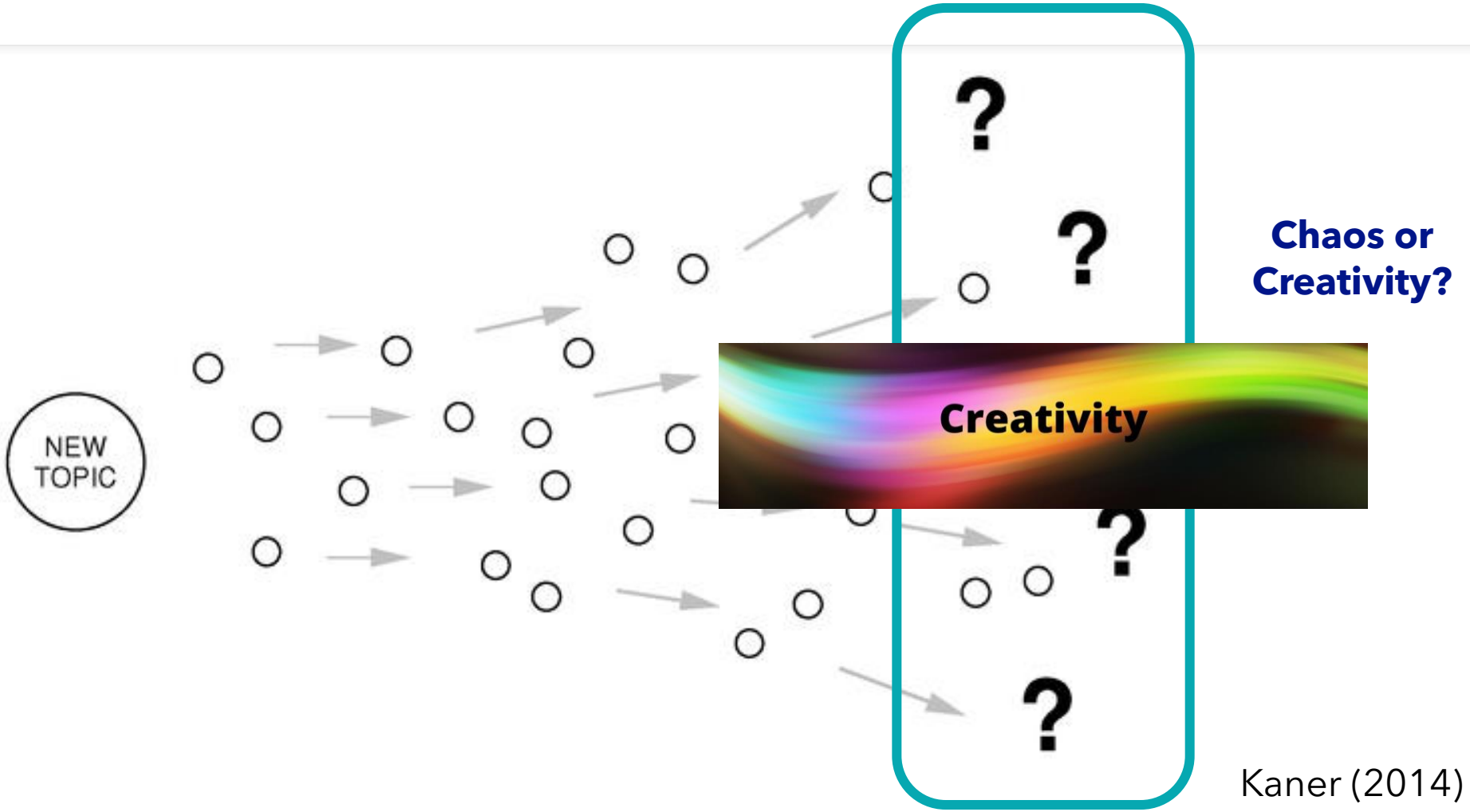
How teams *think* the process looks:



Kaner (2014)

©

What *actually* happens



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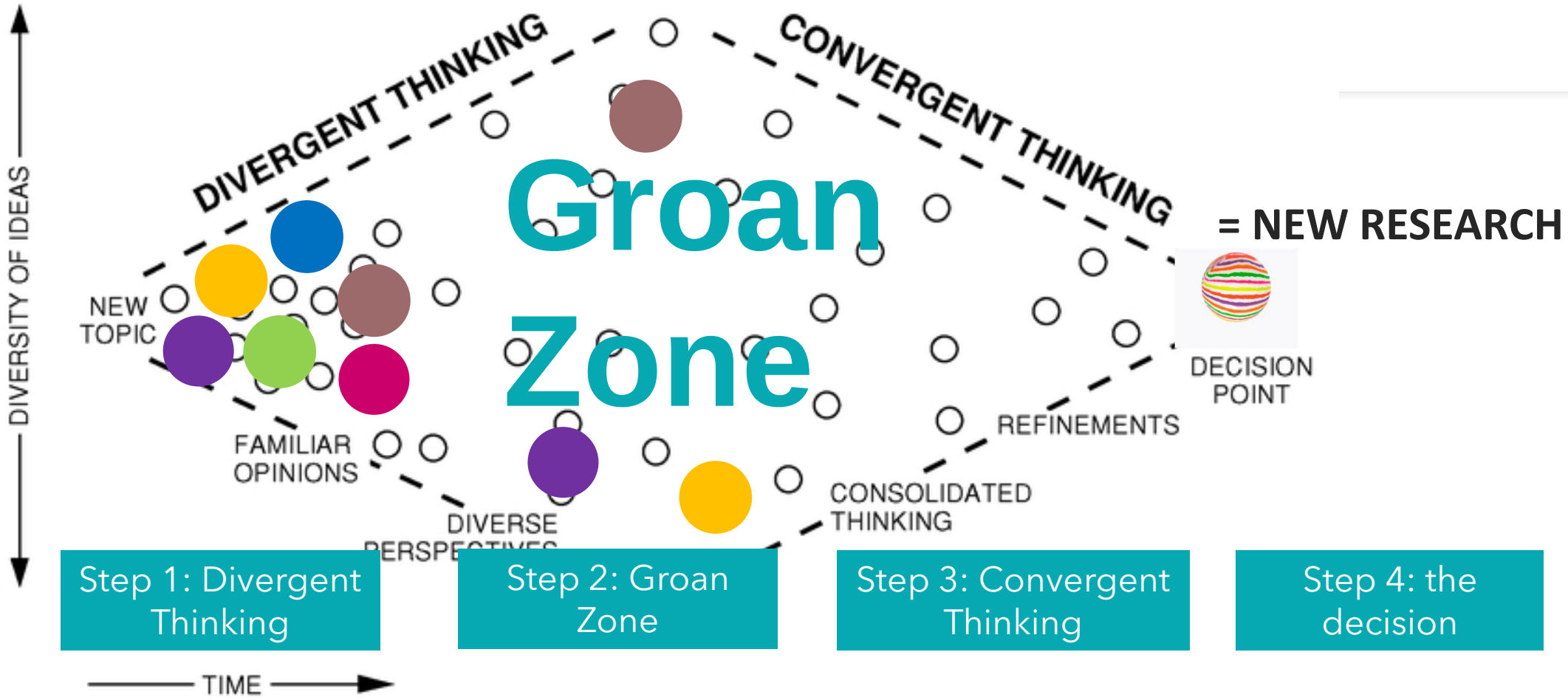
Knowledge Convergence and Creativity



Modified from Kaner 2014

A team will engage in the DIVERGENT and CONVERGENT process……

Modified from Kaner 2014

Knowledge Convergence

Divergent thinking, the Groan Zone, and Convergent Thinking

©

Divergent vs. Convergent Thinking

DIVERGENT THINKING		CONVERGENT THINKING
Generating a list of ideas	vs.	Sorting ideas into categories
Free-flowing open discussion	vs.	Summarizing key points
Seeking diverse points of view	vs.	Coming to agreement
Suspending judgment	vs.	Exercising judgment

Kaner (2014)

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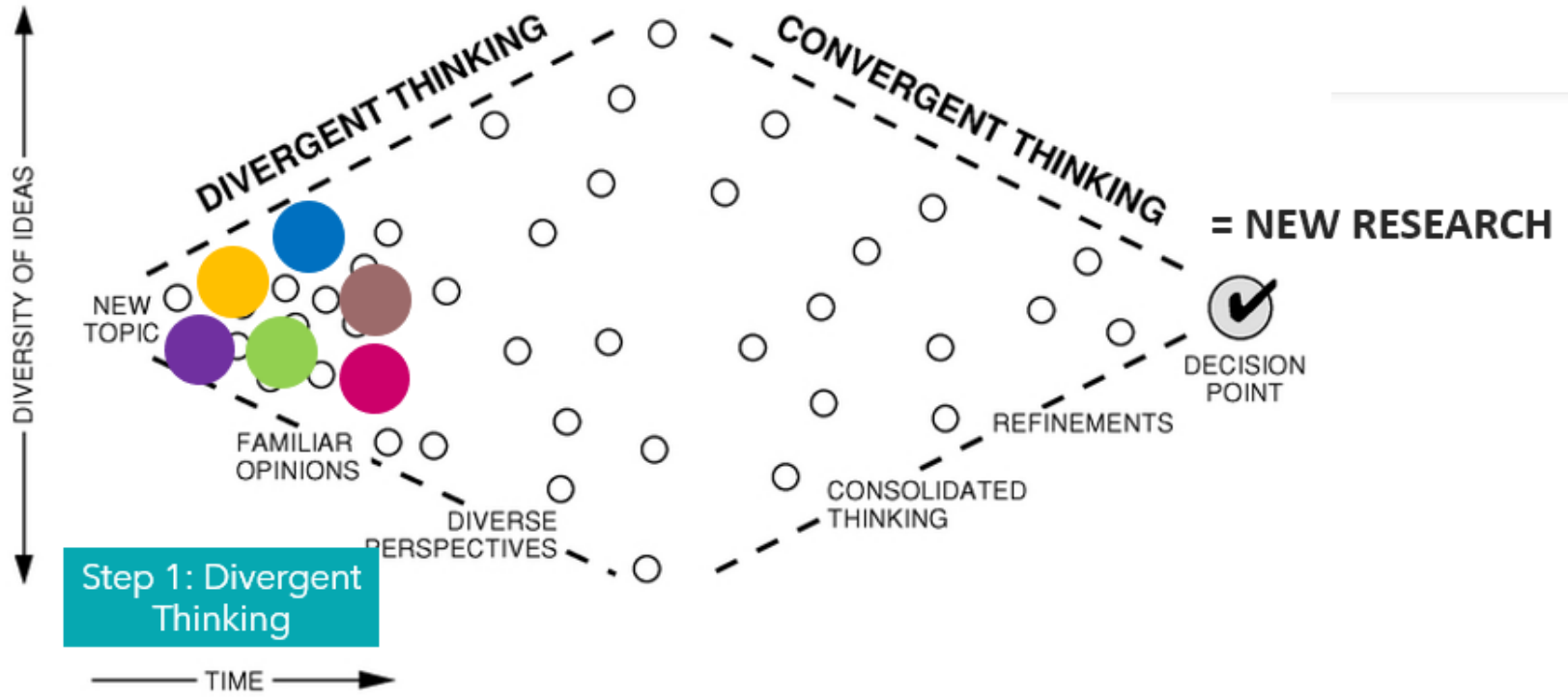
How to: Divergent Thinking

- Generating a list of ideas
- Free-flowing open discussion
- Seeking diverse points of view
- Suspending judgment



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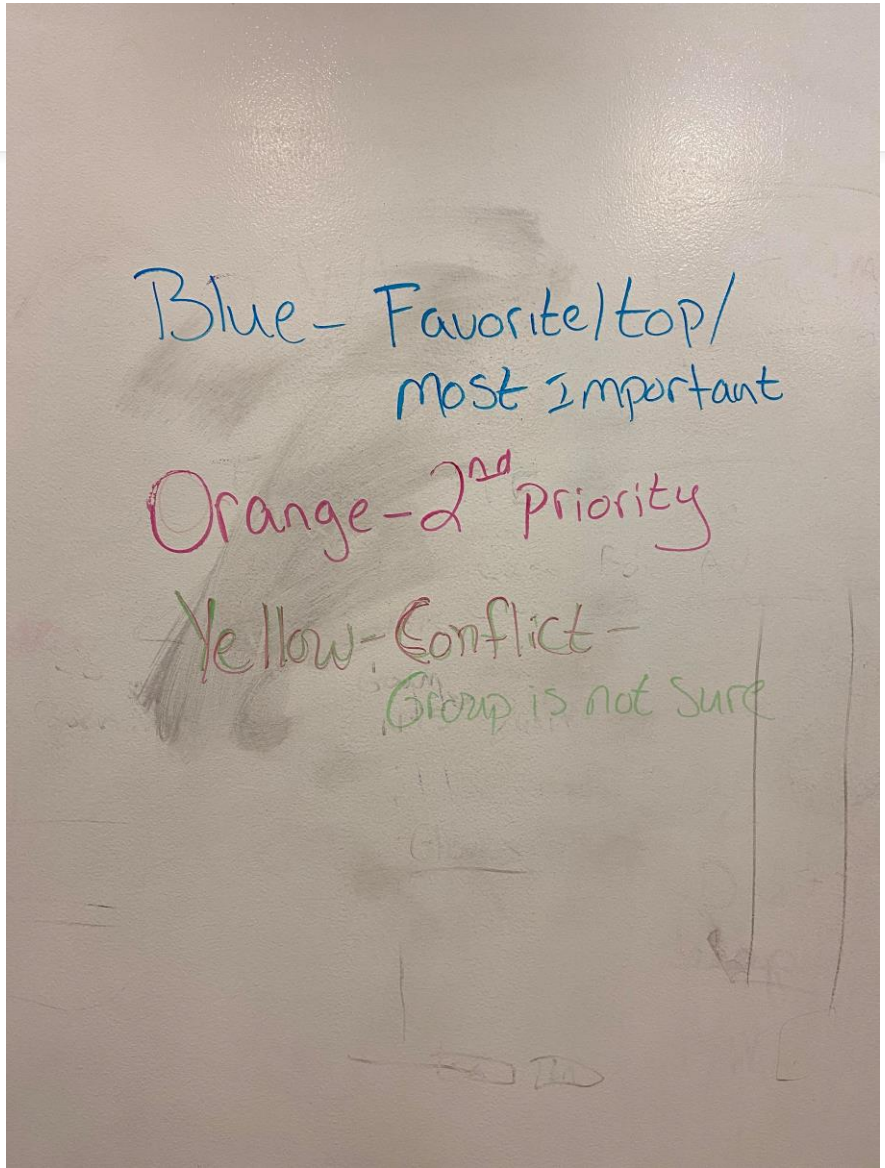
Practice Divergent Thinking for Innovation

- Google Study
- Psychological safety
- Even turn-taking
- Toolbox

©

Divergent Thinking



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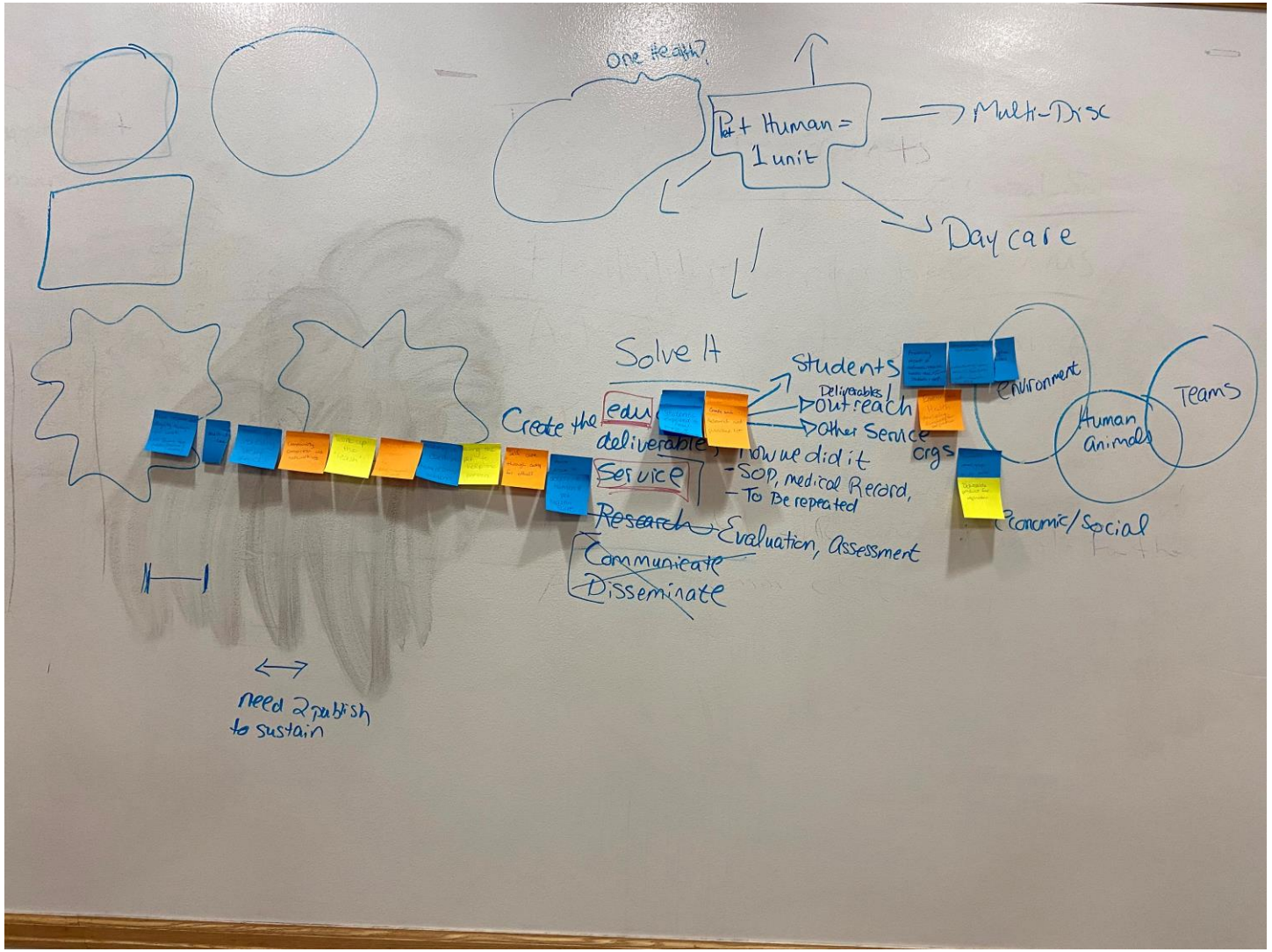
Divergent Thinking



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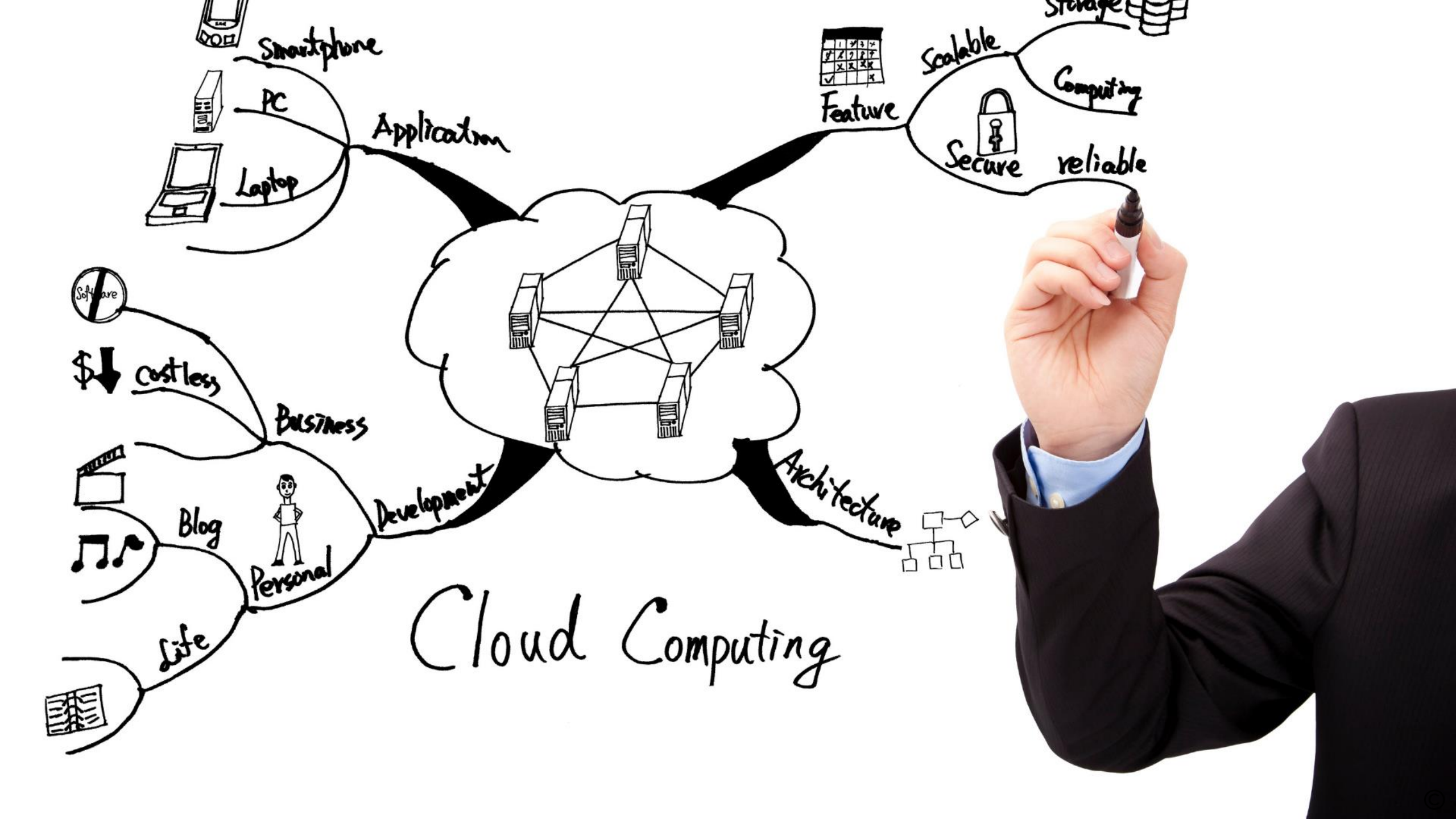

Smartphone
PC
Laptop
Application
Feature
Scalable
Storage
Computing
Secure
reliable
Software
costless
Business
Blog
Personal
Development
Life
Architecture
Cloud Computing

“Think Pair Share”

Think

Pair

Share

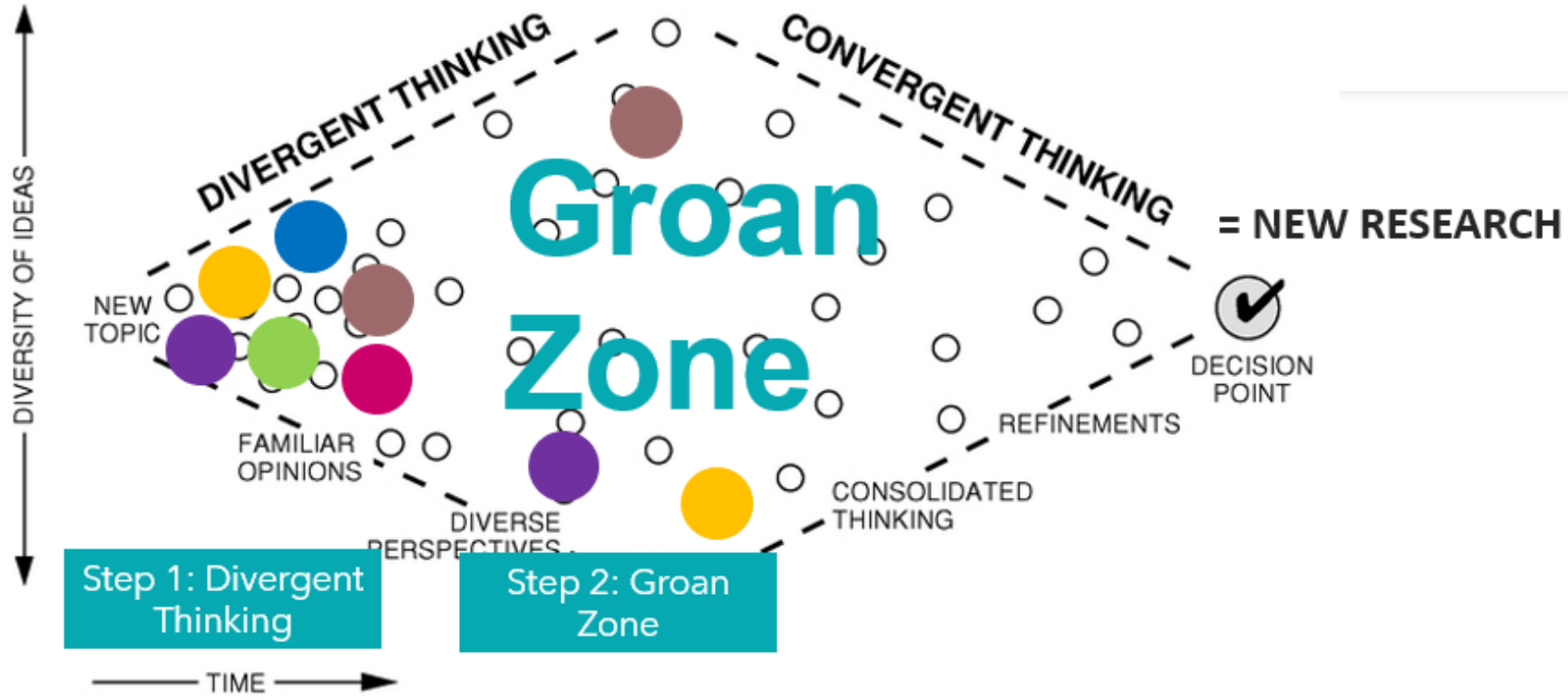
©

Get the ideas out there!

- You might not use them immediately.
- You never when something will be sparked from something you originally dismissed

How to: Groan Zone

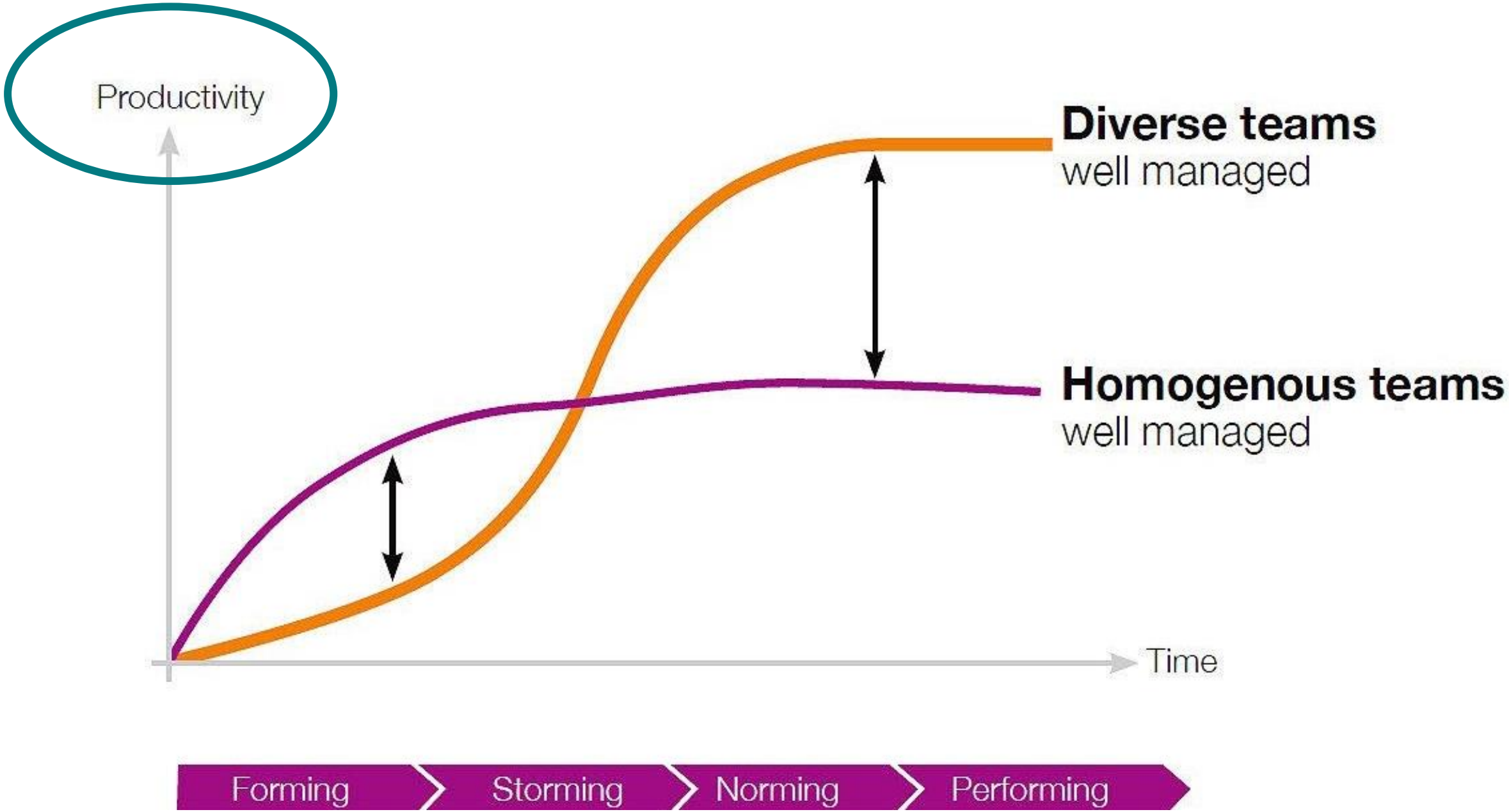
- Team Norms
- Psychological Safety
- Even turn-taking



Modified from Kaner 2014 ©

“The truth is that our finest moments are most likely to occur when we are feeling deeply uncomfortable, unhappy, or unfulfilled. For it is only in such moments, propelled by our discomfort, that we are likely to step out of our ruts and start searching for different ways or truer answers.”

—M. Scott Peck



Korn Ferry Institute, 2019

©

The awkward relationship between psychological safety and conflict

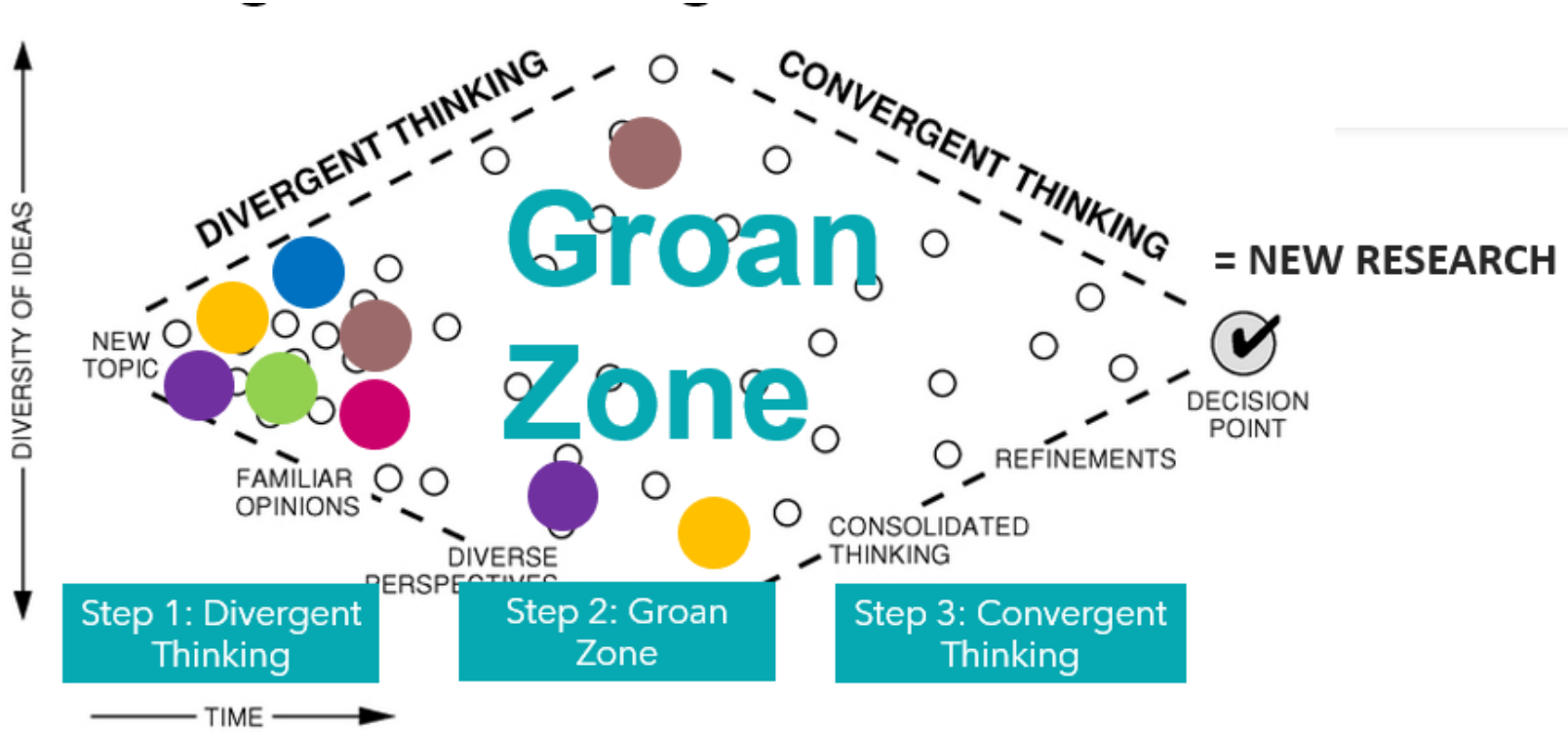
This is where the “magic” happens

It does get better…

- Team Development Skills
- Facilitators/facilitation
  - Archived series on Facilitation: http://www.facilitationguild.com/the-art-science-of-making-meaningful-moments/
- If you work through the groan zone, it will be better on the other side
- It's normal to "storm," or "groan"

How to: Convergent thinking

- Sorting ideas into categories
- Summarizing key points
- Coming to agreement
- Exercising judgment



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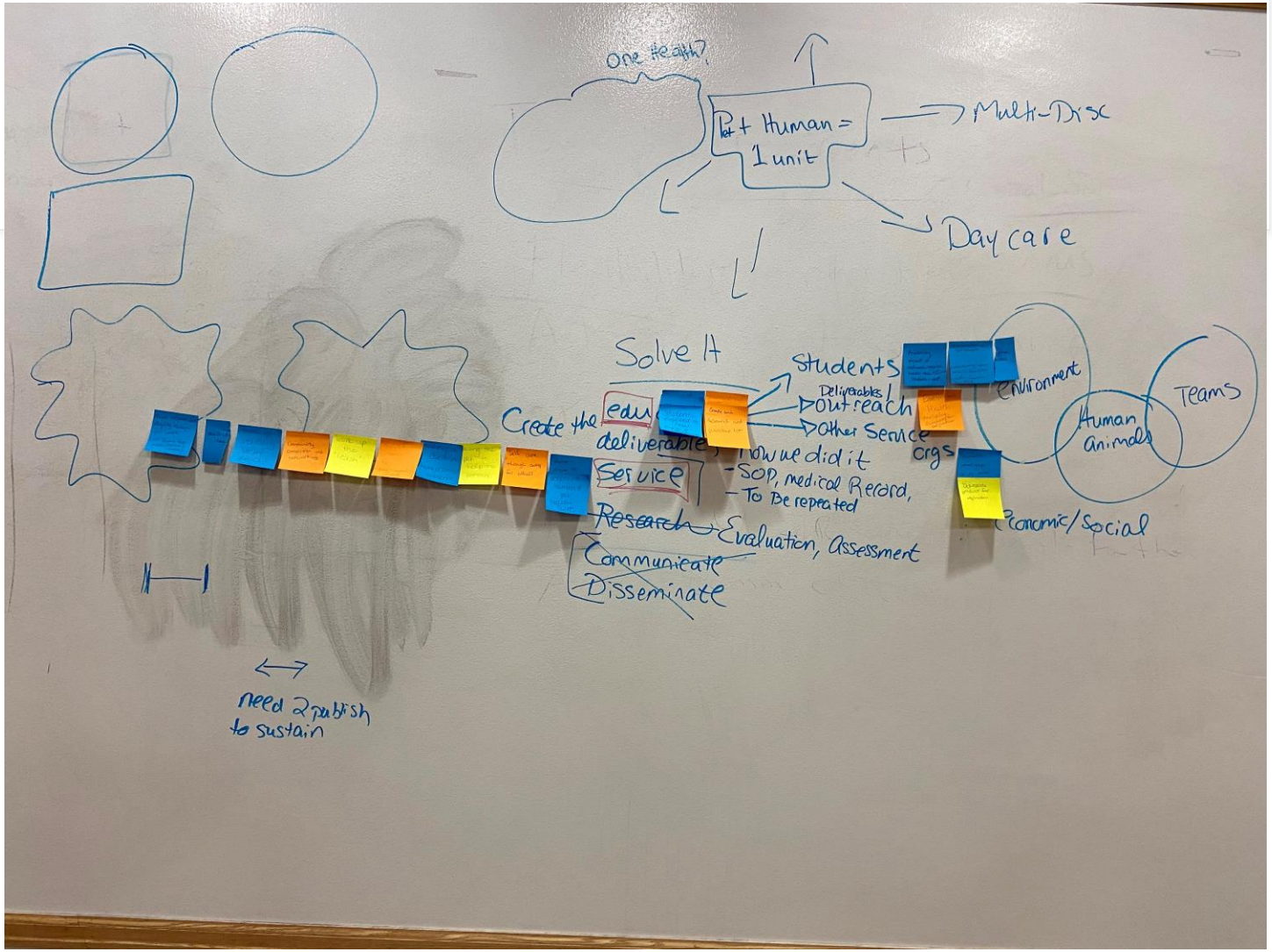
Divergent Thinking



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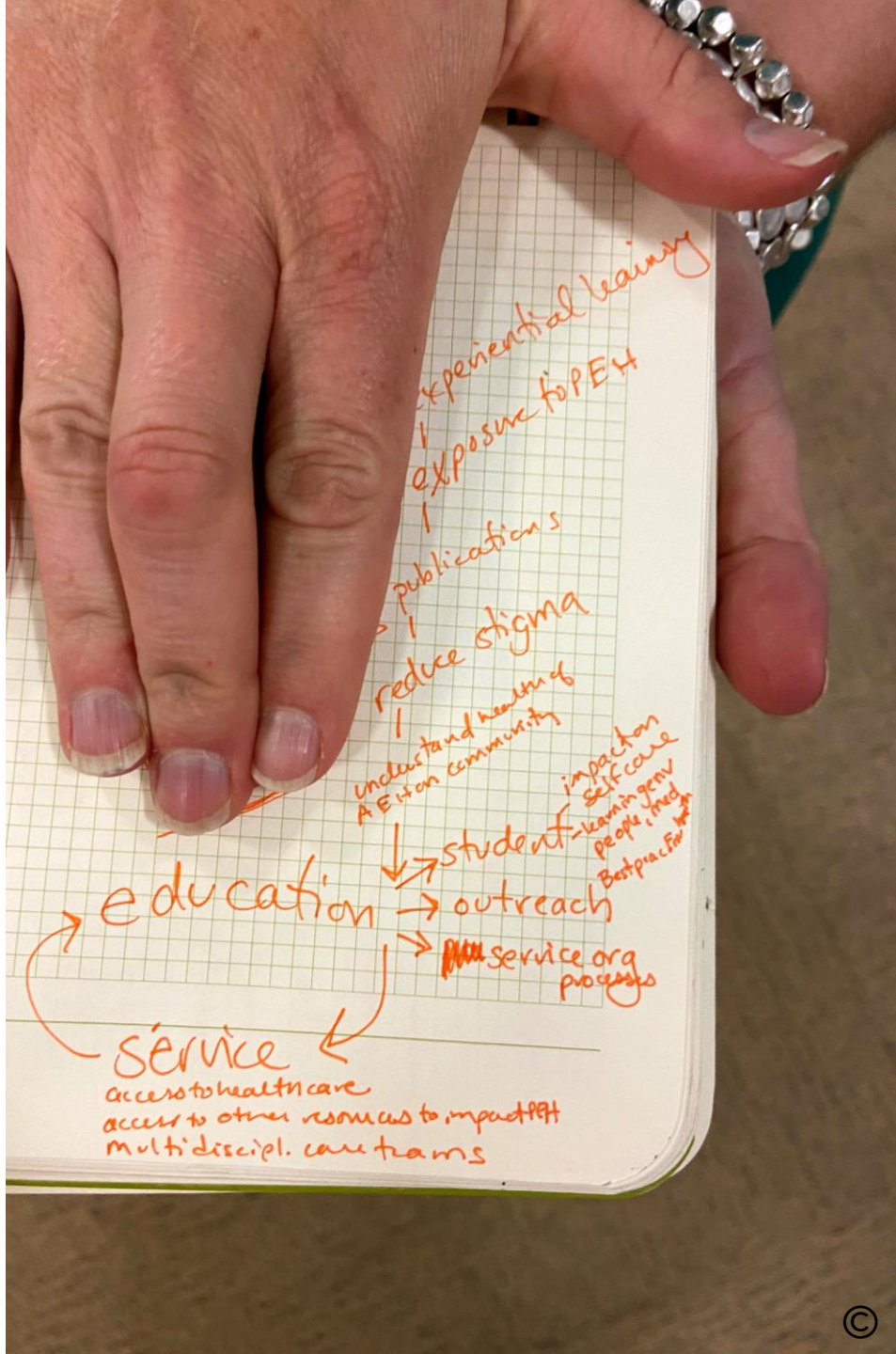
Convergent Thinking

- The core of the team vision is reciprocal connection between service and education



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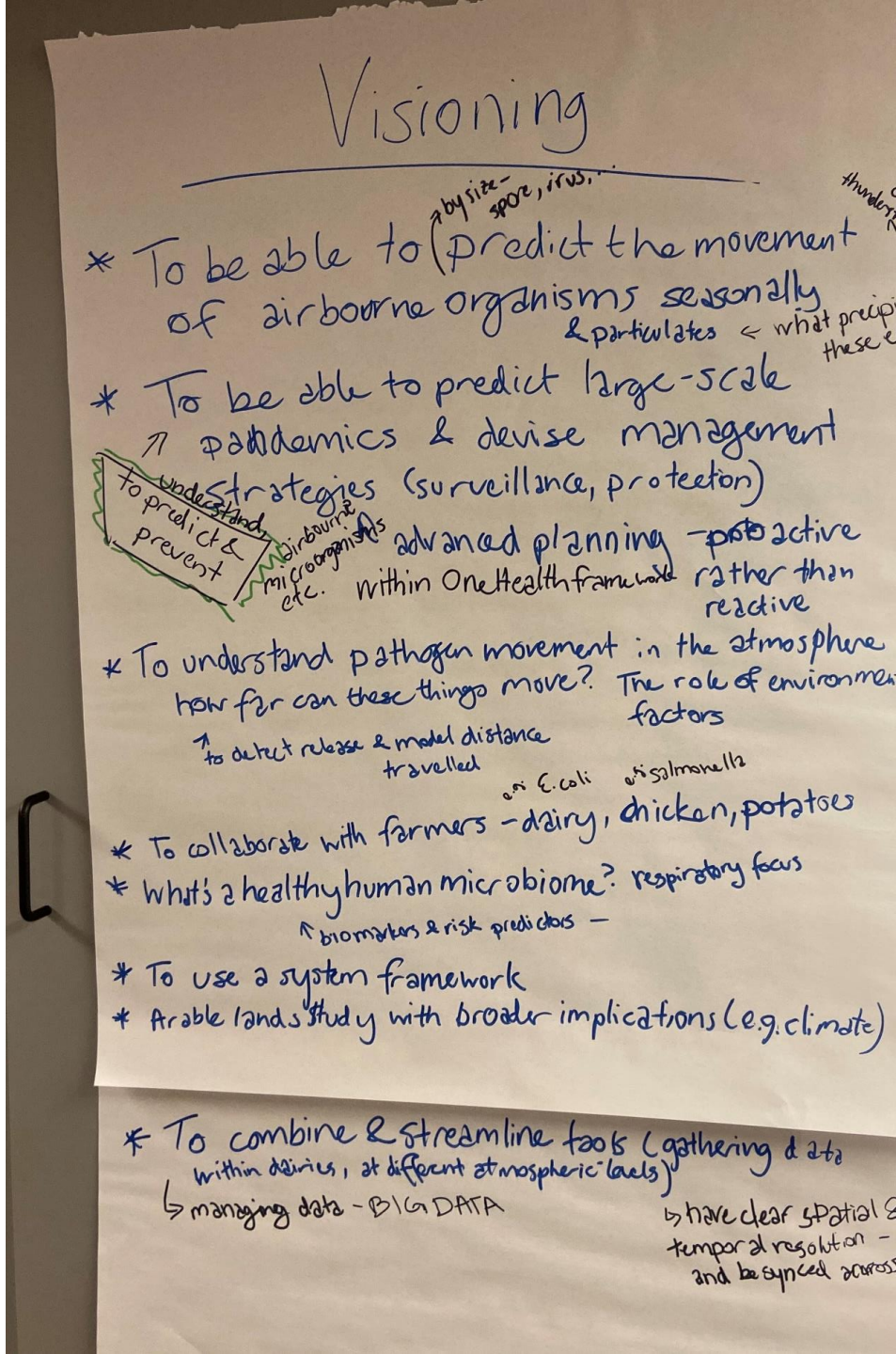
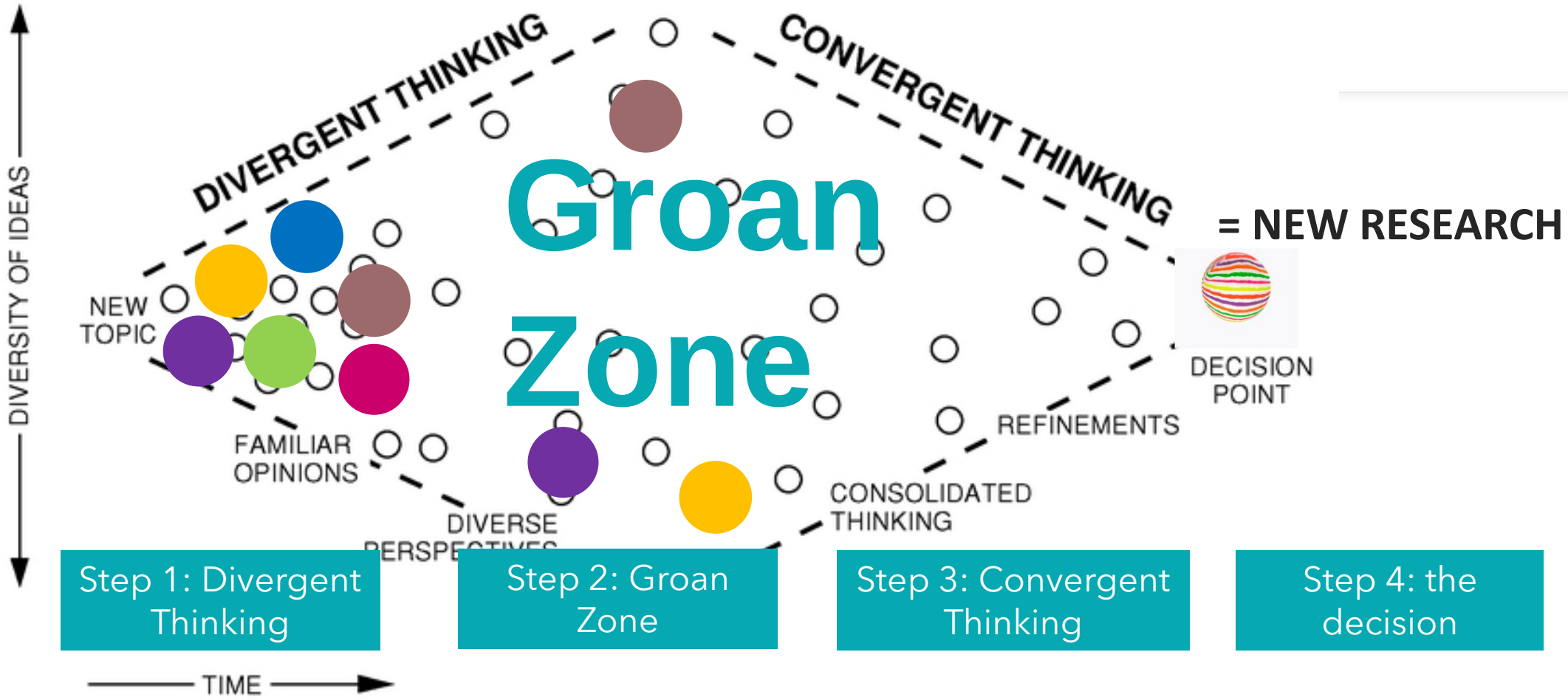
Convergent Thinking

- **Vision Statement *Draft*: To understand, predict, prevent where an outbreak is going to happen [in the atmosphere] and prevent it within the One Health framework**



The Decision



Modified from Kaner 2014

Moose Story

You are backpacking in the mountains. Your goal of this backpacking trip is to see a moose. You did research ahead of time about moose sightings, moose habitats and you even contacted the Colorado Parks and Wildlife Office to ask about moose territories. After backpacking for several days, you still haven't seen a moose. Your feet hurt, your pack is heavy, it's raining, and you are dreaming of a soft bed. Then you walk around the corner and there is the moose!

You never know who on the team will see the moose first. And sometimes it isn't a moose. It's a bear/elk/mt lion. *The animal is already there* through the process of **backpacking, walking, reflecting, and thinking** - someone discovers the hidden **wildlife**.

©

Low-Stakes Divergent and Convergent Thinking: Let's Practice and have FUN

Caption this photo!

©

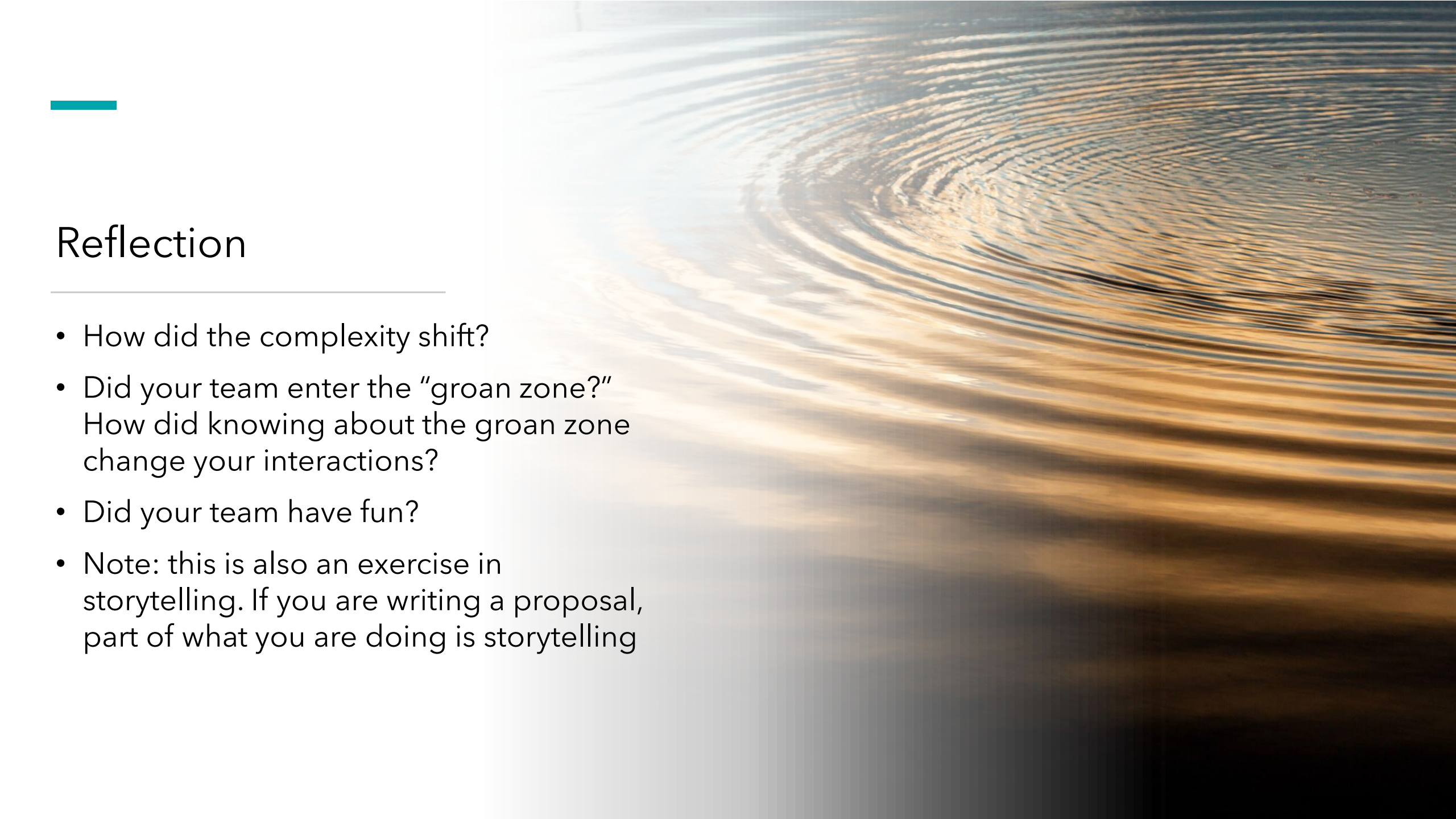
Instructions

- Step 1: Write by yourself for 60 seconds [respond to the prompt above the picture] **PLEASE USE HUMOR!!**
- Step 2: Join a breakout group. Round Robin – share what you wrote.
- Step 3: It's a competition, work together and combine what you heard into the best response.
- Step 4: We will ask each table to share what they wrote.

©

Reflection

- How did the complexity shift?
- Did your team enter the “groan zone?” How did knowing about the groan zone change your interactions?
- Did your team have fun?
- Note: this is also an exercise in storytelling. If you are writing a proposal, part of what you are doing is storytelling



Pro Tips for Knowledge Convergence

Pro tips for putting research into practice

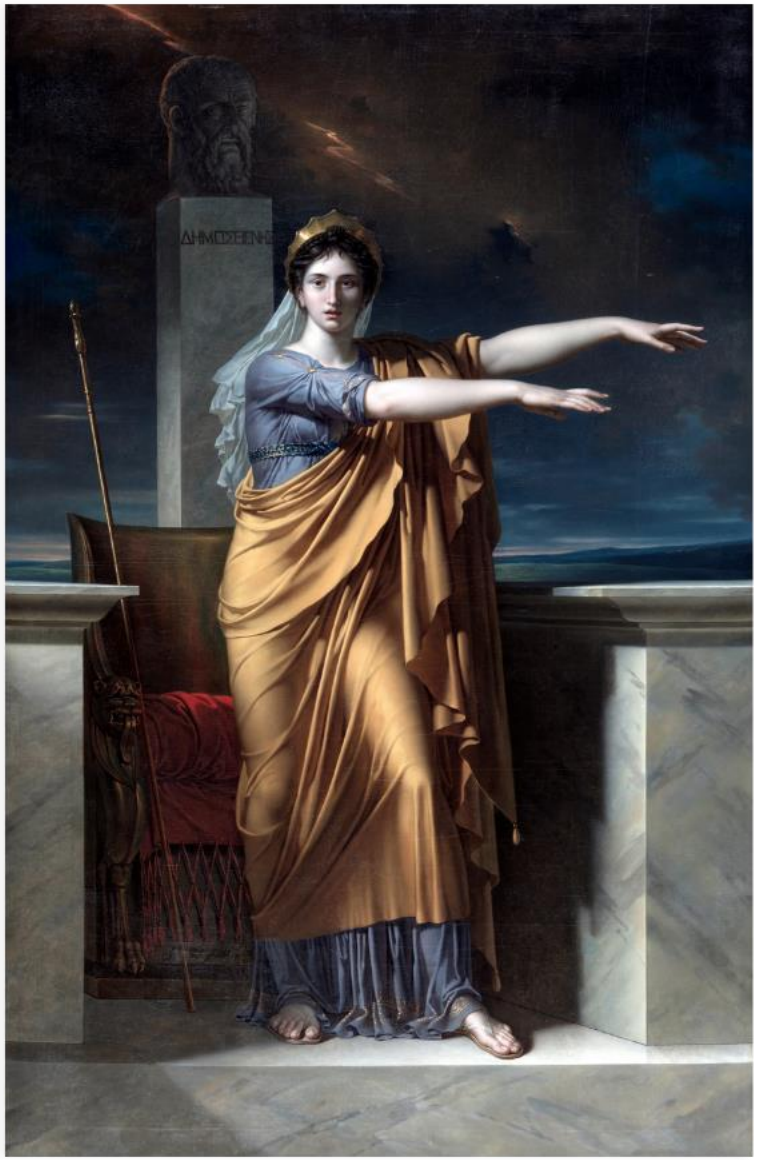
©

Pro tip: you don’t always have to always have an eloquent presentation

Often, ideas get tossed to the side when they are not well articulated, tentative, or clumsy. Ideas don’t have to have perfect, well-formed ideas during the divergent thinking process.

Pro Tips:

- Ask how it connects
- Put it in a parking lot for later
- Write it down anyway



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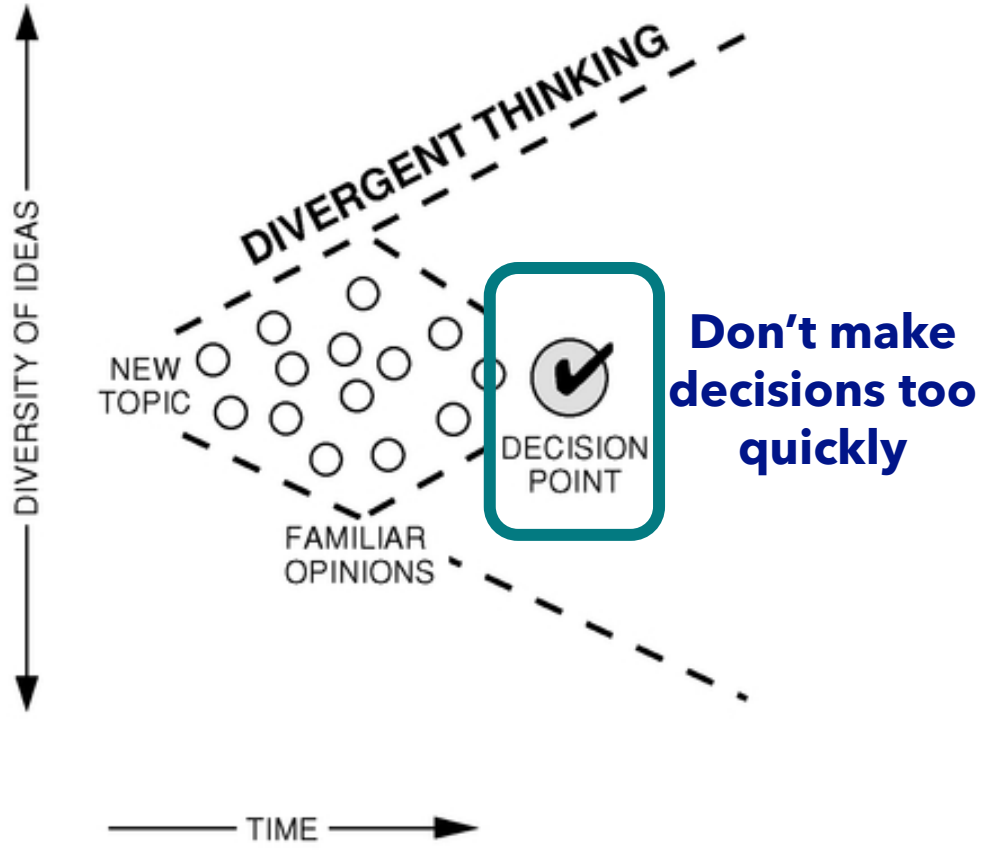
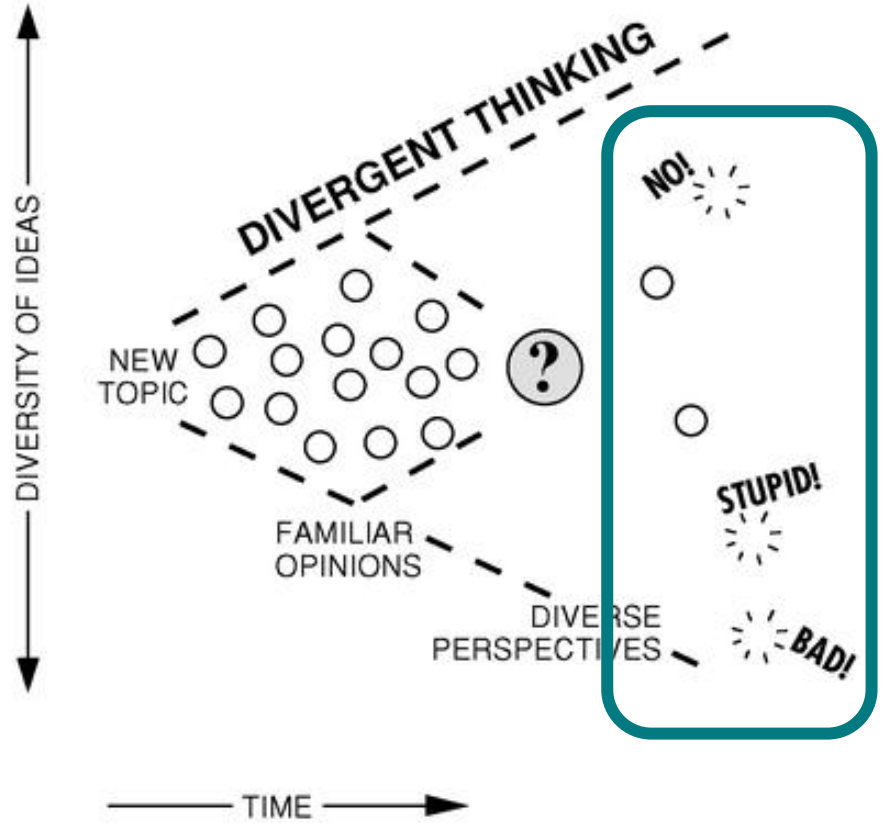
Pro Tips for Divergent Thinking



Don't make decisions too quickly



Don't shut down ideas

Kaner (2014)

©

Pro tips: To get through the Groan Zone

- Set aside time to be in the groan zone
- Articulate with the team that to build collective knowledge you need all the ideas
- Let graduate students ask the first question
- Build trust
- Have fun
- Magic wand question

©

Pro Tips to manage Power Dynamics

Make responses anonymous	Create opportunities for trainees to speak	Create Team Norms	As a PI…	Project management
• Use Jamboards • Write ideas down on sticky notes (virtual or in-person)	• Give trainees the questions ahead of time • Set aside time specifically for trainees during the meeting • Take time to get to know the trainees	• Dependability • Roles and Responsibility • Psychological Safety • Meaning • Impact • Even turn-taking	• Normalize brainstorming: throw up some "dumb ideas." You never know when those ideas will spark innovation. • Speak last • Don't be quick to judge (verbally and with body language)	• Timelines • Roles • Responsibilities • Tight timeline

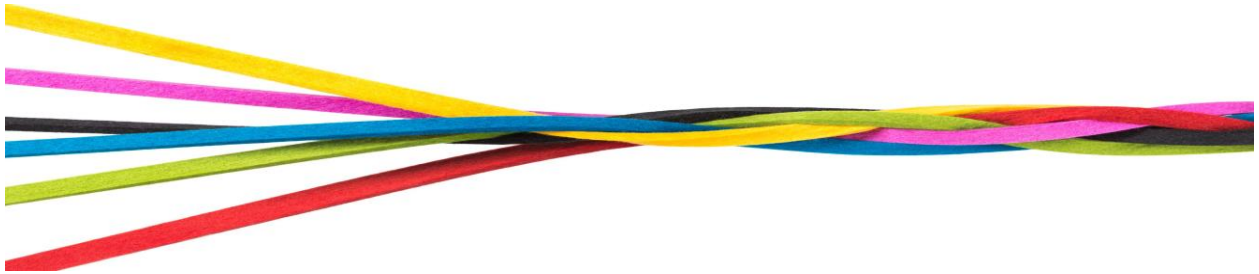
©

Make a plan

- Create meeting agendas
- Include graduate students
- Dare greatly
- Be vulnerable
- **You can do it!**

Definition:
Convergence Research

Convergence research brings together diverse disciplines to identify solutions to wicked social, ecological, economic, and technical problems (Peek et. Al. 2020)



Peek, Lori, Jennifer Tobin, Rachel M. Adams, Haorui Wu, and Mason Clay Mathews. 2020. “A Framework for Convergence Research in the Hazards and Disaster Field: The Natural Hazards Engineering Research Infrastructure CONVERGE Facility.” *Frontiers in Built Environment* 6(July):1–19.

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Mentimeter (Round 2)

- Open link in the chat
- Write 3 words to describe “convergence research”
- Come back to the presentation and we’ll show you the results
- https://www.menti.com/f58ji4qt5j

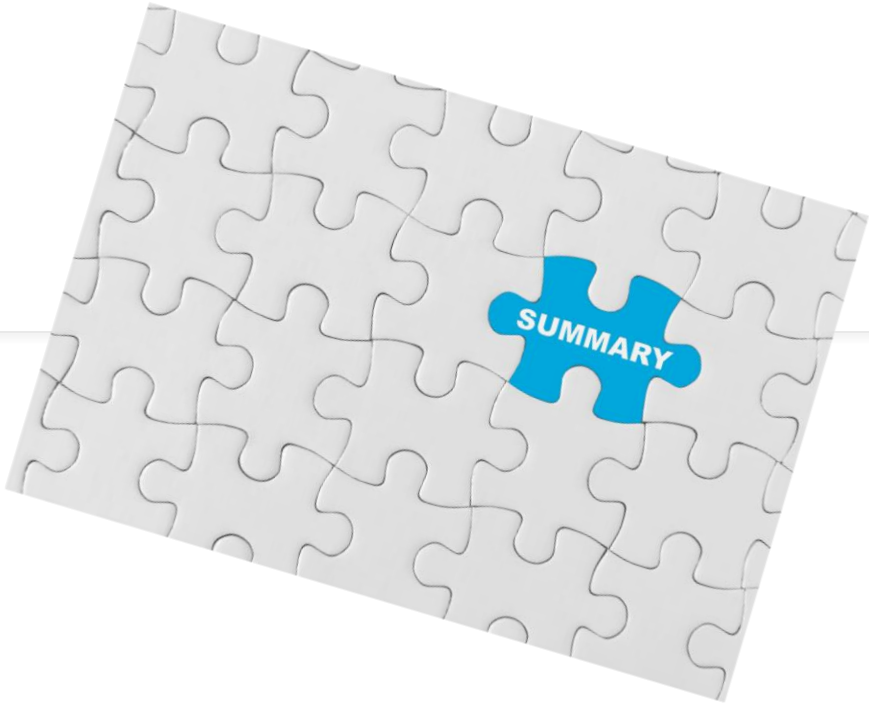
©

CONCLUSION

Agenda

- Warm-up
- Google Study
- Roles and Responsibilities
- Turn-taking
- Toolbox dialogue
- Knowledge Convergence Theory and Practice
  - Team Norms
  - Psychological safety
  - Even turn-taking
- Conclusion, Reflection, and Questions

Summary



- Team Building
  - Psychological Safety
  - Even turn-taking
  - Make the implicit explicit (Toolbox)
- Convergence Research
  - Divergent thinking is messy and not eloquent
  - It's okay to be uncomfortable in the groan zone
  - Convergent thinking is the result of a structured and organized process
- These processes can improve teaming and overall satisfaction

©

Highlights

- There are small things you can do to improve team performance
- Diversity Equity and Inclusion is essential to create new knowledge
- Convergence research is a culture shift
  - Roles change i.e. graduate students speak first
  - Takes time and practice
  - Facilitation is key
  - Team building is the foundation
- Convergence Research is a Process
- To solve the questions that have meaning and impact we need to work as a team
- Funders [NSF, NIH and others] require team science
- Have Fun!

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One Powerful Word

Round Robin ONE word to describe your experience during this presentation

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Questions

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teamdivergentscience@gmail.com
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