

# ONLINE SPEED-TALK

From Crisis to Resilience: Collaboration,  
Adaptation, and Decision-Making



March 20th  
15:00 - 16:00



**4TU.**  
Resilience  
Engineering

Ahmadreza Marandi  
(Assistant Professor,  
Eindhoven University  
of Technology)



Julien Magana  
(PhD Researcher,  
Delft University of  
Technology)



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# 4TU Centre for Resilience Engineering

## Research



## Education



## Organizing Events



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From Crisis to Resilience: Collaboration, Adaptation, and Decision-Making

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Resilience  
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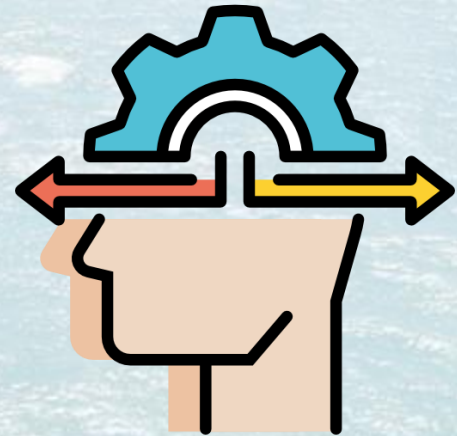
Yvonne Lant  
(PhD Researcher,  
Delft University of  
Technology)

David Hassainneh  
(Postdoc,  
Eindhoven University  
of Technology)

ICRS 2026

International Conference  
on Resilient Systems  
23-25 March 2026  
Delft, The Netherlands

# Collaboration, Adaptation, and Decision-making



# Topics of today:



**Patient Logistics**



**Maladaptation**



**Collaboration**

# Disasters & Consequences

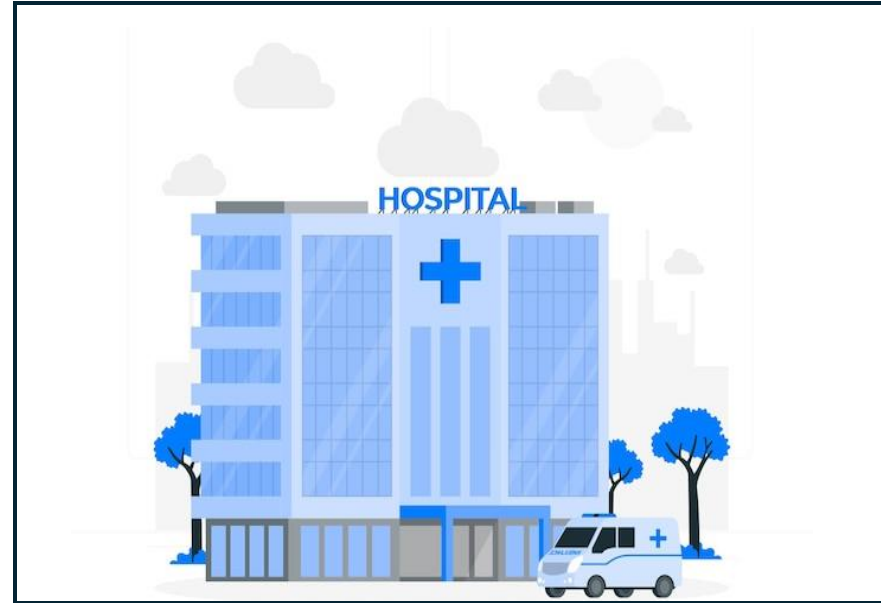
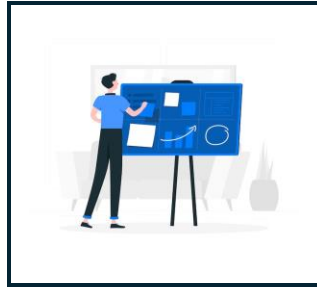


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# A Journey in Disaster : Patient Logistics

**From  
Disaster  
Site**

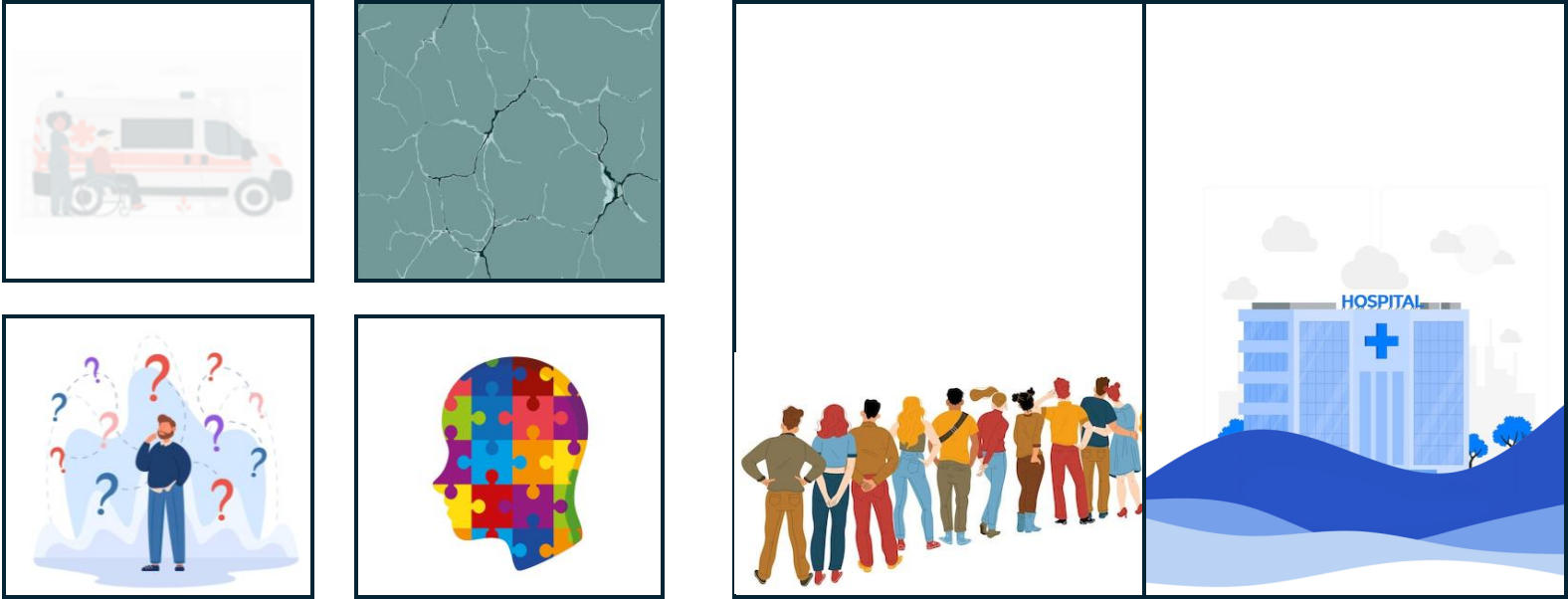


**To  
Care**



# Doing More with Less

**From :**  
?



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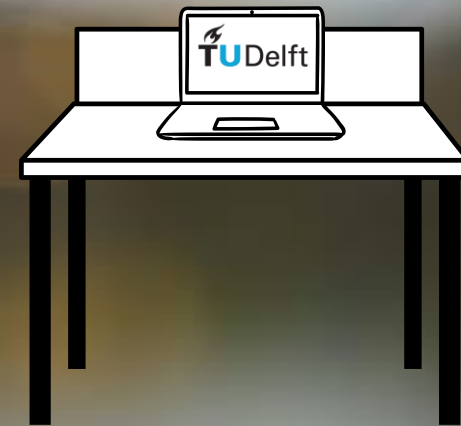
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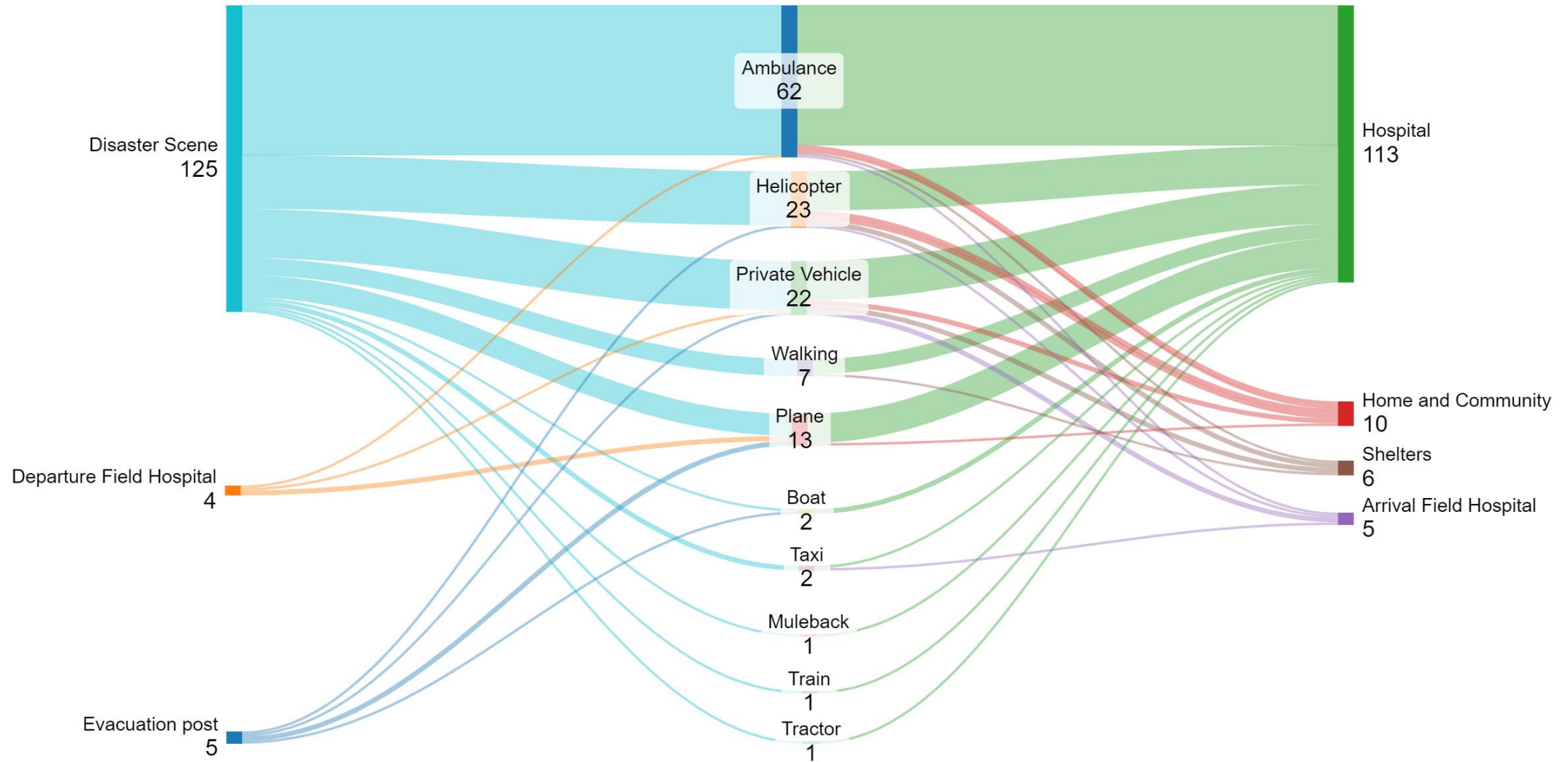
**To :**  
?



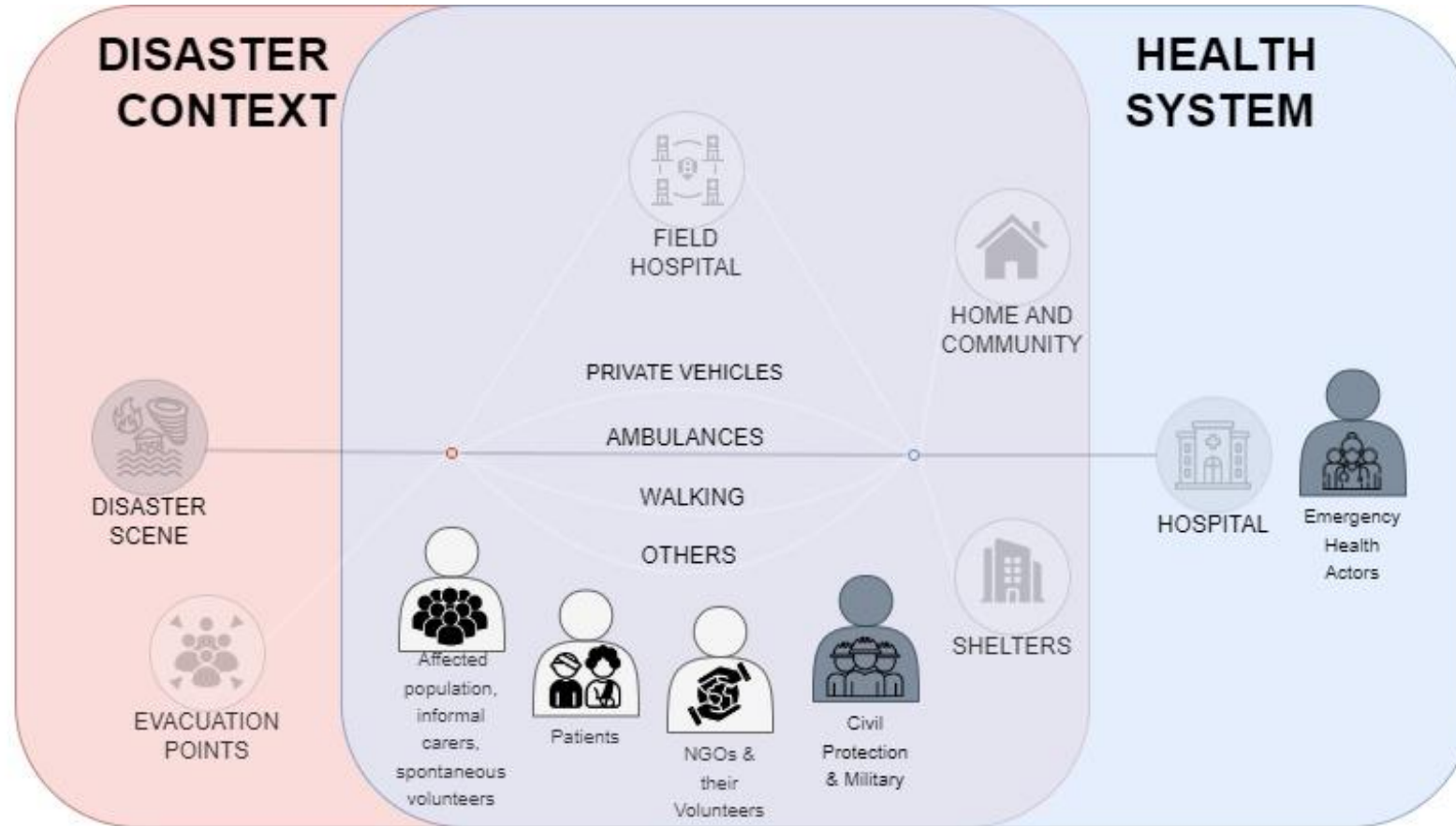





# Solution 1 : Let's use more of what we have

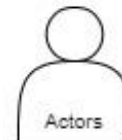


# Solution 2 : Let's use more of who we have



 Largely represented in the literature  
(+60 occurrences)

 Under-represented in the literature  
(-60 occurrences)



Actors

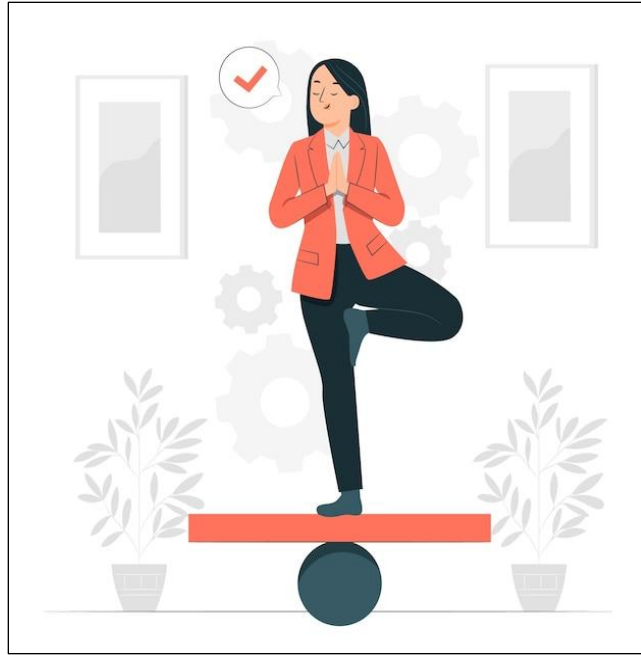


LOCATION

TRANSPORTATION MODE

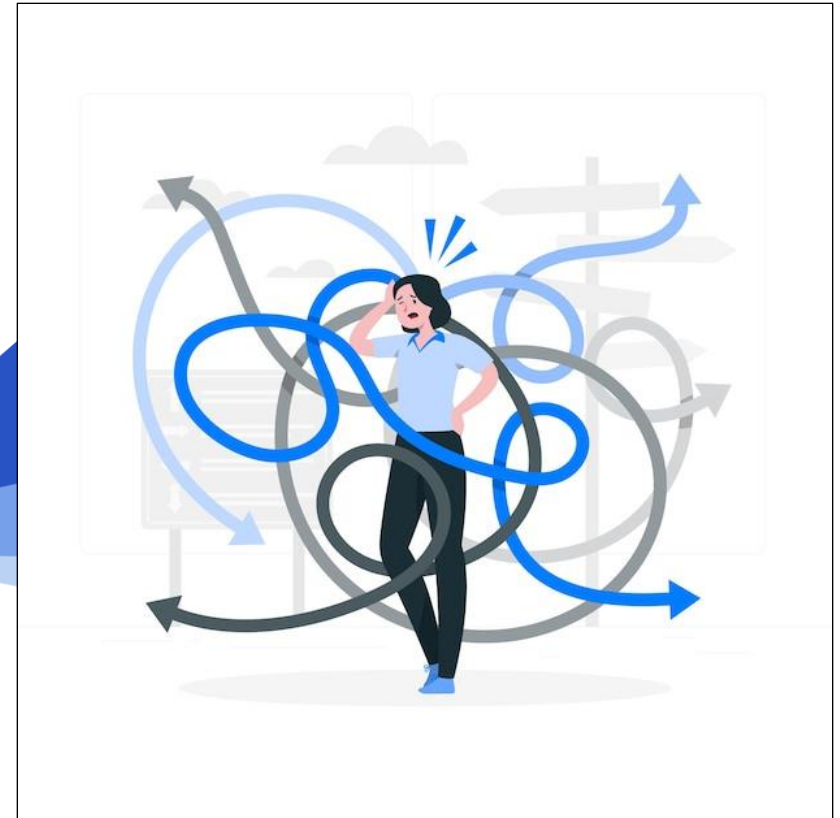


# Be ready to Adapt to Adapt



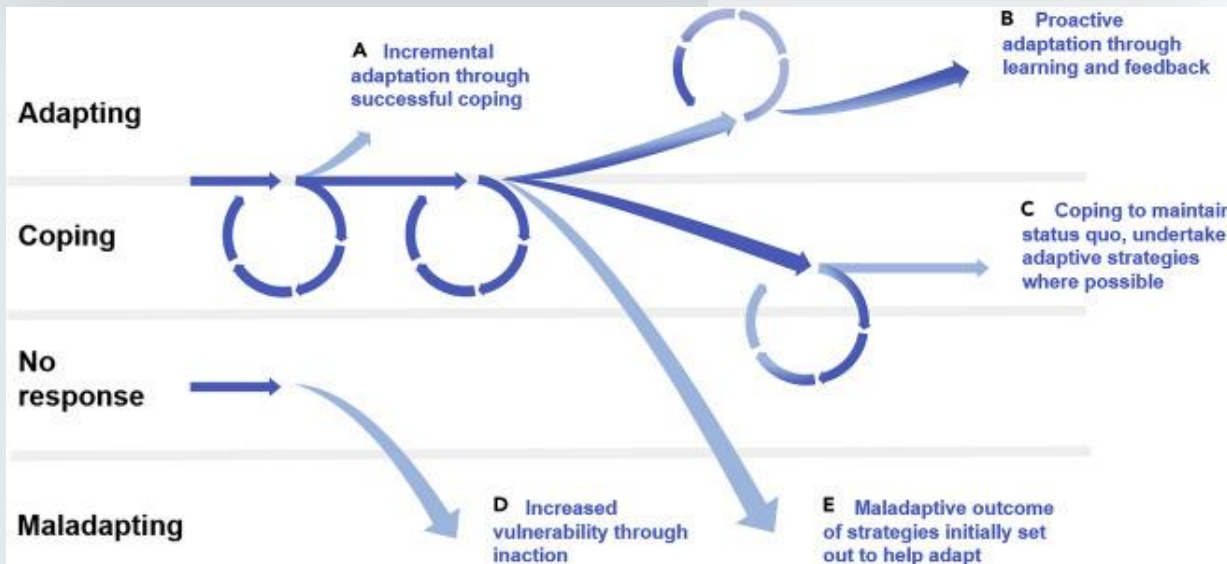
**Being inclusive,  
flexible and adapting  
is good**

**BUT**



**Sometimes it's  
not enough**

# When things go wrong....



**Conventional assumption  
in  
supply chain research:  
Adaptation leads to  
improvements**

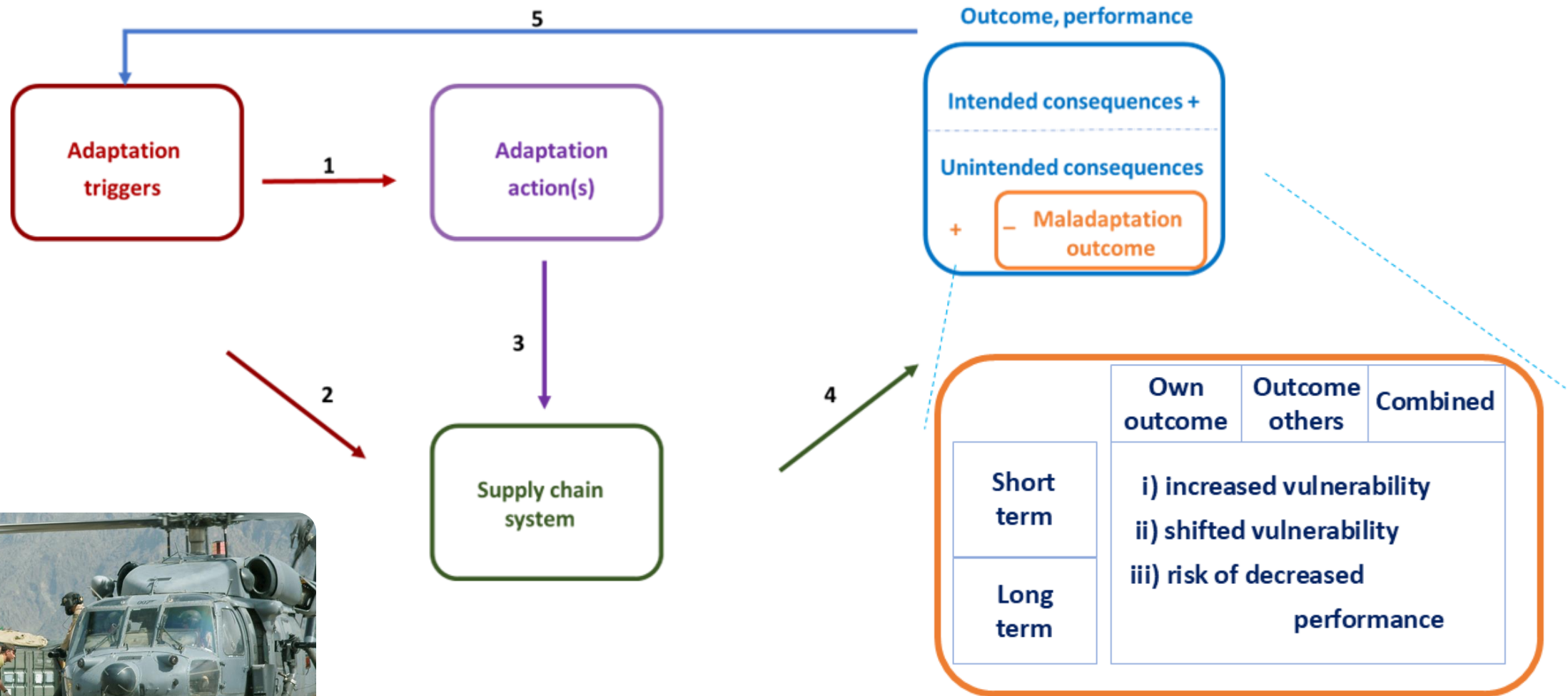
# Case study

The challenge with studying and understanding adaptation is that it is a *process* as much as it is an *outcome*  
(Schipper 2020; Ivanov et al. 2021)







Focus on the processes of the National Support Element who were responsible for the provisioning of supplies as munition, fuel, spare parts and health services

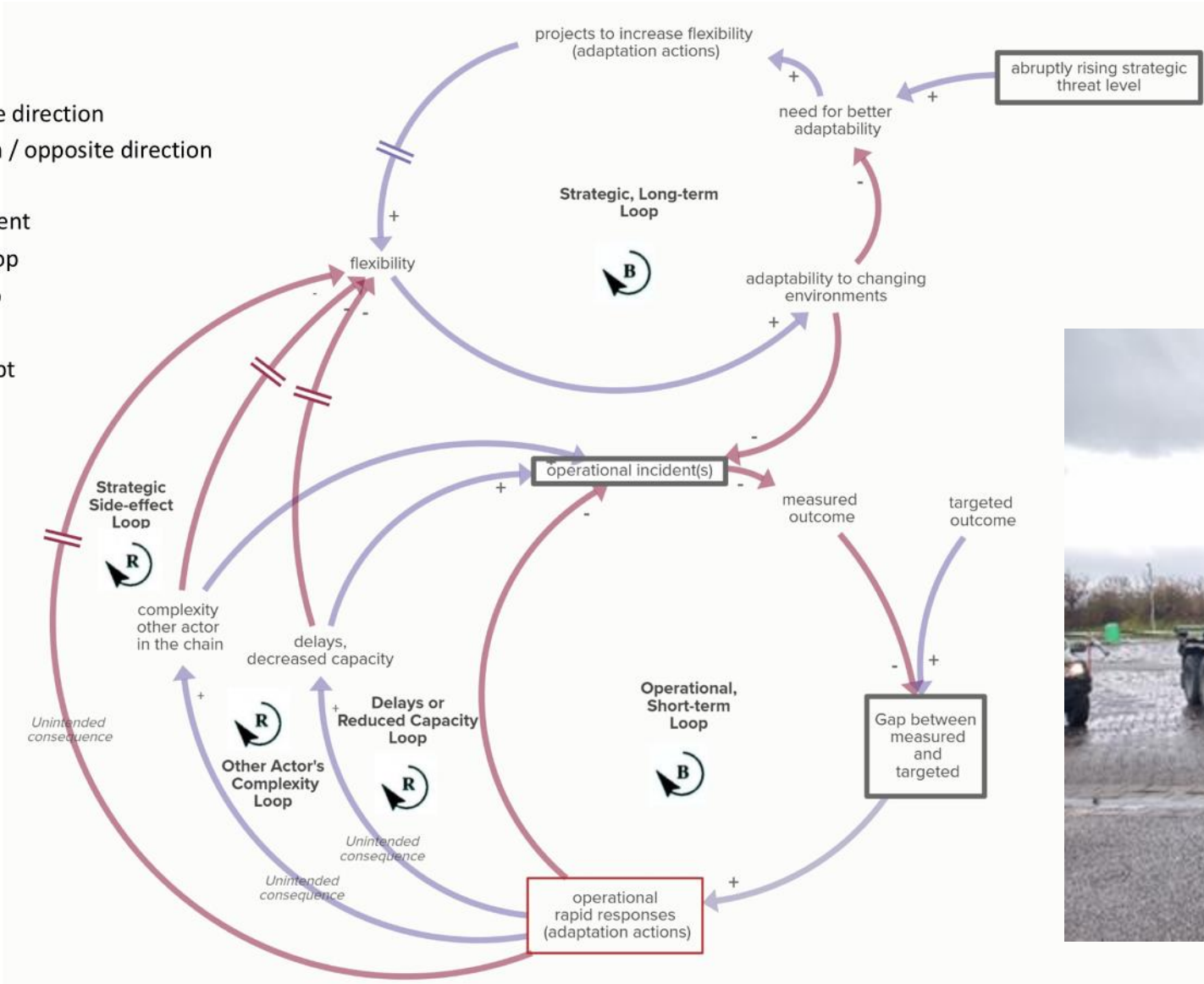
# Supply Chain Maladaptation Framework



# Unintended consequences

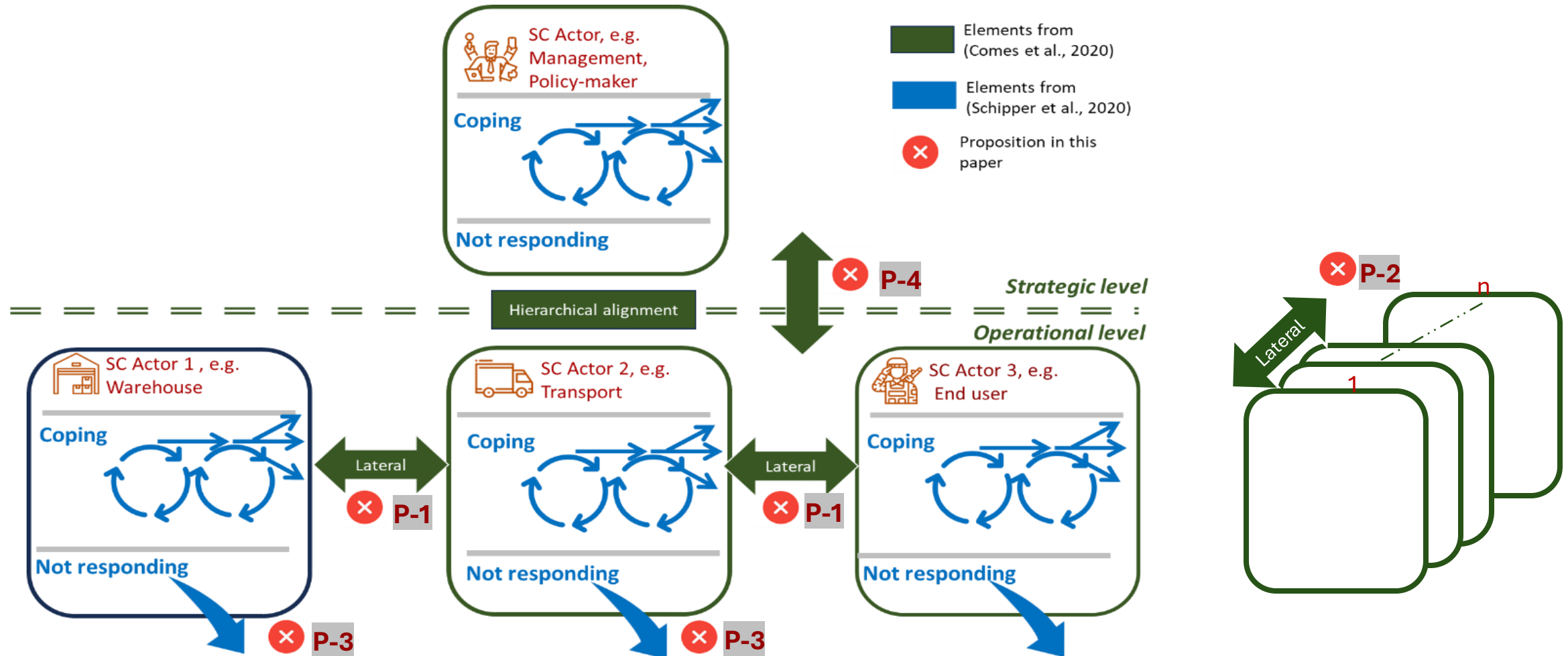
## Legend

- Adds to / same direction
- Subtracts from / opposite direction
- Text Name of loop
- Text System's element
-  Reinforcing loop
-  Balancing loop
-  Delay
-  Trigger to adapt

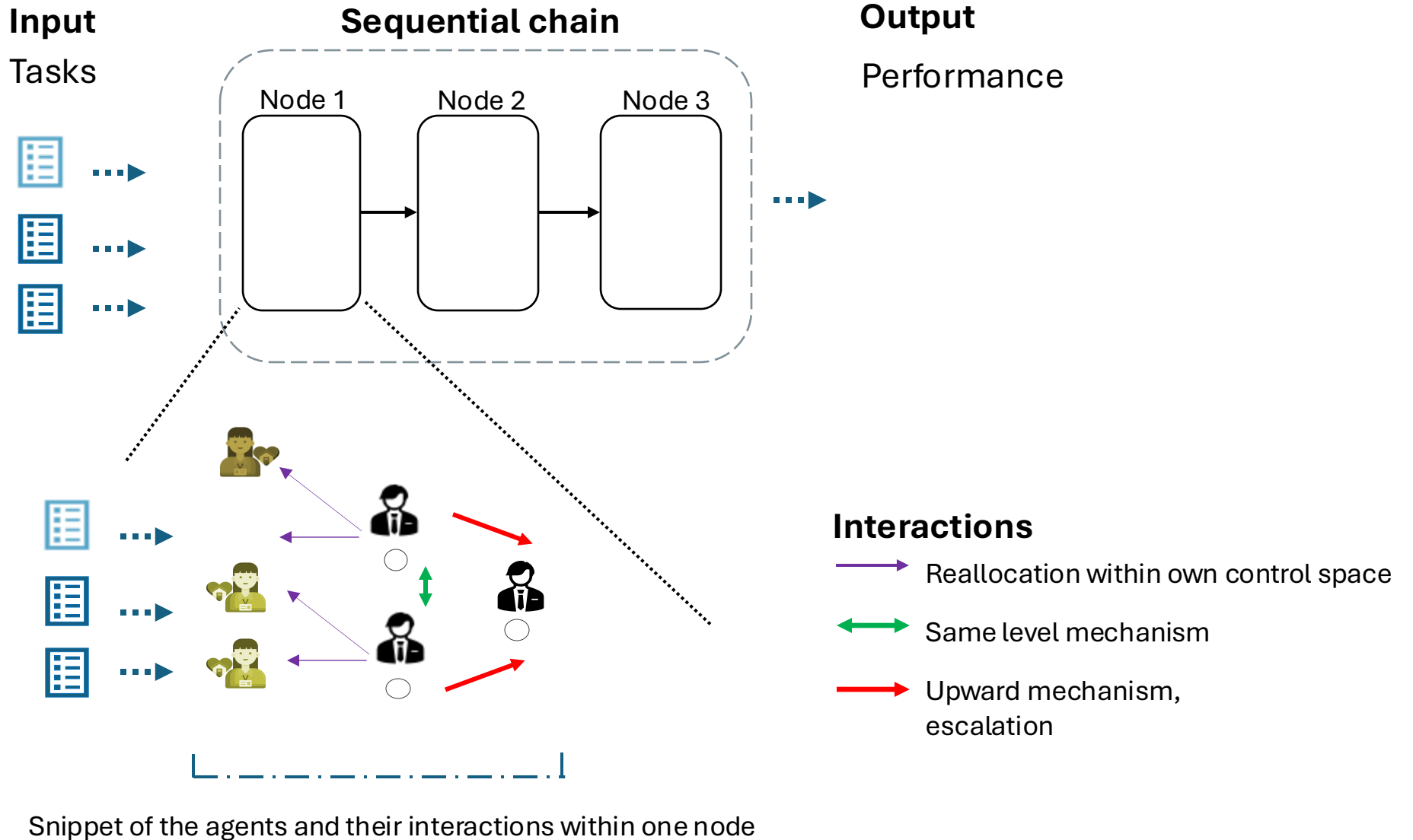




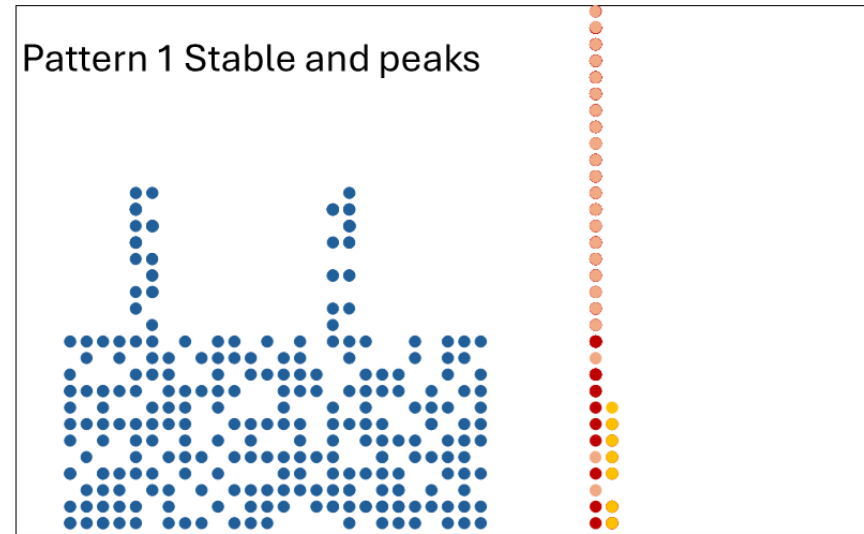
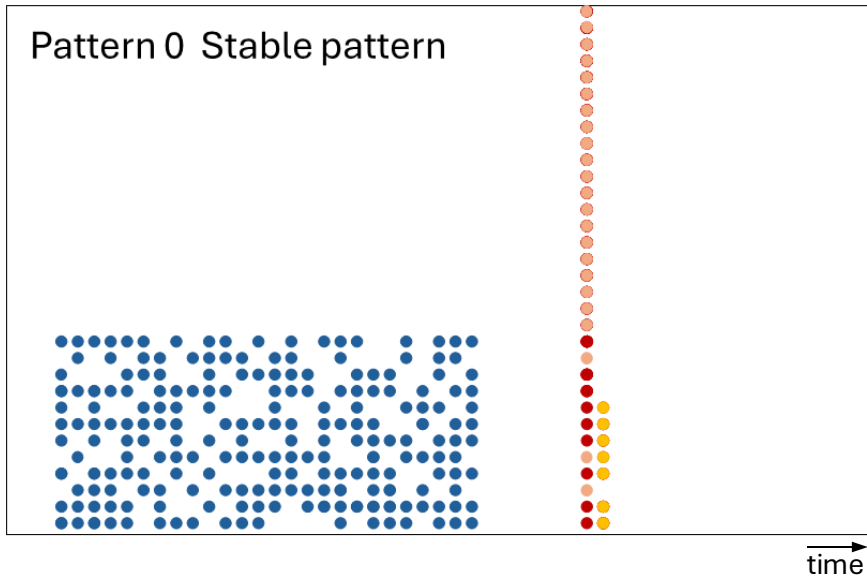
# Misalignments are maladaptation drivers



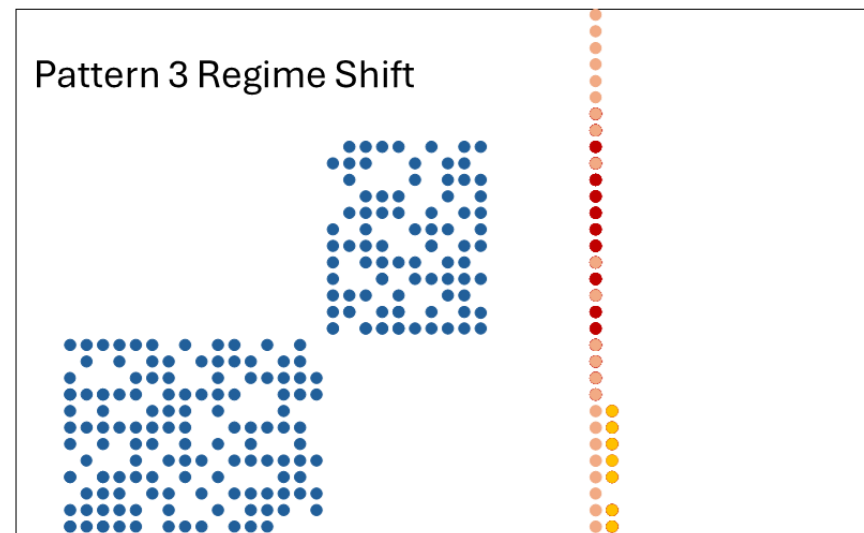
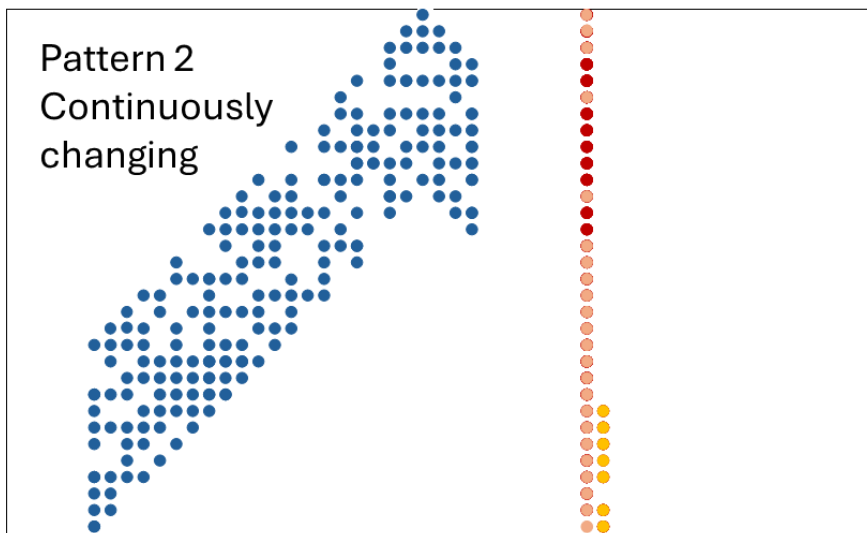
# Agent-based modelling



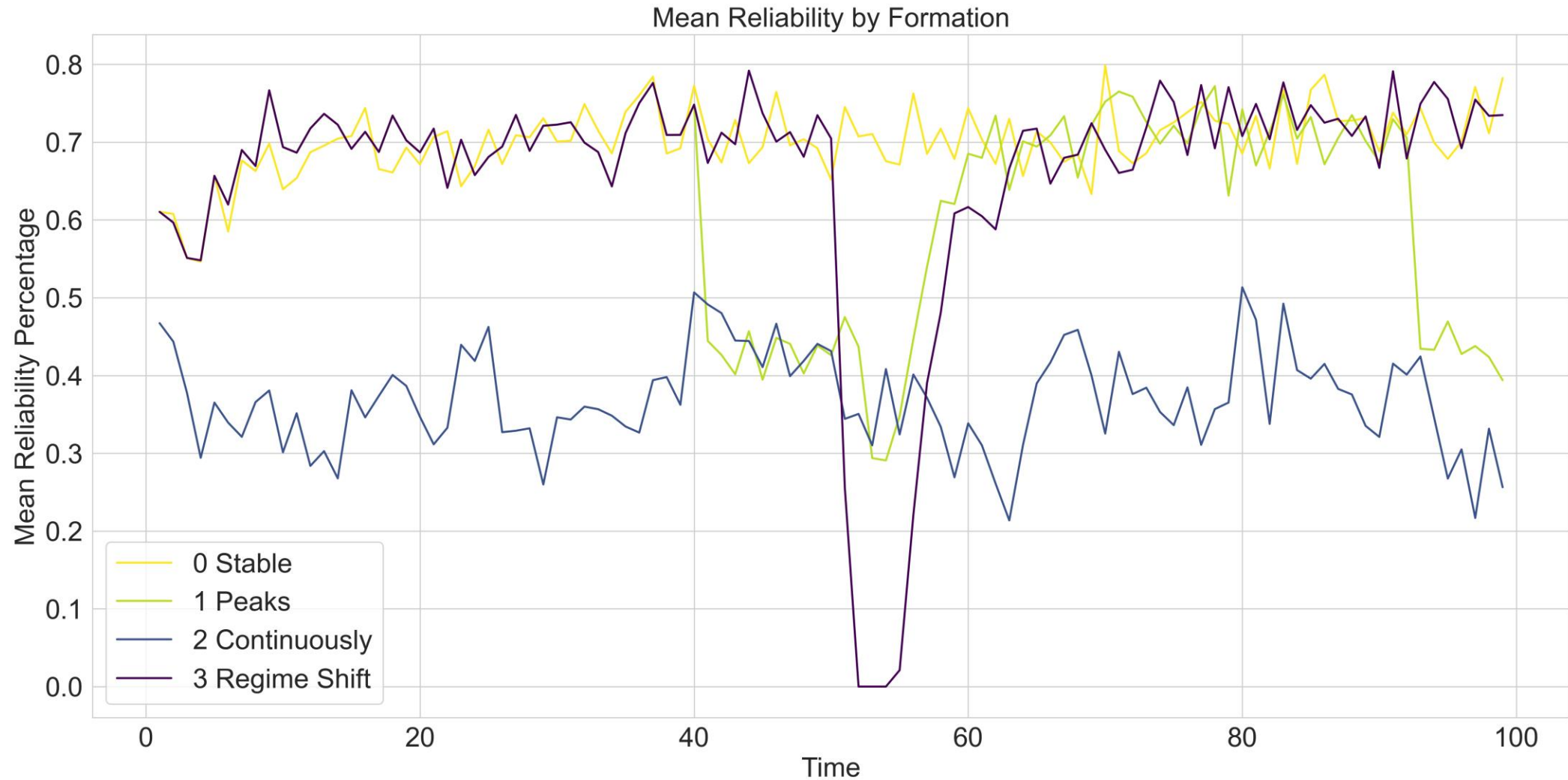
# Understanding delays in adapting



- Legend
- Task
  - Desk
  - Desk with inflow of Task
  - Worker



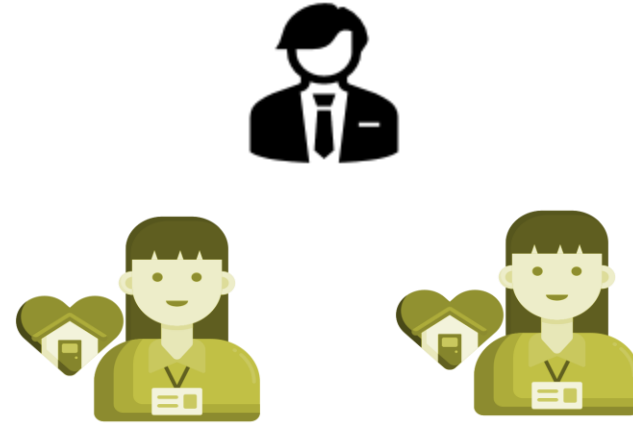
# Disruption analysis



# Maladaptation insights...



**Responding late can  
exacerbates  
chain vulnerabilities**



**Tradeoffs between  
overall overview and  
information delays**

# 4TU.CENTRE FOR RESILIENCE ENGINEERING

## COLLABORATION AND RESILIENCE

By: Davoud Hosseinnezhad

# 4TU. RESILIENT SUPPLY CHAIN: A MULTI-DIMENSIONAL APPROACH



## 1. Collaboration

Working together to share resources, information, or strategies to strengthen supply chains' ability to adapt, recover, maintain operations during disruptions.

## 2. Flexibility

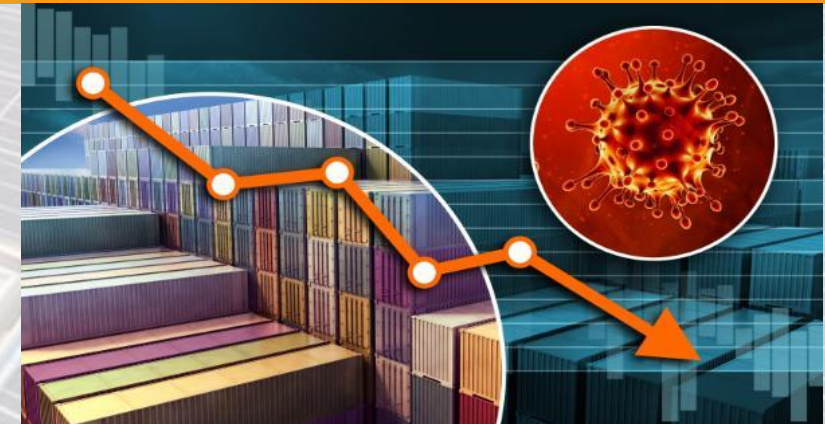
The ability to adapt and adjust to changes without significant disruptions. (Alternative sourcing, backup supply, flexible supply, etc.)

## 3. Visibility

The ability to track and monitor the movement of goods, information, and resources in real-time. A resilient supply chain requires high visibility.

## 4. Velocity

The speed at which goods, information, and money flow through the system.



# SCOPES OF COLLABORATION

Cooperation between companies operating within the same stage of supply chains, competing in the same industry. Unlike vertical collaboration, those engaged in horizontal collaborations pool their strengths to exert greater influence compared to suppliers or customers.

Horizontal  
Collaboration

External

COLLABORATION

Internal

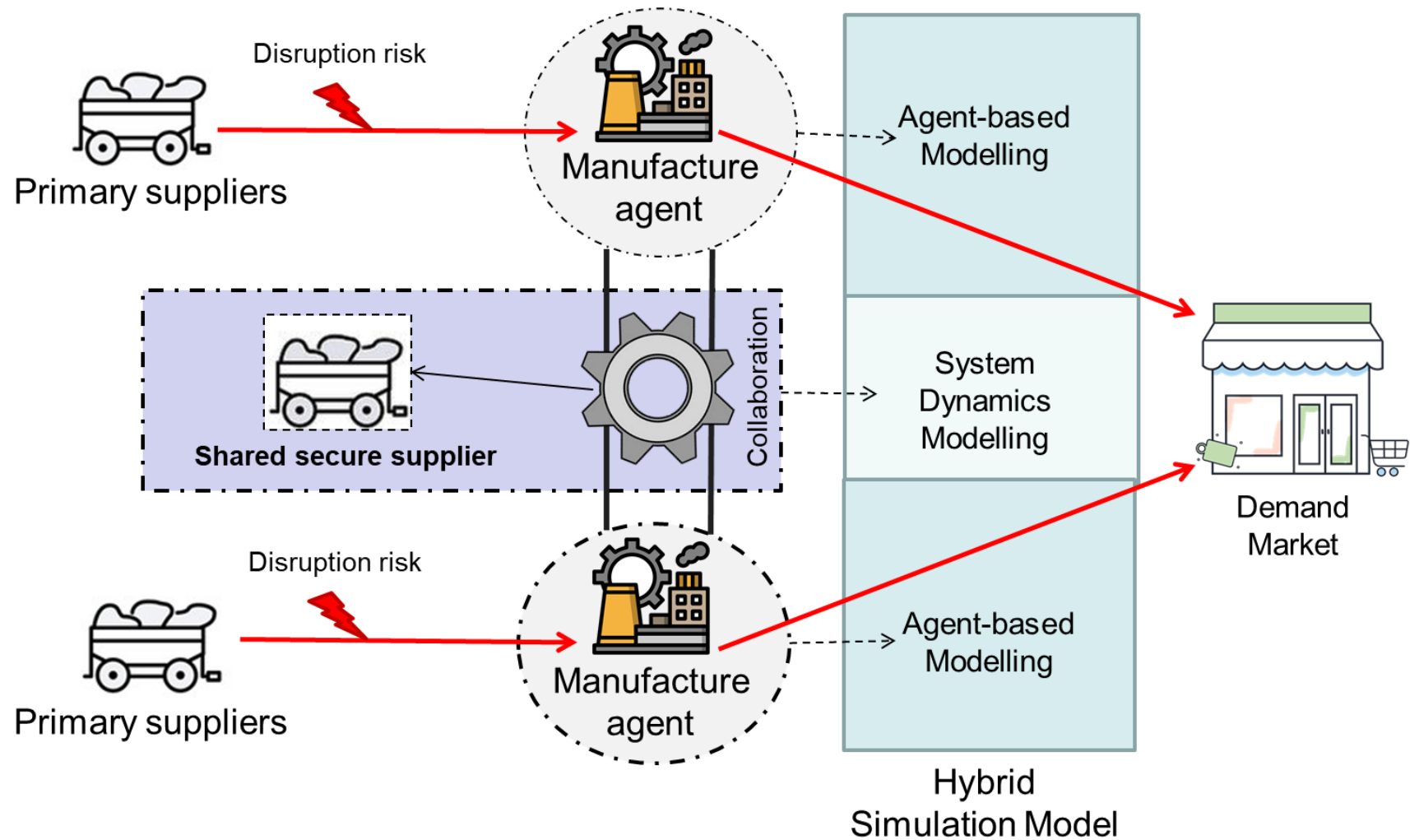
Vertical  
Collaboration

Collaboration between companies at different supply chain levels or from diverse industries. For example, suppliers and manufacturers along a supply chain may collaborate to mitigate the bullwhip effect. Typically, each partner is responsible for specific production steps with minimal overlap.

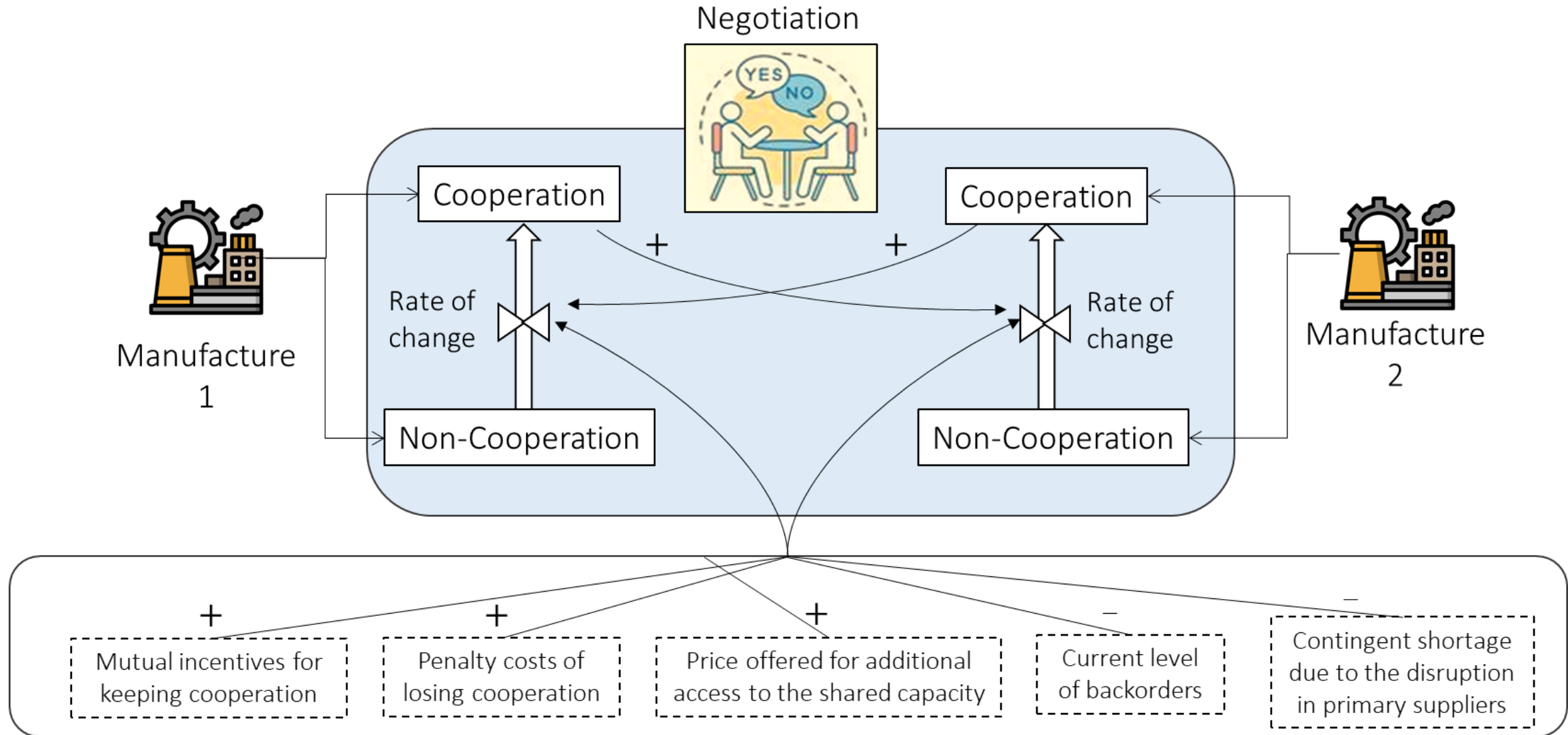


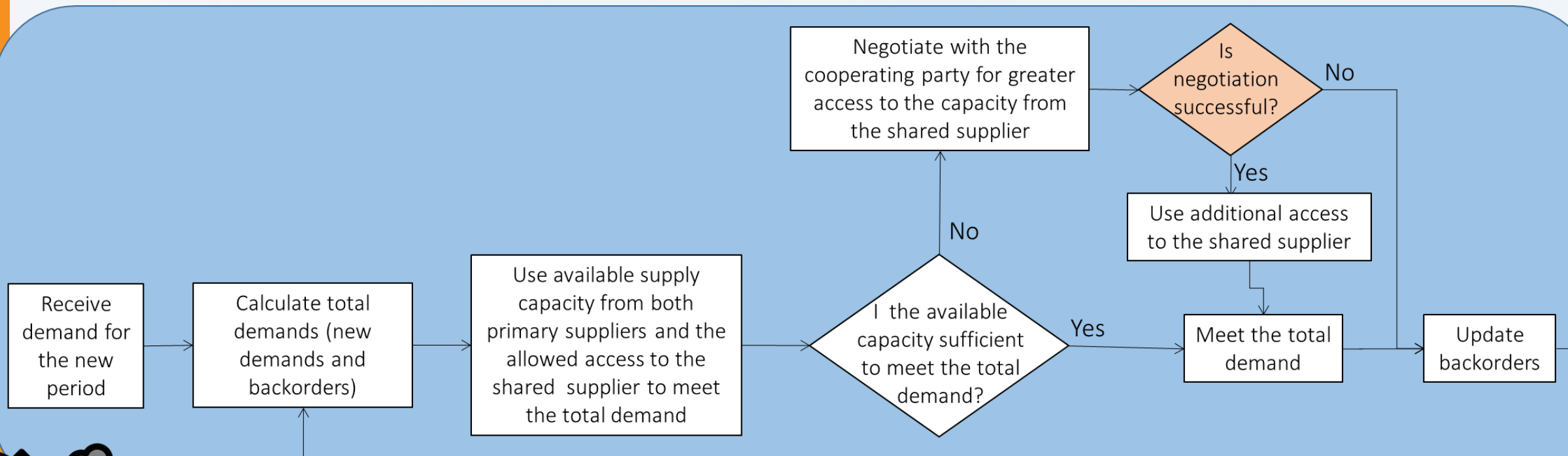


# COLLABORATION APPROACH: SHARED CAPACITY



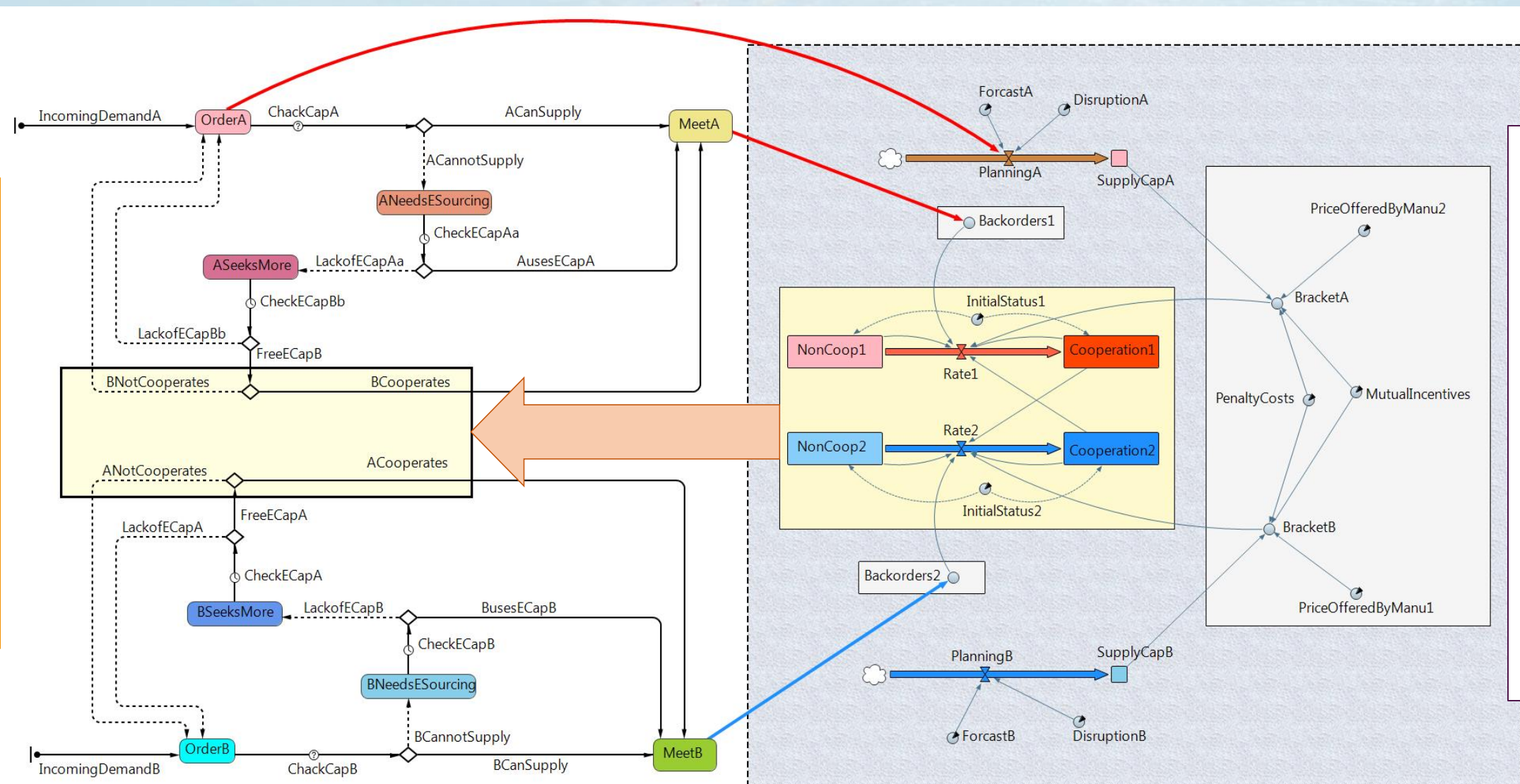
# STABILITY OF COLLABORATION: SYSTEM DYNAMICS EVOLUTIONARY GAME MODEL





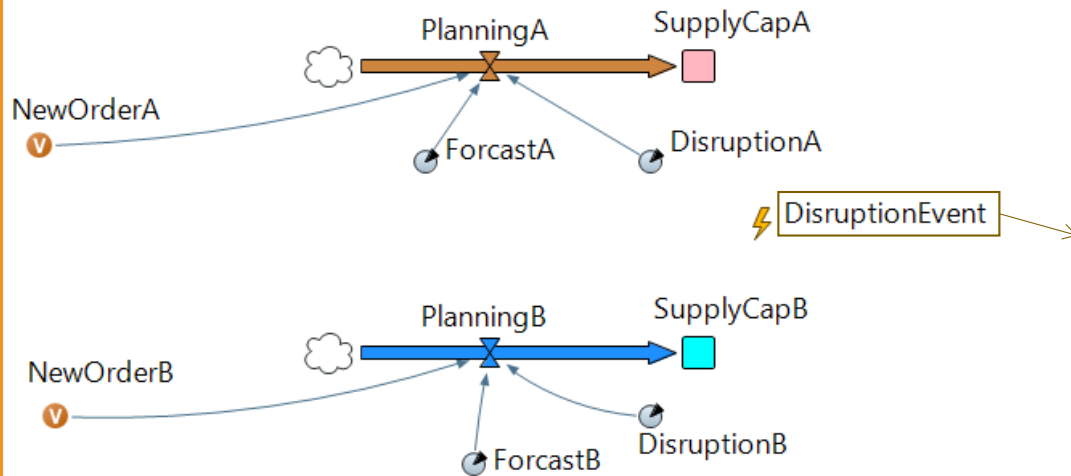
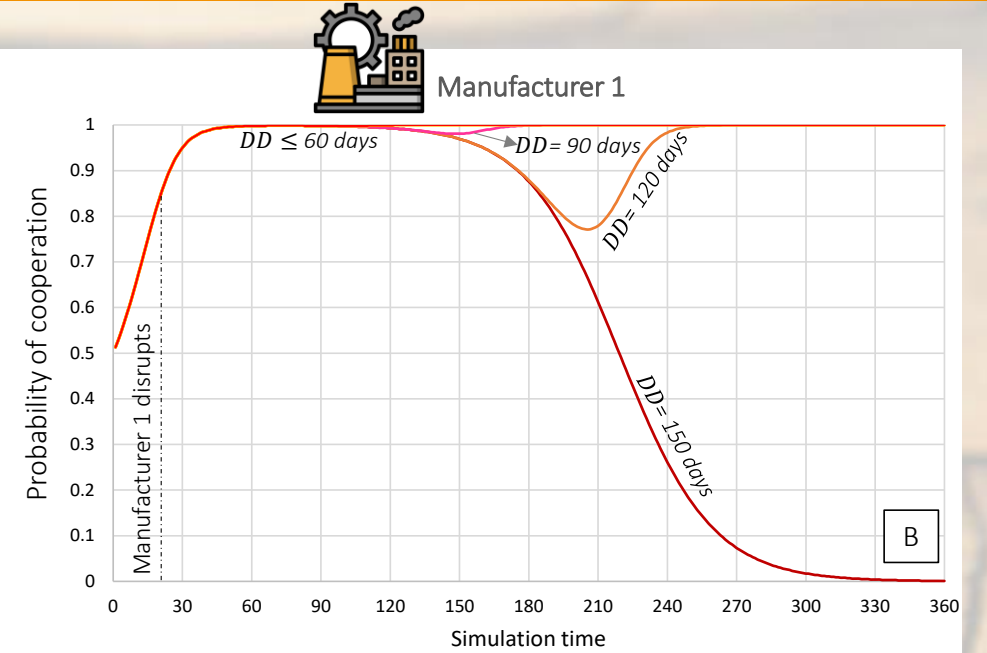
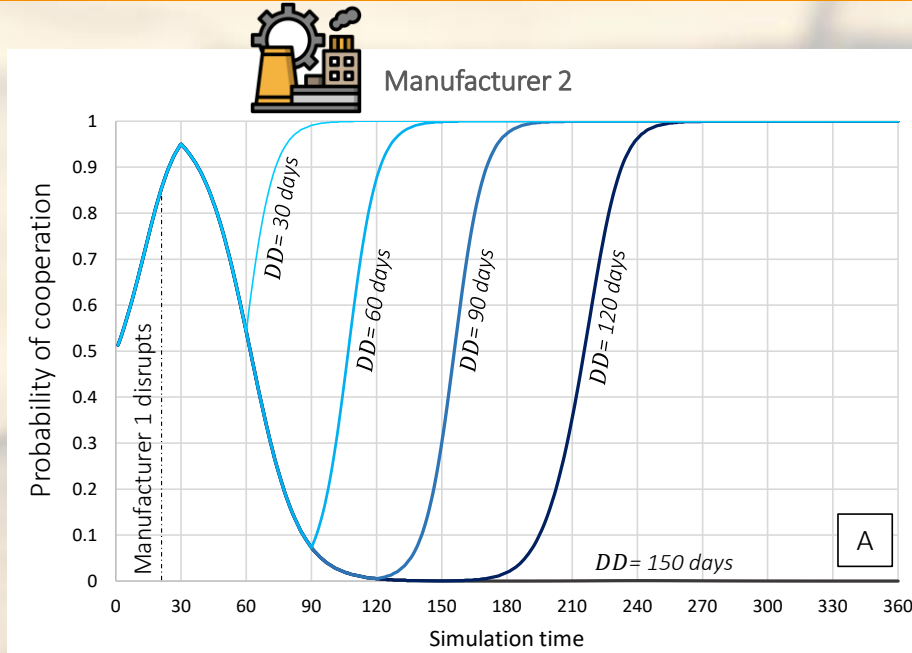
# Collaboration as a HYBRID SD-ABM PROBLEM

AGENT-BASED MODELLING



SYSTEM DYNAMICS MODEL

# 4TU. Collaboration and DISRUPTION ANALYSIS



**DisruptionEvent - Event**

Name:   Show name  Ignore

Visible:  yes

Trigger type:

Mode:

Use model time  Use calendar dates

Occurrence time (absolute):  days

Occurrence date:

Log to database  
[Turn on model execution logging](#)

**Action**

# COLLABORATION: INDIVIDUAL PREFERENCES OR MUTUAL COMMITMENT



COLLABORATION



ANY QUESTIONS?

Thank you for your attention!

# Concluding remark

**Resilience** is not given, it is built through careful **analysis**, **adaptive** strategies, and fostering trust and **collaboration** among **all actors** involved in managing disruptions.