What SRE Could Be: Systems Reliability Engineering
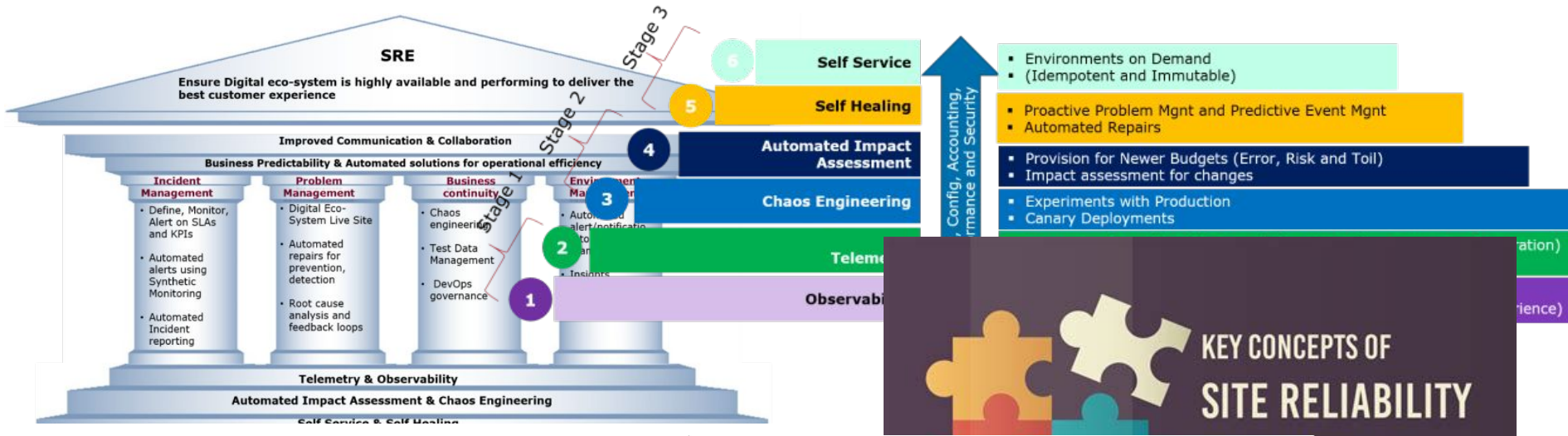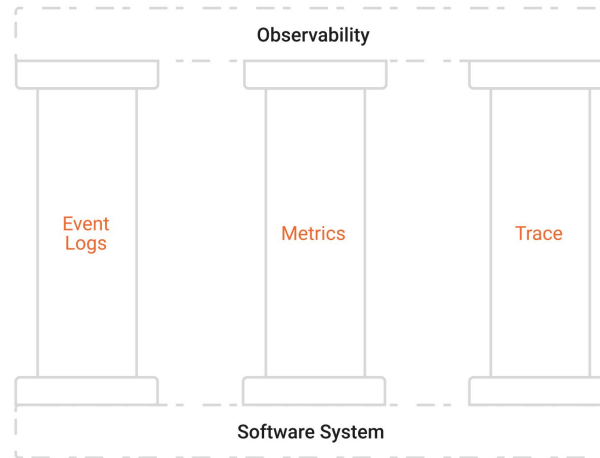
Laura Nolan
@lauralifts

stanza

SRE's Identity Crisis

- Is it mostly about automation?
- Is it similar to DevOps?
- Is it even operations at all?
- Do SREs write code?
- Am I SREing right if I don't have SLOs?
- Do SREs have to be oncall?
- Is SRE just a new name for ops/sysadmin?

SRE

Ensure Digital eco-system is highly available and performing to deliver the best customer experience

Improved Communication & Collaboration

Business Predictability & Automated solutions for operational efficiency

Incident Management	Problem Management	Business continuity	Environment Management
• Define, Monitor, Alert on SLAs and KPIs	• Digital Eco-System Live Site	• Chaos engineering	• Automated alert/notification to management
• Automated alerts using Synthetic Monitoring	• Automated repairs for prevention, detection	• Test Data Management	• Insights
• Automated Incident reporting	• Root cause analysis and feedback loops	• DevOps governance	

Telemetry & Observability

Automated Impact Assessment & Chaos Engineering

Self Service & Self Healing

Stage 1 Stage 2 Stage 3

6	Self Service	• Environments on Demand • (Idempotent and Immutable)
5	Self Healing	• Proactive Problem Mgmt and Predictive Event Mgnt • Automated Repairs
4	Automated Impact Assessment	• Provision for Newer Budgets (Error, Risk and Toil) • Impact assessment for changes
3	Chaos Engineering	• Experiments with Production • Canary Deployments
2	Telemetry	
1	Observability	

Config, Accounting, Performance and Security

KEY CONCEPTS OF SITE RELIABILITY ENGINEERING

Tenets of SRE

- Ensure a durable focus on engineering
- Maximise change velocity within a given error bud
- Monitoring
- Emergency response
- Change management
- Demand forecasting and capacity planning
- Provisioning
- Efficiency and performance

Observability

| Event Logs | Metrics | Trace |

Software System

Laura Nolan 13 Oct at 1:53 PM

the pillars of sre are doric, ionic, corinthian, tuscan and composite. obviously

9 replies

Blake 12 days ago
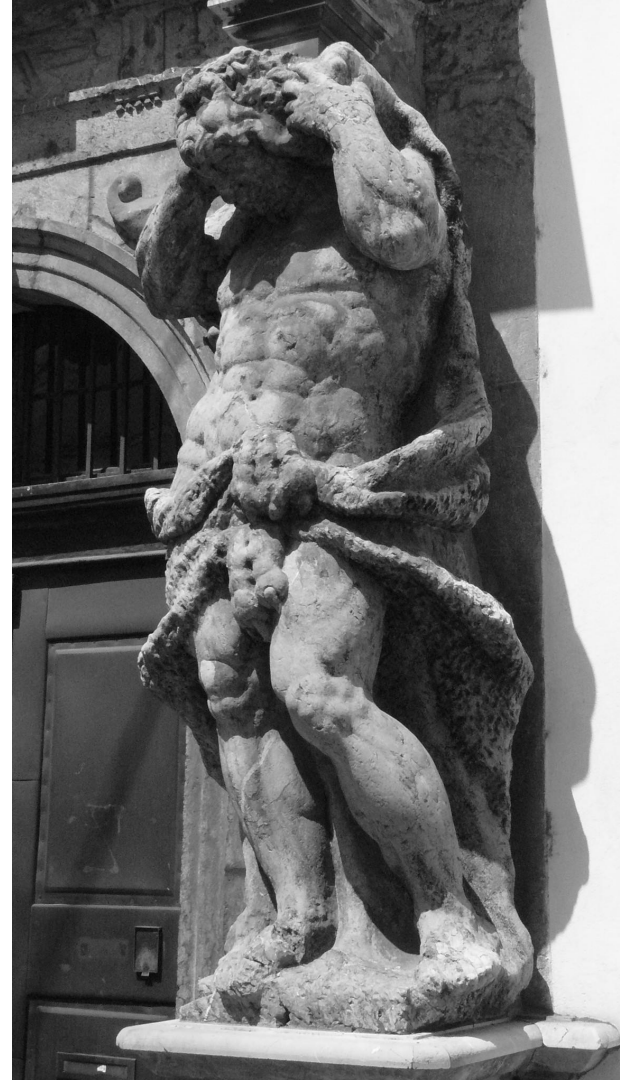
Don't forget Caryatids.

Blake 12 days ago

Clearly superior to the dubious Palmiform, Papyriform, Coniform, Hathoric, and Osiride Pillars used by practitioners of DevOps, however, even without that addition.

"Pillars of SRE"

Some poor schmuck being crushed under the weight of HCL and YAML and run scripts and alerts....

Photo: @juliemacnam, via Flickr

DevOps Philosophy

- Based on Lean Manufacturing
- Deliver small changes frequently to create fast feedback loops
- Eliminate bottlenecks and friction
- The ability to make changes safely is foundational to high-performing IT organisations

SRE Philosophy?
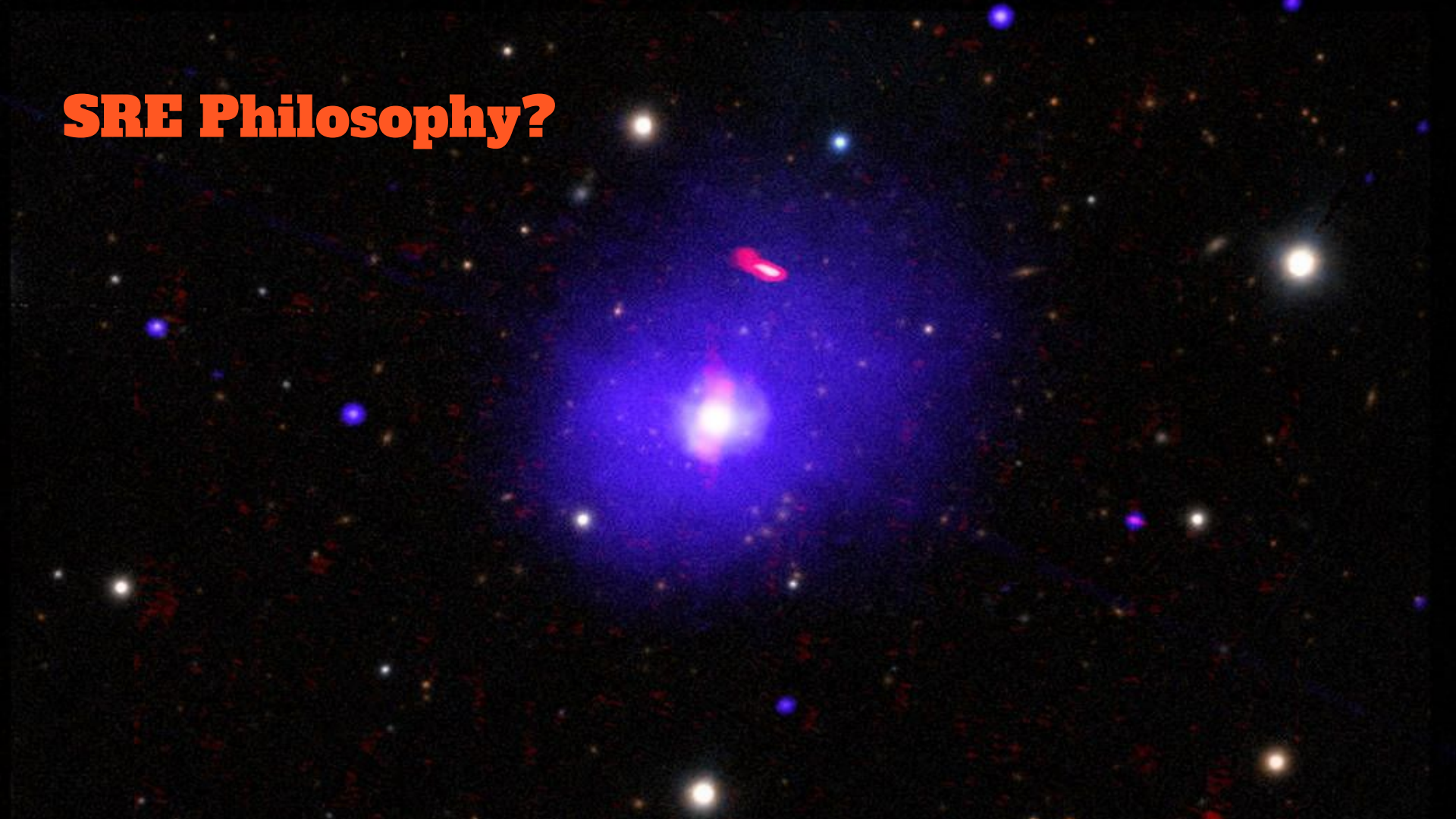
Standardisable Practices

- SLOs
- Incident Management
- Some kinds of automation

Non-standardisable SRE work

- System design and improvement
- Anomaly investigation and incident review
- Risk analysis
- Building safe control planes
- Design of service-specific monitoring and alerting
- System-specific disaster testing

SRE is: Understanding Systems and Making Appropriate Interventions to Make Them Function Better

SRE Technical Systems Interventions

- Delaying before rereplicating data

SRE Technical Systems Interventions

- Cellular design pattern

SRE Technical Systems Interventions

- Start incrementing counters close to their maximum value to test wraparound

SRE Social Systems Interventions

- Minimum oncall team size

- SLOs and error budgets

- Blameless IRs

- Automating Toil

Systems Thinking

A discipline focused on understanding and optimising complex systems.

HANDBOOK OF SYSTEMS THINKING METHODS

Paul M. Salmon, Neville A. Stanton, Guy H. Walker, Adam Hulme, Natassia Goode, Jason Thompson and Gemma J.M. Read

CRC Press
Taylor & Francis Group

Engineering a Safer World

Systems Thinking Applied to Safety

Nancy G. Leveson

ENGINEERING SYSTEMS

Thinking in Systems

A Primer

Donella H. Meadows

Edited by Diana Wright,
Sustainability Institute
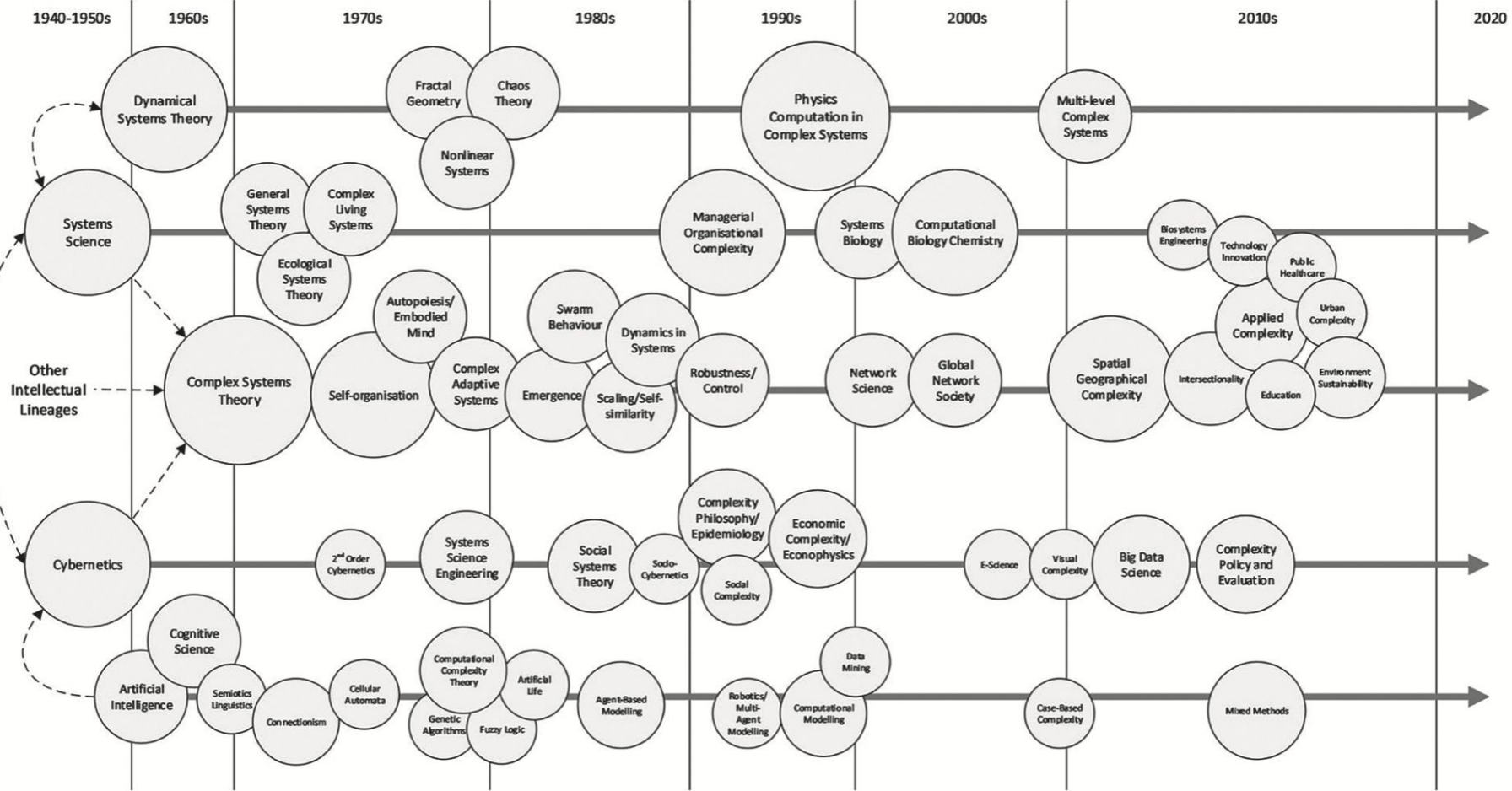
From *The Handbook of Systems Thinking Methods*, by Salmon et al.

What is a System?

- Elements or parts
- Interactions and interconnections
- A function
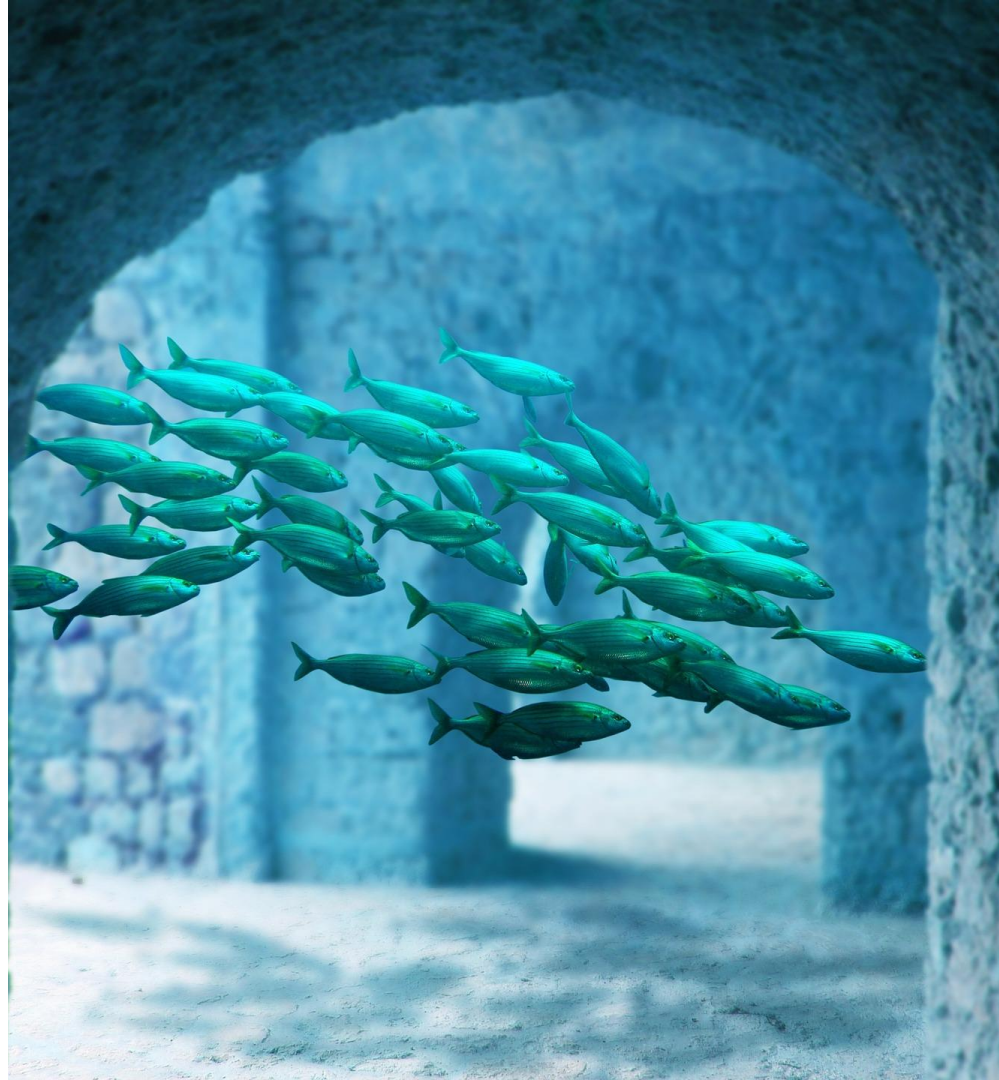
Complex Systems

- Multiple components
- Non-linear interactions
- There are loops in the interactions
- Interactions with environment
- Dynamic: constantly in flux
- State and history

In the post-cloud, post-DevOps, post-SRE world, we are not astronauts anymore. We're mission control.

More Ways to Destroy a Death Star

- Use "soft power" and entice Stormtroopers to defect. Create an insurgency
- Use navicomputer to collide Death Star with a planet or sun
- Create artificial gravity in wrong direction
- Sabotage medical droids and "turn them rogue"
- Poison atmosphere
- Sabotage maintenance droids by gradually degrading their performance so that no one would suspect they were secretly allowing normal faults to propagate and worsen

Ways of Using Systems Thinking Tools

- Describing and understanding systems behaviour
- Evaluating risks
- Analysing incidents

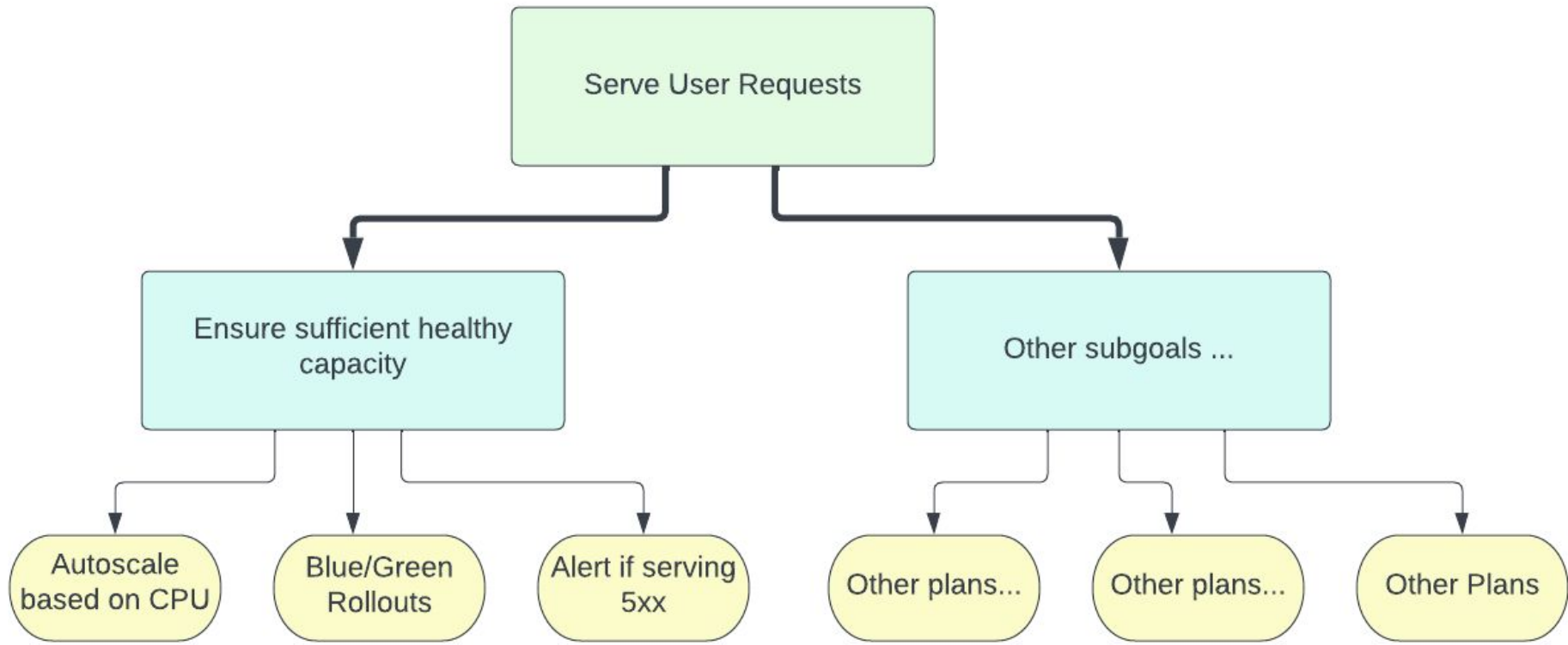# Informal Systems Thinking in SRE

- Premortems
- Tabletop scenarios
- Disaster test
- Wheel of Misfortune
- Incident Reviews

Describing Systems: CWA

- CWA: Cognitive Work Analysis
- Work domain analysis: purpose of system, assessing performance (SLIs!), functions, processes, and objects.
- Control task analysis: what tasks can be done in which situations, how decisions are made
- Strategies analysis: how the system moves between states
- Social and worker competencies analysis

Describing Systems: HTA

- HTA: Hierarchical Task Analysis
- Decompose systems into goals, subgoals, operations, and plans
- Very flexible way to describe systems, including machine and human parts
- HTA descriptions are inputs to other systems analysis techniques

```mermaid
graph TD
    A[Serve User Requests] --> B[Ensure sufficient healthy capacity]
    A --> C[Other subgoals ...]
    B --> D[Autoscale based on CPU]
    B --> E[Blue/Green Rollouts]
    B --> F[Alert if serving 5xx]
    C --> G[Other plans...]
    C --> H[Other plans...]
    C --> I[Other Plans]
```

Serve User Requests

- **Ensure sufficient healthy capacity**
  - Autoscale based on CPU
  - Blue/Green Rollouts
  - Alert if serving 5xx
- **Other subgoals ...**
  - Other plans...
  - Other plans...
  - Other Plans

Socialising knowledge of control paths

Modelling Systems: EAST-BL

- Starts with a HTA
- Extracts network of tasks
- Analyses how information needs to be shared to carry out tasks safely (including feedback)
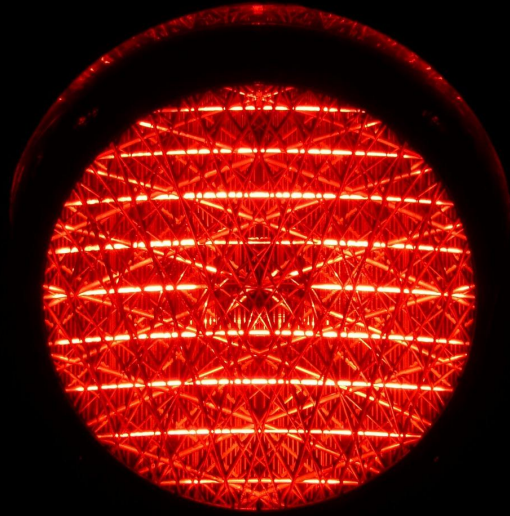- For each link: determine what would happen if it was broken

Modelling Systems: Causal Loop Diagrams

From https://www.infoq.com/articles/anatomy-cascading-failure/
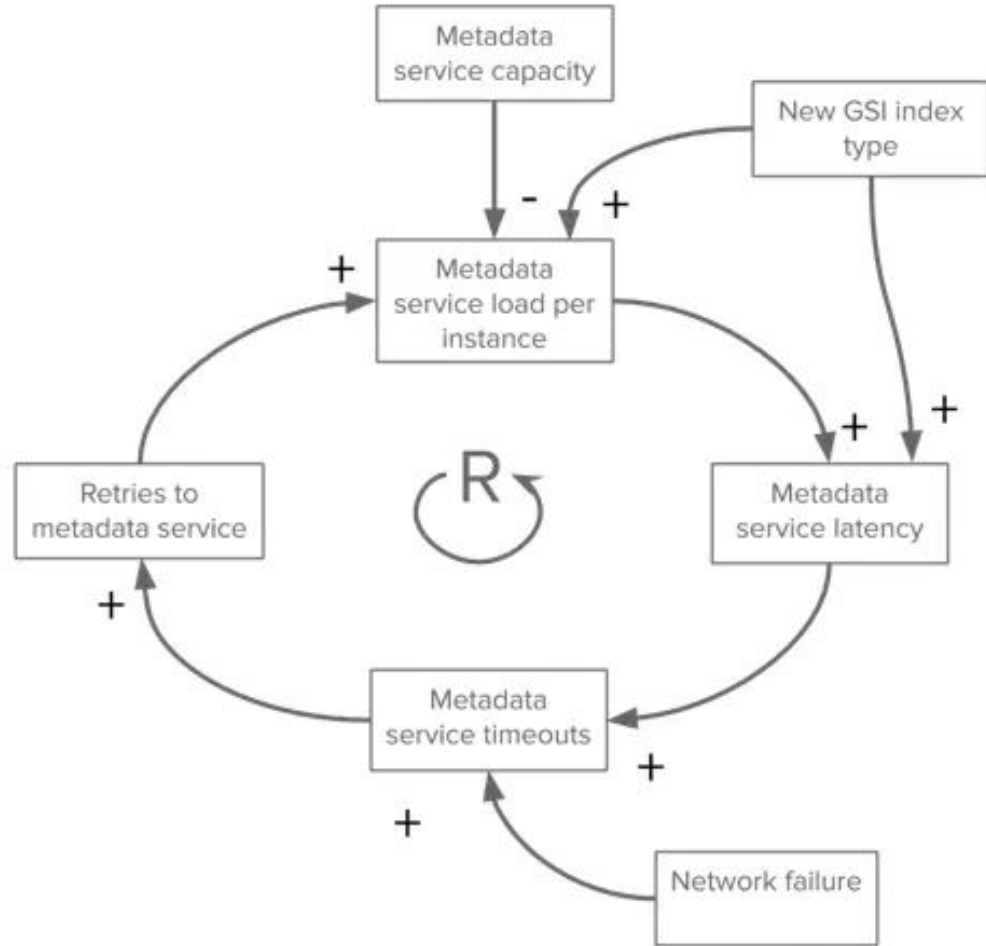
Models don't need to be perfect

Hazards, Constraints, and Controls

We should always be data driven
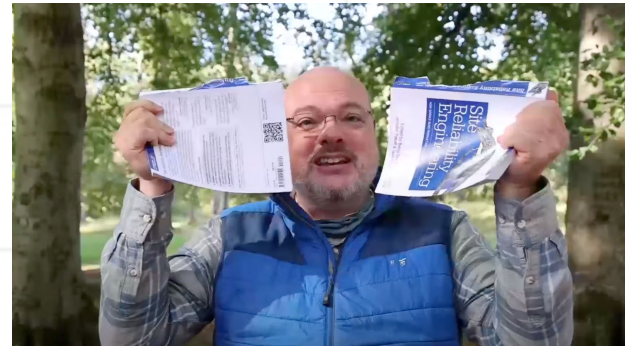
CHANGE MY MIND

Be
flexible

Mike
@mpk

one day I think we're going to have to ask Google to formally apologise for the SRE book. I know they meant well but they unintentionally sparked off a whole industry of bullshitters suddenly claiming to know everything because "it's covered in the SRE book" and I'm just tired.

10:01 AM · Oct 24, 2022 · Twitter Web App

1 Retweet   14 Likes

SRE 2.0: A Call to Action

- Systems thinking is **<u>already</u>** our SRE special sauce
- We can surface the underlying systems thinking principles that effective SREs use implicitly
- We can make concepts like goals, plans, links, hazards, constraints, and controls first-class concepts
- We can describe recurring patterns in our work