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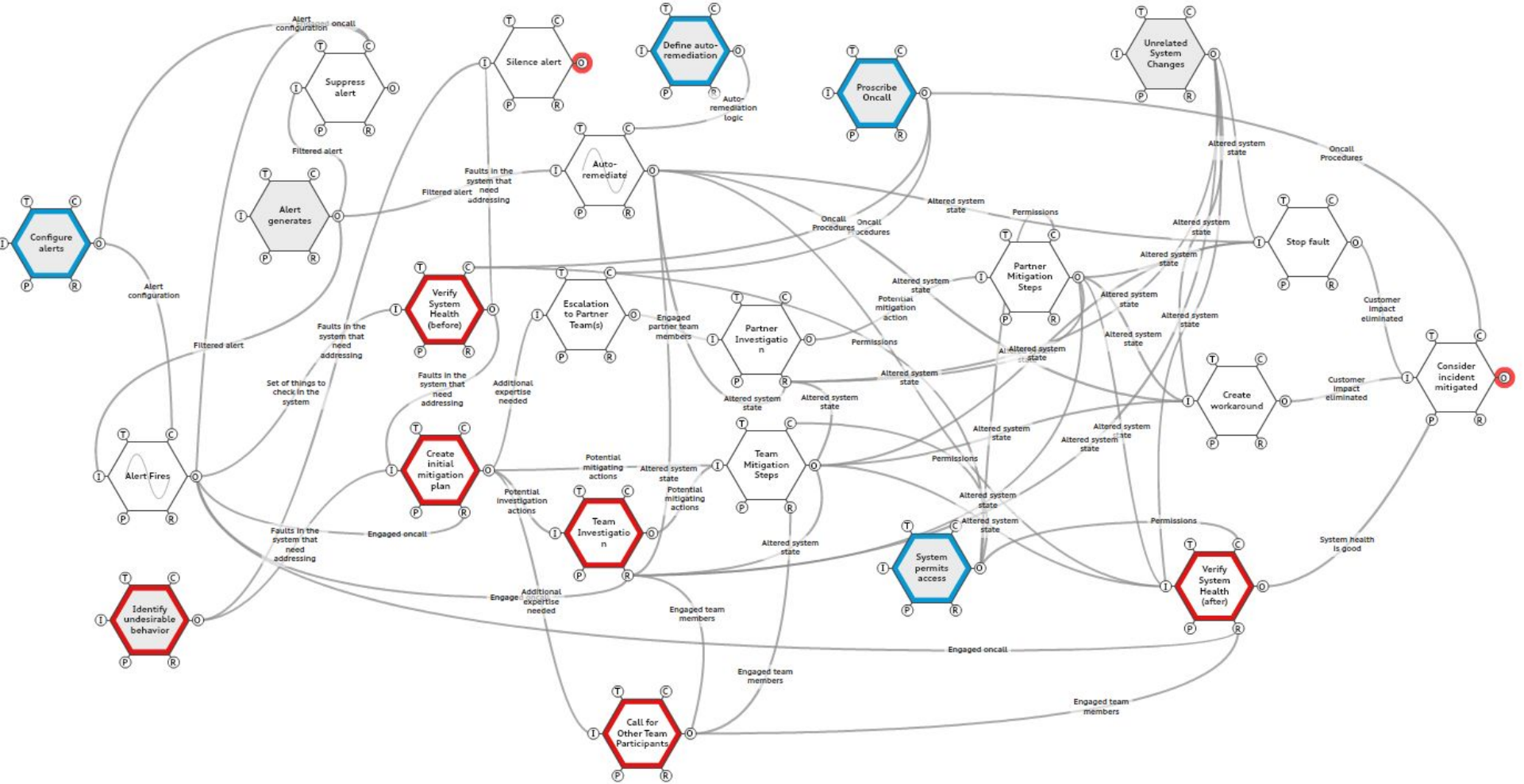
Functional Resonance Analysis: Diagramming Your System

Tanner Lund

2023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Alert configuration
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Filtered alert
Suppress alert
Alert configuration
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Auto-remediate
Faults in the system that need addressing
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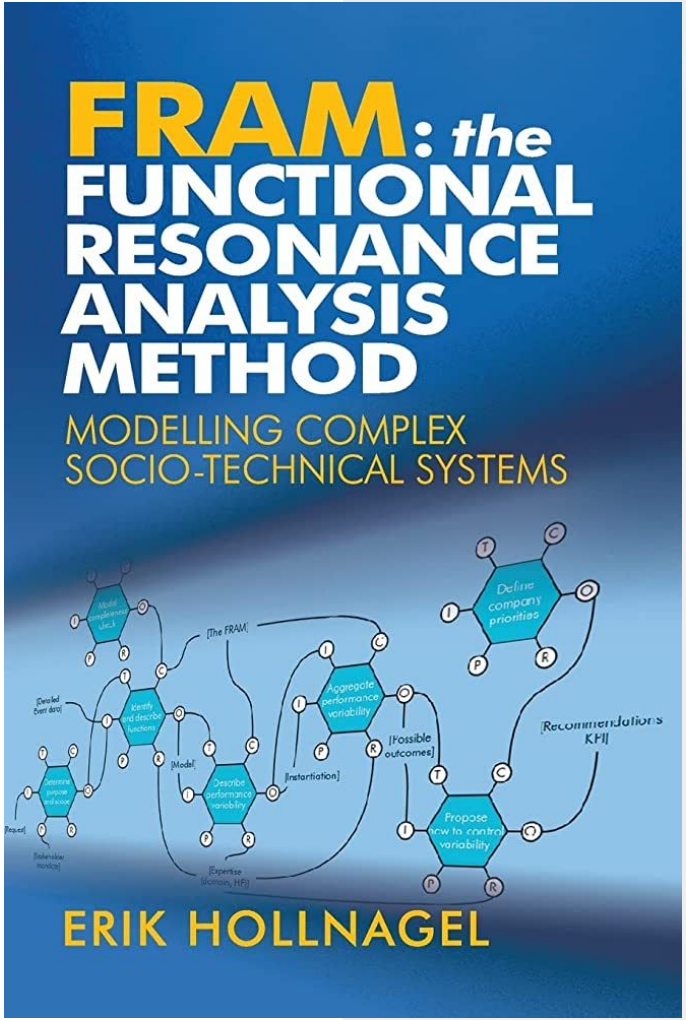
FRAM: the FUNCTIONAL RESONANCE ANALYSIS METHOD
MODELLING COMPLEX SOCIO-TECHNICAL SYSTEMS
ERIK HOLLNAGEL

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Why FRAM?

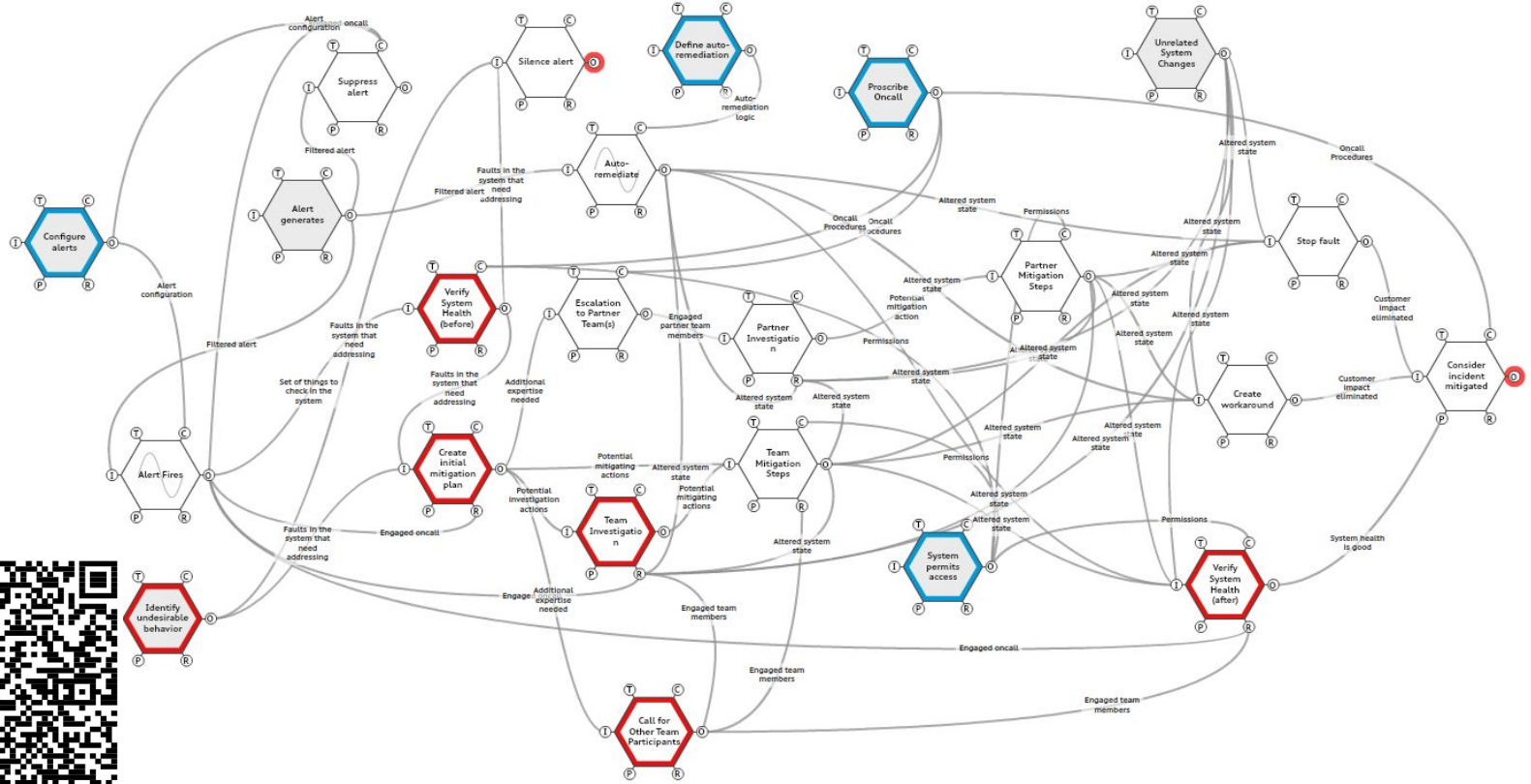
“Who’s Fram?”

“I dunno, I joined late…”

“Is it good to think with?”

- Claude Lévi-Strauss

Relative Ignorance, Complexity, and Intractability



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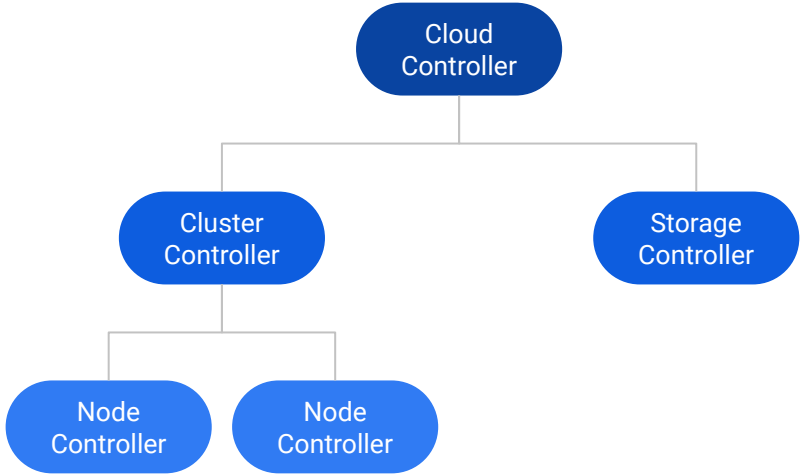
FRAM Principles

“Is FRAM not a model-cum-method then?”

“Apparently it’s more of a method-sine-model”

Functions, not Components

>



Failure

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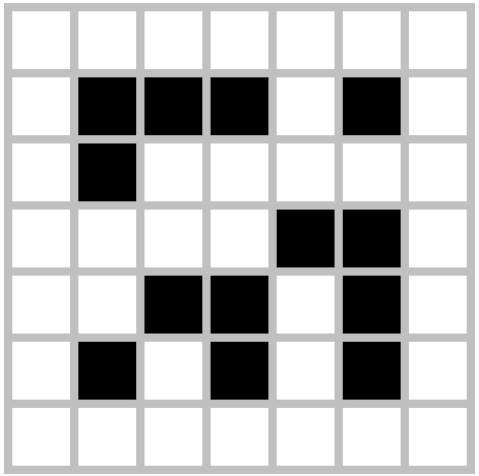
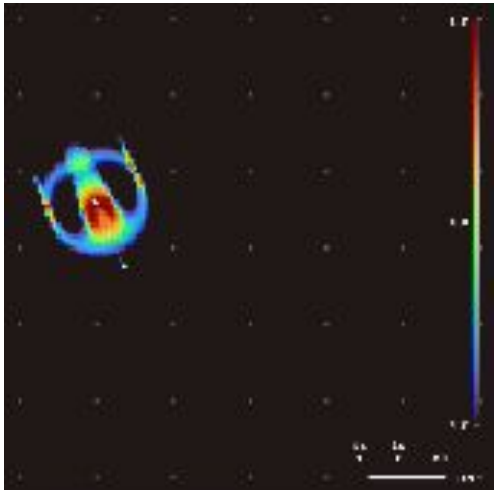
Success

Emergence

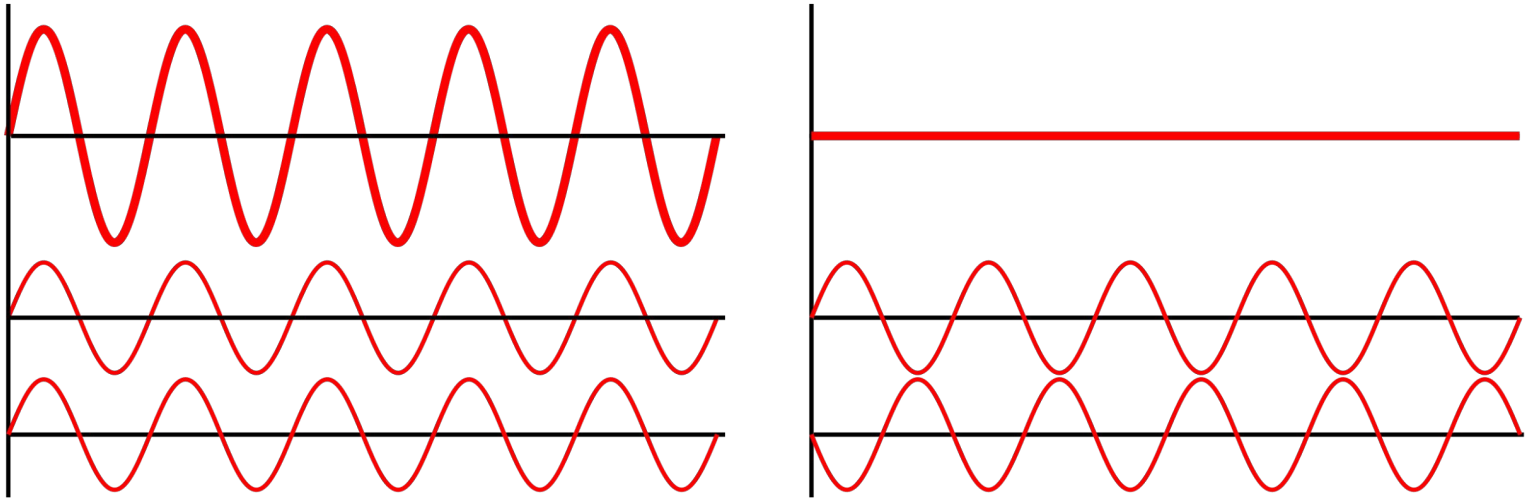




https://chakazul.github.io/lenia.html

Resonance

Stochastic Resonance, Functional Resonance



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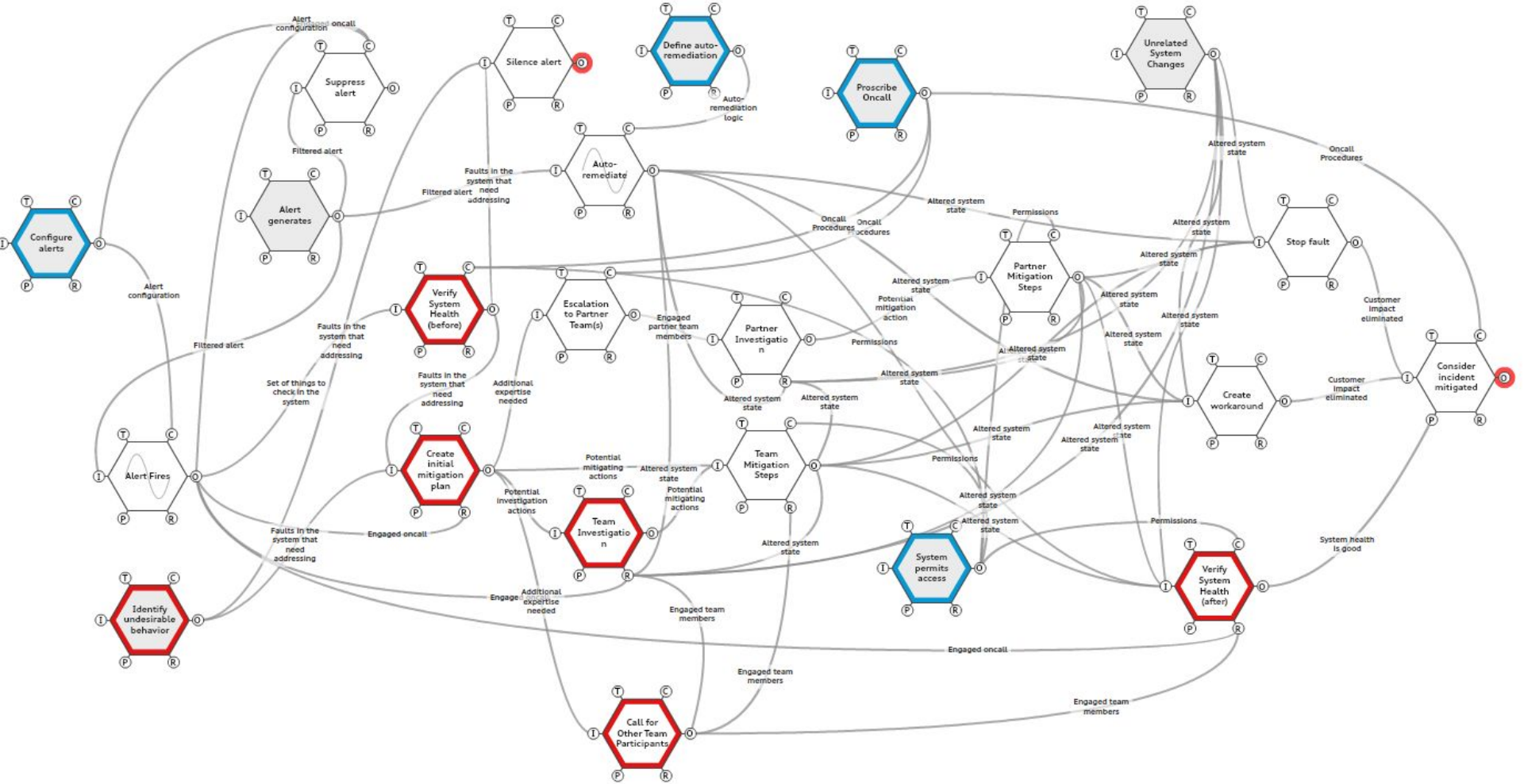
FRAM Models

“So there ARE models then!”

“Yes, but most of the value is in the making of them, apparently”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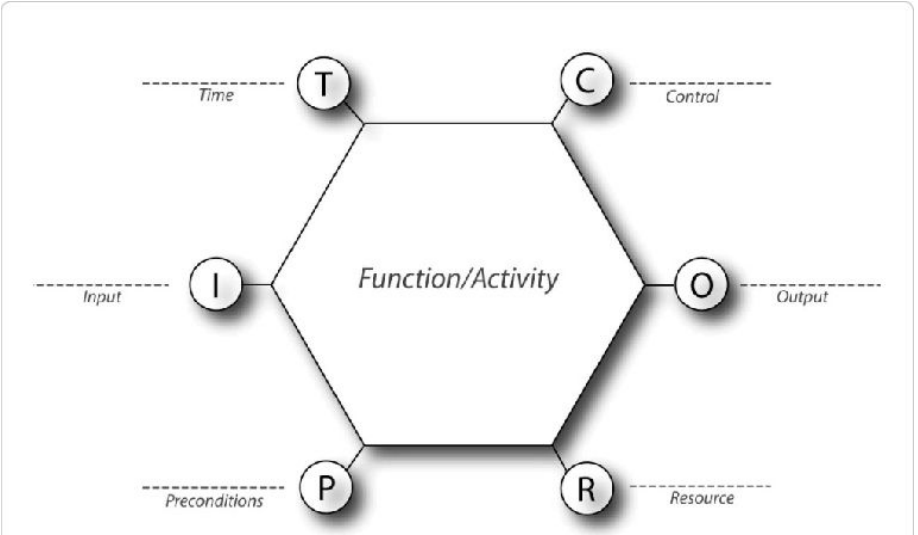
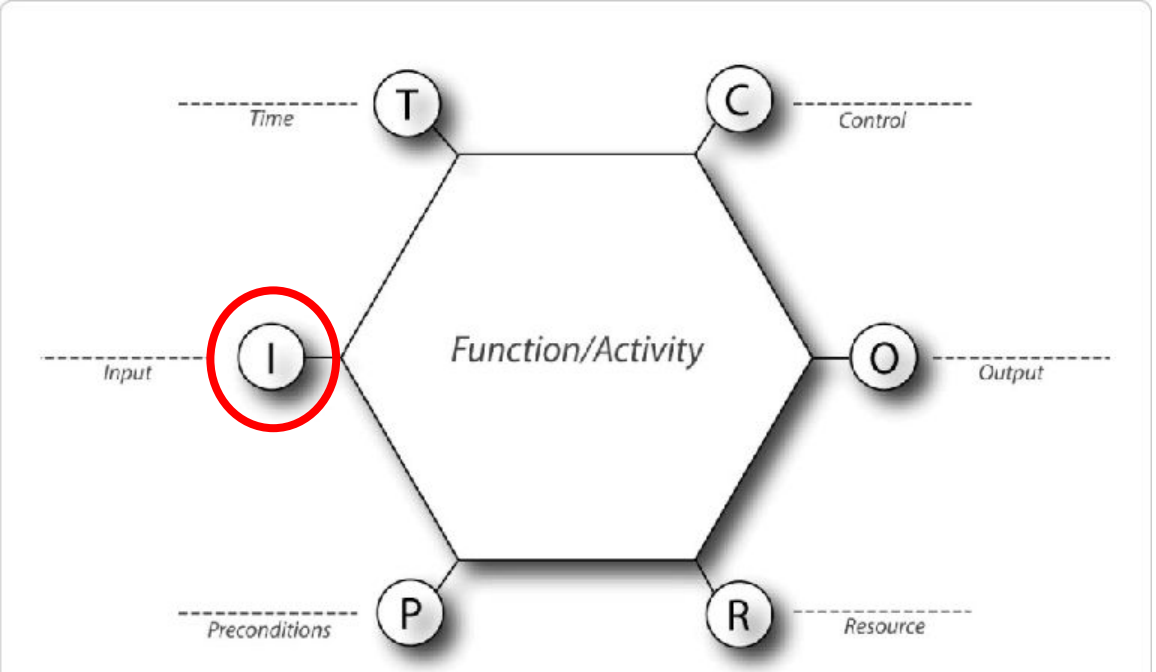
H E X A G O N S


Time
T
C
Control
Input
I
Function/Activity
O
Output
Preconditions
P
R
Resource

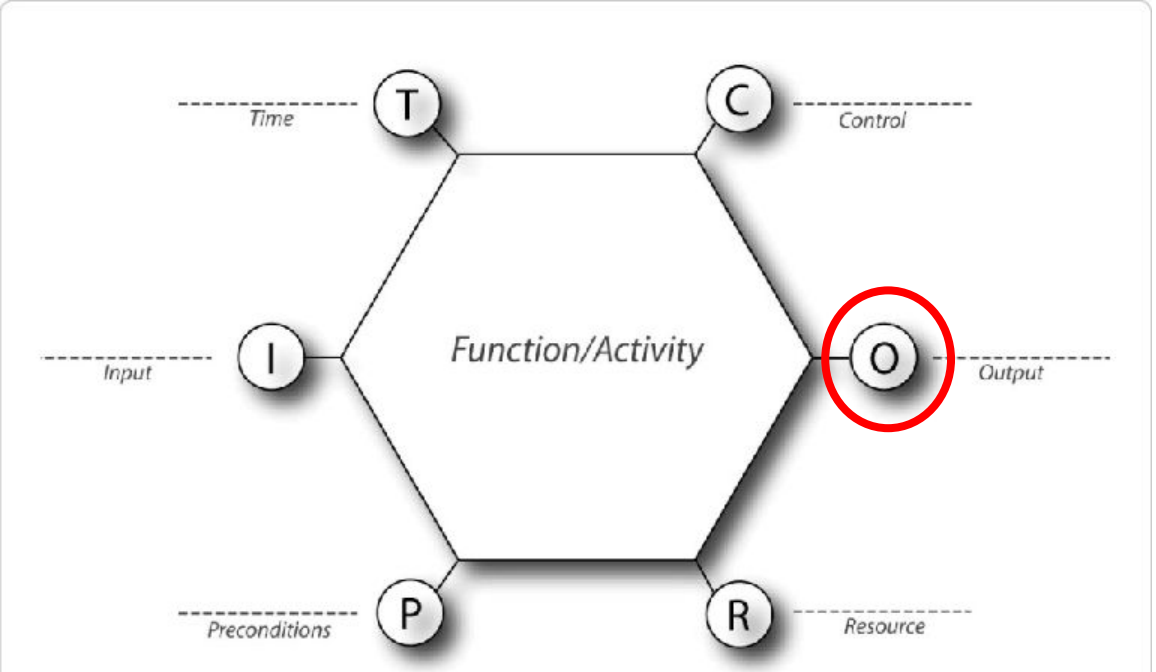
Input

“Open the Door”



Output

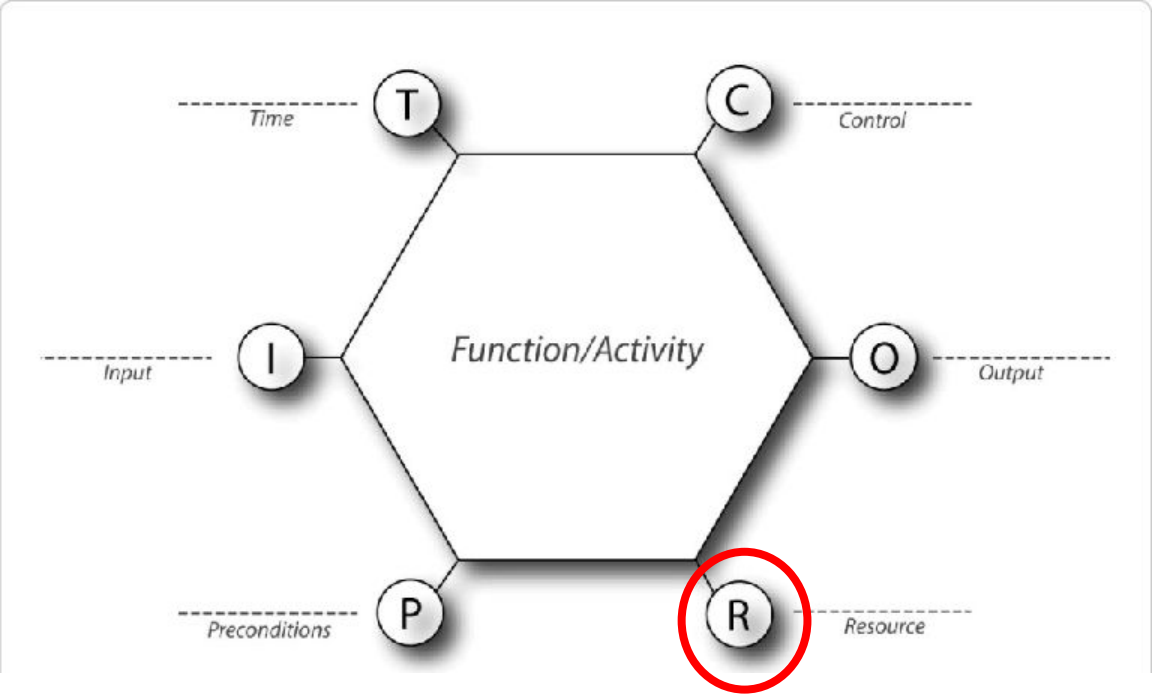
"Lock the Door"



Resource

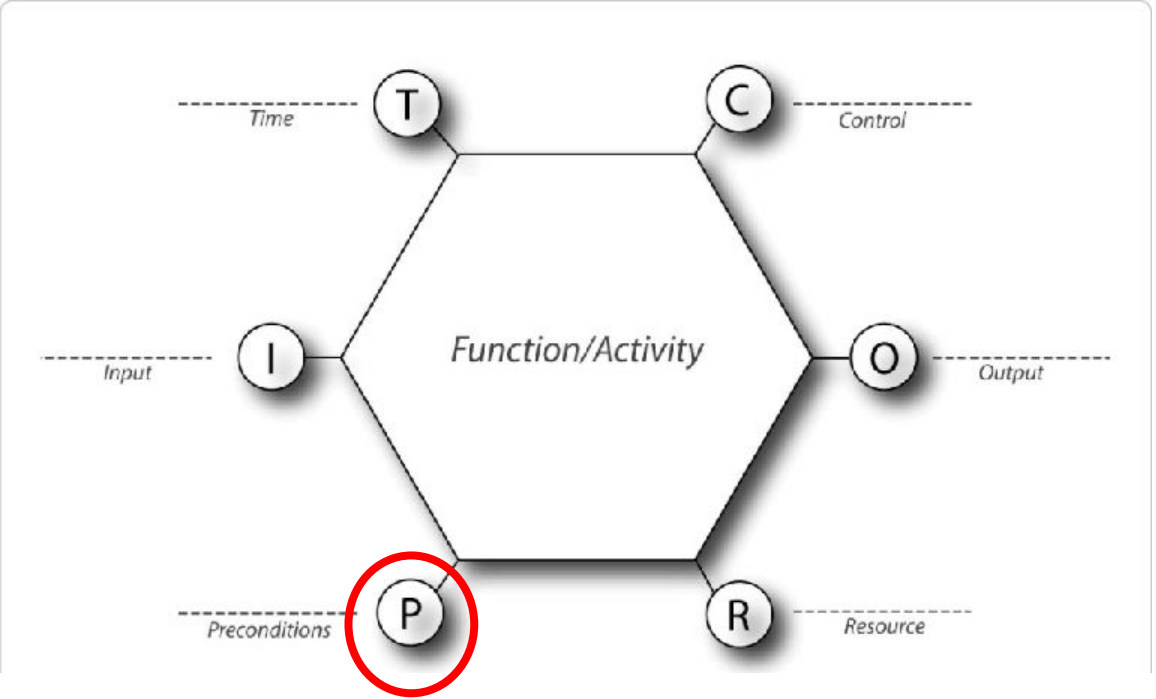
"Drive to the Job Site" ← Gas

Save the File ← Storage Capacity



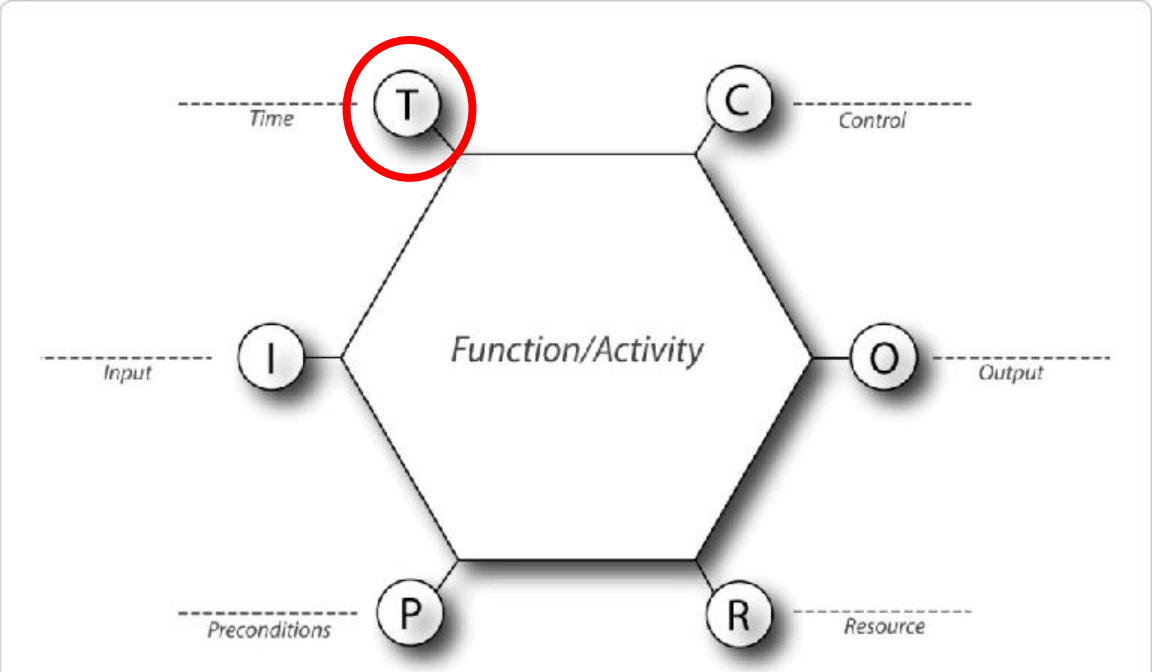
Preconditions

Close Up the Wound ← Check For All Surgical Tools / Apply Analgesic



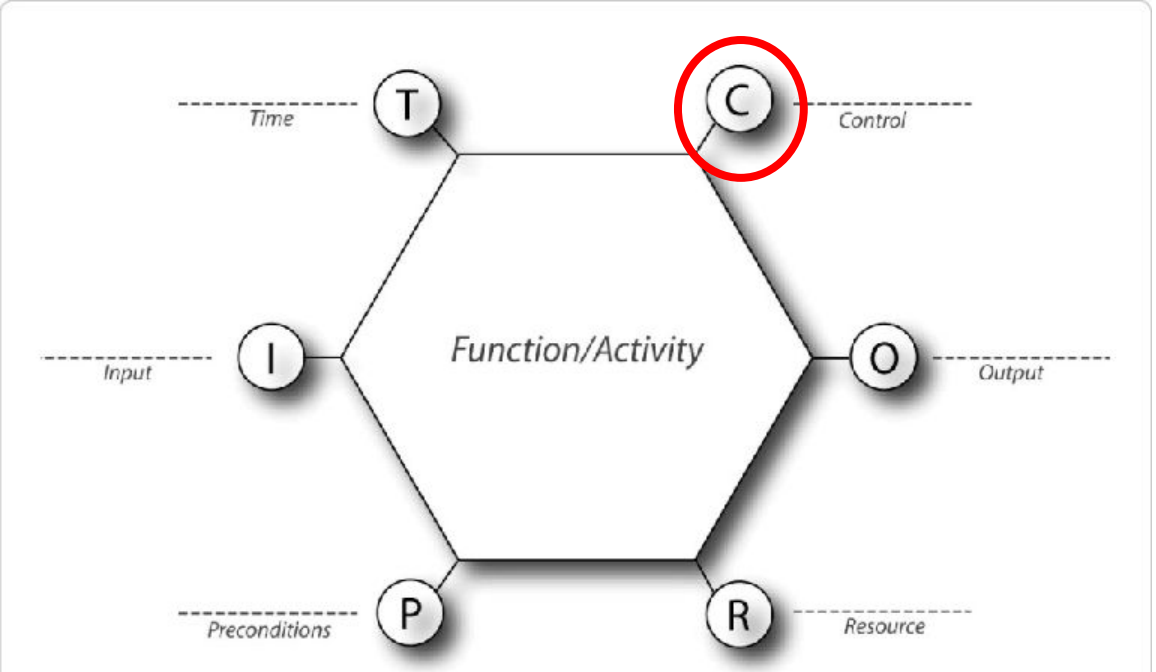
Time

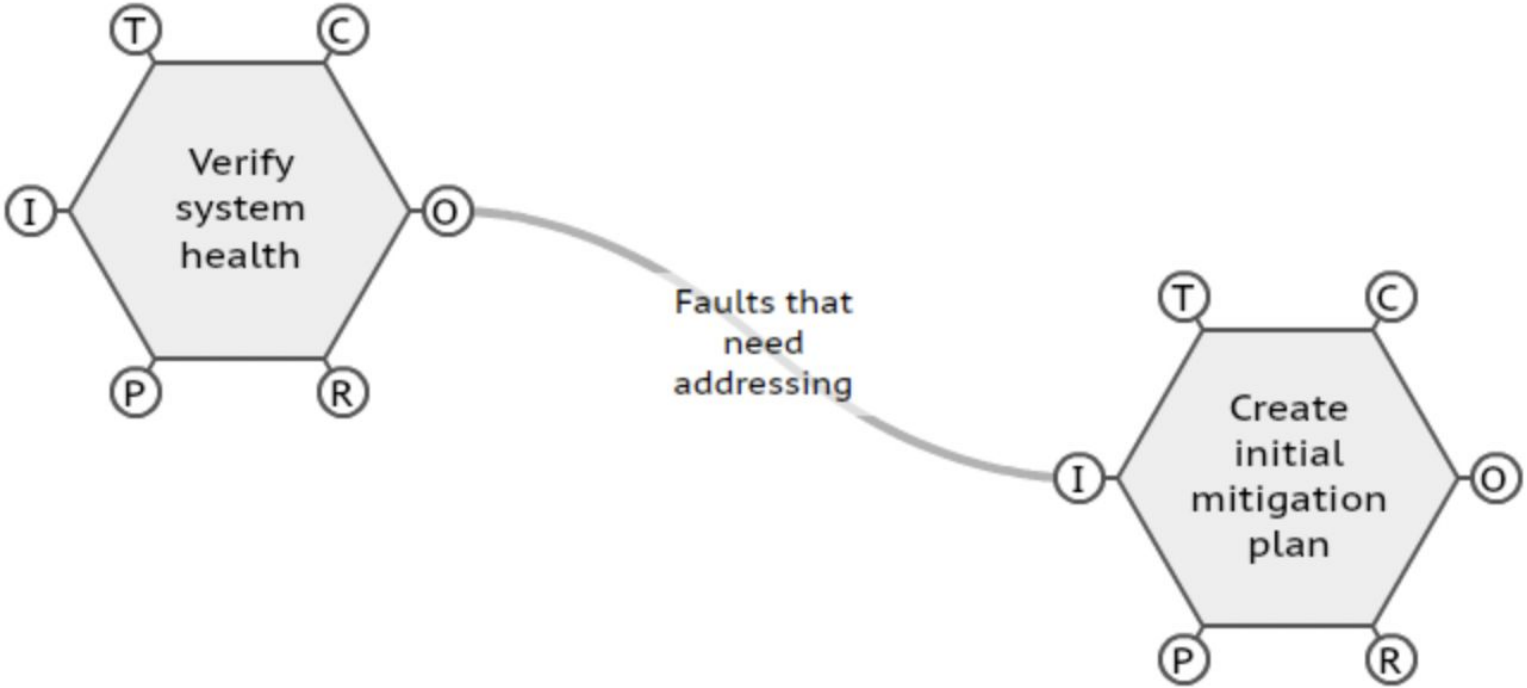
Ship Sailing Schedule



Control

- Runbook
- Ship’s Standing orders
- Code Deployment Configuration

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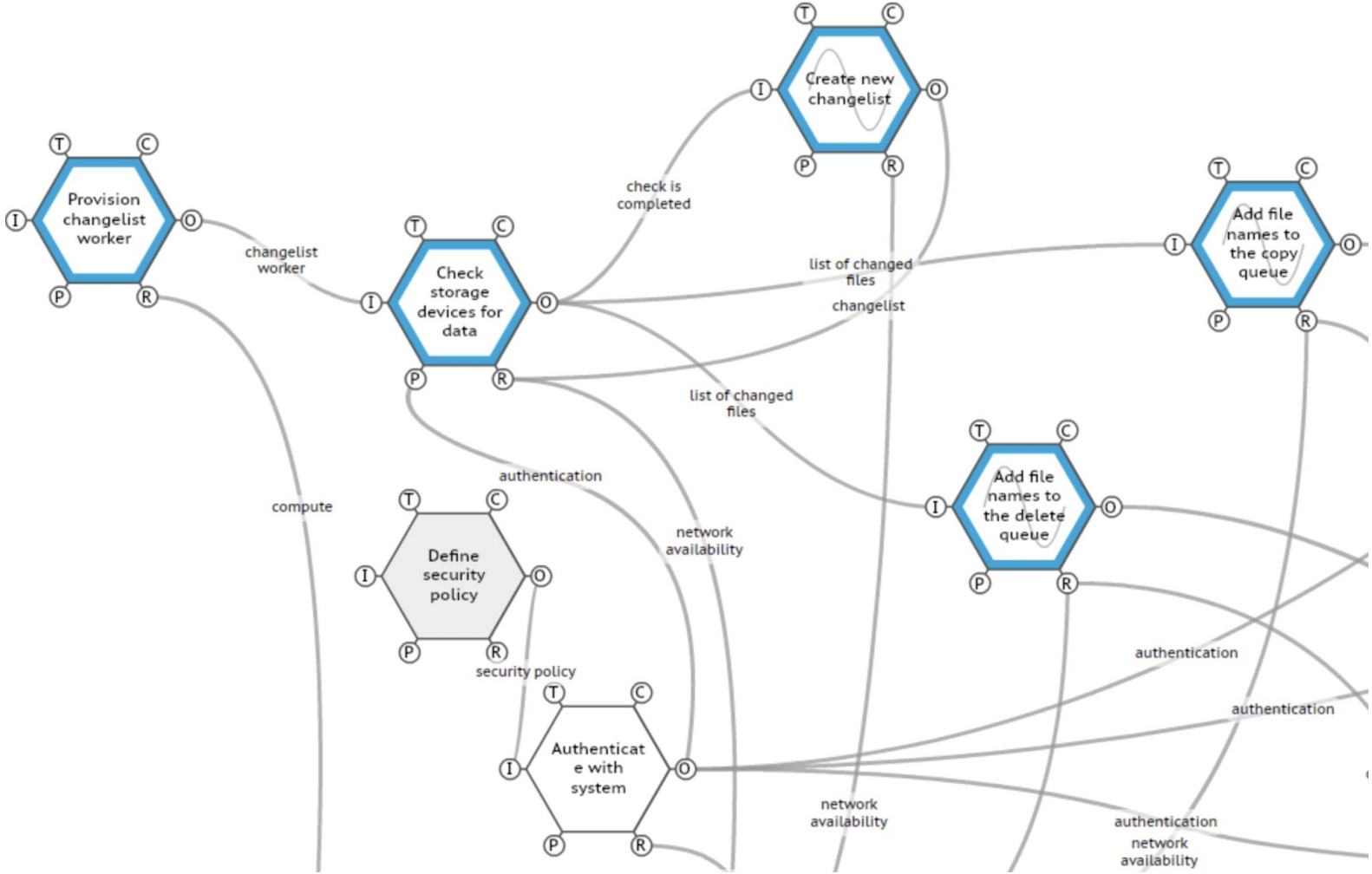
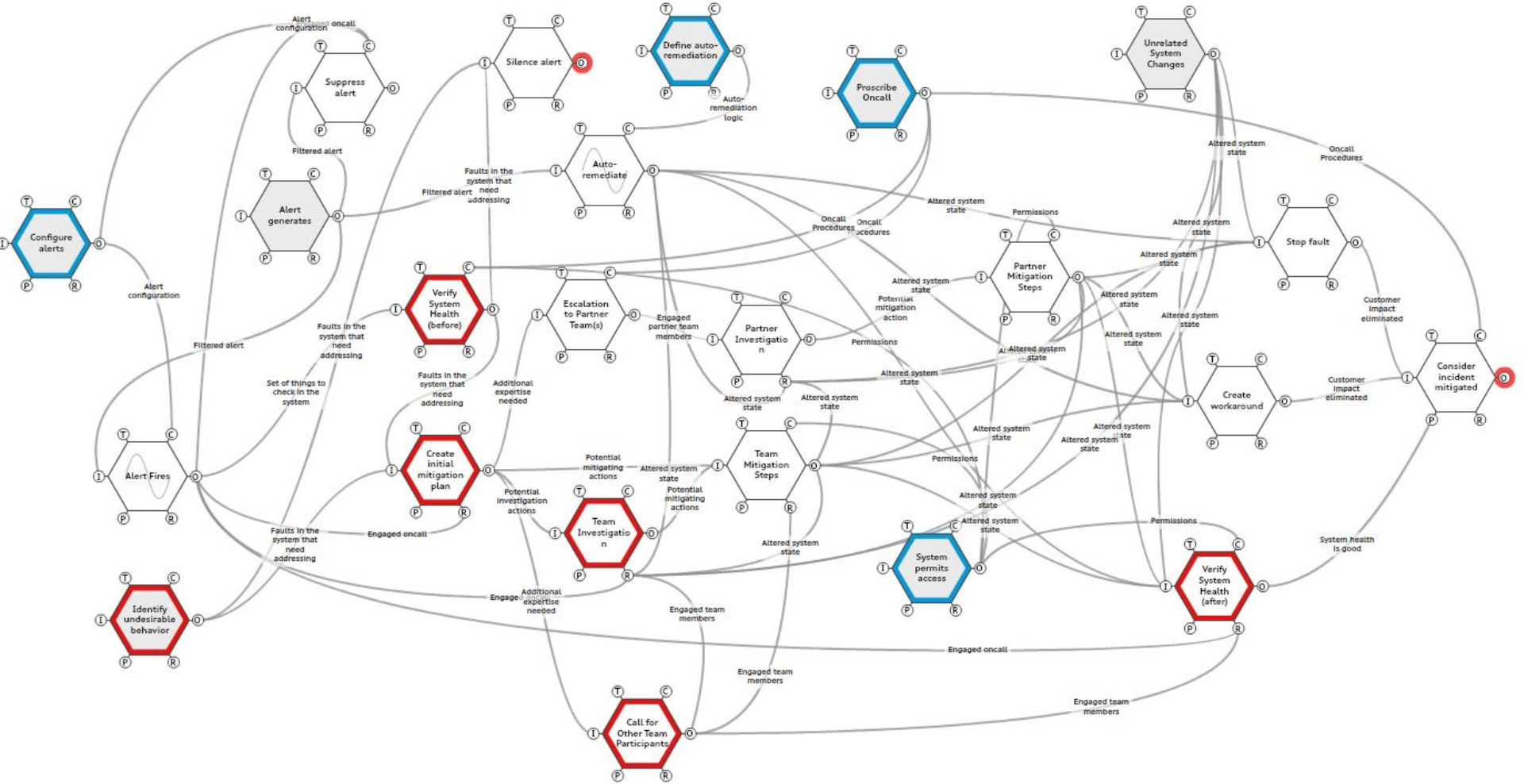

Provision changelist worker
changelist worker
Check storage devices for data
check is completed
Create new changelist
list of changed files
changelist
Add file names to the copy queue
list of changed files
Add file names to the delete queue
authentication
compute
Define security policy
network availability
security policy
Authenticat e with system
authentication
authentication
network availability
authentication
network availability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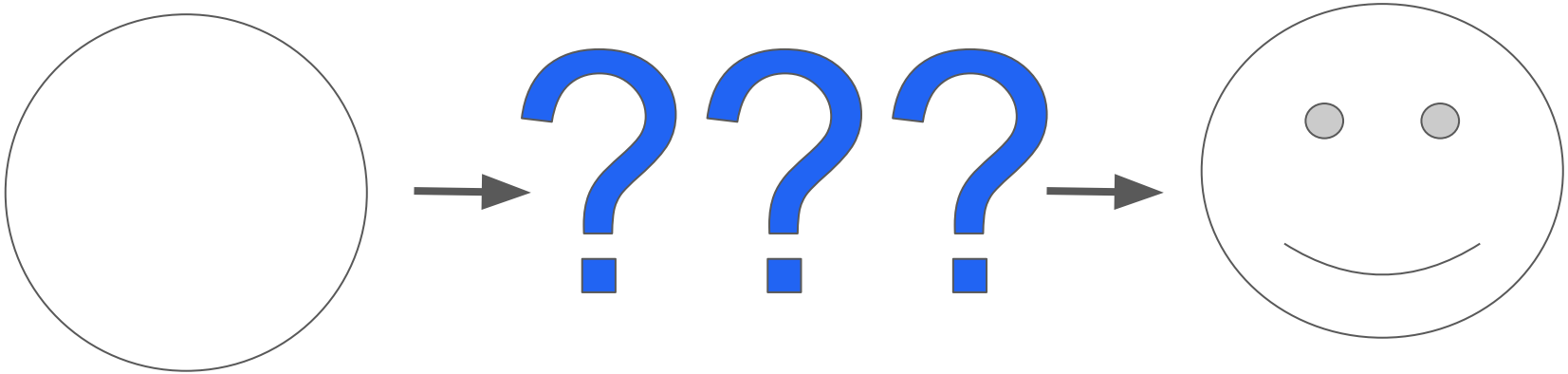
How FRAM

“How FRAM of you, sir!”

“Sorry, I didn’t mean to analyze your system like that…”

Identify & Describe The Functions

How to Draw a Smiley Face:

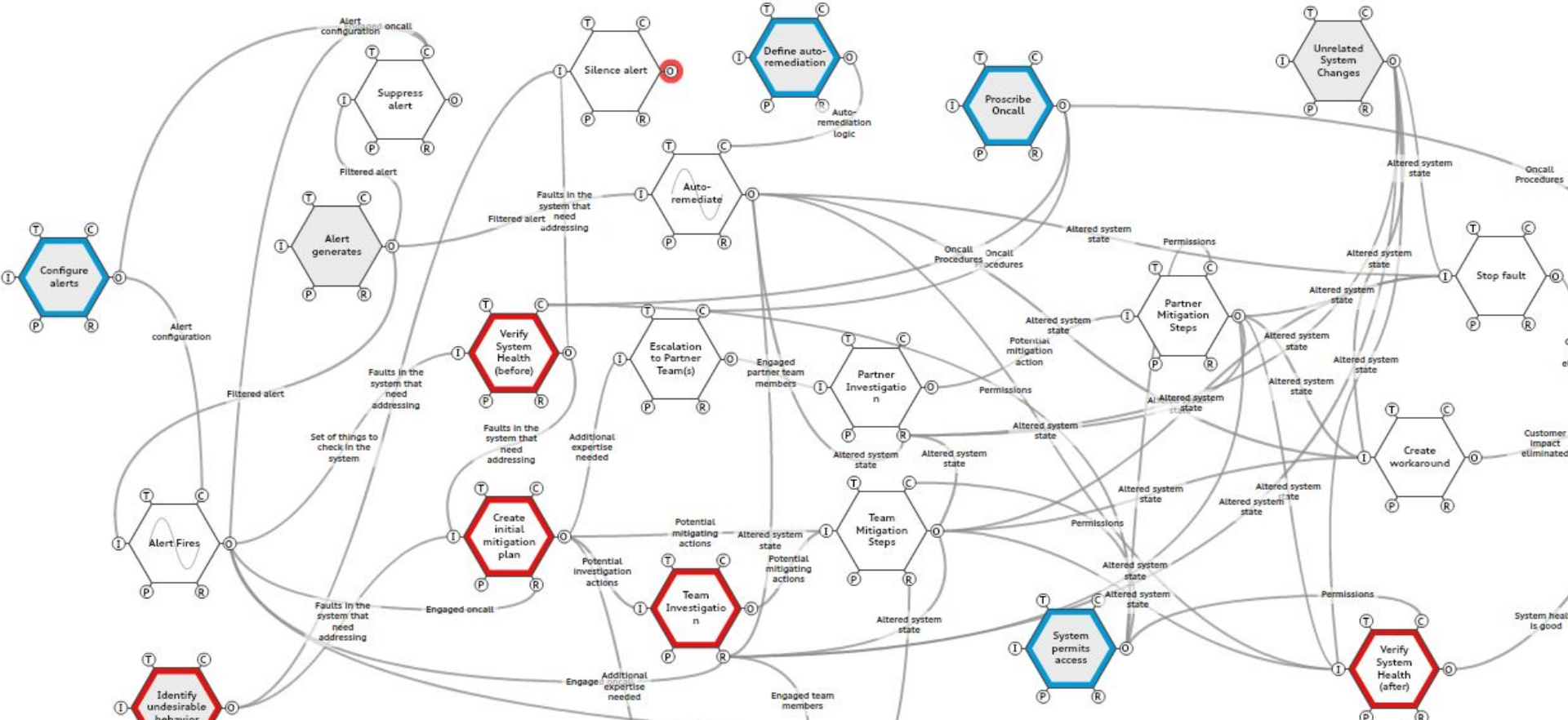


1. Draw a Circle

2. ???

3. Draw the Rest of the Smiley Face

Identify Variability



Aggregate and Categorize **Input** and **Output** Variability

1. Internal
2. External
3. Upstream/Downstream

Timing

- Too early
- Too late
- Omission

Force/Distance/Direction

- Too weak
- Too strong
- Wrong direction
- Wrong type

Object

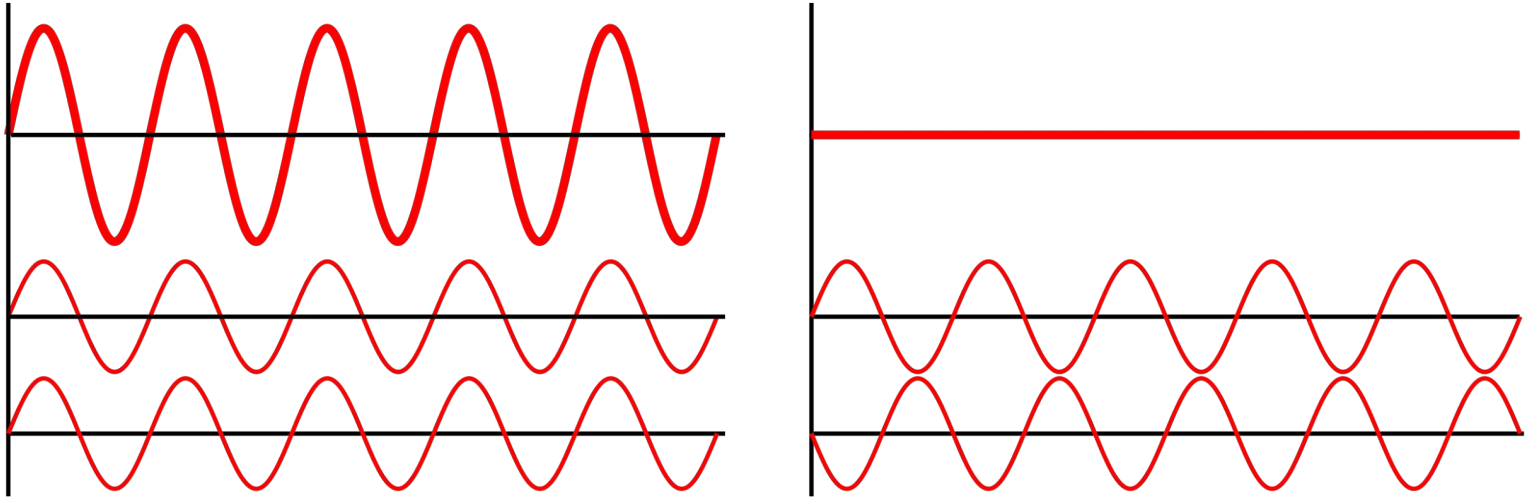
- Wrong object

Sequence

- Omission
- Skipping
- Repetition
- Reversal/Swap
- Extra wrong object

But don’t overthink the categories, eh?

How does the variability of the output affect downstream functions?



Handout!

- FRAM Visualizer Software Download
- An exercise for practicing FRAM
- FRAM website & tutorials
- FRAM book link
- ~~My soundcloud link (again)~~
- Contact information

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When FRAM?

“When? Is FRAM late for something?”

“I dunno, I missed that part…”

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