LEARNING FROM COMPLEX SYSTEMS

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Main takeaways

Incidents are always going to happen, they are valuable, so use them

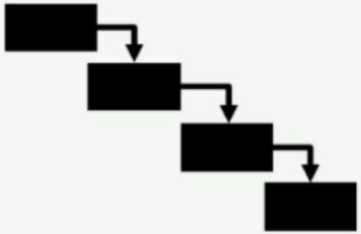
Seek understanding, not just knowledge of complex systems

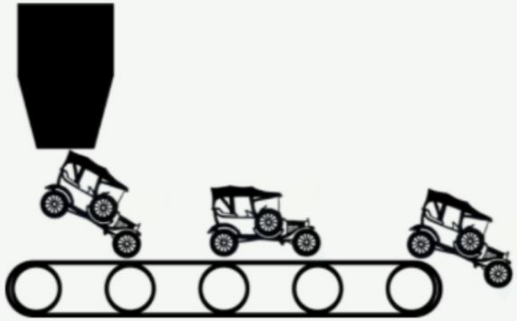
Humans will always be the adaptable parts of your complex system. Not automation

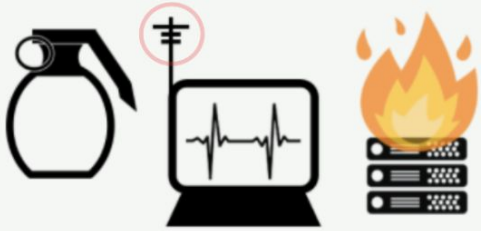
Better learning will improve our ability to engineer resilience

whoami
20+ years
DATSUN
AWS

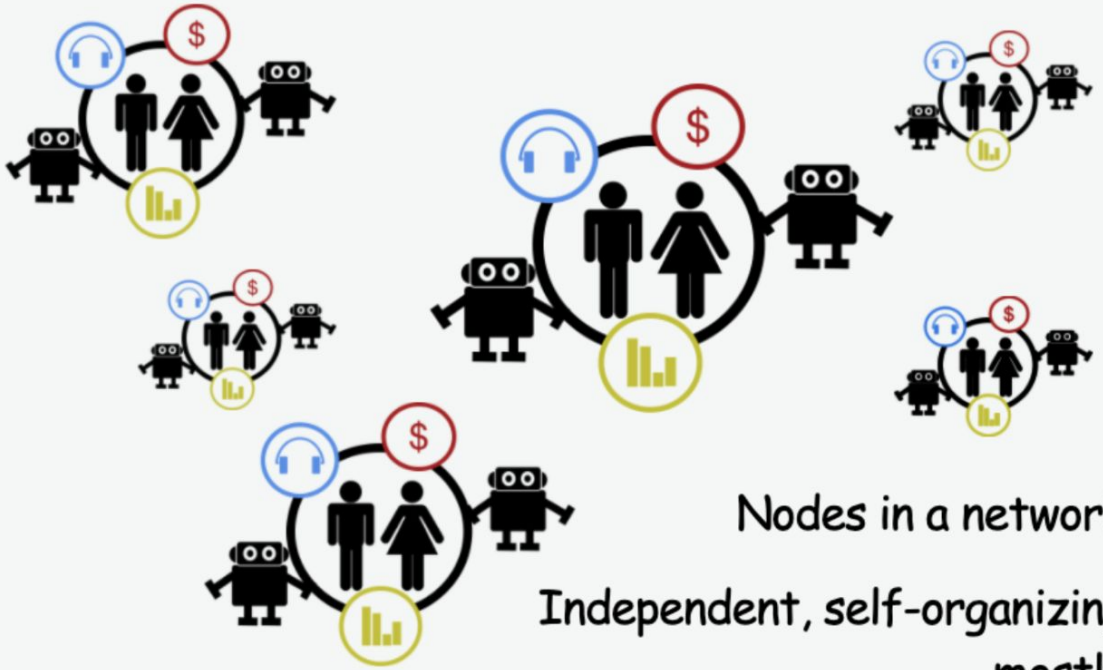
Linear Models of Delivery







Evolution to autonomous teams



Nodes in a network

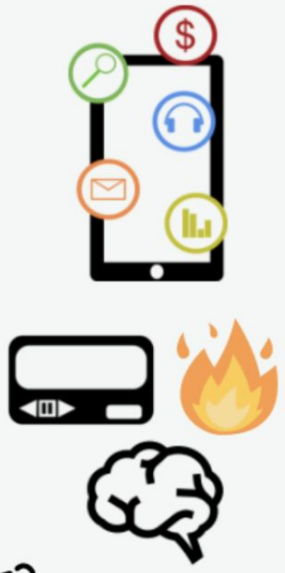
Independent, self-organizing

....mostly

Mindset shift

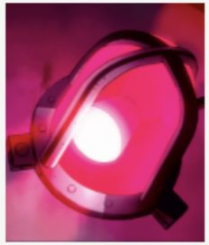
Centralized,
command and control

Distributed,
localized



How can we learn?
As complexity increases,
and the knowledge gap grows?

Traditional Incident Management



Incidents are always preventable!

People aren't following processes!

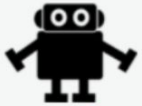
Management is not in control!

The Post-mortem

IN OUT

Root Cause
Action Items!

"How could you not have noticed that?"



"But isn't that the way it should work?"

Hindsight bias

Diagnosis?

Human error may be behind ship blocking Suez Canal: authorities

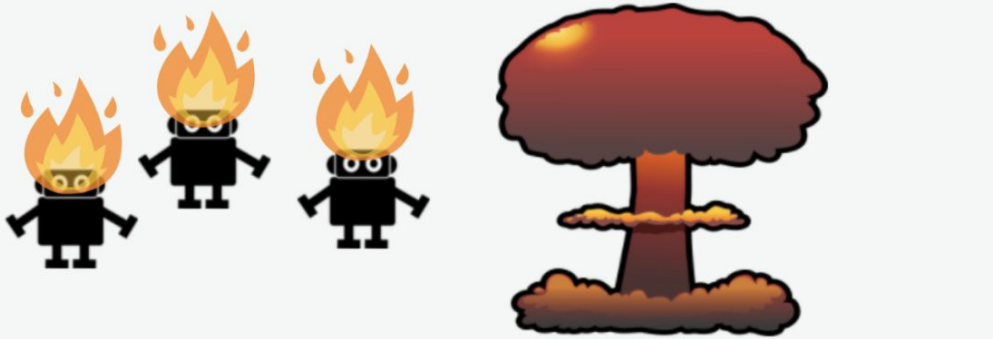
By Eileen AJ Connelly

March 28, 2021 | 3:34pm | Updated

Suez Canal Authority chairman Osama Rabie says the Ever Given container ship could have committed "technical or human errors" that caused it to wedge between the banks of the canal.

EPA/SUEZ CANAL AUTHORITY/Handout

Is there a better way?



Maybe learning and adapting is a better strategy?

Management of work

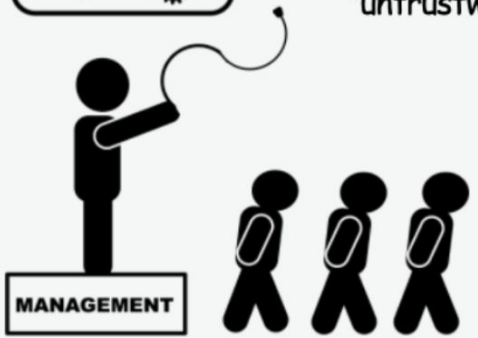
Frederick Winslow Taylor

The Principles of Scientific Management (1911)

"unpredictable"

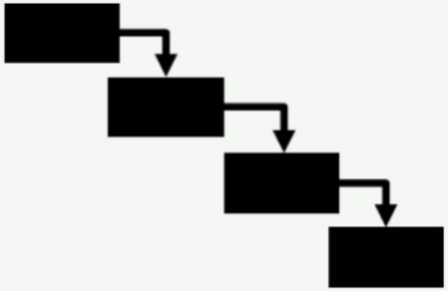
"inefficient"

"untrustworthy"



WORK-AS-IMAGINED = WORK-AS-DONE

$$\frac{\text{Lines of code}}{\text{day}}$$



Business Process

Use Case

Development

System Test

System Integration Test

User Acceptance Test

Pre-Production Test

Post-Production Test

Linear Thinking

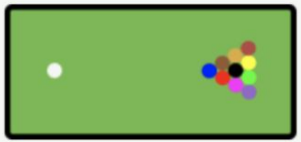
Chain of events

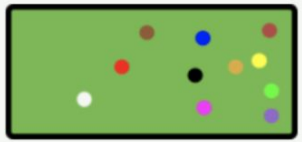
1:1 Cause and Effect

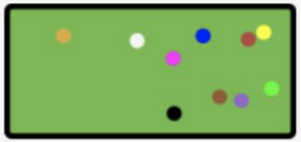
Breakdown in WAI vs WAD!

Causal Determinism

Reductionism







Anything can be known,

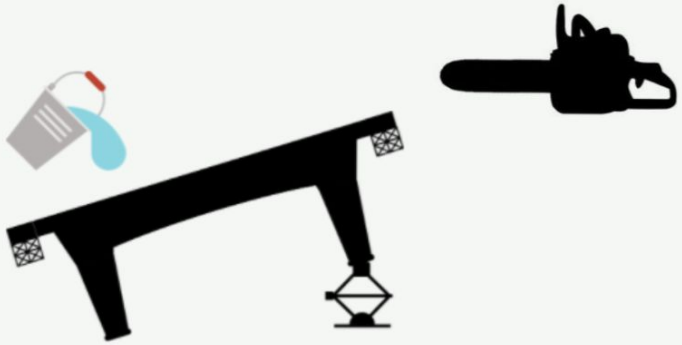
by following reducible analysis....and controlling the environment

Knowledge and Understanding

(Linear Analysis and Systems Thinking)

NHTSA

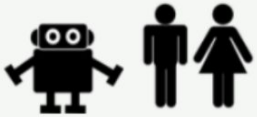
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION



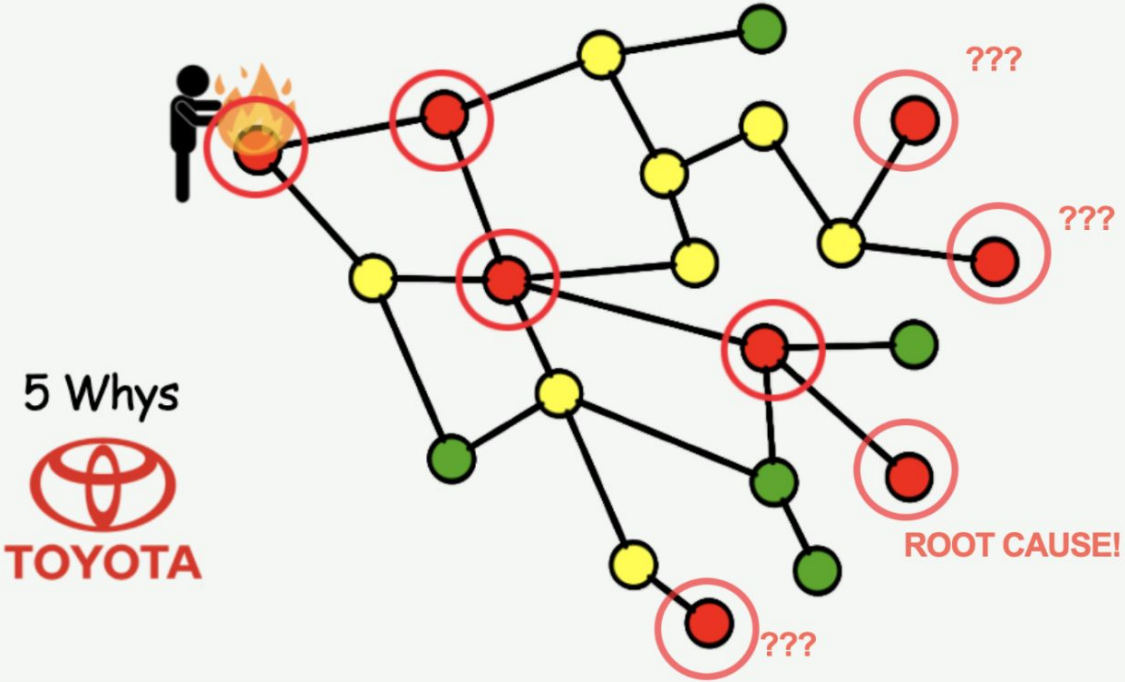
Understanding the affects of environments is crucial!

What are the influencing factors, internal and external?

How does the system respond and adapt its behaviors?



Where linear analysis breaks down



Characteristics of Complex Systems

Philosophy and sciences can agree that:

They have lots of components, that interact locally, not globally

Small changes done locally, can have unintented effects globally

Embed in their environments, adapt, grow and sensitive to changes

Require constant energy, entropy is constant, equilibrium is impossible

Hierarchy imposes constraints, added layers become more abstract

They have a history, which is crucial to their growth

LEARNING

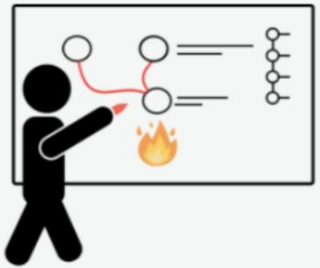
How can we learn better?

Contributing factors

Signals received

Event timeline

Facilitator



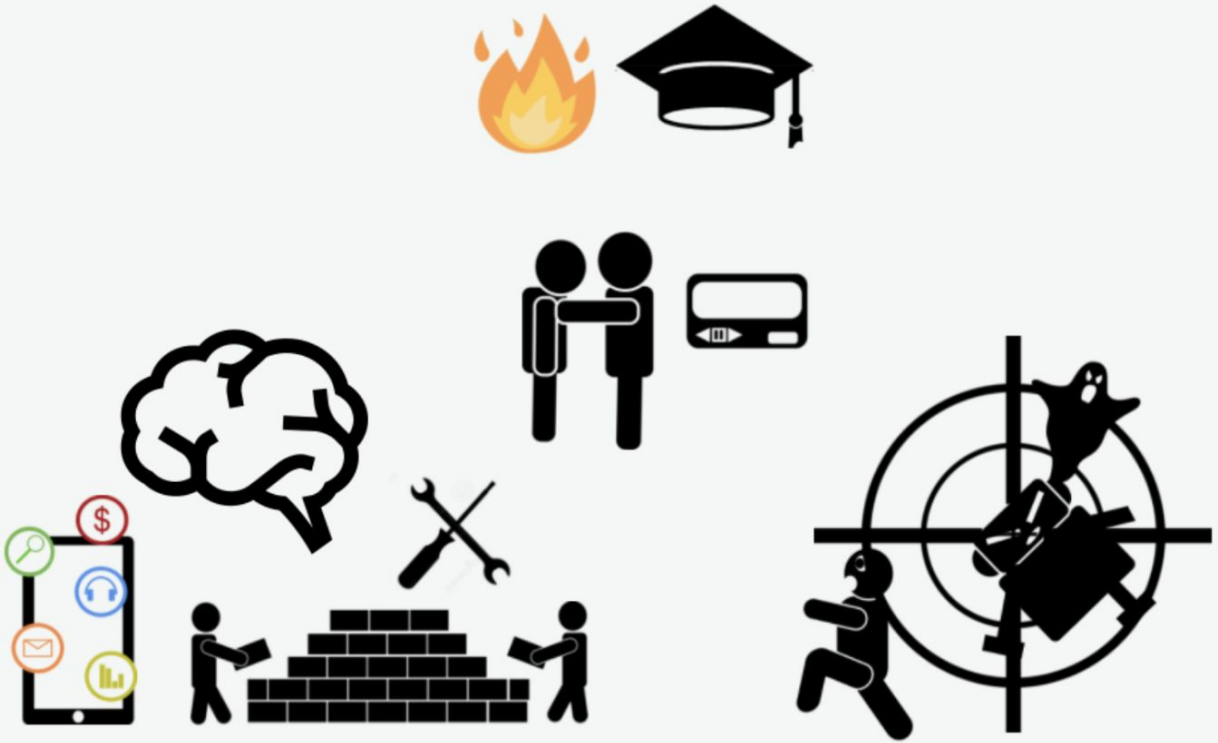
Scribe

Patterns

Themes

Focus areas

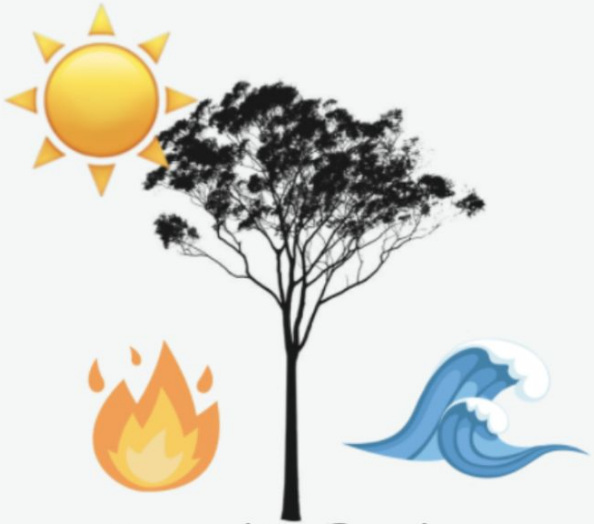
Support & assistance



We will build more resilient systems

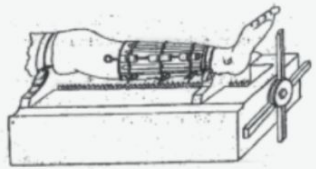
And improve our Knowledge and Understanding

Resiliency in nature



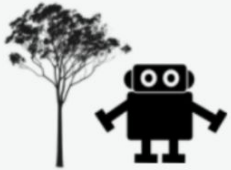
Australian Eucalypts

We've engineered resilience for millenia



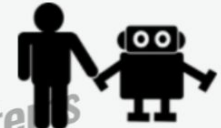
Conditions for Resiliency

Learn from incidents as much as possible
They are part of normal complex system behavior. Use them.



You can't wait for resilience to evolve naturally.
It must become an on-going practice

Create conditions and environments where teams can sustain adaptive capacity - wherever the work-is-done



Understand the interactions between people and technology.
Don't isolate them as separate challenges

Focus and promote what you do well.
Sustain and grow the learning culture

Complex Systems

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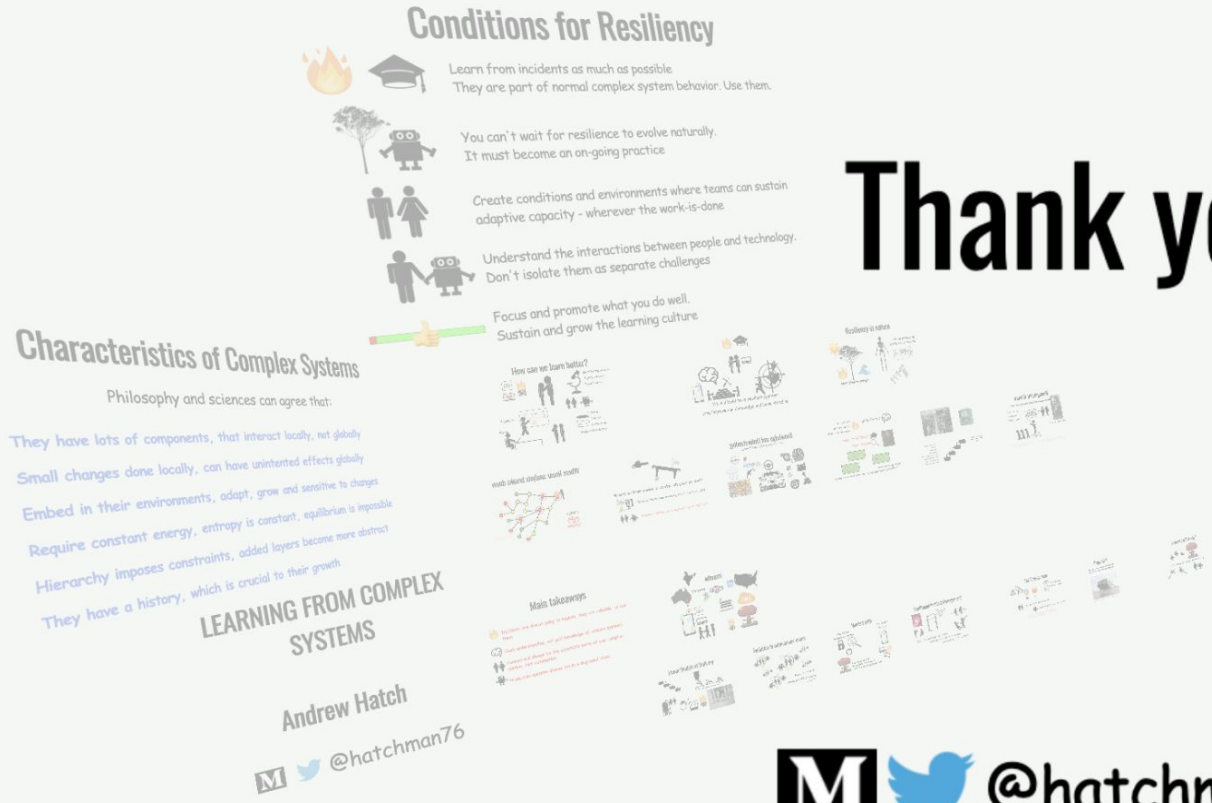
not globally



Thank you

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