

Modeling interpersonal trust in distributed command and control teams

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Note: The views expressed in this presentation are those of the authors and do not necessarily reflect the official policy or position of the Army

Overview

- **Goal:** Model impact of trust on **BEHAVIOR** in C2 (e.g., information sharing, collaboration)
 - Simulate trust's impact in future concepts experimentation
 - Develop training to help calibrate trust and build trust
- *Preliminary* model development
- Supports ARI effort to promote collaboration in network-enabled C2

Why Does Trust Matter?

C2: Trust information, judgment

- Commander
- Teammates
- Larger groups
(all network users)



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Individuals
Collectives



Defining Trust

- Willingness of someone (*trustor*) to be vulnerable to the actions of another (*trustee*)

Defining Trust

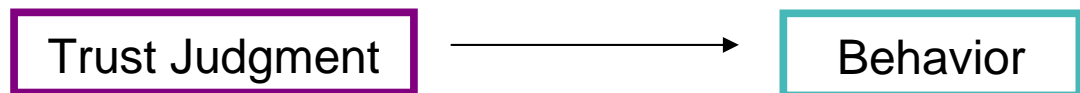
- Willingness of someone (*trustor*) to be vulnerable to the actions of another (*trustee*)
- How to measure?
 - Expecting that the trustee's actions will be favorable
 - Absence of attempts to mitigate risk or gain control from trustee

Trust Judgment

Behavior

Modeling Trust

- Understand the *observable impact* of trust
 - What trustor behaviors are enabled by trust judgments?



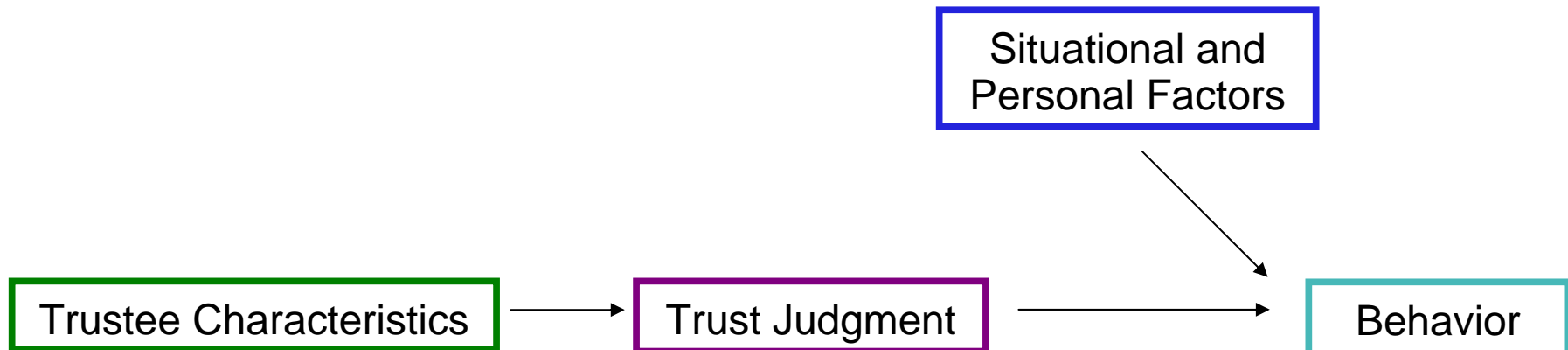
Modeling Trust

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- Understand *contributors* to trust
 - What trustee behaviors build trust?



Modeling Trust

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 - What trustor behaviors are enabled by trust judgments?
- Understand *contributors* to trust
 - What trustee behaviors build trust?
- Understand *when* trust has greatest impact
 - In C2, what situational factors influence behavior?



Method

Literature review: Scholarly and military literature

- Examined characteristics people evaluate when making trust judgments

Interview: 8 active-duty or recently retired Army officers with C2 staff experience

- Talked about trustee behaviors (cues) that build trust, trustor behaviors that result from trust, and factors that influence impact of trust on behavior

Observation: 2 Army C2 simulation exercises

- Noted trustee behaviors (cues) that convey trustworthiness, trustor behaviors that follow these cues, and situational factors that influence behavioral responses to these cues

What Trustee Behaviors Build Trust?

Goal: To identify trustee behaviors that convey trustworthiness

What Trustee Behaviors Build Trust?

- **Competence**

- *Can do*: domain-specific knowledge and skills

Individuals:

- Sharing accurate information
- Mentioning second- and third-order effects in planning meetings

Collectives:

- Training
- Collaborative history
- Frequency of errors on C2 network

What Trustee Behaviors Build Trust?

- **Character**

- *Will* do: Honesty, helpfulness, accountability

Individuals:

- Accepting help from others
- Prioritizing mission over own career
- Sharing information honestly

Collectives:

- Similarity of goals
- Training

What Trustee Behaviors Build Trust?

- **Dependability**

- Does *consistently*: Predictability of actions

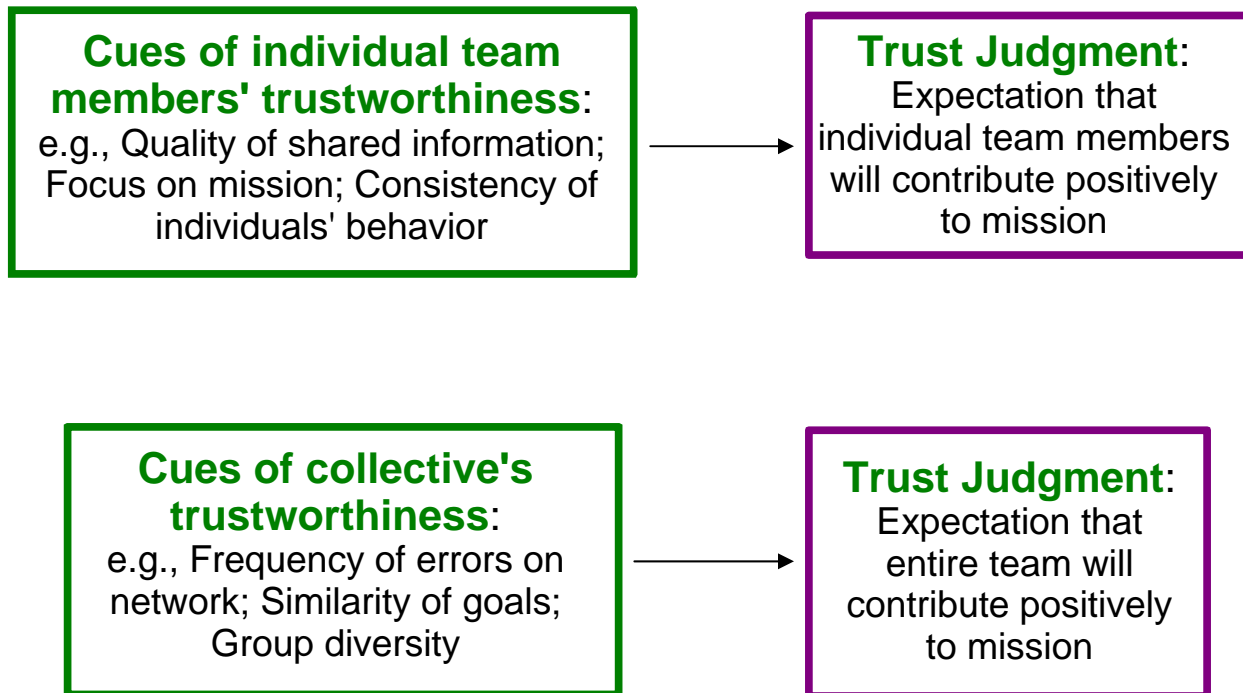
Individuals:

- Using consistent format in reports
- Accessible when needed
- Meeting commitments

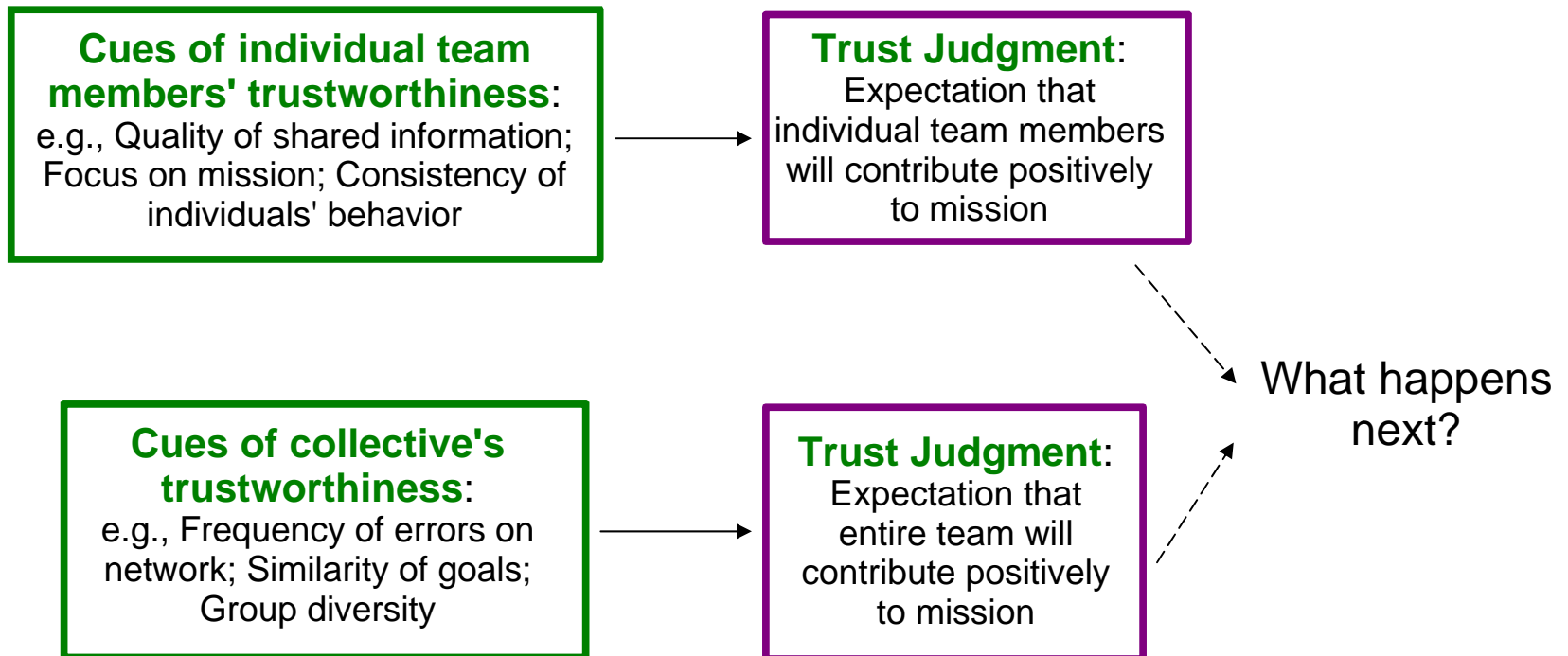
Collectives:

- Group similarity
- Interoperable C2 networks

Trust Model



Trust Model



How Does Trust Influence Behavior?

Goal: To identify aggregate behaviors associated with different levels of trust

Specific Behaviors

- More extensive double-checking



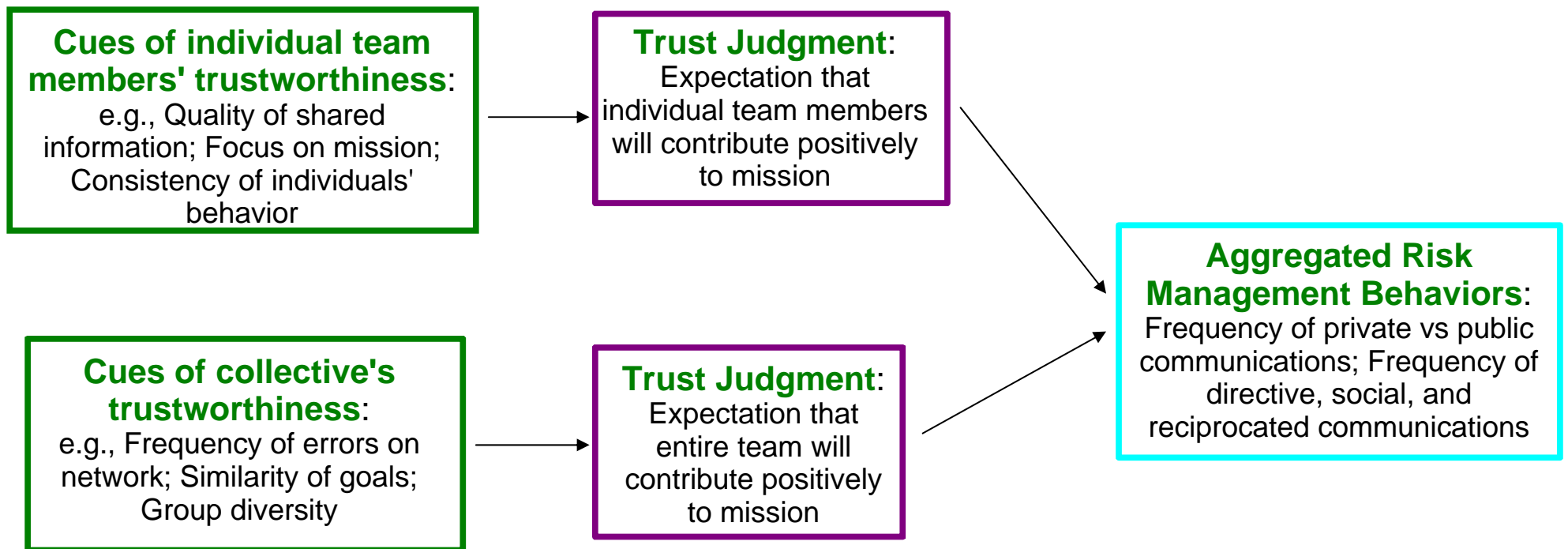
Aggregate Behaviors

- Slow responses to trustee
- One-way interactions

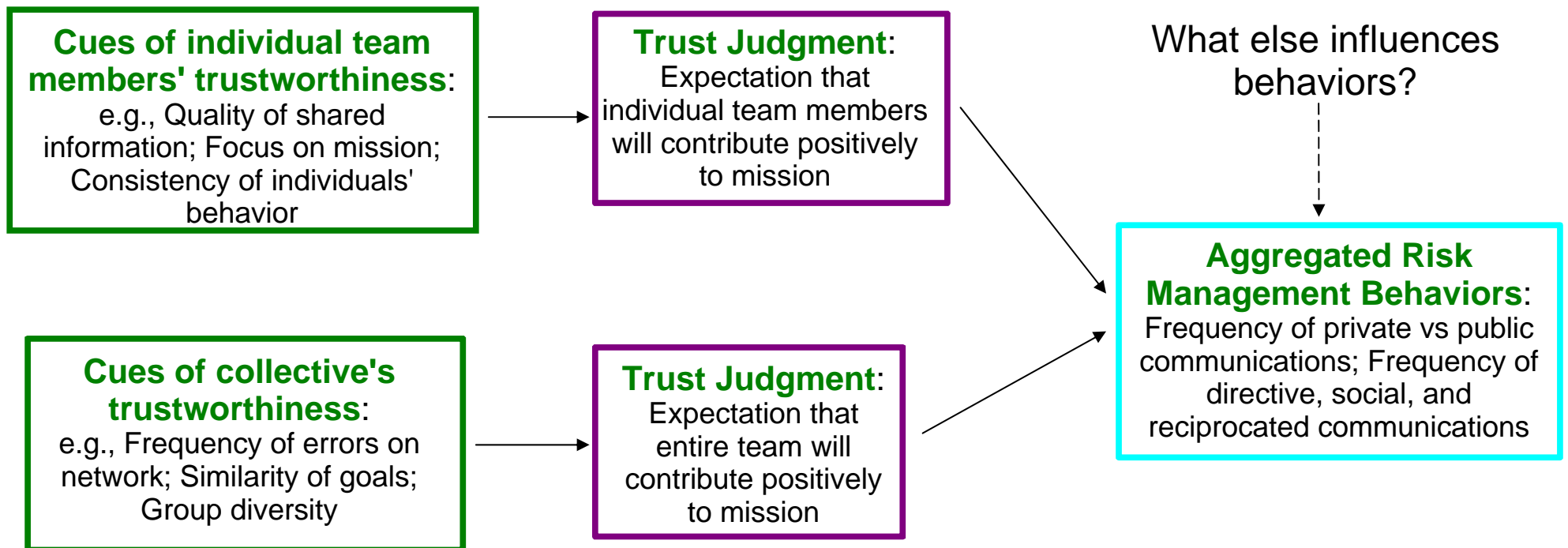
How Does Trust Influence Behavior?

Trusted Individual	More frequent interactions with trustee; Rapid responses to trustee; Greater frequency of two-way interactions; Initiates interactions more often; Message content involves requests, confirmations, and even social chat; Message tone is informal
Trusted Collective	Frequent group-level / network interactions
Un-trusted Individual	Reduced frequency of interactions with trustee; Slow responses to trustee; Rarely initiates interactions; Message content involves instruction and monitoring; Message tone is formal
Un-trusted Collective	Avoid group-level / network interactions; Establish SOPs

Trust Model



Trust Model



When Does Trust Influence Behavior?

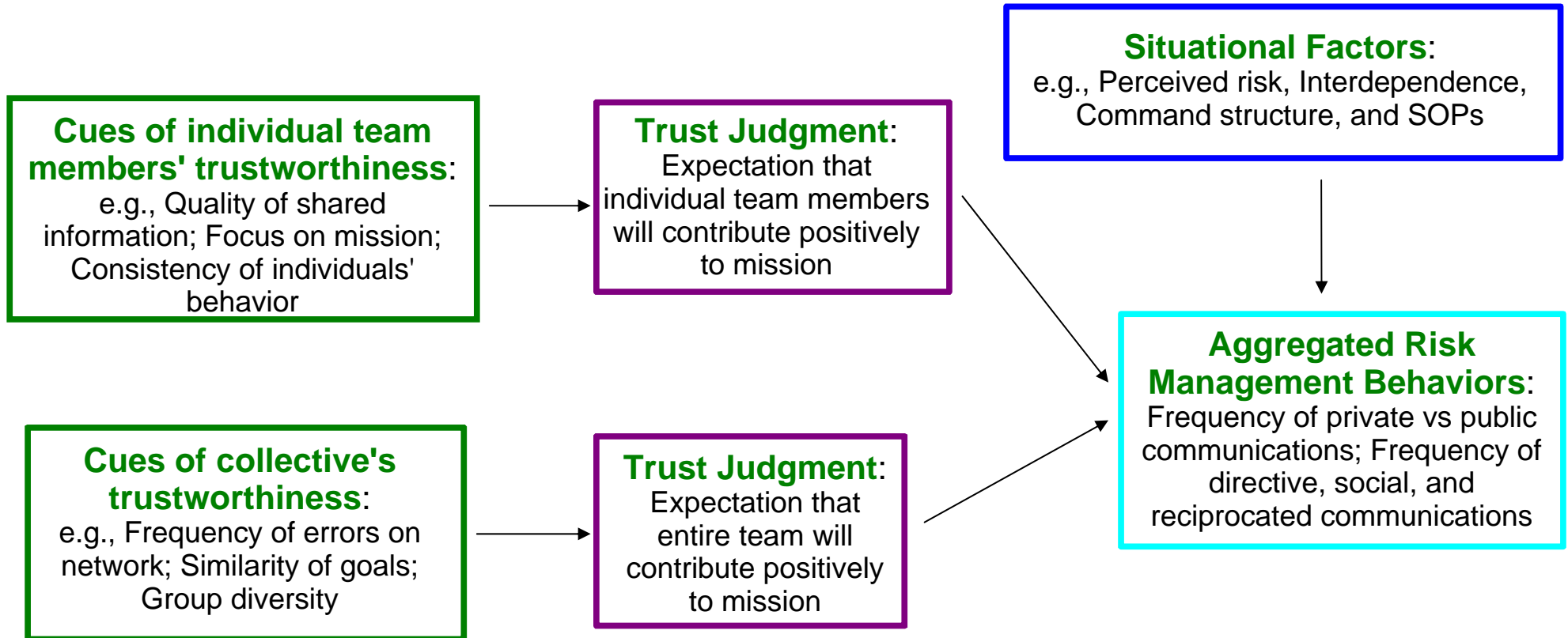
Goal: To identify conditions that cause trust to have strongest (and weakest) impact on behavior

When Does Trust Influence Behavior?

Behavior is likely to reflect trust judgments if there is:

- Moderate risk
- Low interdependence
- Uncertainty of procedures
- Ample time to change behavior
- Available alternatives
- Confidence in trust judgment

Trust Model



Summary

- Through qualitative analysis, we have:
 - Developed a model of trust in C2 teams
 - Identified trustee behaviors that build trust
 - Identified trustor behaviors that reflect trust
 - Specified situational factors that influence the expression of trust
- In future quantitative analysis, we will:
 - Reduce model to most important elements
 - Investigate trust in C2 simulations

Thank you!

Questions?

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