Moving a Monolithic Apps to Kubernetes

Kris Nova

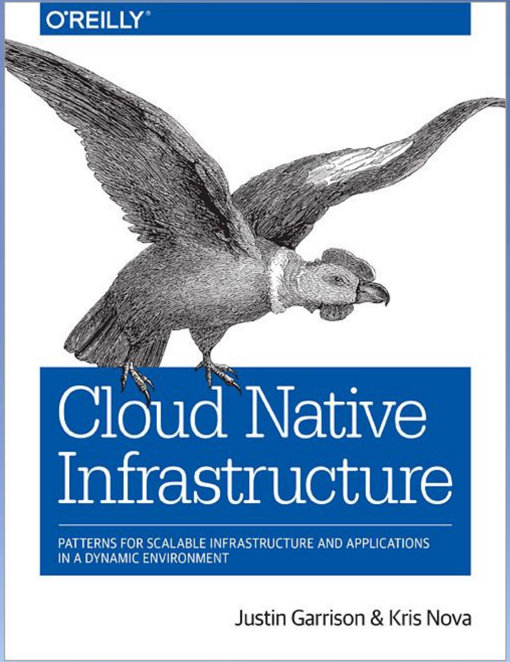
heptio

Who am I?

Kris Nova

- Kubernetes Contributor and Maintainer
  - Kops
  - Kubeadm
  - Cluster API
- Author: Cloud Native Infrastructure
  - Go
  - Terraform
  - Kubernetes
  - CNCF
- Kubicorn
- Developer Advocate - Heptio

heptio


O'REILLY

Cloud Native Infrastructure

PATTERNS FOR SCALABLE INFRASTRUCTURE AND APPLICATIONS IN A DYNAMIC ENVIRONMENT

Justin Garrison & Kris Nova

heptio

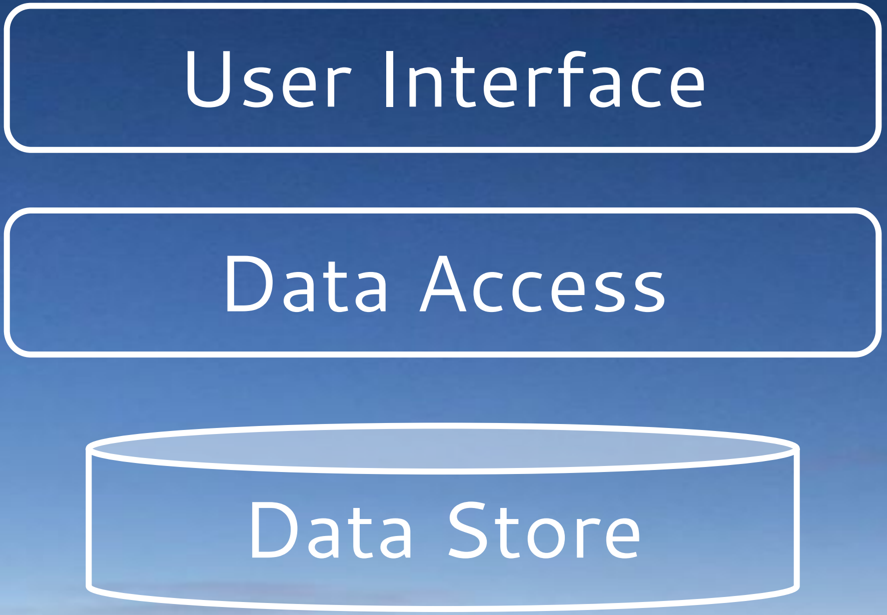
So why monolthic applications?

Experience at Heptio

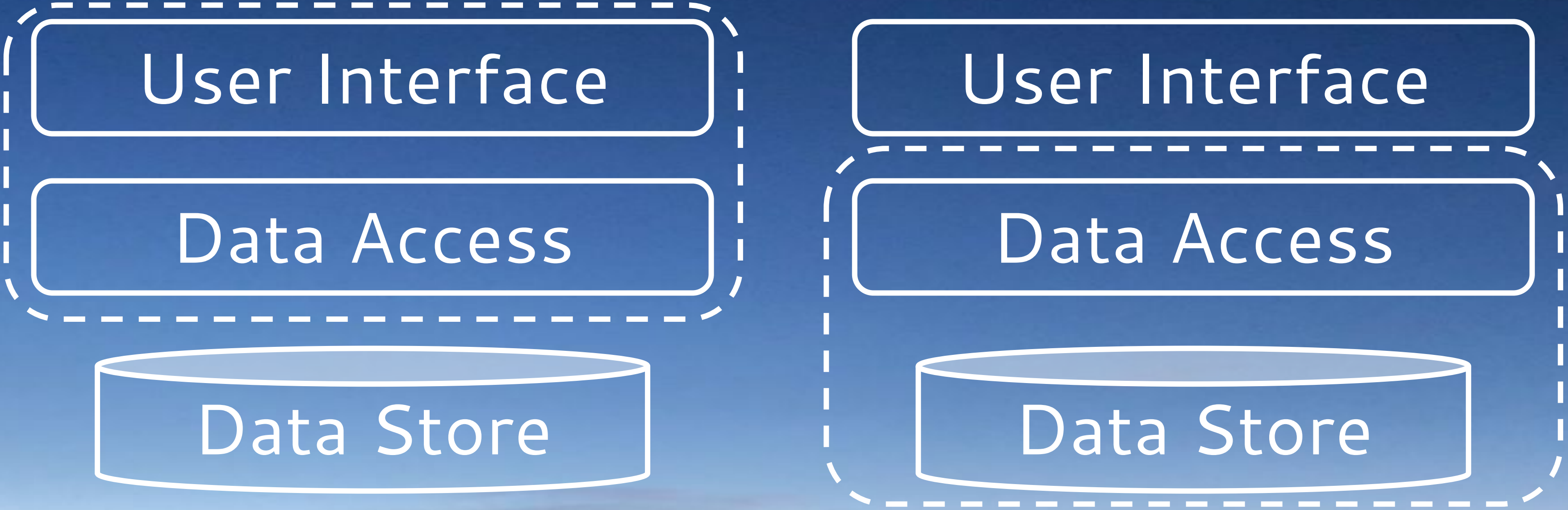
- Looking at real life situations with large stateful applications
- Discovered there is way more Java than we thought
- Discovered there wasn't really a good story for these large applications
- Started working on figuring out a migration story

What is a monolithic application?

Lets define an application



Monoliths have one or more are tightly coupled



There are a lot of monolithic applications

So what about Kubernetes?

Is Kubernetes right for me?

What should I consider?

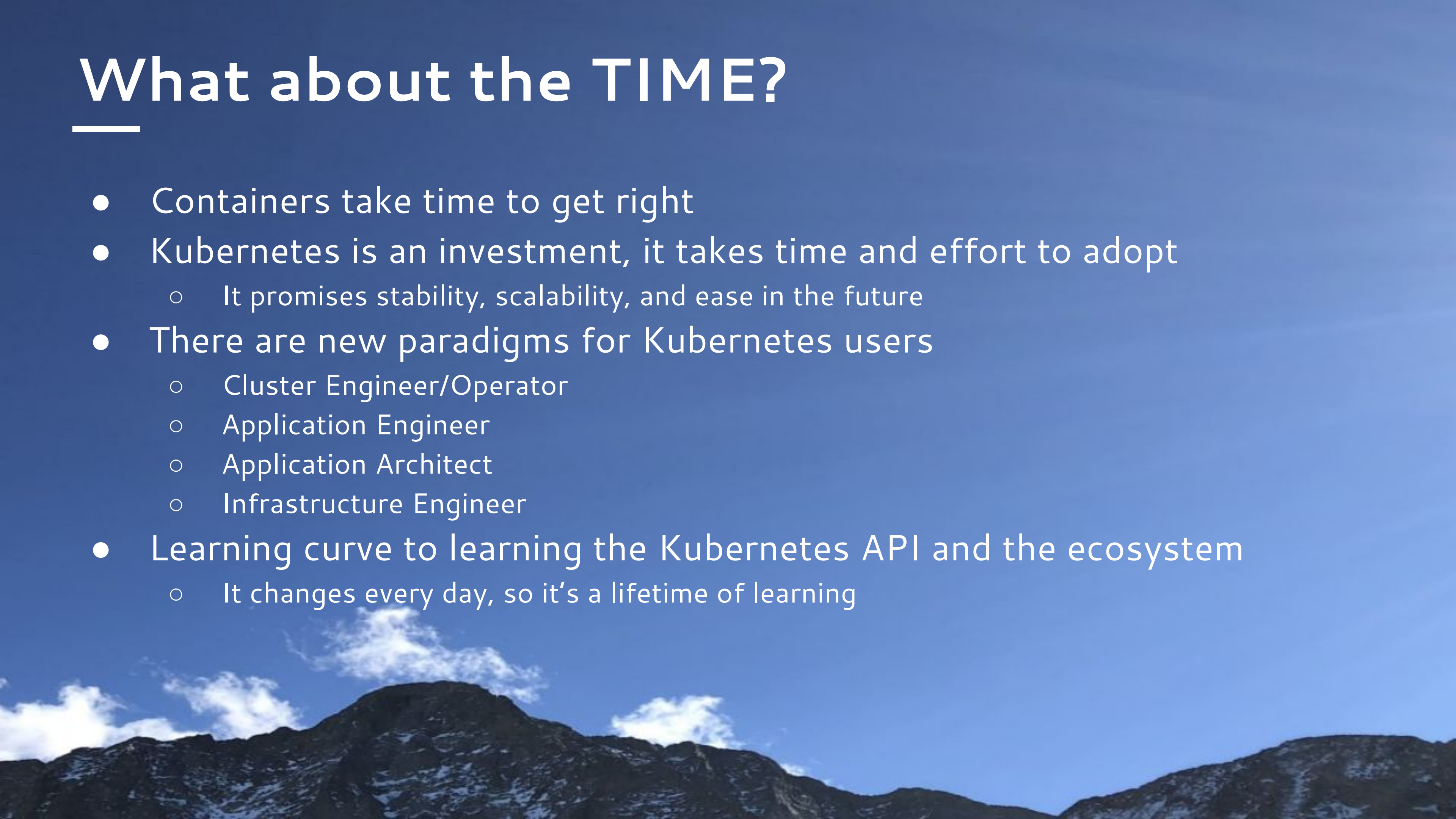
1. Value
2. Risk
3. Time

What do we gain in VALUE?

- Scalability
- Ease of orchestration
  - More time for customers and engineering
- Ecosystem of work in open source
  - Storage, CNI, Logging, Alerting, Monitoring
- Cost savings
  - Case studies of 40-50% cost in hardware savings
- API of the cloud

What are the RISKS?

1. Kubernetes is NEW and YOUNG
   a. New: most people are less than a year or two in production (learning curve)
   b. Young: the project was open sourced in 2014
2. Installing a cluster is still fragmented and confusing
3. Still have most of the same concerns as you would without Kubernetes
4. Most large applications are not containerized
5. CI/CD systems need to be built out and understood
6. Security is still a concern



What about the TIME?

- Containers take time to get right
- Kubernetes is an investment, it takes time and effort to adopt
  - It promises stability, scalability, and ease in the future
- There are new paradigms for Kubernetes users
  - Cluster Engineer/Operator
  - Application Engineer
  - Application Architect
  - Infrastructure Engineer
- Learning curve to learning the Kubernetes API and the ecosystem
  - It changes every day, so it’s a lifetime of learning

Technical Concerns?

Let's talk about state in Kubernetes

- Implies some volume management (block storage, volumes, etc)
- Implies persistency
- Implies backups and restoring
- Still relatively complicated in Kubernetes
- Automatable (Heptio Ark)

Risk

Time

Value

Running stateful applications in Kubernetes can sometimes make sense

Running your app in a container

- There are a lot of developers tools to help with this
- Java 10 solves most* Java concerns with containers!
- Gain security, repeatability, and packaging
- CI/CD (something) needs to be put in place
- You can either have one container to rule them all or...
    - See next slide

Risk

Time

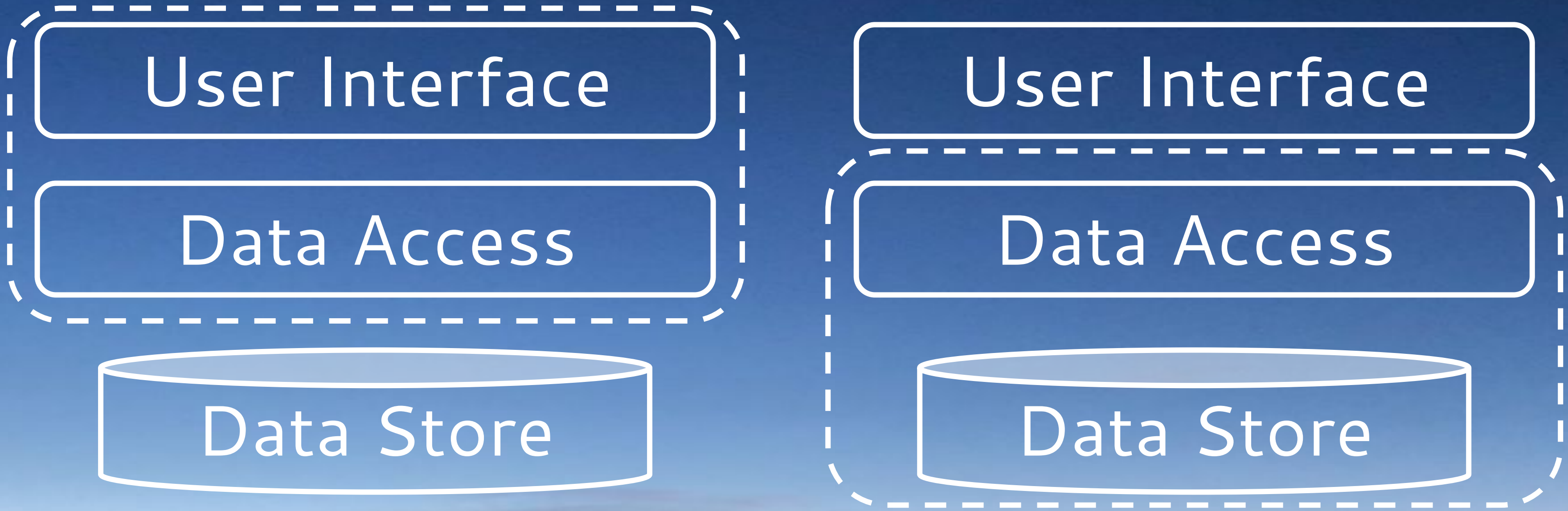
Value

You can finally start breaking your app apart…

Where do you draw the line in your app?

- The network is the new application interface
  - gRPC, HTTP, Istio, Service Meshes
- Any time you start to transfer large, complete data structures in your app
- Sometimes just bring the whole thing over
- But you can always start with the big 3
  - Next slide...

Monoliths have one or more are tightly coupled



Awareness that containerizing your app might take time, but has benefits

What about your applications?

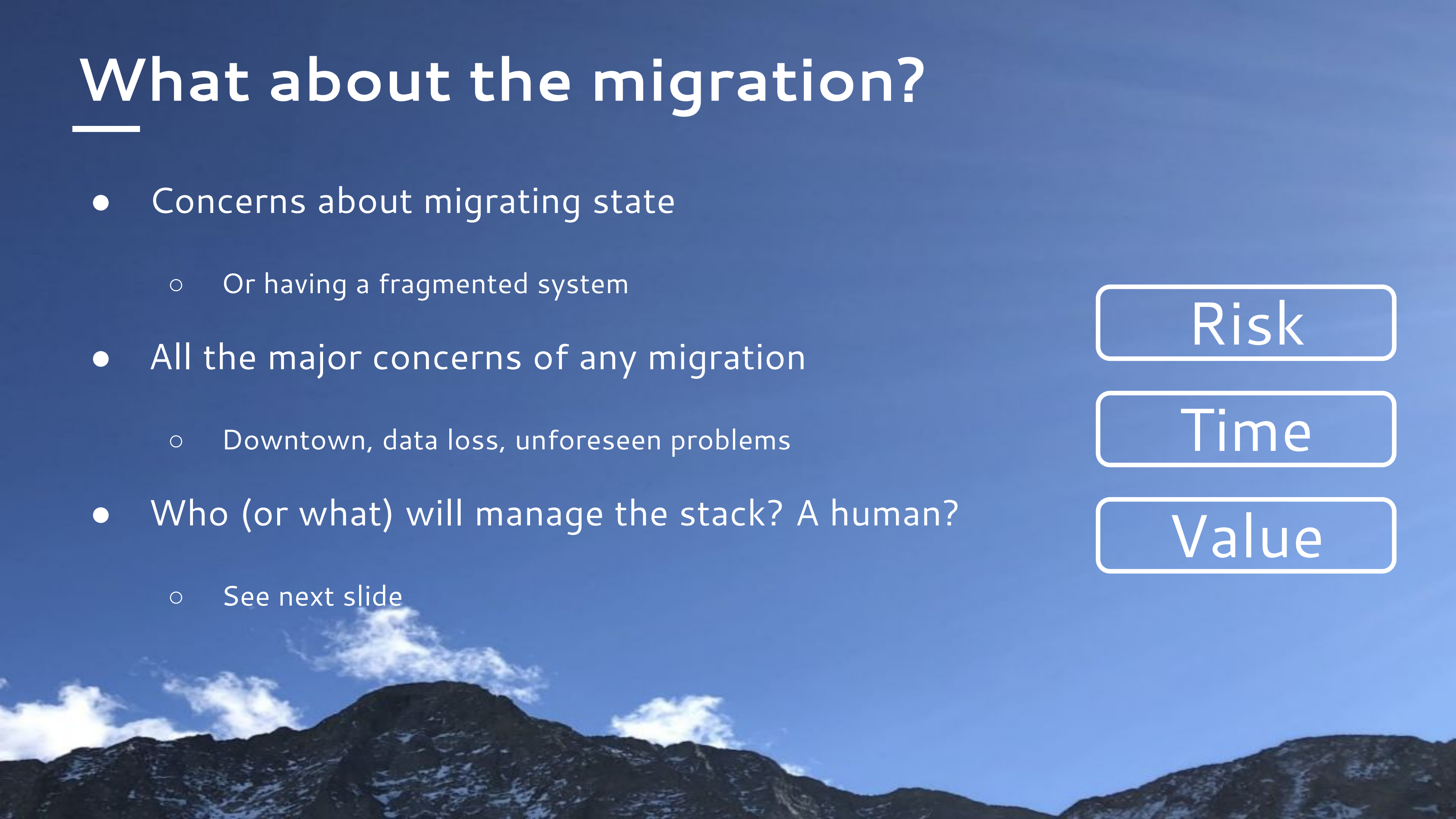
- Encapsulate all resources for your app
    - Static manifests, ksonnet, helm, git
- Debugging and developing your applications take work
    - New logging paradigms, new development stories
- Gain scalability, and reliability
    - Scheduler is dope

Risk

Time

Value

Running applications takes time, but offers a lot of gained value.



What about the migration?

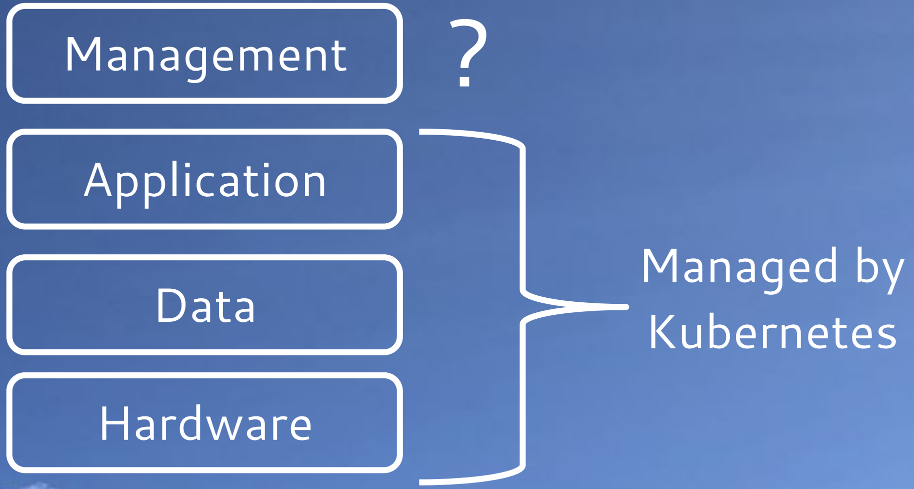
- Concerns about migrating state
  - Or having a fragmented system
- All the major concerns of any migration
  - Downtown, data loss, unforeseen problems
- Who (or what) will manage the stack? A human?
  - See next slide

Risk

Time

Value

What about the migration?



The migration is similar to any other migration, and risky.

Why are monoliths harder

- Probably a code change
    - Entrypoint matters
- How do you manage config
- Applications not designed to be ran in a container
- Engineering effort to change already brittle application
- Big

Risk

Time

Value

The application audit

- Huge lesson on even knowing concretely what you have
- Where is the list of dependencies your application needs?
- Where do your configs live?
- Does your application care what OS it’s running ?

Monlithic applications are significantly harder

What about logging, monitoring, alerting?

- Plethora of open source solutions
  - Prometheus, Heapster, Grafana, etc
- Kubernetes has built in health endpoints
  - Readiness probe, healthz, etc

Risk

Time

Value

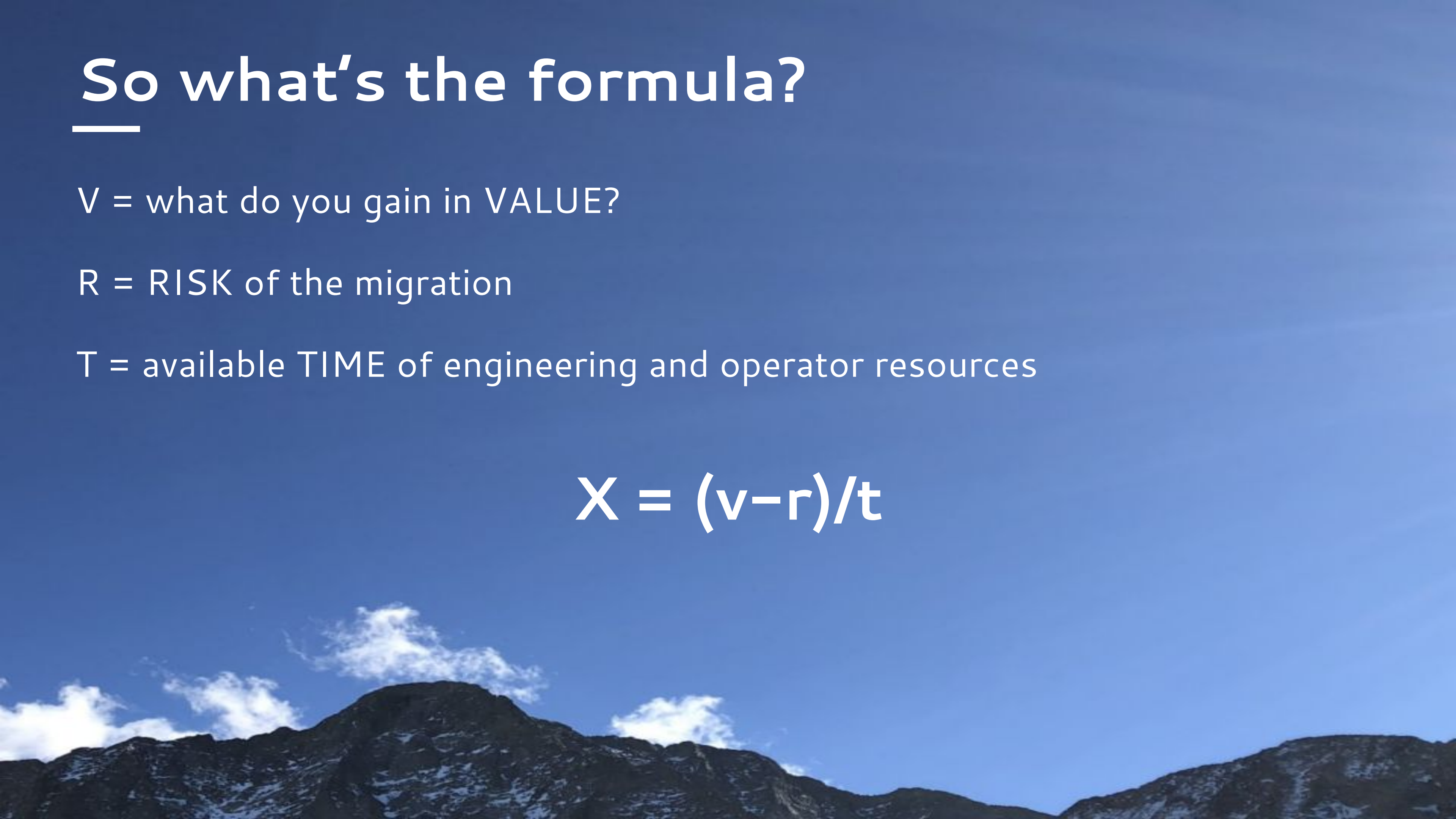
The Kubernetes ecosystem can help cut costs

Where did we learn this?

We created a prototype application

- Written in Java
- Hard to run and manage
- Designed for cloud foundry
- Never containerized
- github.com/heptio/java-prototype

So in conclusion



So what’s the formula?

V = what do you gain in VALUE?

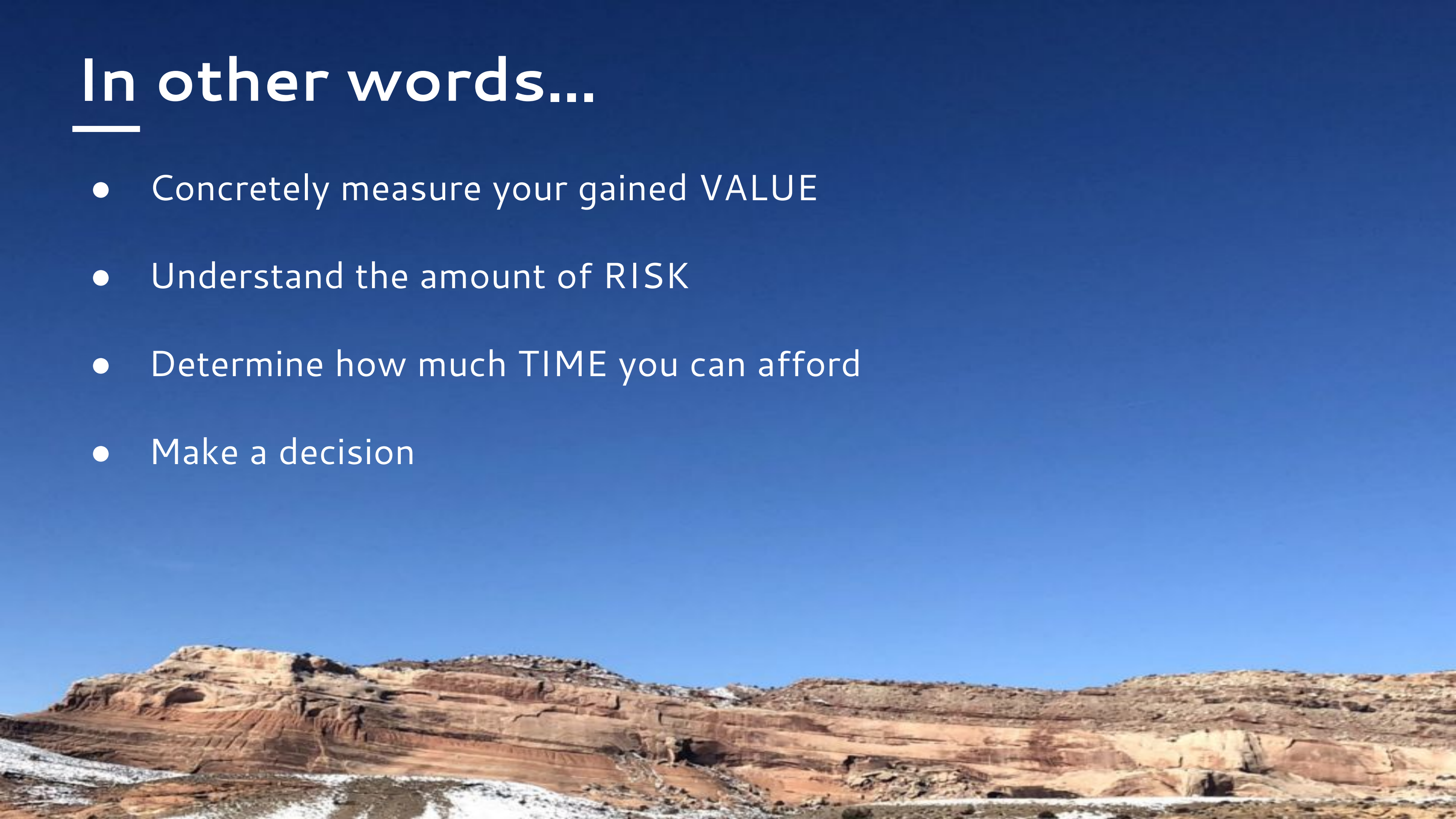
R = RISK of the migration

T = available TIME of engineering and operator resources

$$X = (v-r)/t$$

In other words...

- Concretely measure your gained VALUE
- Understand the amount of RISK
- Determine how much TIME you can afford
- Make a decision



Kris Nova

@krisnova

Kris Nova

@krisnova

Thanks Matt!