

An Organizational Response to Incidents:

Designing for Smooth Coordination in High Tempo,
Large Scale Software Incident Response

SRECon Americas
MARCH 22, 2023

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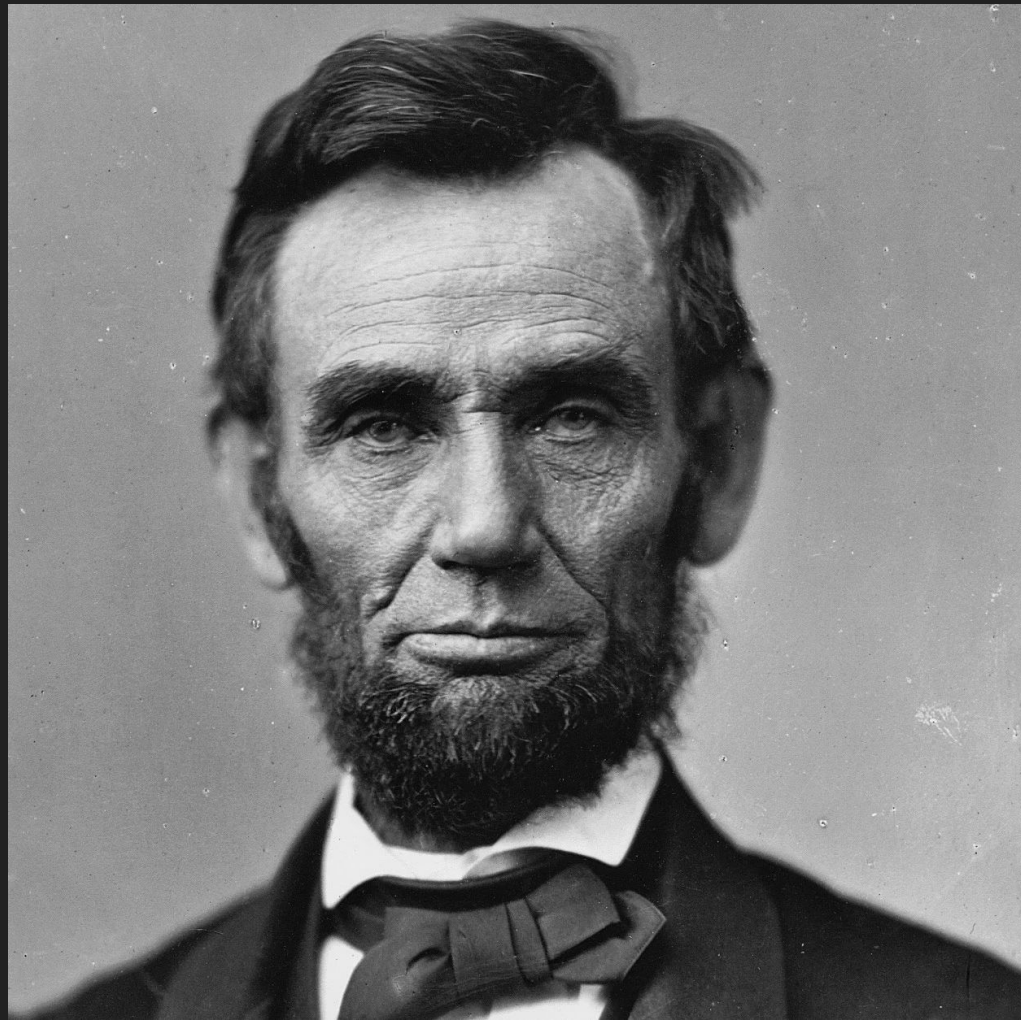
SRECon Americas
MARCH 22, 2023

Followship: A proposed model of incident organization for how to have better incidents

A cognitive systems approach to coordination.

SRECon Americas
MARCH 22, 2023

Dr. Laura Maguire, Jeli.io





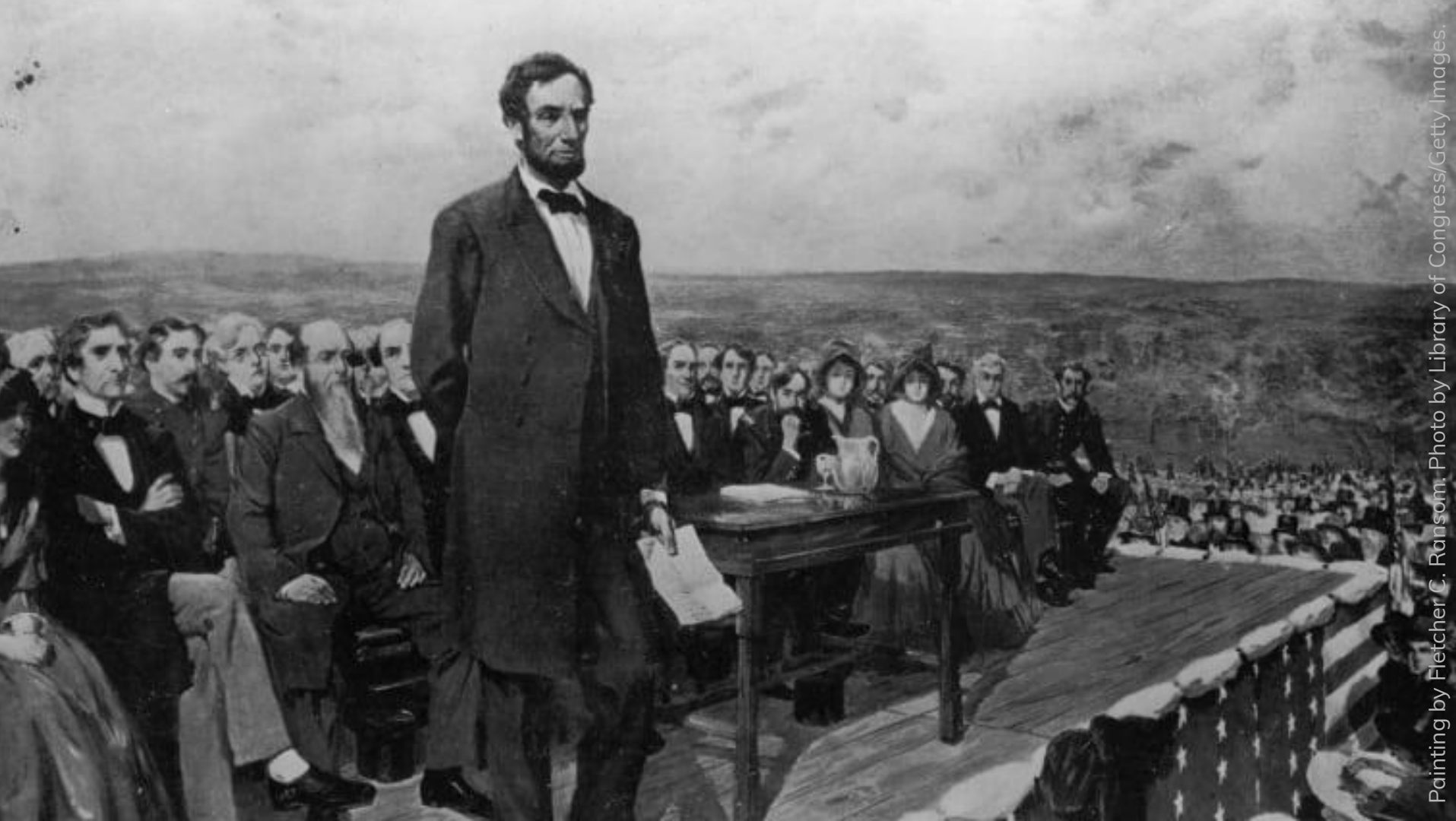






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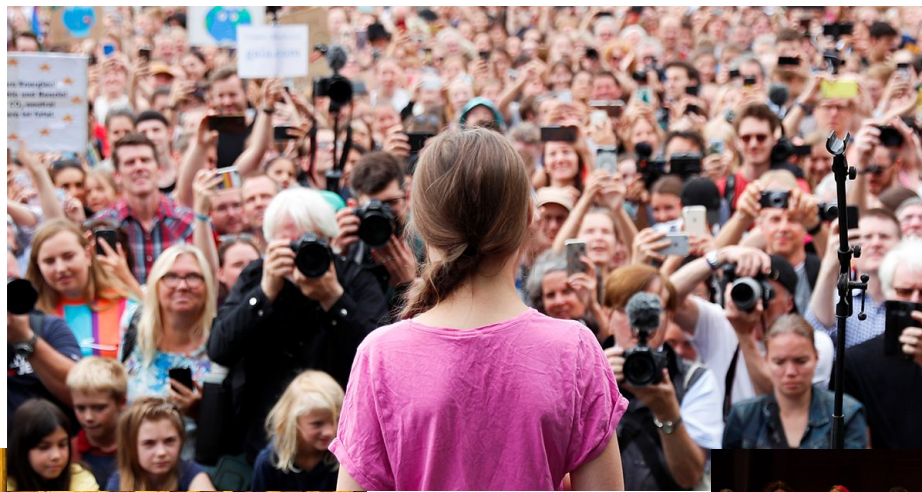




Painting by Fletcher C. Ransom. Photo by Library of Congress/Getty Images.





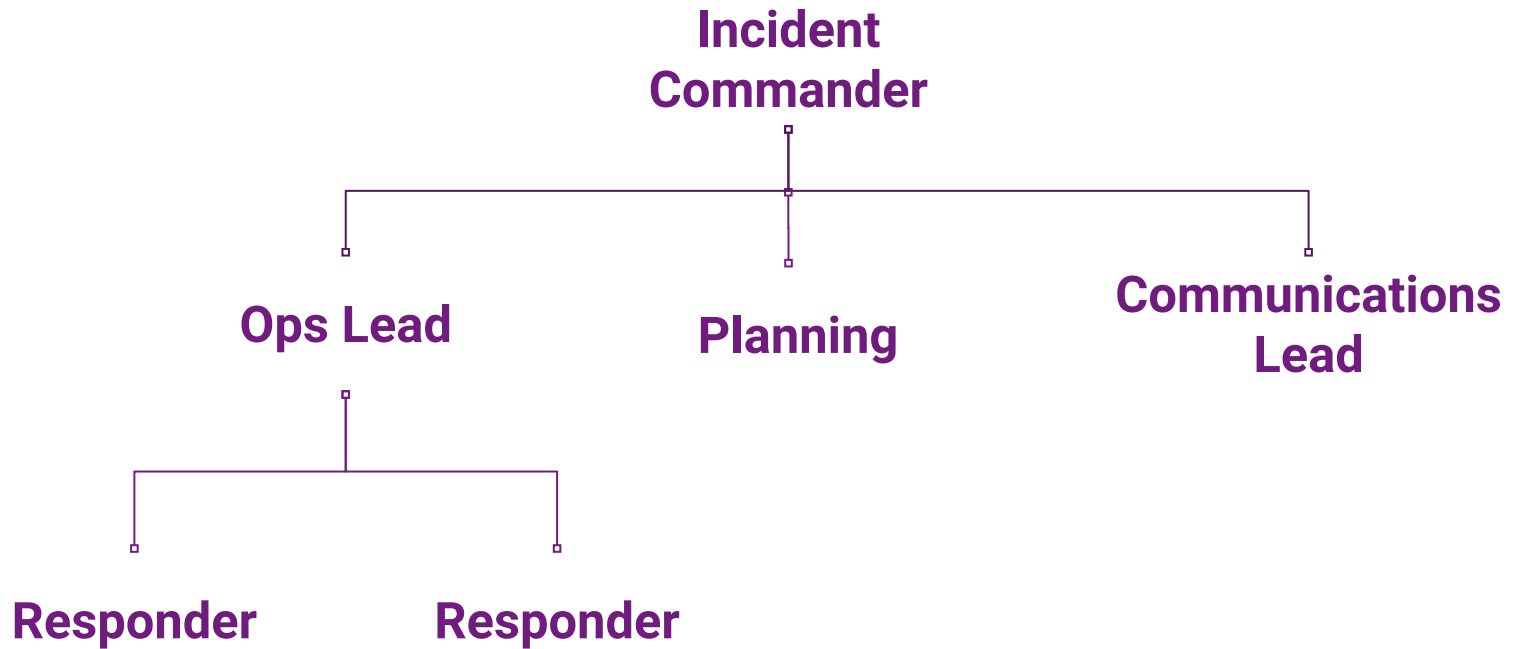


Followship

Leadership

Followship is:

The **adaptive choreography** of experienced responders working together for a common goal or purpose.

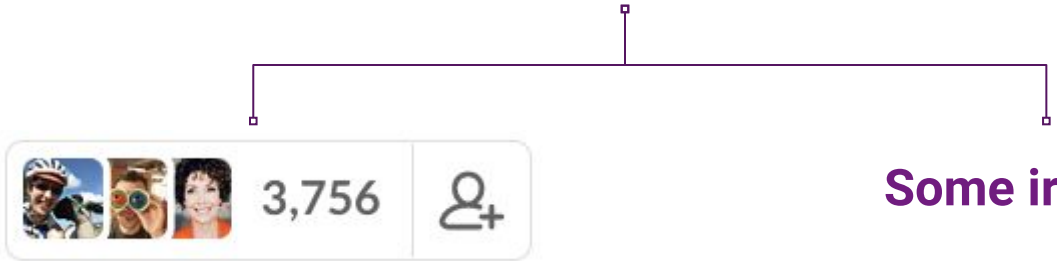


Incident Commander

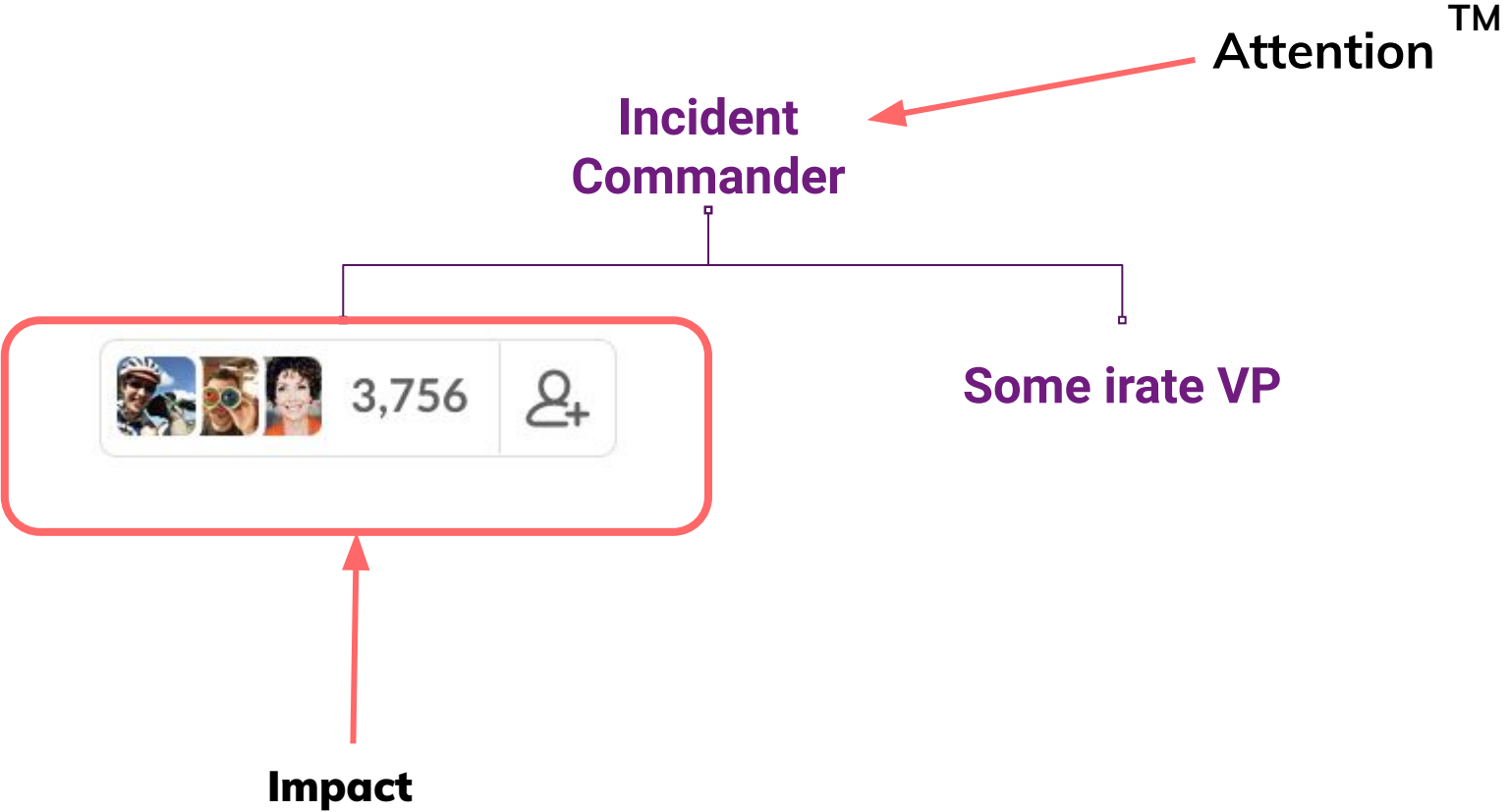


AttentionTM

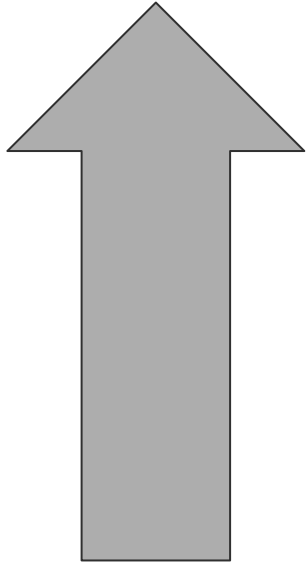
Incident
Commander



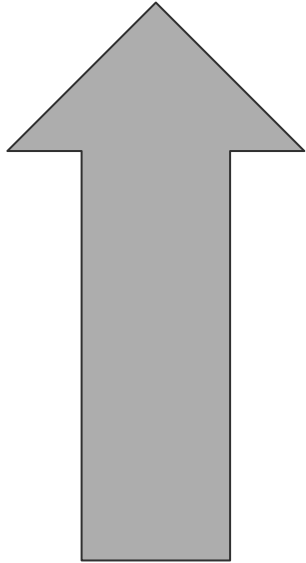
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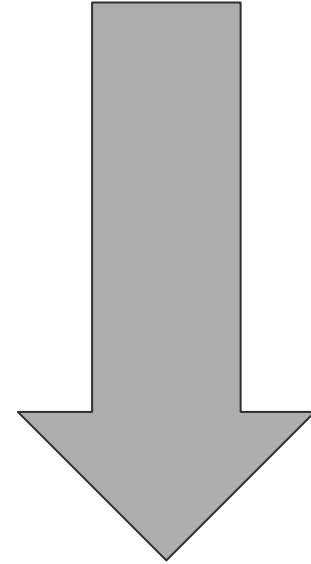
DEMANDS



DEMANDS



COORDINATION



The coordination paradox

- In complex adaptive systems, everyone's model is going to be partial and incomplete (Woods, 2017).

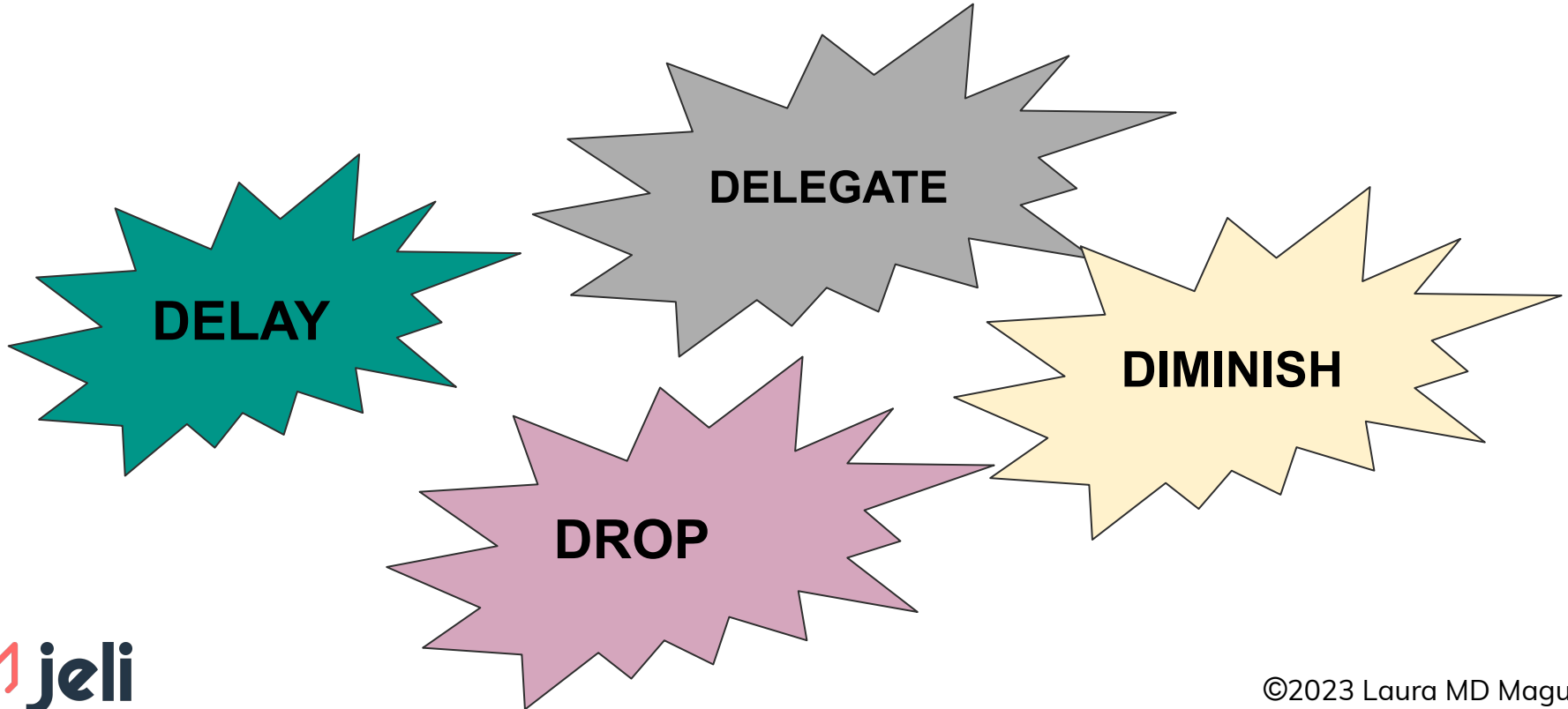
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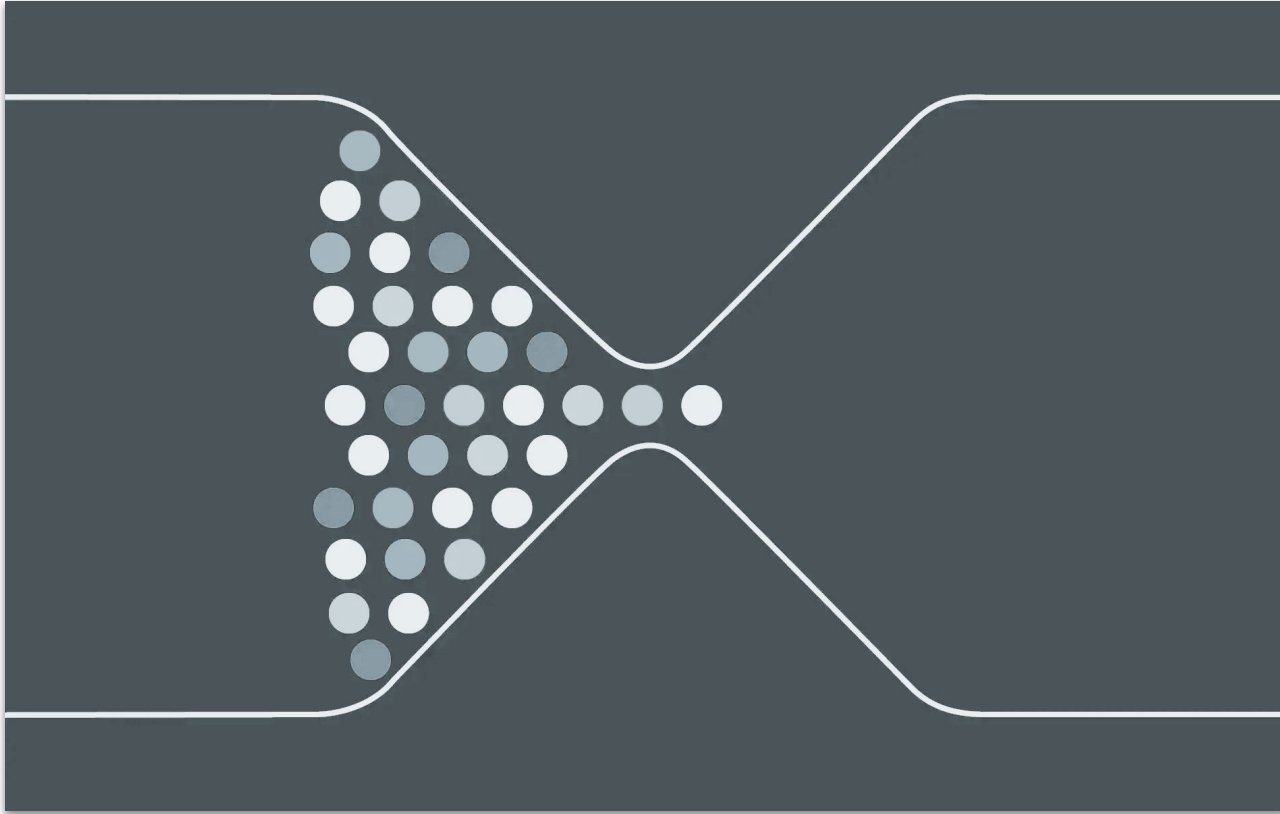
- In complex adaptive systems, everyone's model is going to be partial and incomplete (Woods 2017).
- Therefore we need multiple, diverse perspectives to handle non-routine or exceptional events (Grayson, 2018, Watts-Perotti & Woods, 2001).

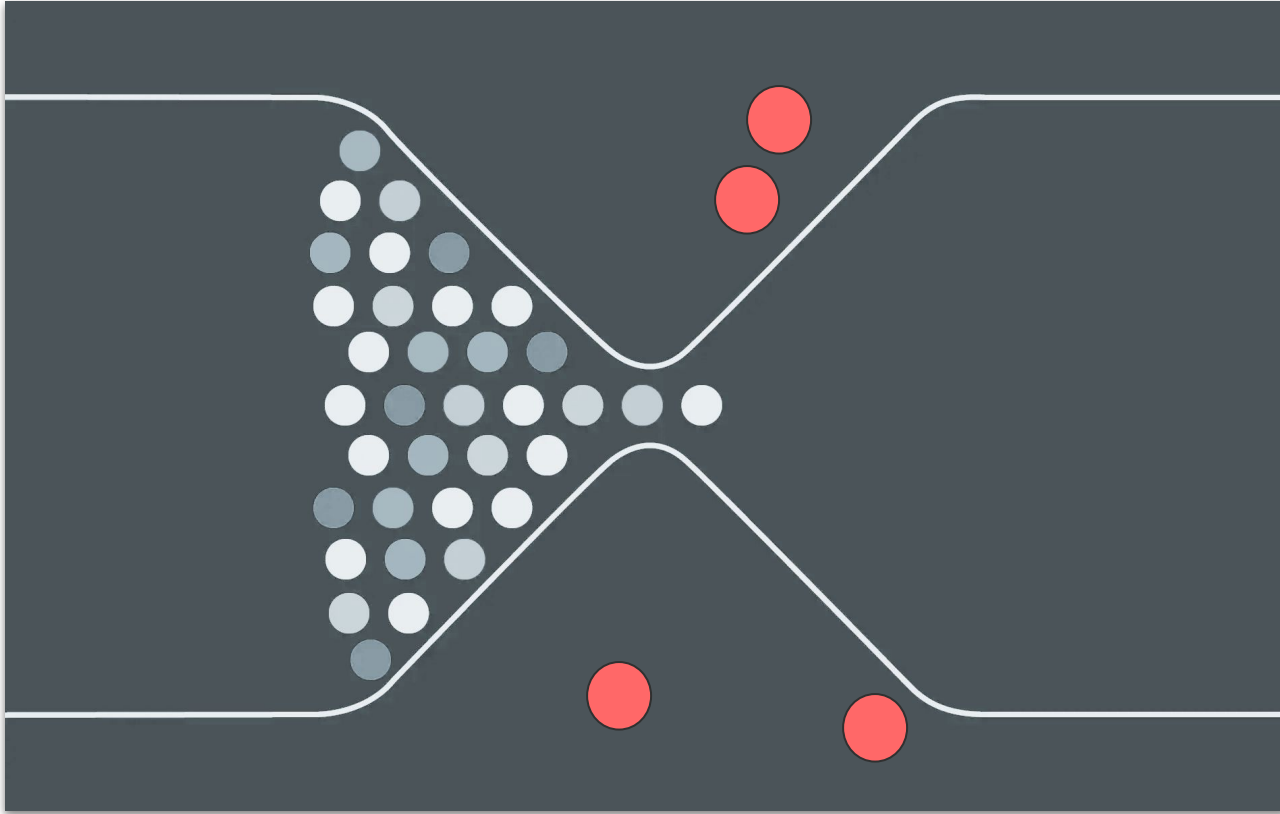
The coordination paradox

- In complex adaptive systems, everyone's model is going to be partial and incomplete (Woods 2017).
- Therefore we need multiple, diverse perspectives to handle non-routine or exceptional events (Grayson, 2018, Watts-Perotti & Woods, 2001).
- But there is additional cognitive load working with others (Klein et al, 2005; Maguire, 2019) **so investments and strategies are needed to keep CoC low.**

Strategies for coping with increased demands







Followship is:

The adaptive choreography of responders working together for a common goal or purpose.

Followship

Leadership

Where the findings come from:



Where the findings come from:



Where the findings come from:



Where the findings come from:



Cognition

Cognition

"the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses" (Oxford English Dictionary)

Cognition involves the acquisition, processing, storage, and retrieval of information by the brain (Lawlor, 2002)

"All forms of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem solving." (APA)



What are the elements of cognition?



Perceiving



Attending



Reasoning



Acting

What are the elements of cognition?



Perceiving

Looking

Sensing

Seeking cues

Receiving cues

Recognizing

change

What are the elements of cognition?

Diagnosing
Troubleshooting
Forming hypotheses
Validating/invalidating
Inferring
Judging
Planning
Correcting
Modifying



Reasoning

What are the elements of cognition?



Attending

Focusing
Prioritizing
Switching
Ignoring

What are the elements of cognition?

Recruiting
Updating
Signalling
Synchronizing
Grounding
Initiating
Updating
Delegating
Accepting
Adjusting 

A practice exercise in recognizing cognitive work.





Cognitive work is asking and answering:

- What is happening?
- Why is it happening?
- What will happen next?
- How quickly will that happen?
- What do I need to do right now? Later?
- What are the consequences?
- What are the goals and priorities? Which ones can I sacrifice?

Coordinative work is asking and answering:

- Who has the skills and knowledge to help me?
- What do they need to know about the current situation to be useful to helping resolve the outage?
- What tasks should I give them versus others?
- How long will it take for them to be done?
- What work might be deferred as a result?
- What does that mean for my users? How/ should I let them know?

SRE work is asking and answering:

- What is happening?
- Why is it happening?
- What will happen next?
- How quickly will that happen?
- What do I need to do right now? Later?
- What are the consequences?
- What are the goals and priorities?
Which ones can I sacrifice?
- Who has the skills and knowledge to help me?
- What do they need to know about the current situation to be useful to helping resolve the outage?
- What tasks should I give them versus others?
- How long will it take for them to be done?
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- What does that mean for my users? How/ should I let them know?

Yes Laura, we know.

Do you though?

Followship

Leadership

Followship looks like:

- **Anticipating** the **sequencing** of work needed to be accomplished and of others needs

Followship looks like:

- **Anticipating** the **sequencing** of work needed to be accomplished and of others needs

“I’m ready to deploy that change whenever you finish reviewing it.”

“I’ll hold on asking the network team until we have the results back.”

Followship looks like:

- Anticipating the sequencing of work needed to be accomplished and of others needs
- **Initiating** work, communications, or outreach

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“I have Jamine’s cell phone number and can loop her in.”

“I’ll open a ticket with Google support.”

“I’ll work on messaging to send to other teams”

Followship looks like:

- Anticipating the sequencing of work needed to be accomplished and of others needs
- Initiating work, communications, or outreach
- **Signalling intent** to others to aid coordination

“Ben, I am in the database now and can run those queries”

“I just put the kids to bed and will order pizza so you all get dinner”

“I’m on a customer call for the next 20 minutes but I’m here for backup if needed”





Followship looks like:

- Anticipating the sequencing of work needed to be accomplished and of others needs
- Initiating work, communications, or outreach
- Signalling intent to others to aid coordination
- Proactively **providing** information and updates and **stating** assumptions

“I think the payments team just launched a new feature that might be causing our issues.”

“Most of those users are on the west coast so it’s probably a surge in log on traffic.”

“I’m almost done restarting the server.”

Followship looks like:

- Anticipating the sequencing of work needed to be accomplished and of others needs
- Initiating work, communications, or outreach
- Signalling intent to others to aid coordination
- Proactively providing information and updates and stating assumptions
- **Relaxing goals and constraints** to show reciprocity

“

Followship looks like:

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- **Relaxing goals and constraints** to show reciprocity
- Preparing themselves to be useful

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- **Relaxing goals and constraints** to show reciprocity
- **Synchronizing** activities

Eng 4: While we're waiting for that is somebody's generating a support bundle in the ticket? I think they're waiting for that. [crosstalk]

Eng 1: Yes, sir. [crosstalk]

Eng 2: Yeah. It's still running. It takes a while for run. [crosstalk]

Eng 4: Okay, thank you. I didn't see a task for that. [crosstalk]

Eng 3: You have to do a full support bundle?

Eng 2: A full support bundle?

Eng 3: Well before one takes like a couple of hours.

Eng 2: Yeah. I did a full up, a full cluster support bundle

Eng 3: Doesn't that take a couple of hours? Or did they improve the speed?

Eng 3: I recall it taking a couple hours.

Eng 2: Yeah. Takes a while

Eng 1: While they are waiting for the support bundle we may want to let them know, say, Hey, this kind of take a couple hours. We want something on do something between that time.

Eng 4: I'll let them know that

Followship looks like:

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- Initiating work, communications, or outreach
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- **Relaxing goals and constraints** to show reciprocity
- **Synchronizing** activities
- **Preparing** themselves to be useful

"I'm going to read the backscroll so I can come up to speed on what's been tried already"

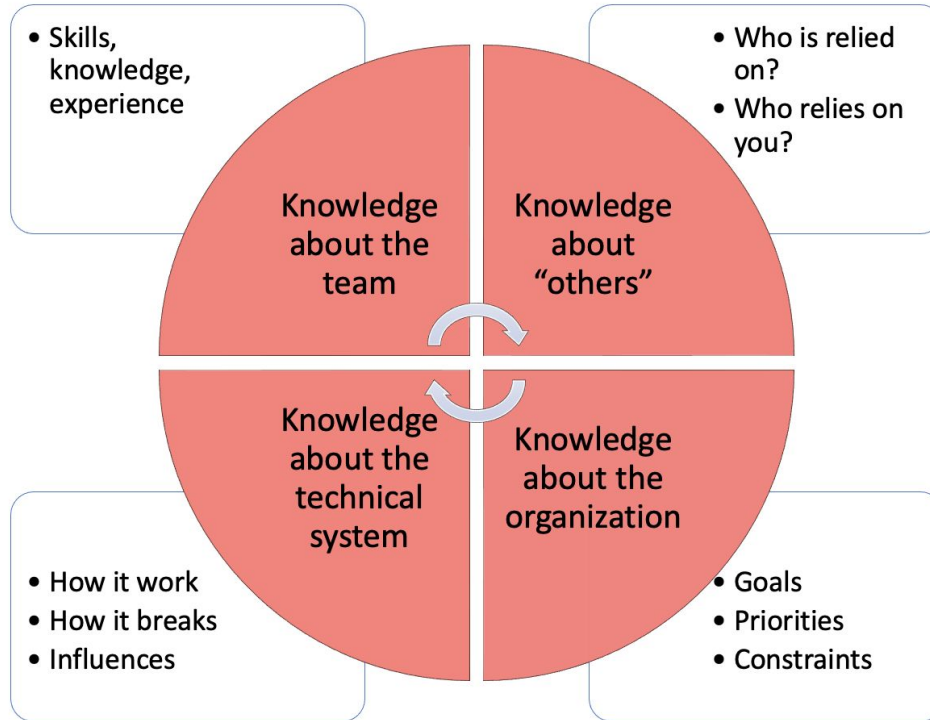
"I'll work on a mitigation script in case our primary plan doesn't work out"

Followship looks like:

- Anticipating the sequencing of work needed to be accomplished and of others needs
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- Signalling intent to others to aid coordination
- Proactively providing information and updates and stating assumptions
- **Relaxing goals and constraints** to show reciprocity
- **Synchronizing** activities
- **Preparing** themselves to be useful
- **Looking in and listening in.**

Developing a base for followship

**Common ground is:
“mutual knowledge, beliefs, and/or
assumptions”**



Maguire, 2020



VEng 2: Hi , Thanks for reuploading. I'm analyzing the logs you provided and see a LOT of traffic from these IPs: Over 1M requests from . Just 91 looking at the timestamps this is a lot of traffic that is pounding the API. Could you check and/or temporarily disable these jobs or processes and see what that does to help restore overall performance? Thanks, <VEng 2>

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Eng 2(ic): We appreciate the analysis. These two services are the largest consumers of and the behavior you're seeing is BAU. We cannot disable these services. Further, the exhaustion of the the active workers is the behavior since hotpatching which spawned this issue a week ago. Thanks, <Eng2(ic)>

- Investigation
- Report
- Notes
- Event Data
- Settings

The One with Consul

Incident-346

Export Report

Overview Narrative **People** Takeaways Action Items Attached Resources

6 Total People | 5 Participants on-call 1 Participants not on-call 0 Observers Show observers



Becca Demo
SRE |

Tenure	almost 2 years Dec 11, 2020
Location	new york, ny Eastern Standard Time (UTC-05:00)
On call?	No
First message	looks like consul template not working 10:10 AM 02/18/2021 (local)

		Participation (word + reaction count)
	Becca Demo	Participant
	Natalie Demo	Participant
	Becca Demo	Participant
	Natalie Demo	Participant
	Becca Demo	Participant
	Natalie Demo	Participant

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Becca Demo Not on call Participant

Natalie Demo On call Participant

Participation (word + reaction count)








Participant	Progress bar
Participant	Progress bar
Participant	Progress bar
Participant	Progress bar
Participant	Progress bar

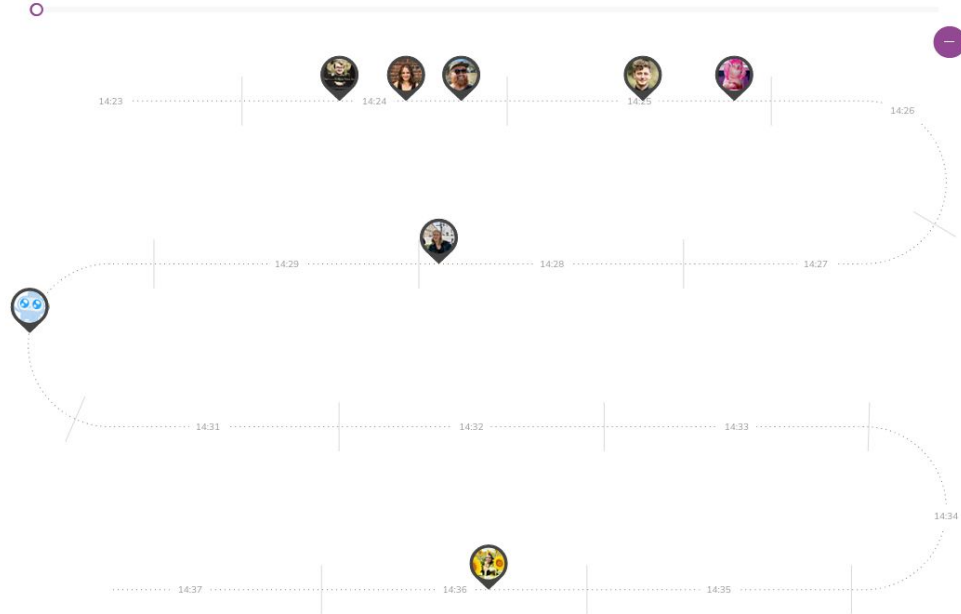
Reciprocity



Reconfiguring

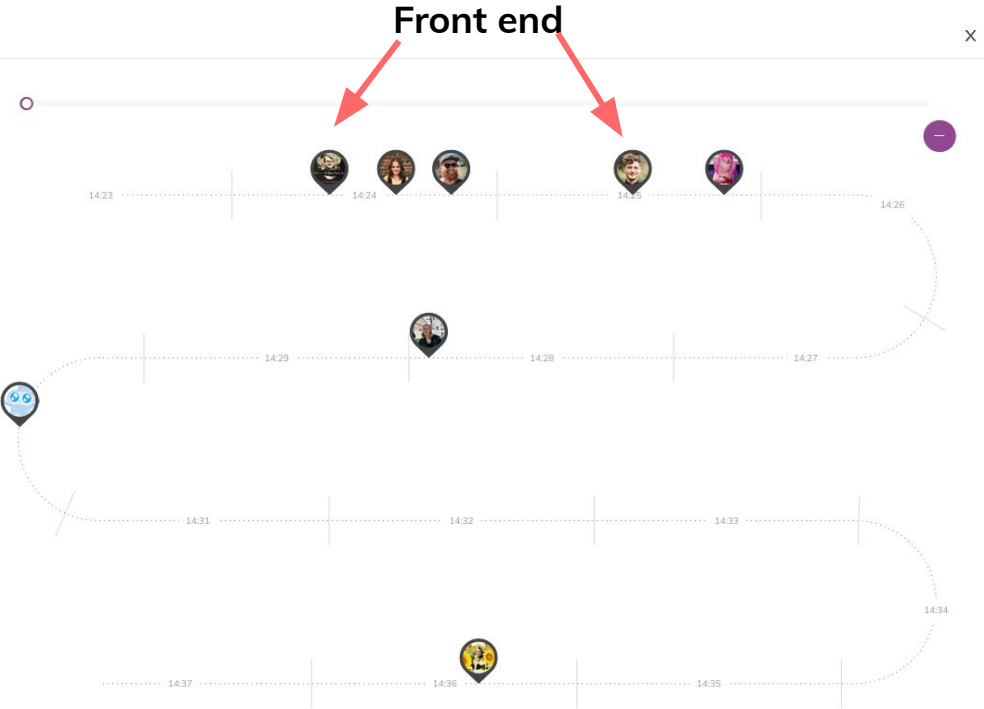
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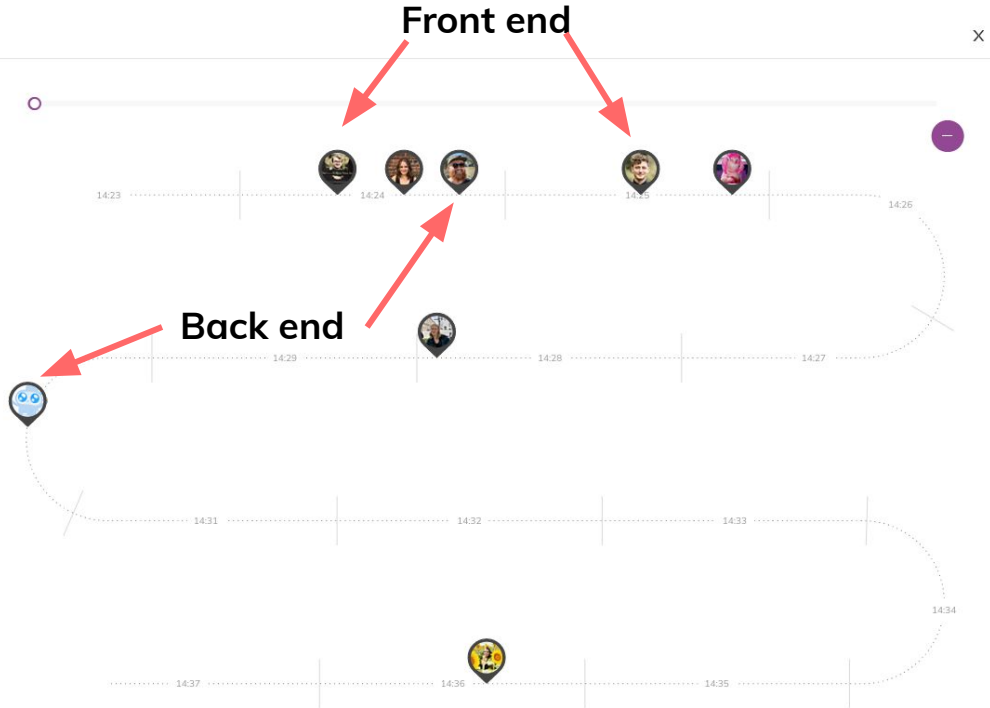
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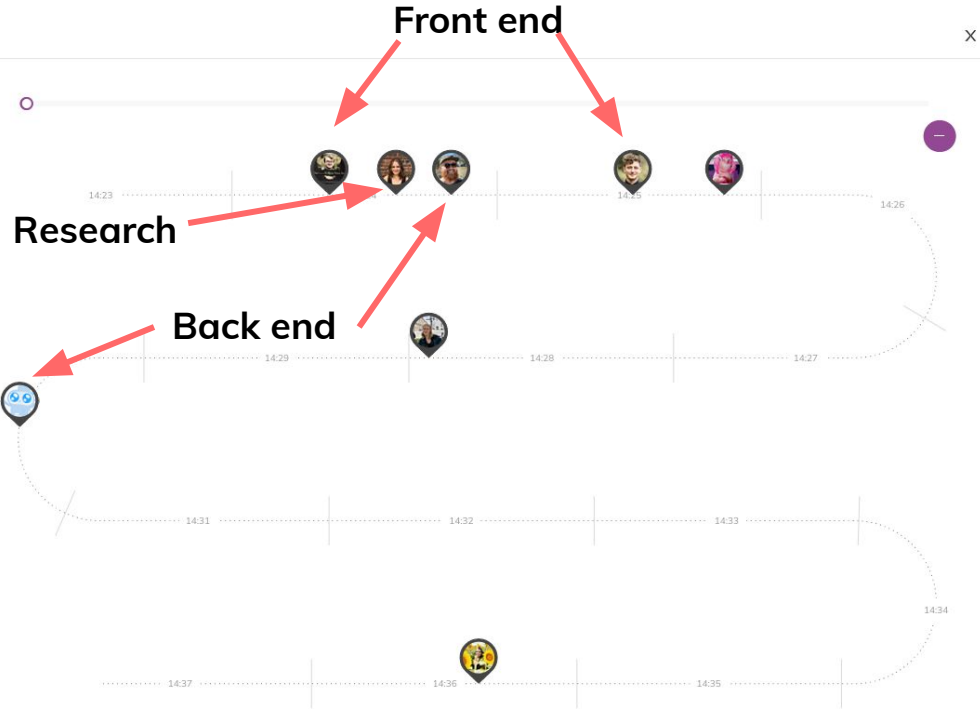
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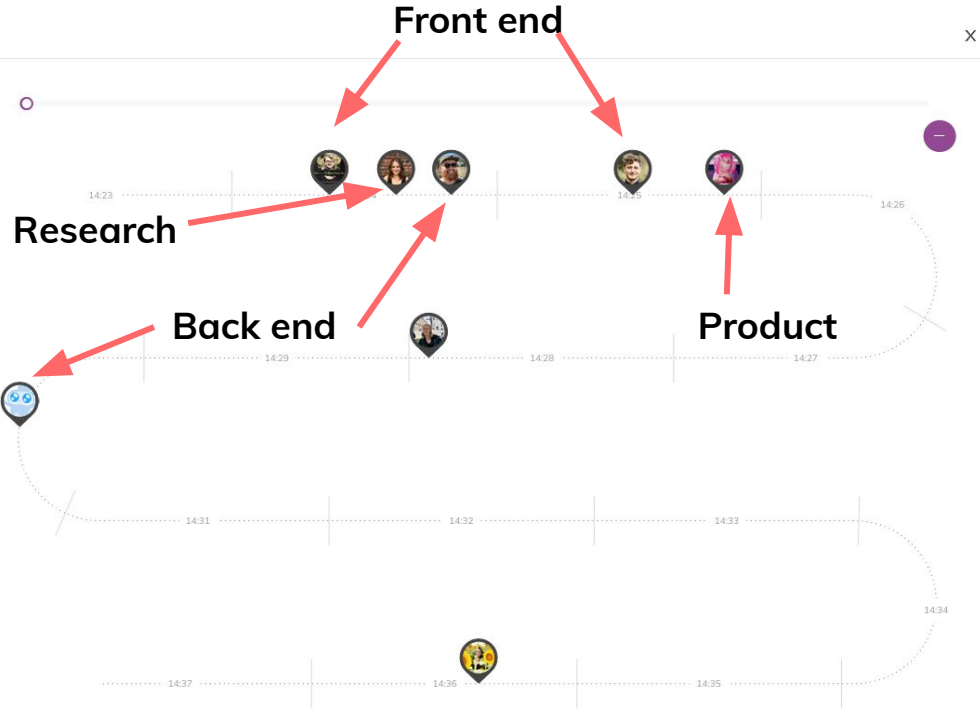
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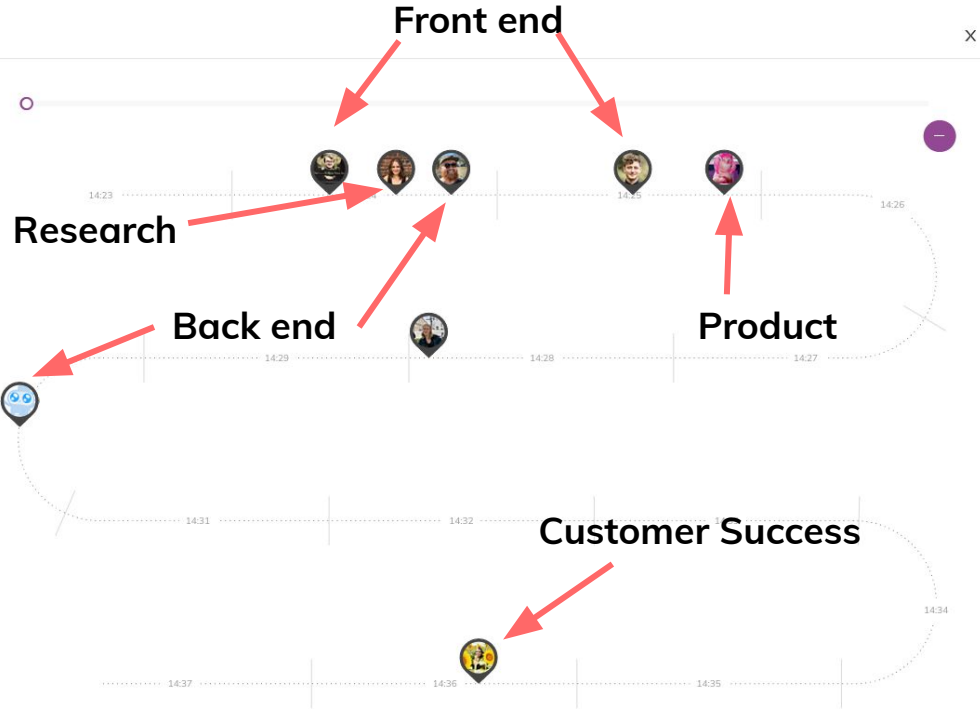
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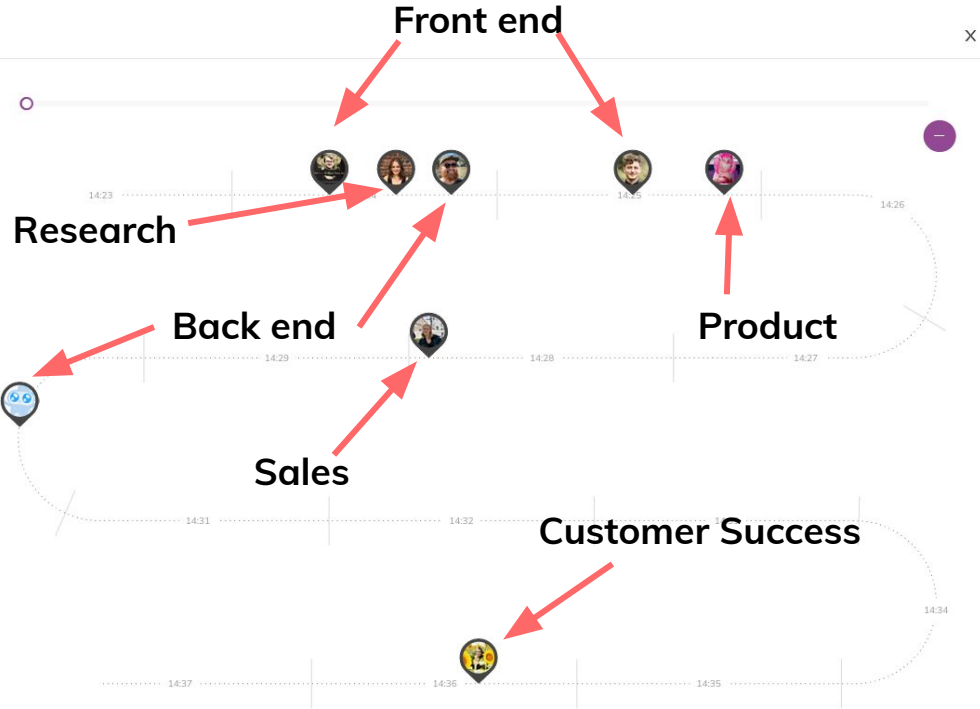
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Organizational responses





Why did it take so long?



Why did it take so many people?

504 Gateway Time-out

nginx

**Why didn't you minimize
the impact to
customers?**



**How can we stop this from ever
happening again?**

How does it make you feel?

~~How does it make you feel?~~

How does it change how you work?

Anti-patterns

X Shame, Blame, Retrain.

Anti-patterns

X Shame, Blame, Retrain.

X MTTI (Mean Time To Innocence)

X Pushing the costs of coordination across boundaries

A photograph of two military personnel in camouflage uniforms sitting at a desk in an office. They are viewed from behind, looking at two computer monitors. The person on the left is a woman with her hair in a bun, and the person on the right is a man. The desk has papers, a keyboard, and a small eagle figurine on top of the monitors. The background shows a window with curtains and a bookshelf.

How to improve your organization's response.

Observe.

Talk.

Analyze.



Observe.

- How do people interact with one another?
- Do they seem to share similar beliefs and assumptions about how the system works?
- If not, do they notice? Do they question it and share knowledge?
- Do questions go unanswered?
- Are people comfortable or are they stressed out?
- Is disagreement ok?
 - For everyone or just some responders?
- Do people support one another?

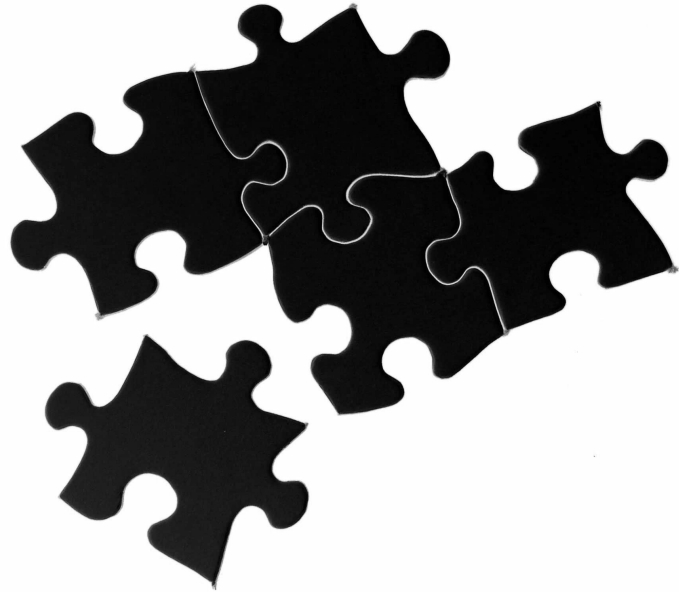
Talk.



Talk.

- Develop shared language for “talking about how you talk”
 - Common ground
 - Signaling
 - Updating
 - Anticipating
 - Synchronizing
 - Prioritizing (and re-prioritizing!)
 - Grounding
 -

Analyze.



How post-incident analysis helps with cognitive work?

It reveals:









- how the system fails
- how the system behaves under different conditions
- how the system interacts
- the degree of observability into different parts of the system
- what dependencies exist and to what extent do they impact performance
- what knowledge was needed to diagnose or repair the problem
- how flexibly that knowledge can be applied to novel problems
- how easy (or difficult) it is to get help from others when needed

Opportunity Data

Search and Filter

Clear search

All #Incident-room

-  Natalie Demo - Feb 18, 2023 at 11:28 AM
@Natalie Demo has joined #Incident-room
Hypothesis - Generated **Responder - Jites**
-  Becca Demo - Feb 18, 2023 at 12:01 PM
@Becca Demo has joined #Incident-room
Communication - Becca **Responder - Jites**
-  Greg Demo - Feb 18, 2024 at 12:05 PM
@Greg Demo has joined #Incident-room
Responder - Jites
-  Natalie Demo - Feb 25, 2023 at 12:10 PM
getting lots of complaints about messages not sending @Becca Demo can you confirm? 👤 2
-  Becca Demo - Feb 18, 2023 at 12:10 PM
@Becca Demo has joined #Incident-room
Hypothesis - Generated **Responder - Jites**
-  Becca Demo - Feb 18, 2023 at 12:10 PM
looks like console template not working 👤 1
Communication - Becca
-  Jen Harvey - Feb 18, 2023 at 12:11 PM
@Jen Harvey has joined #Incident-room
Responder - Jites
-  Maria Demo - Feb 18, 2023 at 12:11 PM

Close Buddy

Narrative Marker Details

Done

Marker Type

Detection

Title

Feb 18, 2023 at 12:10 PM

Add an end time

Summary

Describe why this marker is important to the story of the incident.

Don't worry you can always update this later

Supporting Evidence

#Incident-room



Natalie Demo - Feb 18, 2023 at 12:10 PM

getting lots of complaints about messages not sending @Becca Demo can you confirm? 👤 2

#Incident-room



Becca Demo - Feb 18, 2023 at 12:10 PM

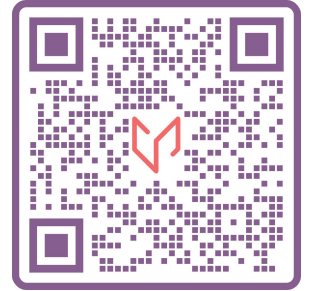
@Becca Demo has joined #Incident-room

Hypothesis - Generated

Responder - Jites

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Keep in touch.



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