Microservices: Service Oriented Development

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How do I break up my monolith?
How do I architect my app with microservices?
What infrastructure do I need in place before I can benefit from microservices?

Microservices at Datawire ...

- Building a cloud application using microservices in 2013
- Distributed systems engineers
- Multiple services
- Prototyping was really fast

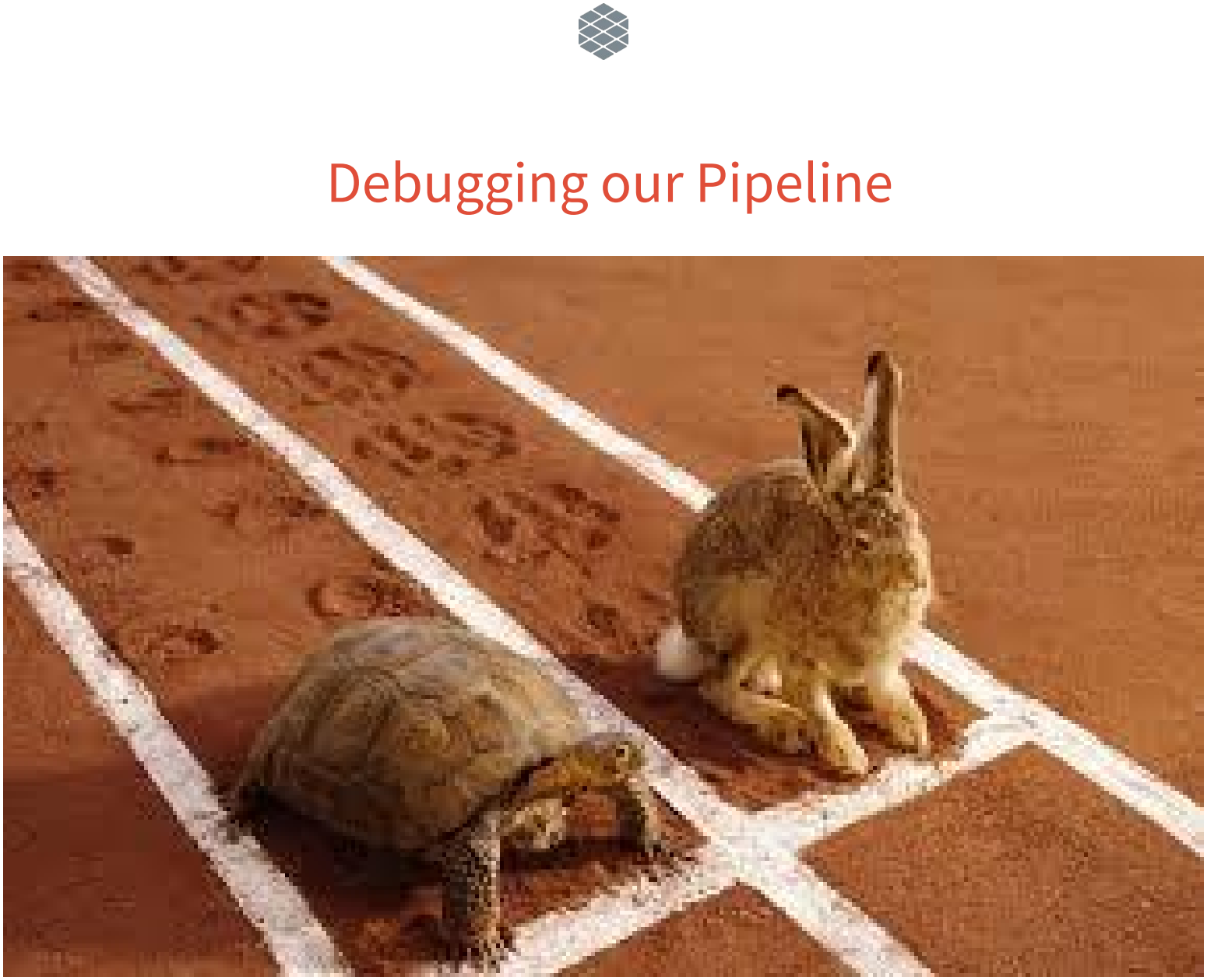
- … then we launched and things slowed down…

Debugging Velocity (or lack thereof)

~~Tooling~~

~~Architecture~~

Process!!!

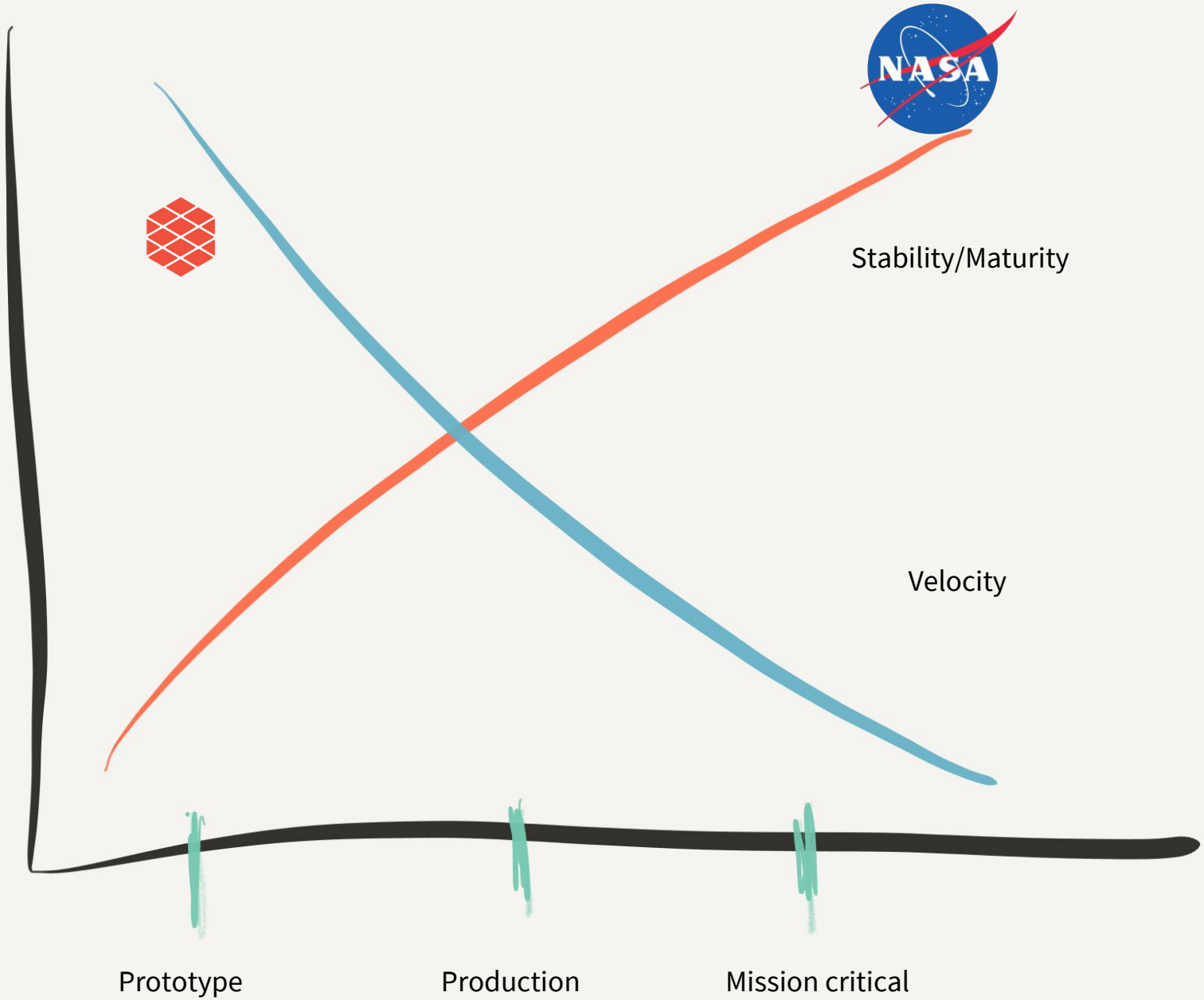


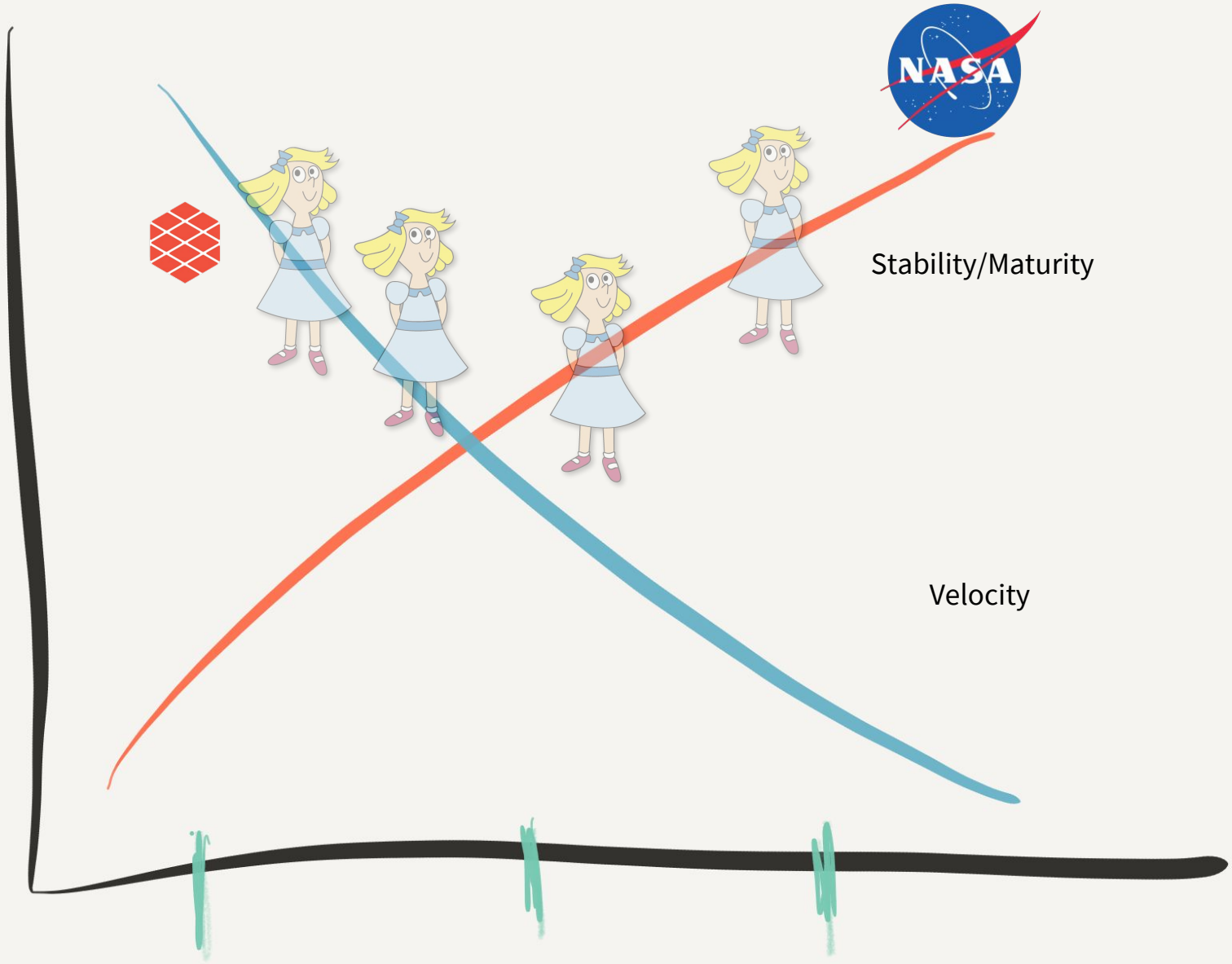
Debugging our Pipeline

Velocity comes from Process, not Architecture

~~Service Oriented Architecture~~

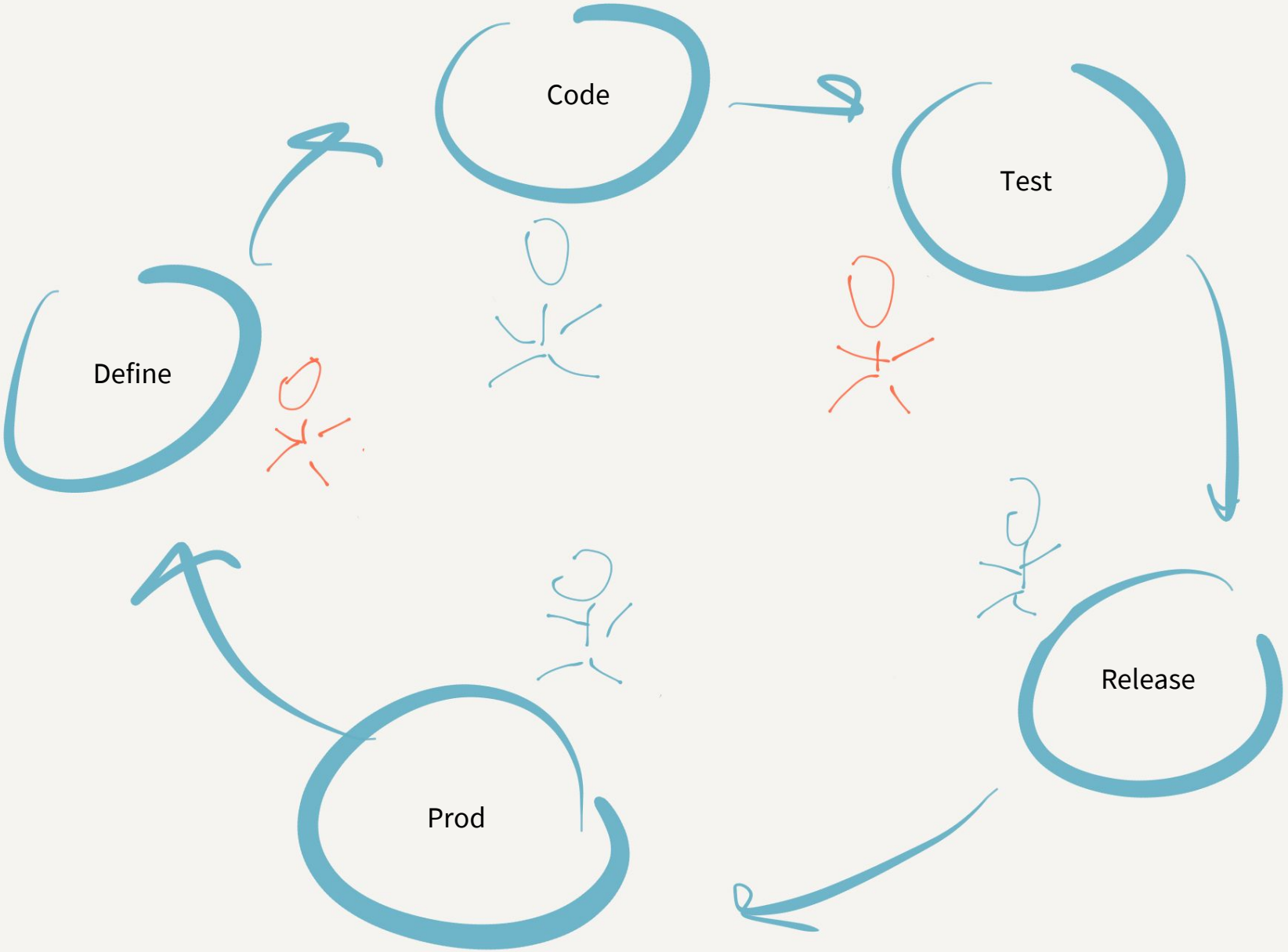
Service Oriented Development

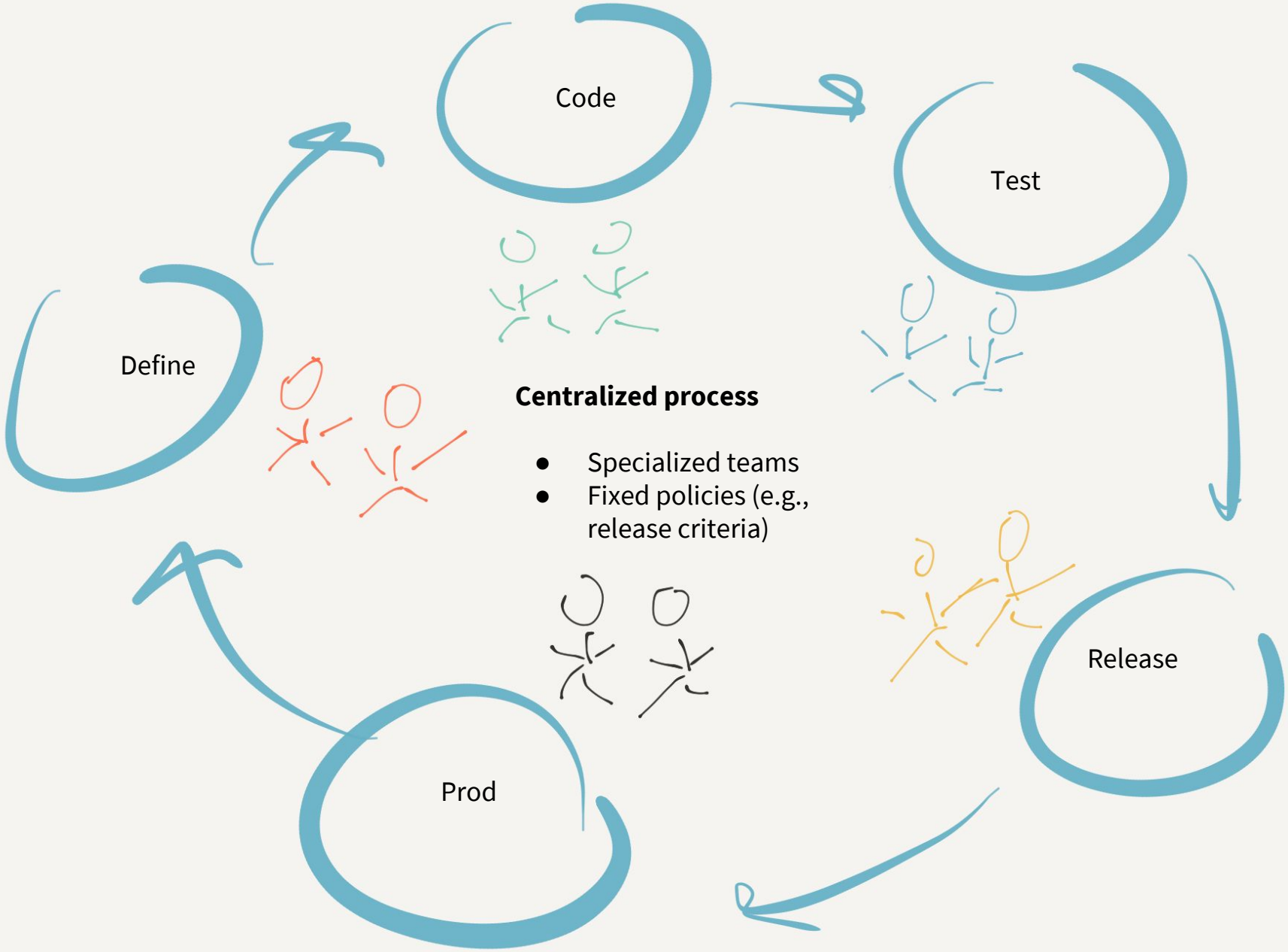

Stability/Maturity
Velocity
Prototype
Production
Mission critical


Stability/Maturity
Velocity
Prototype
Production
Mission critical

A single process is inefficient

(Forces a single Stability vs Velocity Tradeoff)


Code
Test
Release
Prod
Define



Centralized process

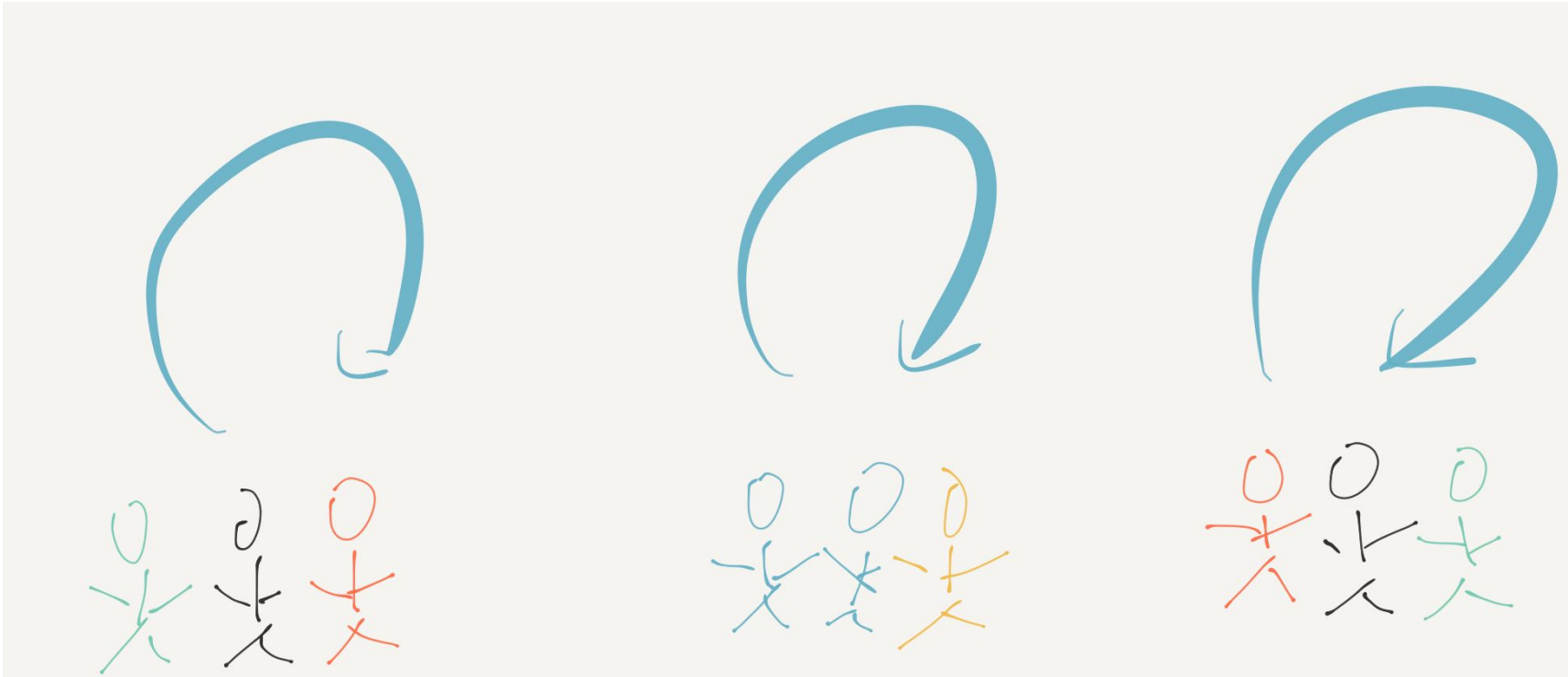
- Specialized teams
- Fixed policies (e.g., release criteria)

A single process doesn’t scale

~~How do I break up my monolith?~~

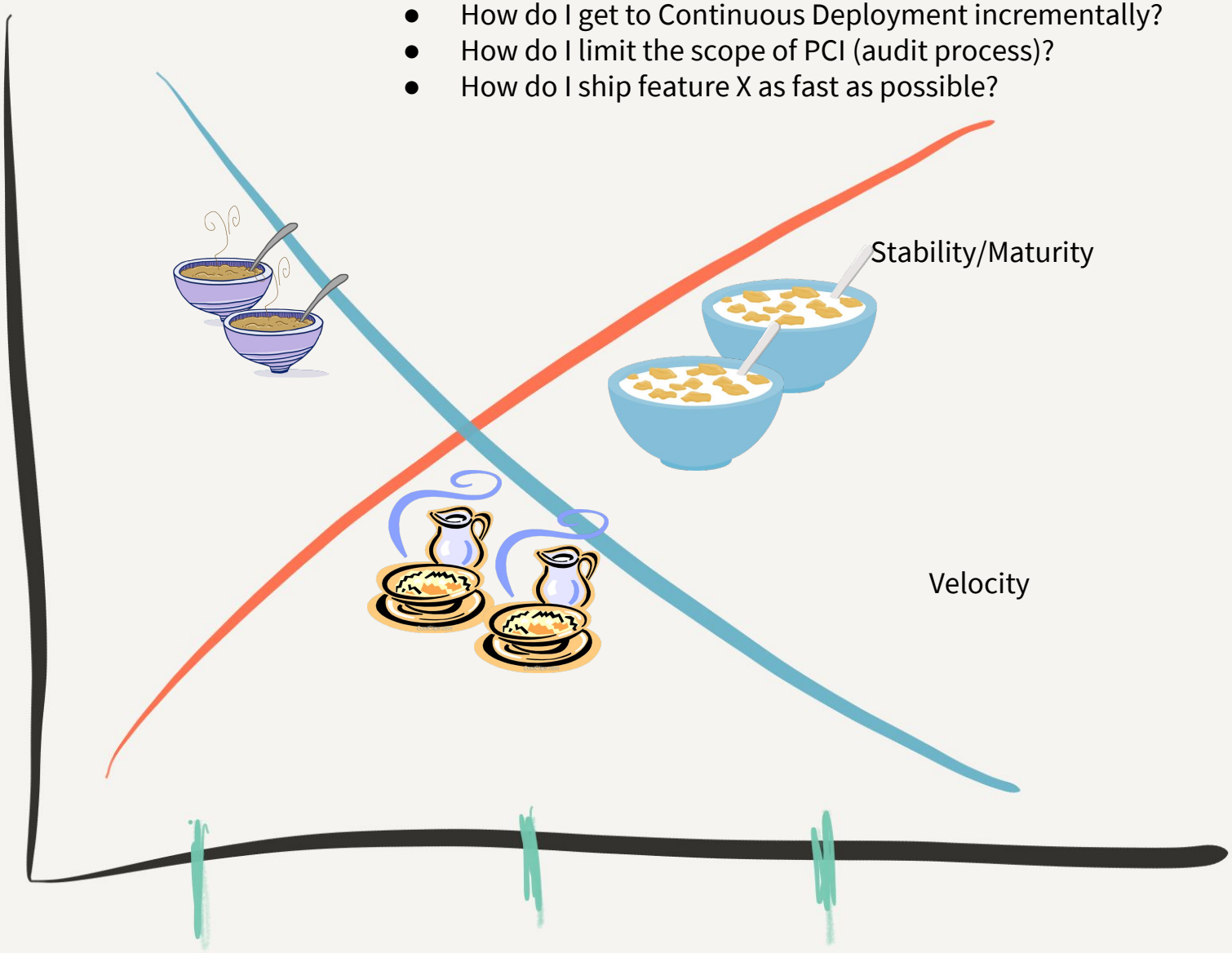
How do I break up my *process*?

Microservices lets you run multiple processes!



Microservices is a distributed development ~~architecture~~ workflow.

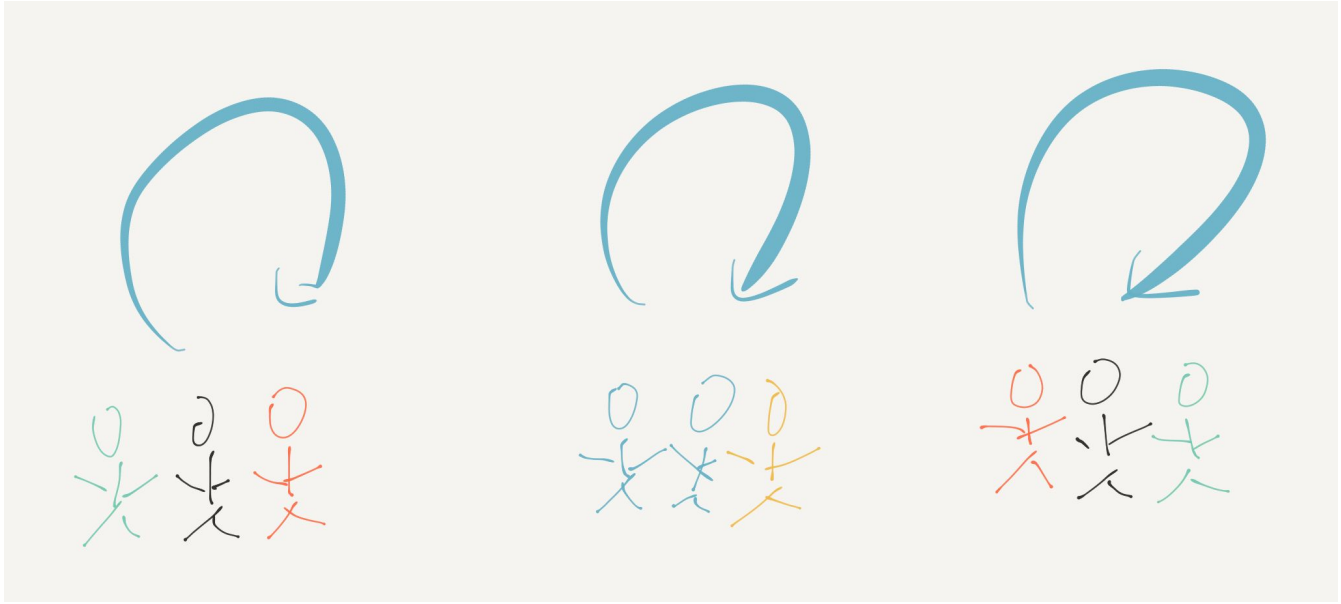
- How do I get to Continuous Deployment incrementally?
- How do I limit the scope of PCI (audit process)?
- How do I ship feature X as fast as possible?



Microservices is ...

- **Multiple** workflows
  - Including your existing workflow!
  - Workflows designed for different stability/velocity tradeoffs
- **Simultaneous** workflows

Doing things this way shifts how people operate!



- Requires *both* **organizational** and **technical** changes

Organizational Implementation

You gotta give in order to get

Education

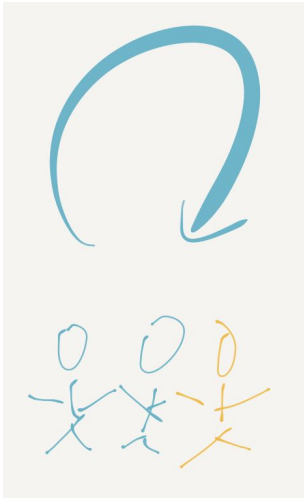
- Everyone exposed to full dev cycle

Communication

- Nobody speaks the same language

Delegation

- Small teams own big important parts



But you get a lot

Education

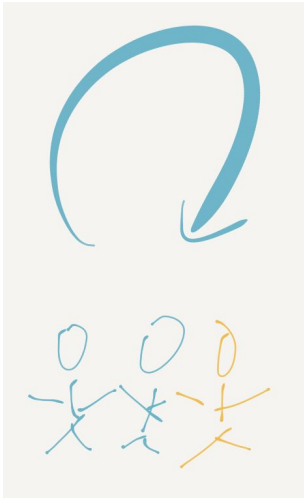
- Specialists become generalists -> Better holistic systems
- Learning, personal growth -> Job satisfaction

Communication

- Conflict -> Collaboration

Delegation

- Massive organizational scale



Create self-sufficient, autonomous software **teams**.

Why self-sufficiency and autonomy?

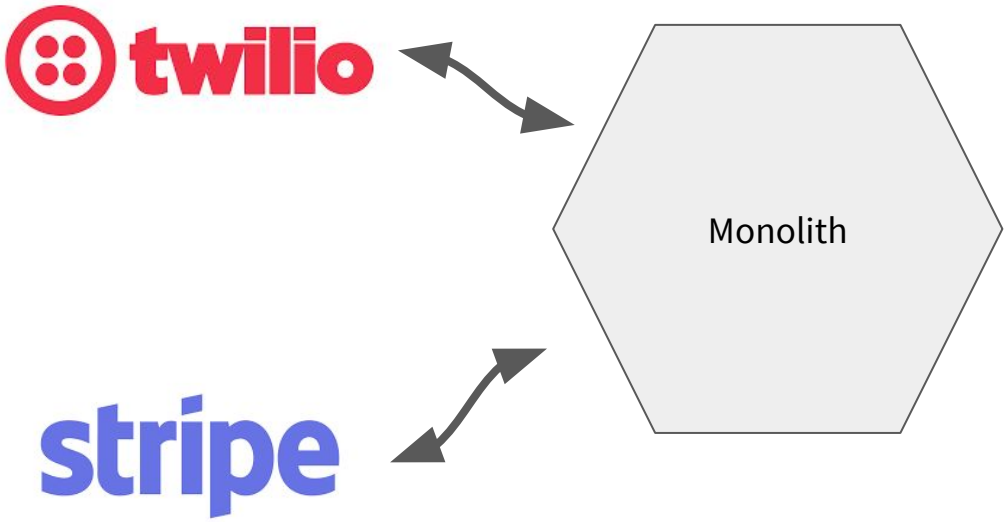
- Self-sufficient
  - Team does not need to rely on other teams to achieve its goals
- Autonomy
  - Team is able to independently make (process) decisions on how to achieve its goals

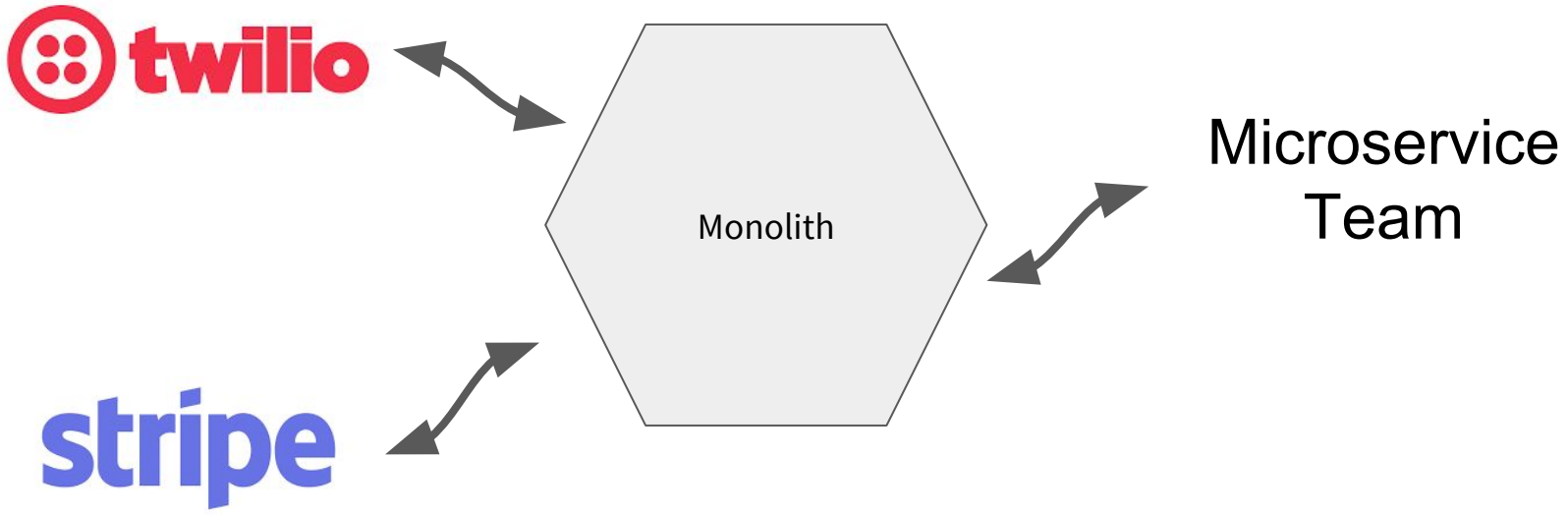
Eliminate centralized specialist functions

Centralized architecture

Centralized infrastructure / ops*
(You might need a platform team)

Think Spinoff


twilio
Monolith
stripe

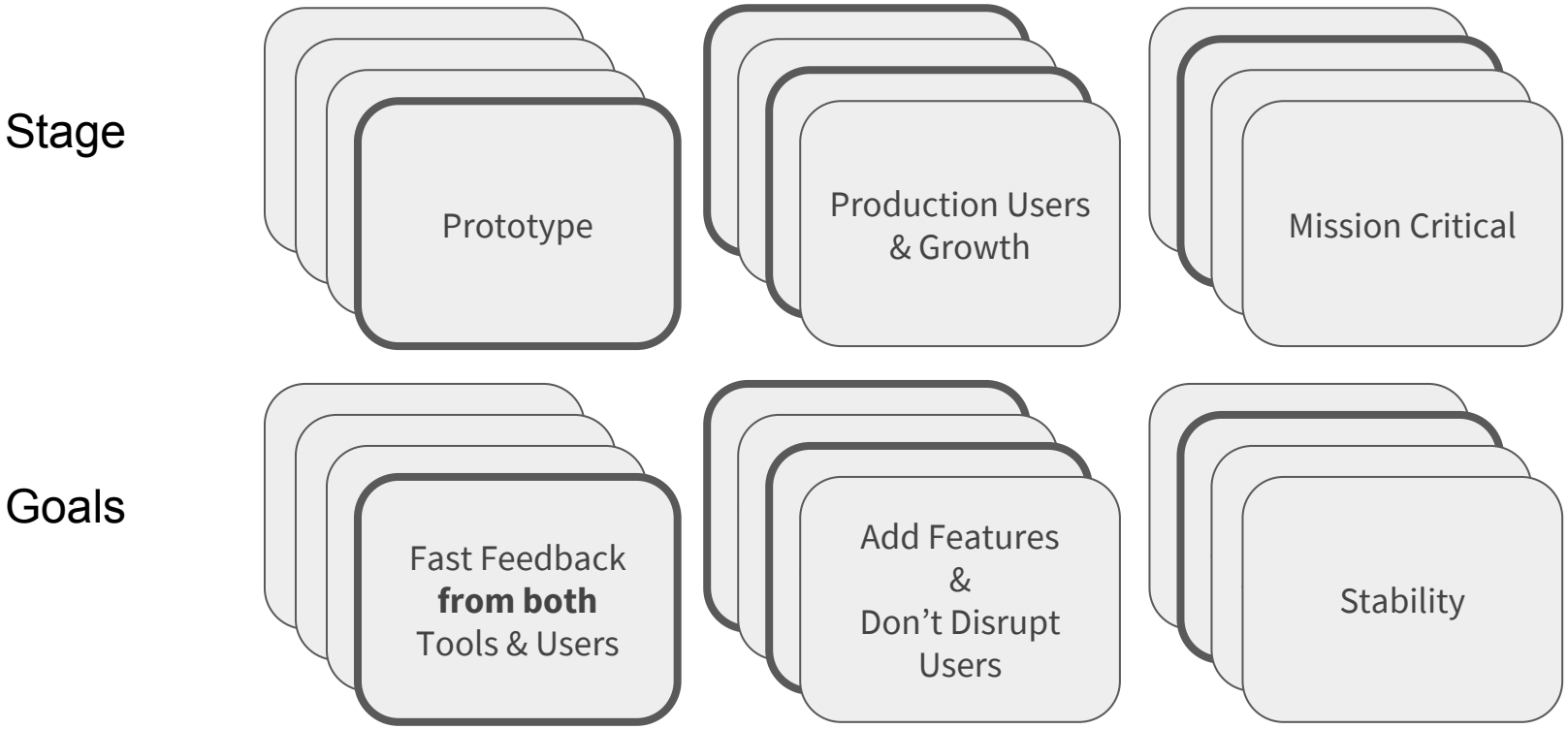

twilio
Monolith
Microservice
Team
stripe

Technical Implementation

The Workflows

Stage	Prototype	Production Users & Growth	Mission Critical
Goals	Fast Feedback **from both** Tools & Users	Add Features & Don't Disrupt Users	Stability

One Platform, Parallel Workflows, Seamless Transitions



Kubernetes / Docker / Envoy give you the infra you need

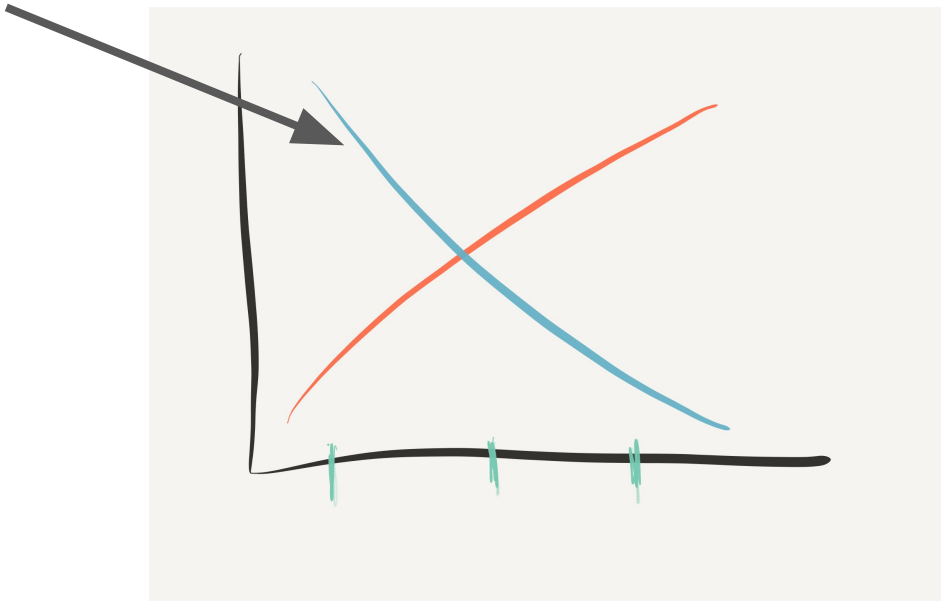
How do I actually use these technologies to build my workflows?

Stage 1: Prototyping

Goal:
Fast Feedback from both Tools and Users

Org Problem:
You need buy-in for prototyping in production

Tech Problem:
You can’t run microservices locally



Strategy:
Self Service Provisioning
&
Development Containers

Provide fast self-service provisioning

Make this fast and easy!

- Too much friction leads to accidental coupling

Problem: Coding on remote infra is slow...

VM based pipeline:

- Deploy time: maybe 45 minutes?

Docker based pipeline:

- Deploy time: maybe a few minutes?

Hacking react on my laptop with live reload:

- Maybe 1-2 seconds?

Hacking flask on my laptop with live reload:

- Instantaneous

How can we do better?

Develop inside a container

Helps with onboarding and jumping between services:

- Single source of truth for build & dependencies
- Consistent and portable dev environment

You can make a faster feedback loop:

1. Sync local files -> remote build
2. Sync local files -> local build; snapshot image; deploy in seconds
3. Sync local files -> local build; proxy into remote cluster

Shameless self promotion:

- See https://forge.sh for (2) and https://telepresence.io for (3)

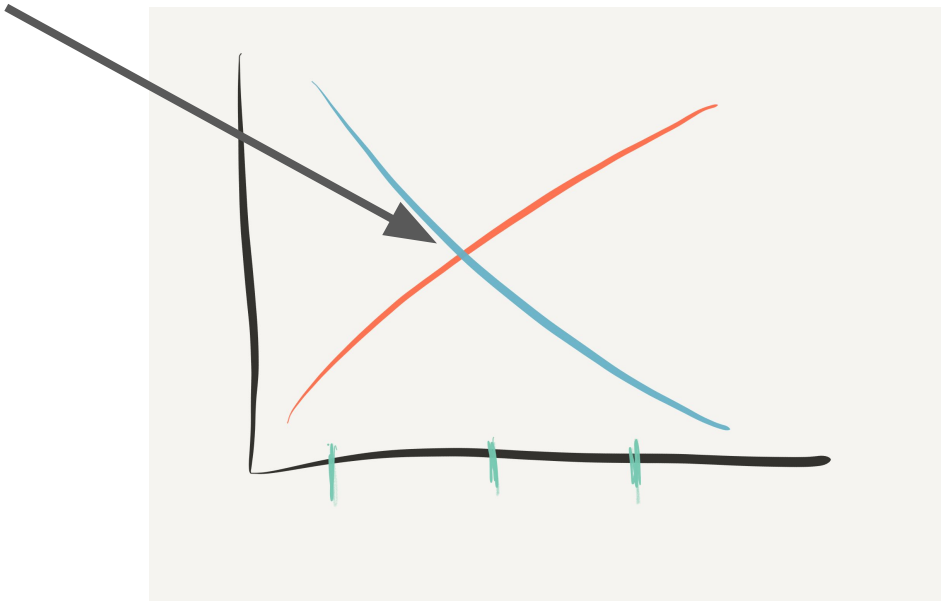
Fast Deploy == Resilience

Stage 2: Production Users & Growth

Goal:
Add Features
&
Don't Disrupt Users

Org Problems:
Recognize the Tradeoff
&
How to measure user impact

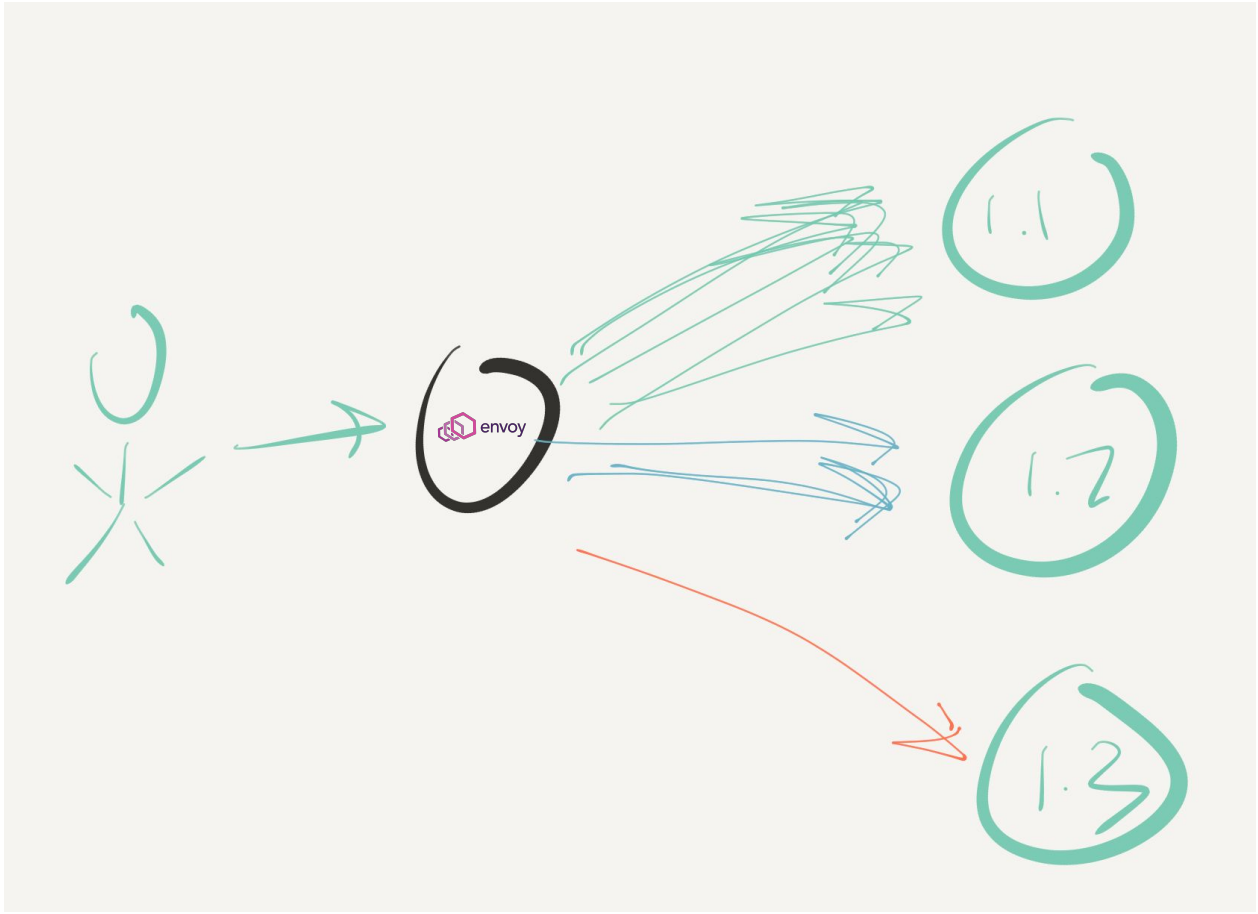
Tech Problem:
Software Bugs



Strategy:
Genetic Diversity
(Multiversion Deployment)

Multiple versions for software redundancy

End user



Primary version

Canary version

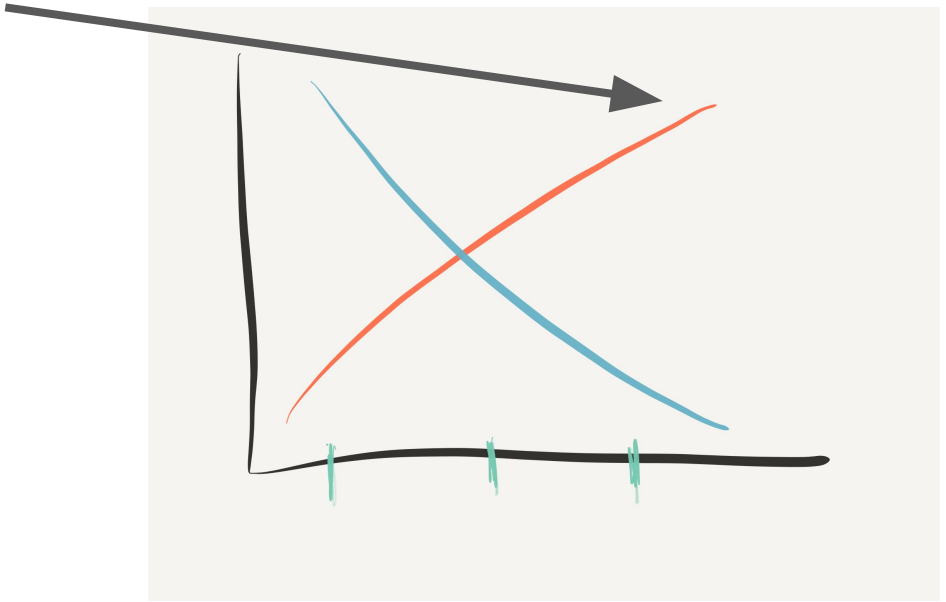
Dev version

Stage 3: Mission Critical

Goal:
Stability

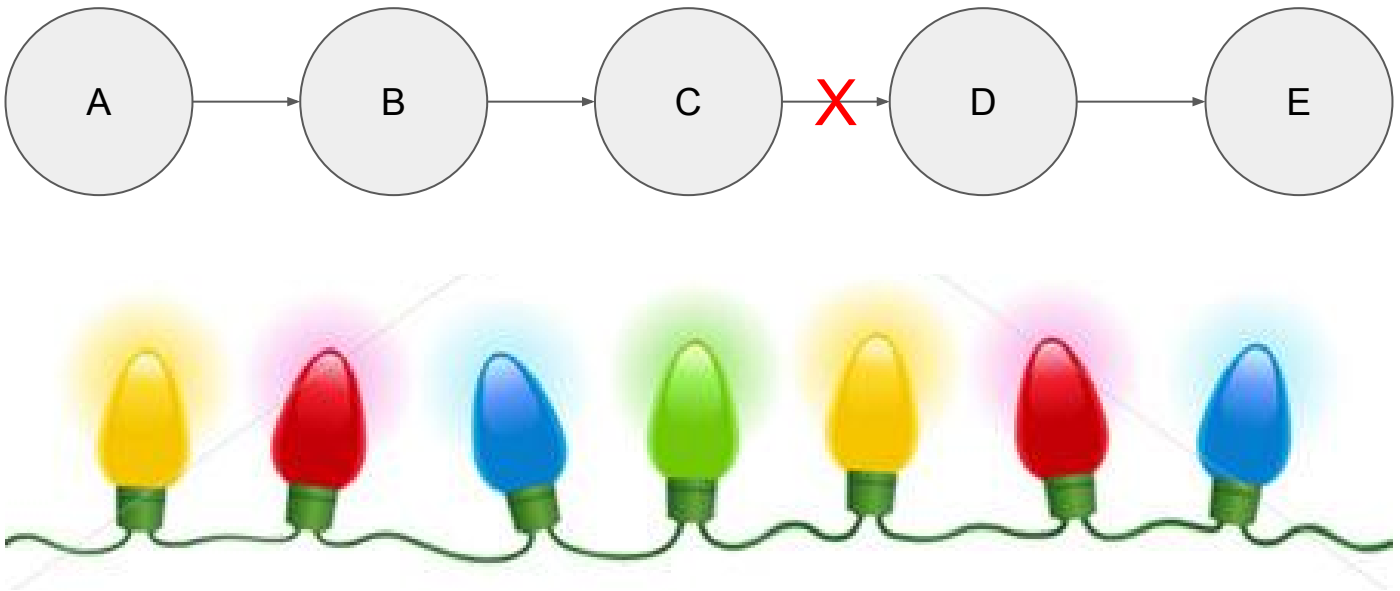
Org Problem:
Avoid regressing

Tech Problem:
L7 Observability



Strategy:
Service Level Objectives
&
L7 Observability

Cascade Failures



Summary

1. Start with: “How do I break up my monolithic process?”
2. Spinoff self sufficient & autonomous teams
3. Build awesome tooling for Service Oriented Development

Thank you!

- rhs@datawire.io
- If you want to learn more about these ideas, check out our hands-on tutorial here:
  - https://datawire.io/faster
- If you're interested in any of our open source tools, check them out:
  - https://forge.sh for deployment
  - https://www.telepresence.io for real-time live coding
  - https://www.getambassador.io self-service API Gateway built on Envoy

END

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