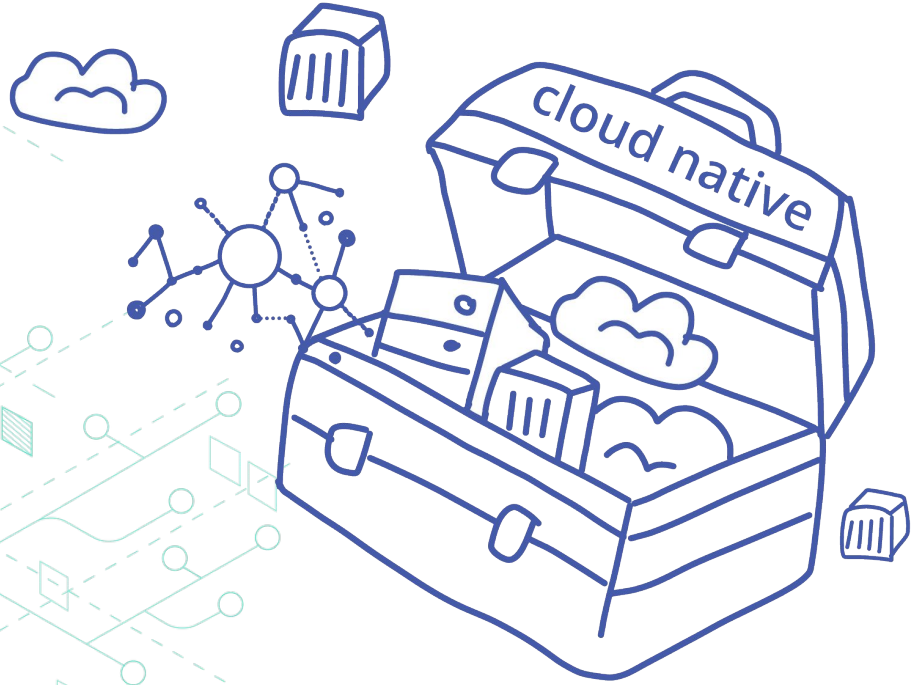
Cloud Native Transformation

Practical Patterns for Innovation

Pini Reznik
@pini42



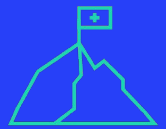
Container Solutions

info@container-solutions.com
container-solutions.com

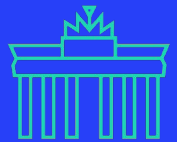
Container Solutions

Amsterdam

London

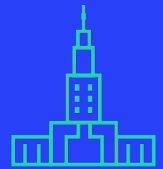


Zurich



Berlin

Montreal



Warsaw

“All great literature is one of two stories; a man goes on a journey or a stranger comes to town.”

Leo Tolstoy

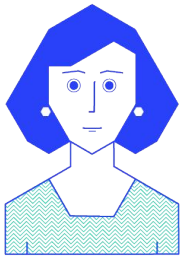
Meet

WEALTHGRID

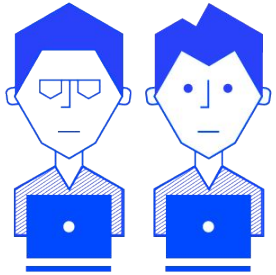
A successful, mid-size financial company

Meet the People

CEO



Jenny
a Technical Manager



Engineers

WEALTHGRID

The Stranger is Coming...

ING

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'We want to be a tech company with a banking license' – Ralph Hamers

08 August 2017 1 min read Listen

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Dutch bank ING to spend millions 'disrupting' its own business

Dutch bank ING used digital technology to reinvent itself following the financial crash, and is about to reinvent itself again, says its global CTO, Brendan Donovan

ComputerWeekly.com 10

STARLING BANK

full production bank was built in a year

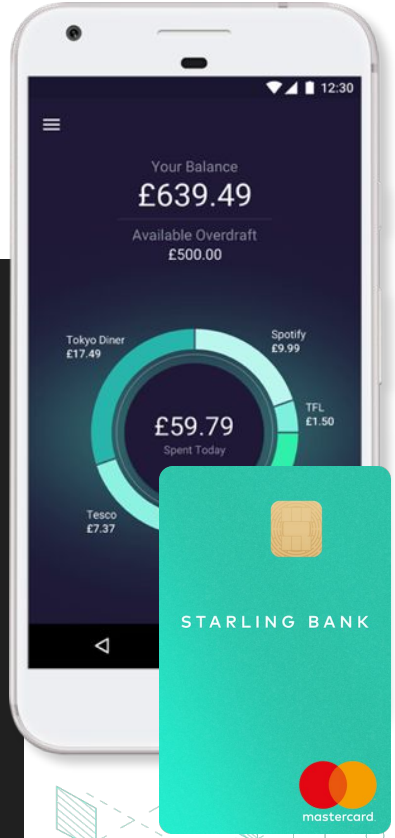
- 2014 Founded by Anne Boden
- June 2014 Kick-off with Regulators
- September 2015 Technical prototypes

2 engineers

- January 2016 Raise $70m – start build
- July 2016 Banking licence & first account in production AWS account
- October 2016 Mastercard debit cards
- November 2016 Alpha testing mobile app
- December 2016 Direct debits live
- January 2017 Faster payments live

20 engineers

- February 2017 Launched beta testing program
- May 2017 Public App Store Launch



Greg Hawkins, Starling Bank

CNBC MARKETS BUSINESS INVESTING TECH POLITICS CNBC TV

Amazon could become the third-biggest US bank if it wants to: Bain study

- Bain writes that Amazon's banking services could grow to more than 70 million U.S. consumer relationships over roughly five years, rivaling Wells Fargo.
- Amazon could evade more than $250,000,000 in credit card interchange fees every year if it finds a bank willing to partner.
- The Bain report finds one-quar
  Alexa would consider using th

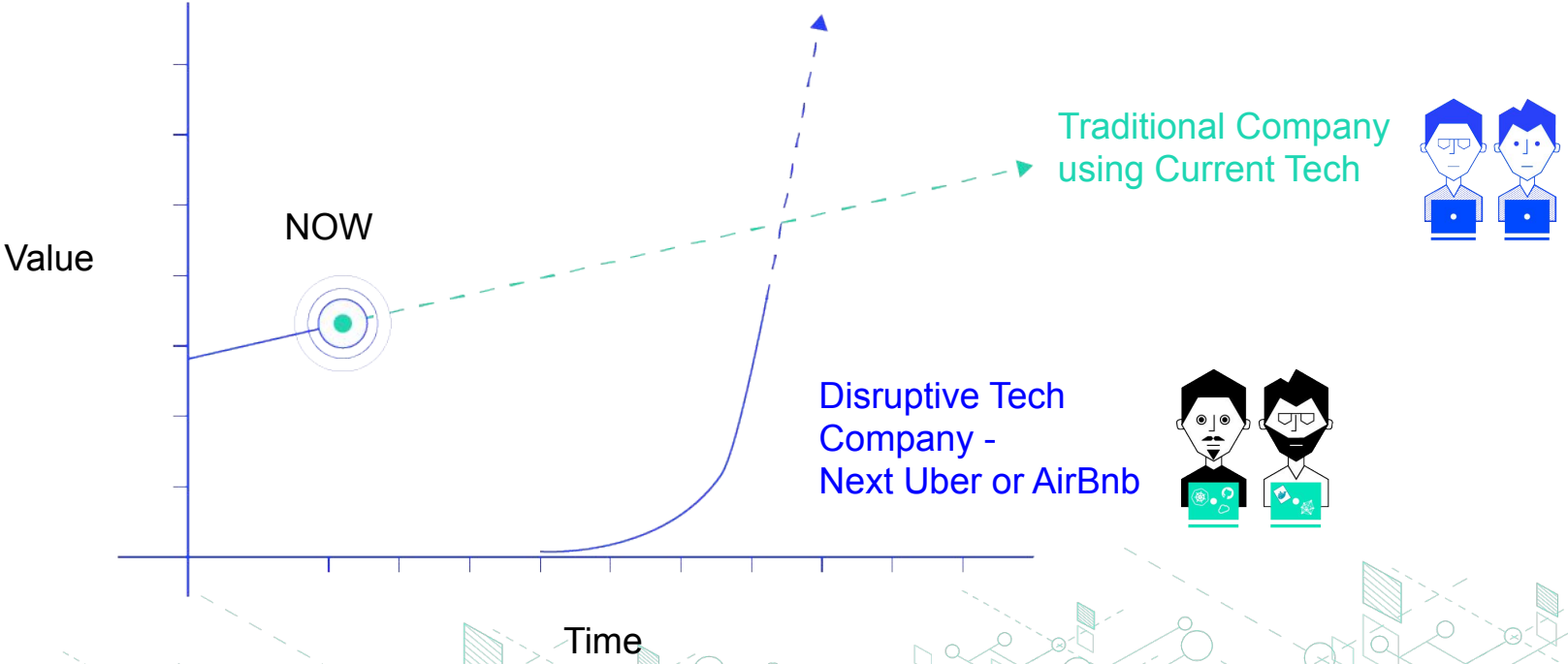
CNN BUSINESS Markets Tech Media Success Perspectives Video

Thomas Franck | @tomwfranck
Published 4:23 PM ET Tue, 6 March 2018 |
CNBC

Pacific

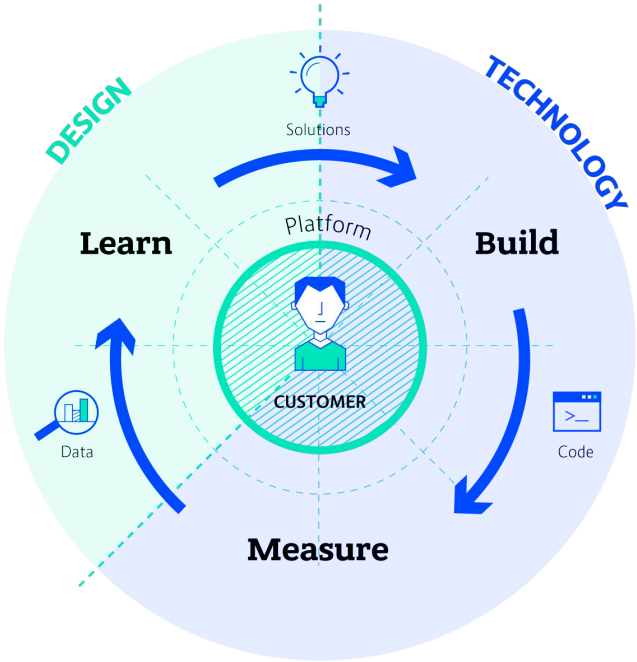
Amazon may eventually have 70 million banking customers

They are coming fast!



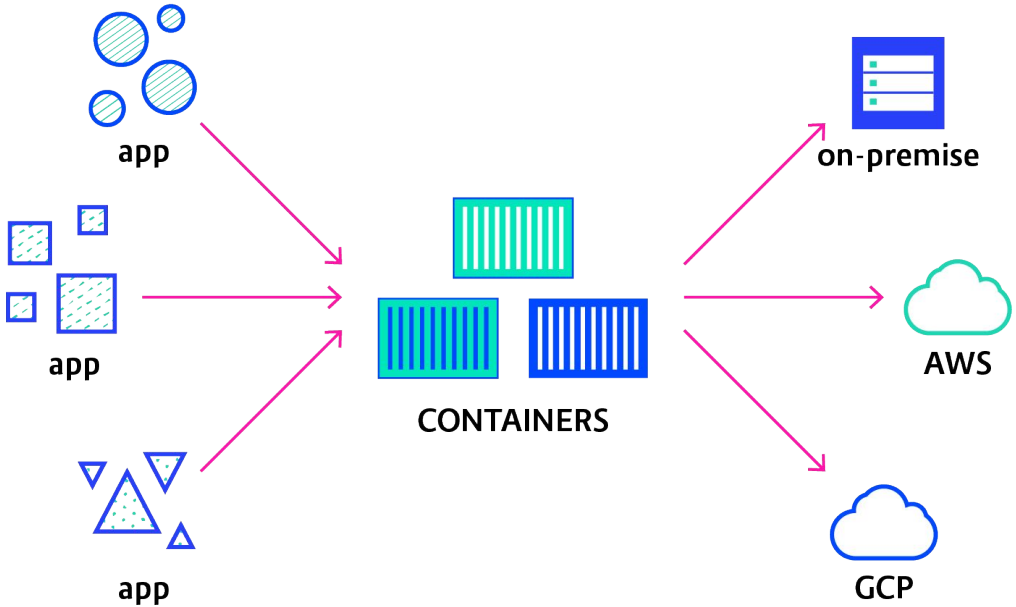
Why?

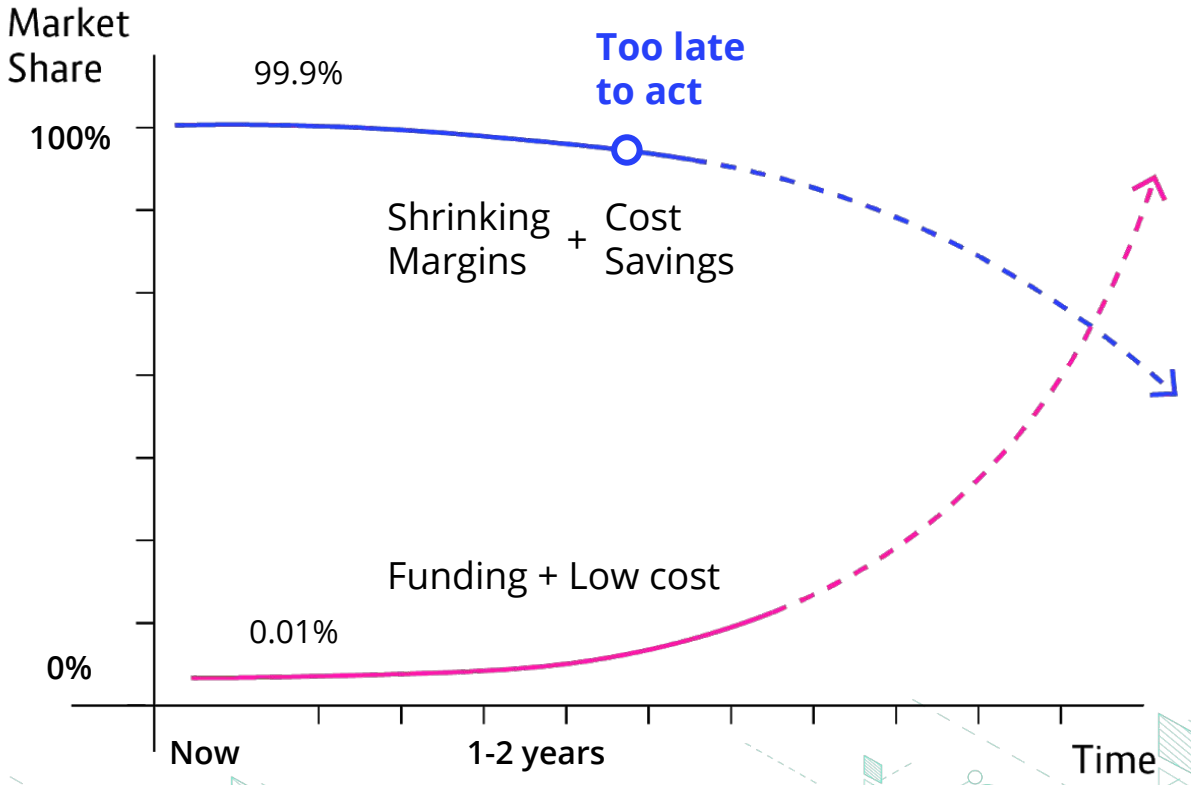
Because they deliver faster and more frequently by using modern technologies



Cloud Native

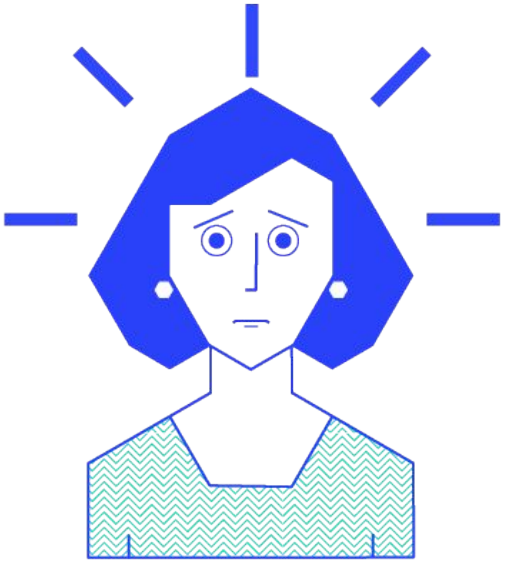
Public Cloud,
Microservices,
Containers (Docker),
Dynamic Scheduling
(Kubernetes),
etc.



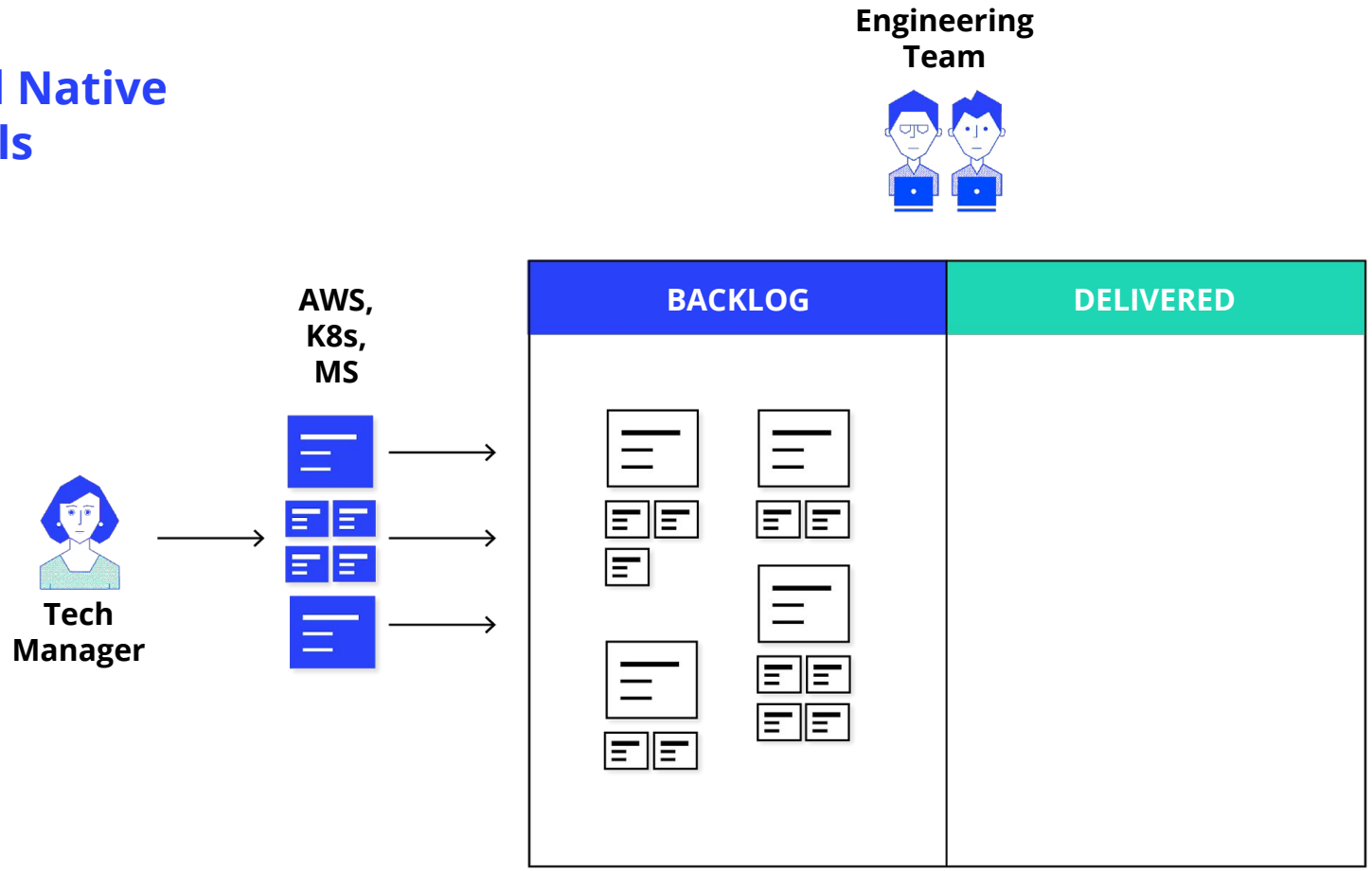

Market Share
99.9%
Too late to act
100%
Shrinking Margins
+
Cost Savings
Funding + Low cost
0.01%
0%
Now
1-2 years
Time

We Must DO Something!

Jenny's wakeup call

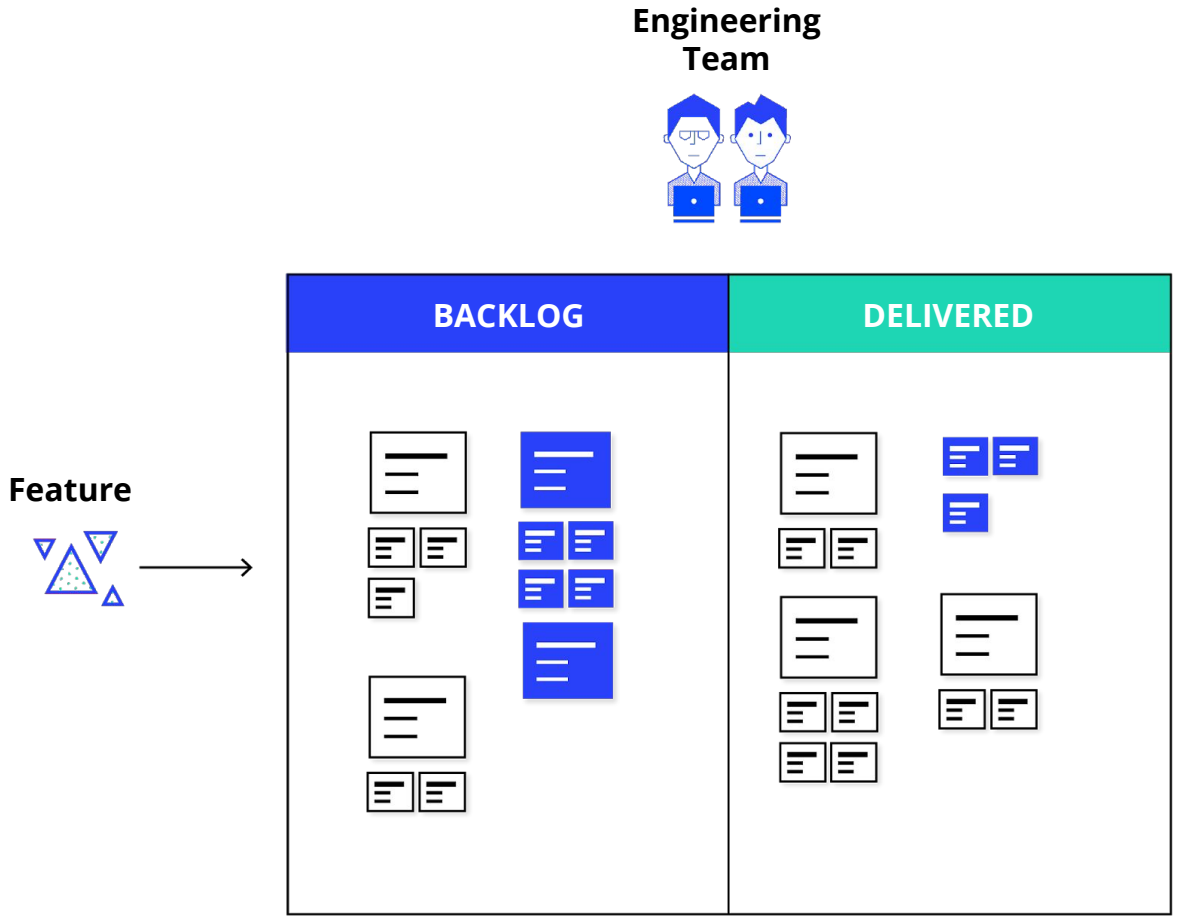


Use Cloud Native Tools



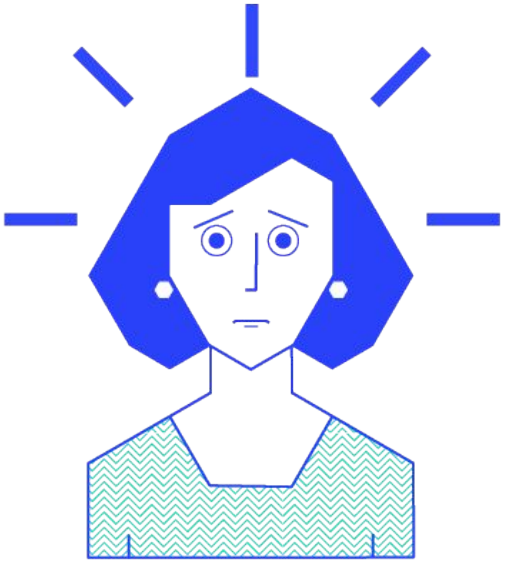
6-12 month later...

Only old stuff +
a bit of CN have
been delivered

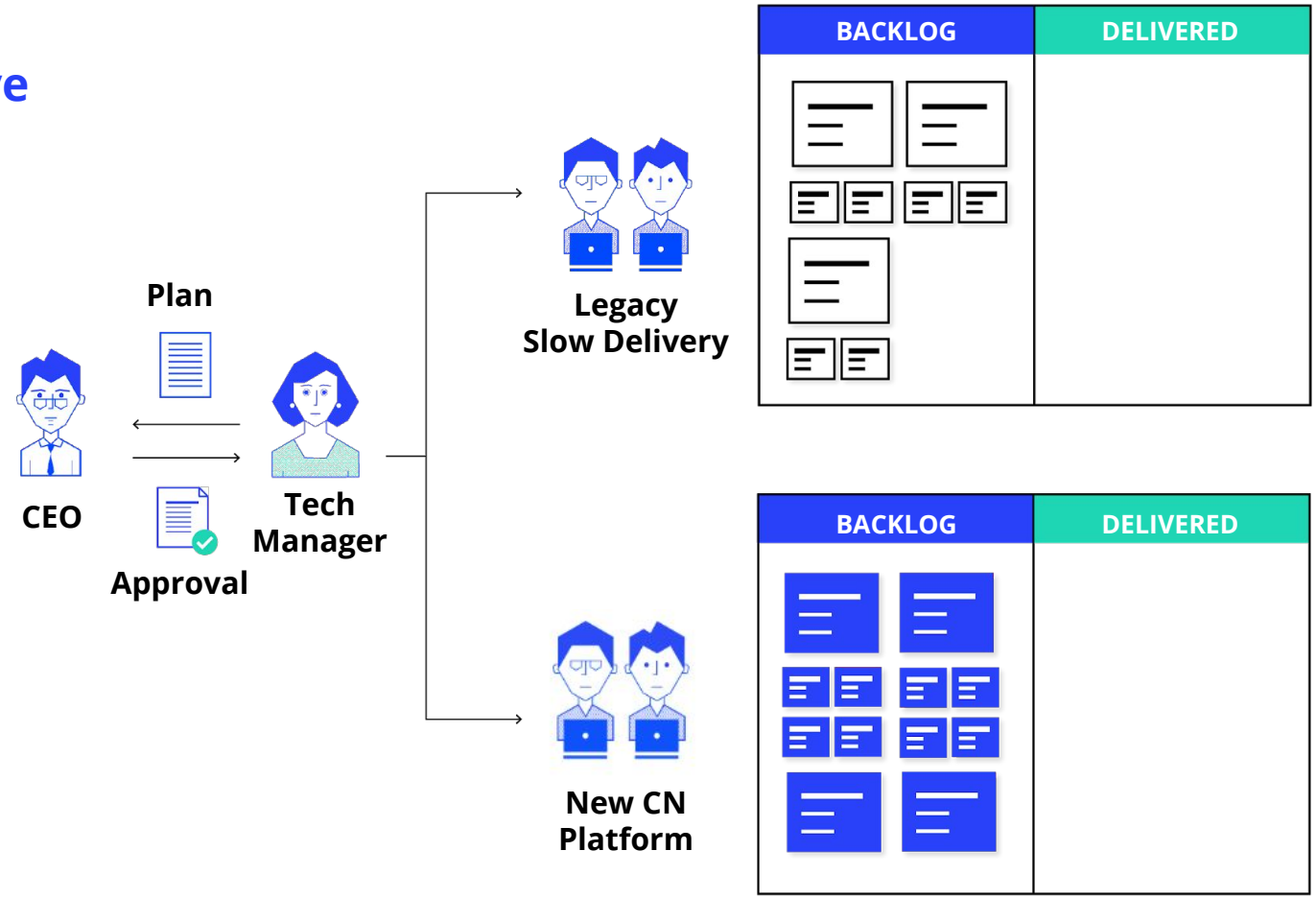


We Must DO Something ELSE!

Jenny's second wakeup call

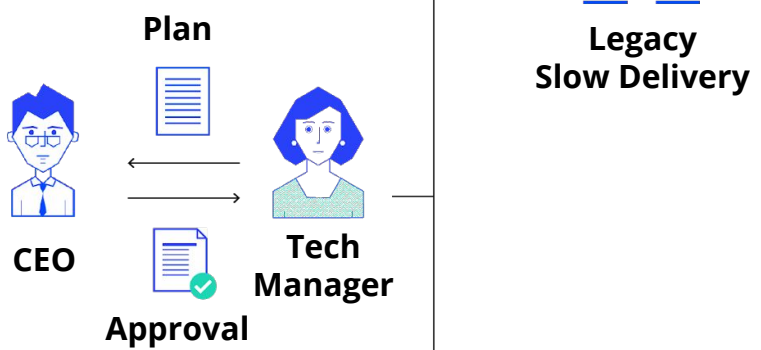


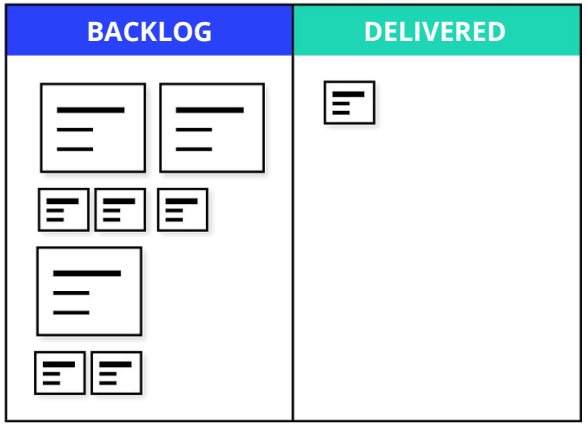
Cloud Native Rewrite

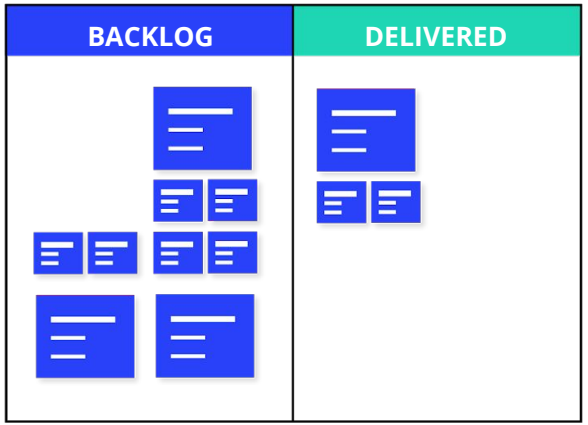


6-12 month later...

Almost no new features + only 30% on CN have been delivered







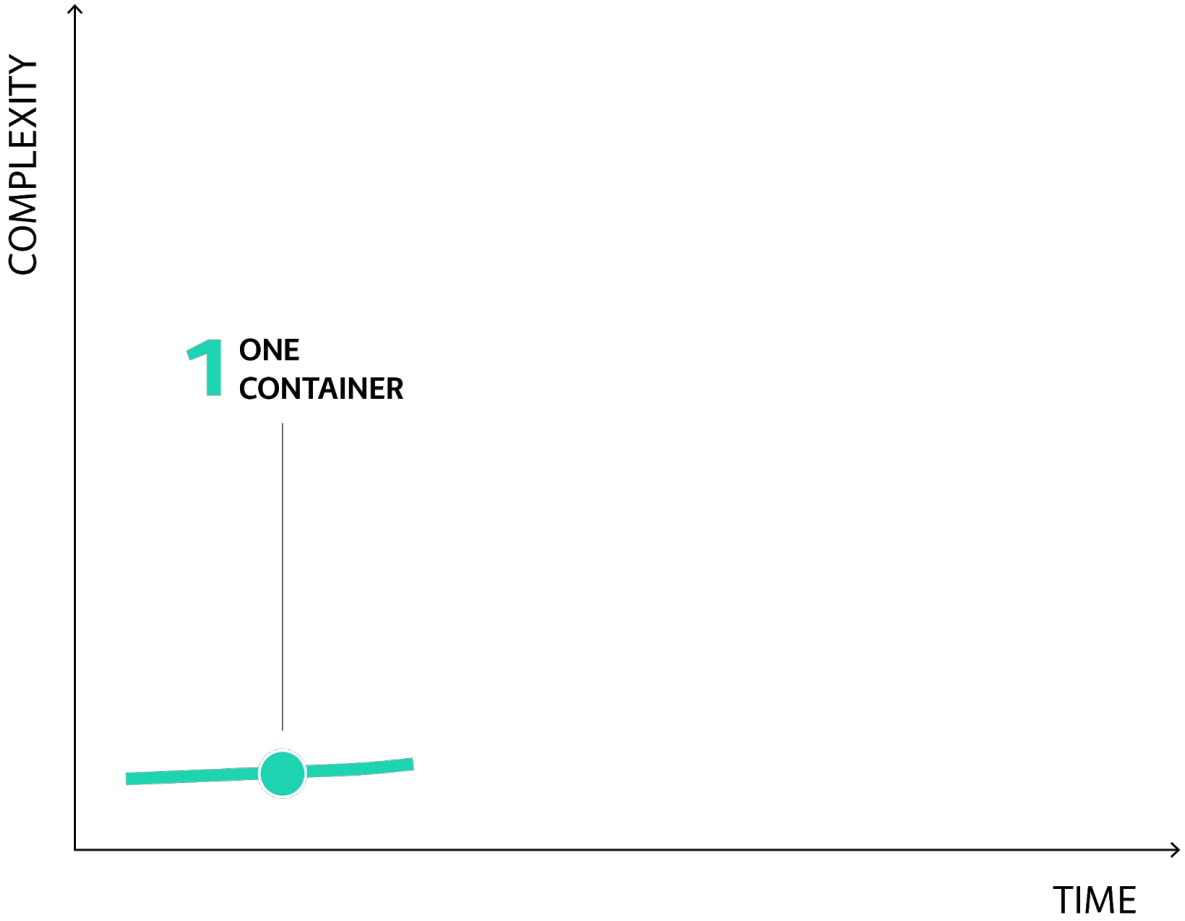
Why is it so difficult?

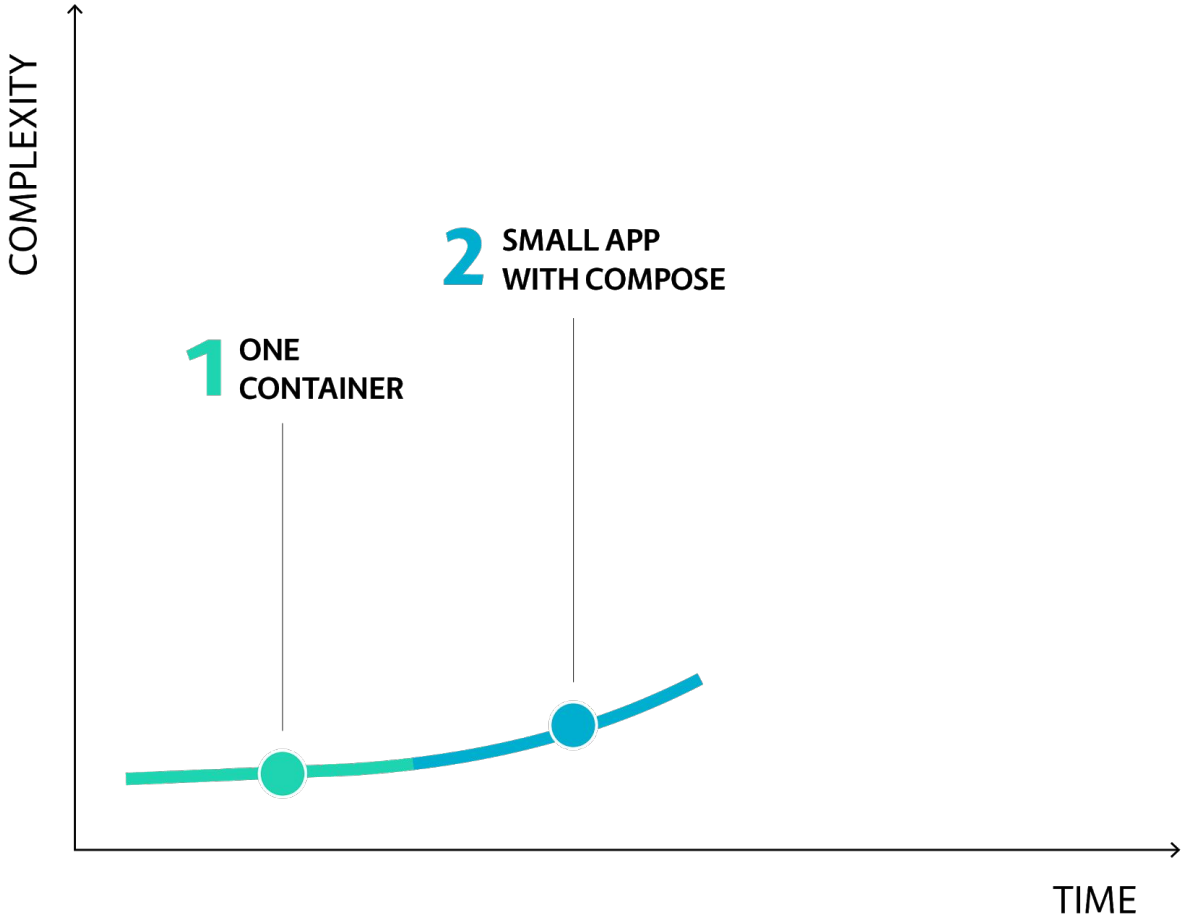
Because - Cloud Native is New, Complex and requires new ways of thinking!

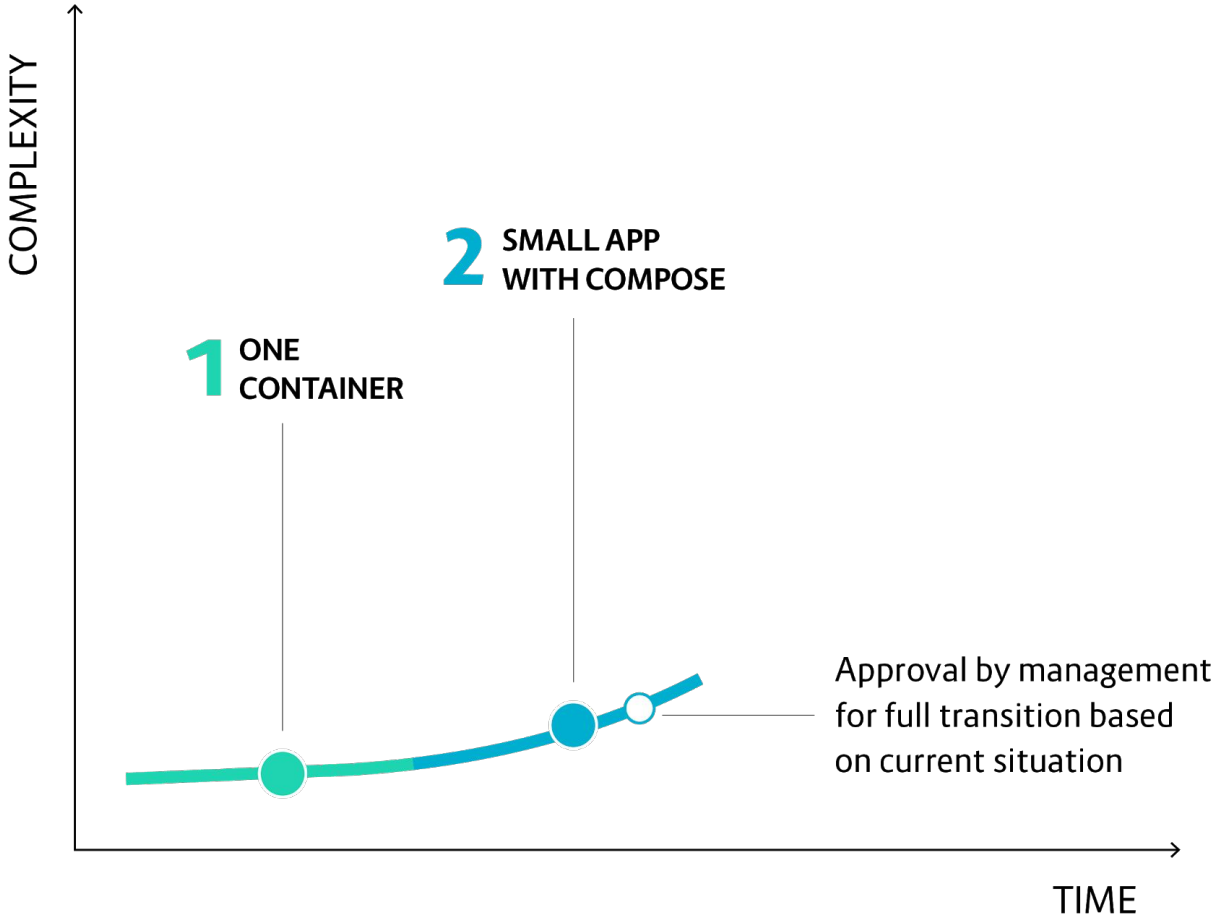
What is CNCF?

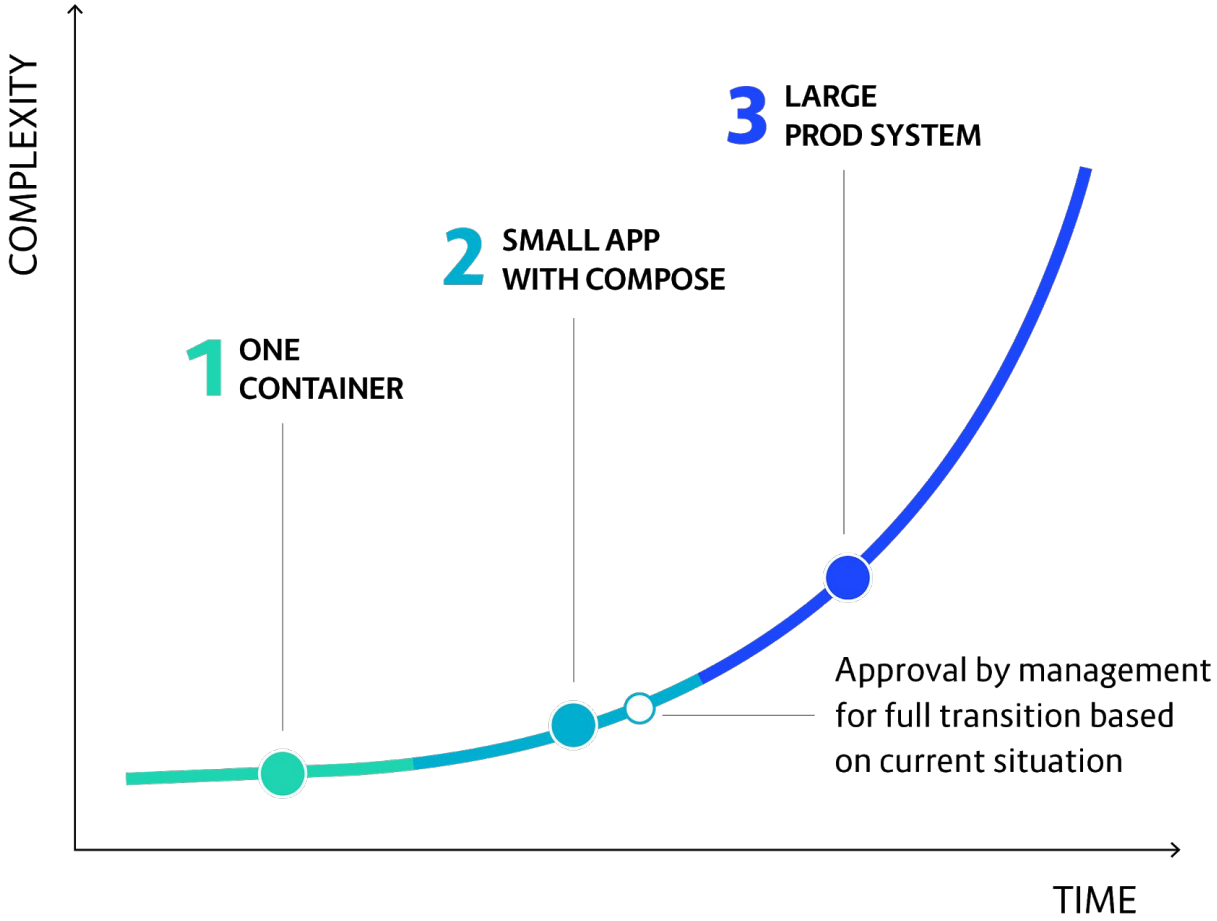
CNCF is an open source software foundation dedicated to making cloud-native computing universal and sustainable. Cloud-native computing uses an open source software stack to deploy applications as microservices, packaging each part into its own container, and dynamically orchestrating those containers to optimize resource utilization. Cloud-native technologies enable software developers to build great products faster.

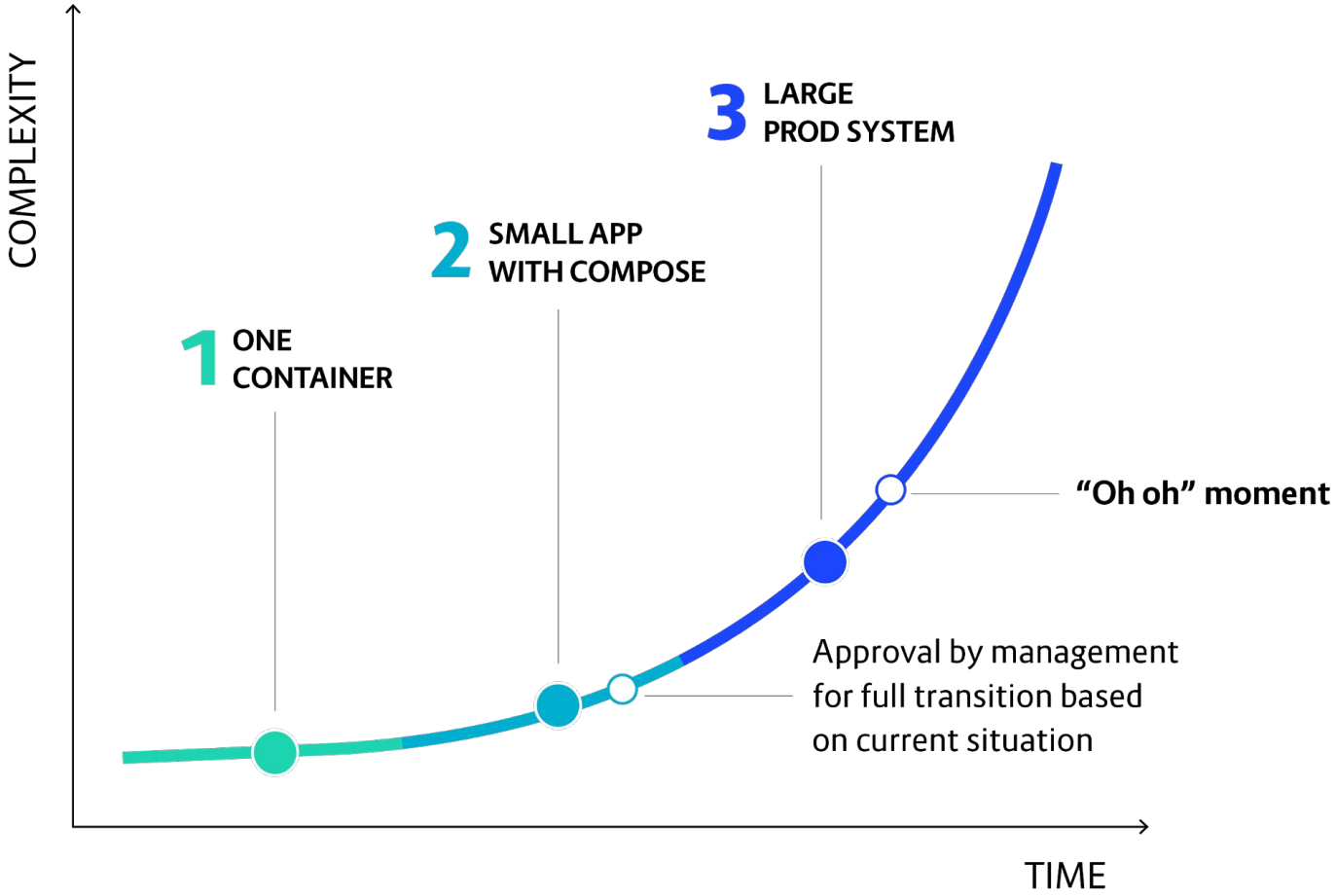
JOIN


COMPLEXITY
1
ONE
CONTAINER
TIME


COMPLEXITY
2 SMALL APP WITH COMPOSE
1 ONE CONTAINER
TIME


COMPLEXITY
2 SMALL APP WITH COMPOSE
1 ONE CONTAINER
Approval by management for full transition based on current situation
TIME

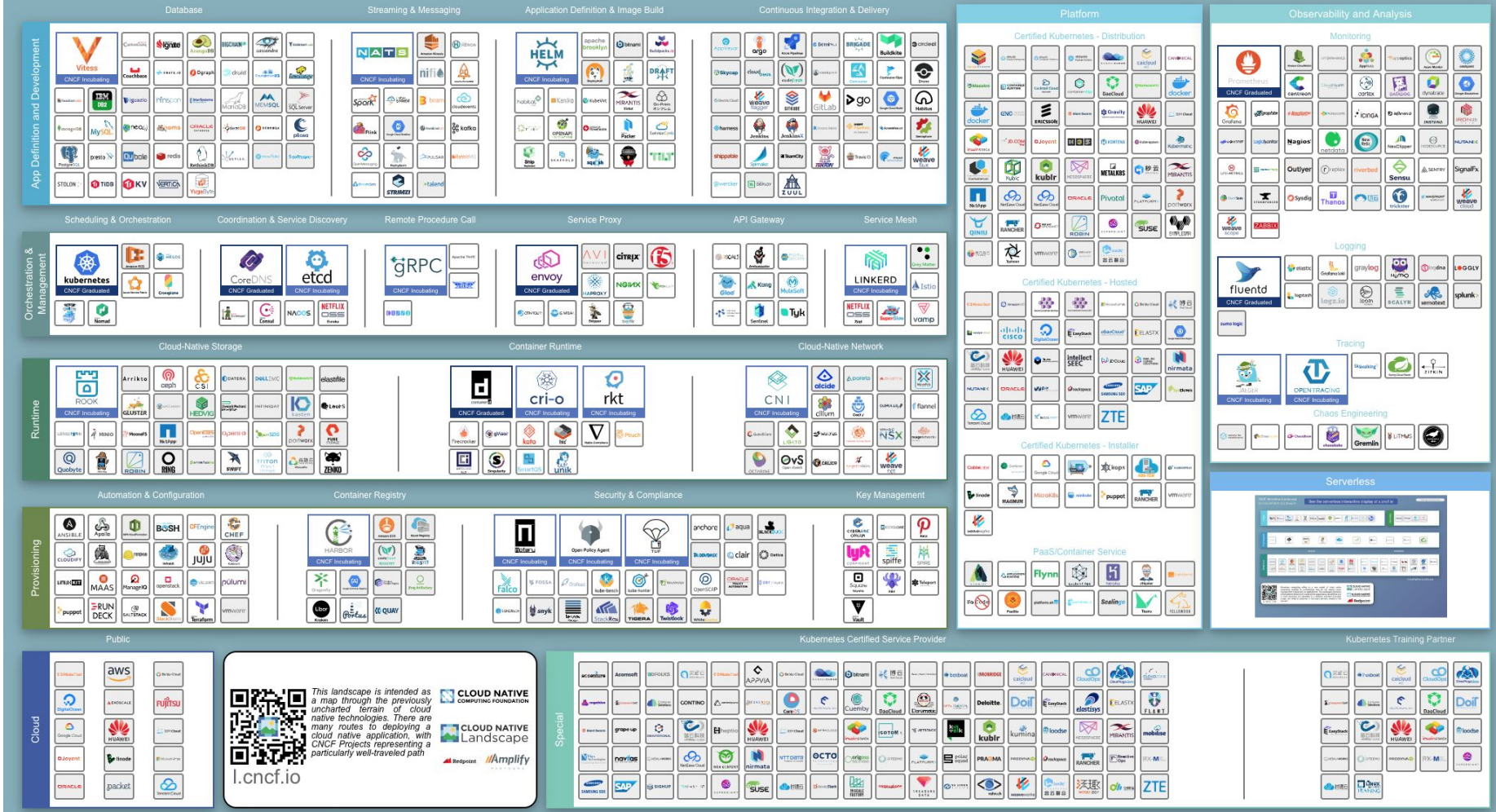

COMPLEXITY
1 ONE CONTAINER
2 SMALL APP WITH COMPOSE
3 LARGE PROD SYSTEM
Approval by management for full transition based on current situation
TIME


COMPLEXITY
1 ONE CONTAINER
2 SMALL APP WITH COMPOSE
3 LARGE PROD SYSTEM
"Oh oh" moment
Approval by management for full transition based on current situation
TIME

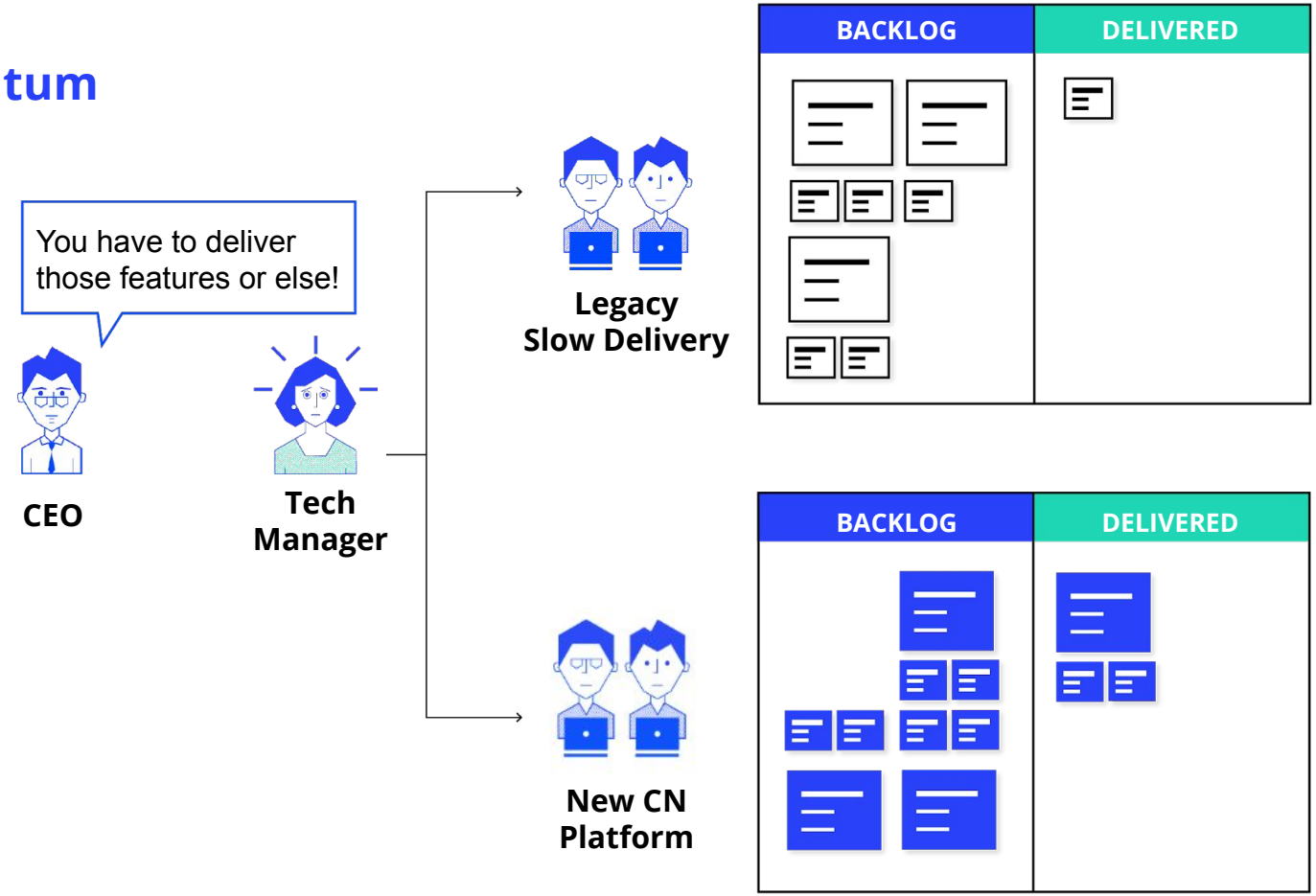
Stage	NO PROCESS	WATERFALL	AGILE	CLOUD NATIVE	NEXT
ARCHITECTURE	Emerging from trial and error	Tightly coupled monolith	Client server	Microservices	Functions
PROVISIONING	Manual	Scripted	Config. management (Puppet/Chef/Ansible)	Orchestration (Kubernetes)	Serverless
INFRASTRUCTURE	Single server	Multiple servers	VMs (pets)	Containers/ hybrid cloud (cattle)	Edge computing

Maturity Matrix

Stage	NO PROCESS	WATERFALL	AGILE	CLOUD NATIVE	NEXT
CULTURE	Individualist	Predictive	Iterative	Collaborative	Experimental
PROD/SERVICE DESIGN	Arbitrary	Long-term plan	Feature driven	Data driven	All driven
TEAM	No organization, single contributor	Hierarchy	Cross-functional teams	DevOps / SRE	Internal supply chains
PROCESS	Random	Waterfall	Agile (Scrum/Kanban)	Design Thinking + Agile + Lean	Distributed, self-organized
ARCHITECTURE	Emerging from trial and error	Tightly coupled monolith	Client server	Microservices	Functions
MAINTENANCE	Respond to users complaints	Ad-hoc monitoring	Alerting	Full observability & self-healing	Preventive ML, AI
DELIVERY	Irregular releases	Periodic releases	Continuous Integration	Continuous Delivery	Continuous Deployment
PROVISIONING	Manual	Scripted	Config. management (Puppet/Chef/Ansible)	Orchestration (Kubernetes)	Serverless
INFRASTRUCTURE	Single server	Multiple servers	VMs (pets)	Containers/ hybrid cloud (cattle)	Edge computing

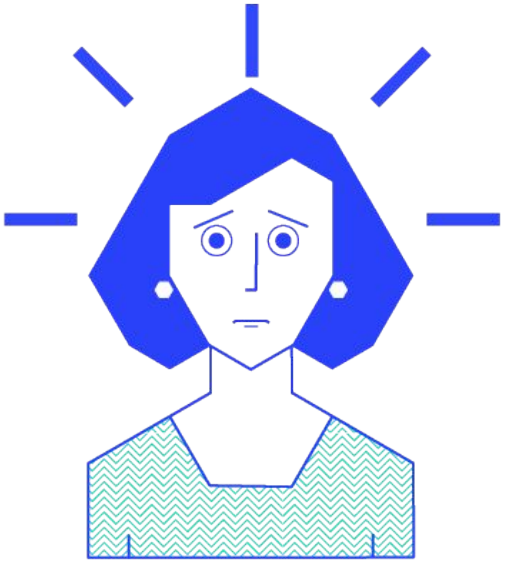

Database
Streaming & Messaging
Application Definition & Image Build
Continuous Integration & Delivery
App Definition and Development
Vitess
CNCF Incubating
NATS
CNCF Incubating
HELM
CNCF Incubating
Scheduling & Orchestration
Coordination & Service Discovery
Remote Procedure Call
Service Proxy
API Gateway
Service Mesh
Orchestration & Management
kubernetes
CNCF Graduated
CoreDNS
CNCF Incubating
etcd
CNCF Incubating
gRPC
CNCF Incubating
envoy
CNCF Graduated
LINKERD
CNCF Incubating
Cloud-Native Storage
Container Runtime
Cloud-Native Network
Runtime
ROOK
CNCF Incubating
cri-o
CNCF Incubating
rkt
CNCF Incubating
CNI
CNCF Incubating
Automation & Configuration
Container Registry
Security & Compliance
Key Management
Provisioning
HARBOR
CNCF Incubating
Notary
CNCF Incubating
Open Policy Agent
CNCF Incubating
TUF
CNCF Incubating
Public
Kubernetes Certified Service Provider
Cloud
Special
Platform
Certified Kubernetes - Distribution
Certified Kubernetes - Hosted
Certified Kubernetes - Installer
PaaS/Container Service
Observability and Analysis
Monitoring
Prometheus
CNCF Graduated
Logging
fluentd
CNCF Graduated
Tracing
OPENTRACING
CNCF Incubating
Chaos Engineering
Serverless
Kubernetes Training Partner
This landscape is intended as a map through the previously uncharted terrain of cloud native technologies. There are many routes to deploying a cloud native application, with CNCF Projects representing a particularly well-traveled path
l.cncf.io
CLOUD NATIVE COMPUTING FOUNDATION
CLOUD NATIVE Landscape
Redpoint
Amplify

The Ultimatum



We Must DO Something Else AGAIN!

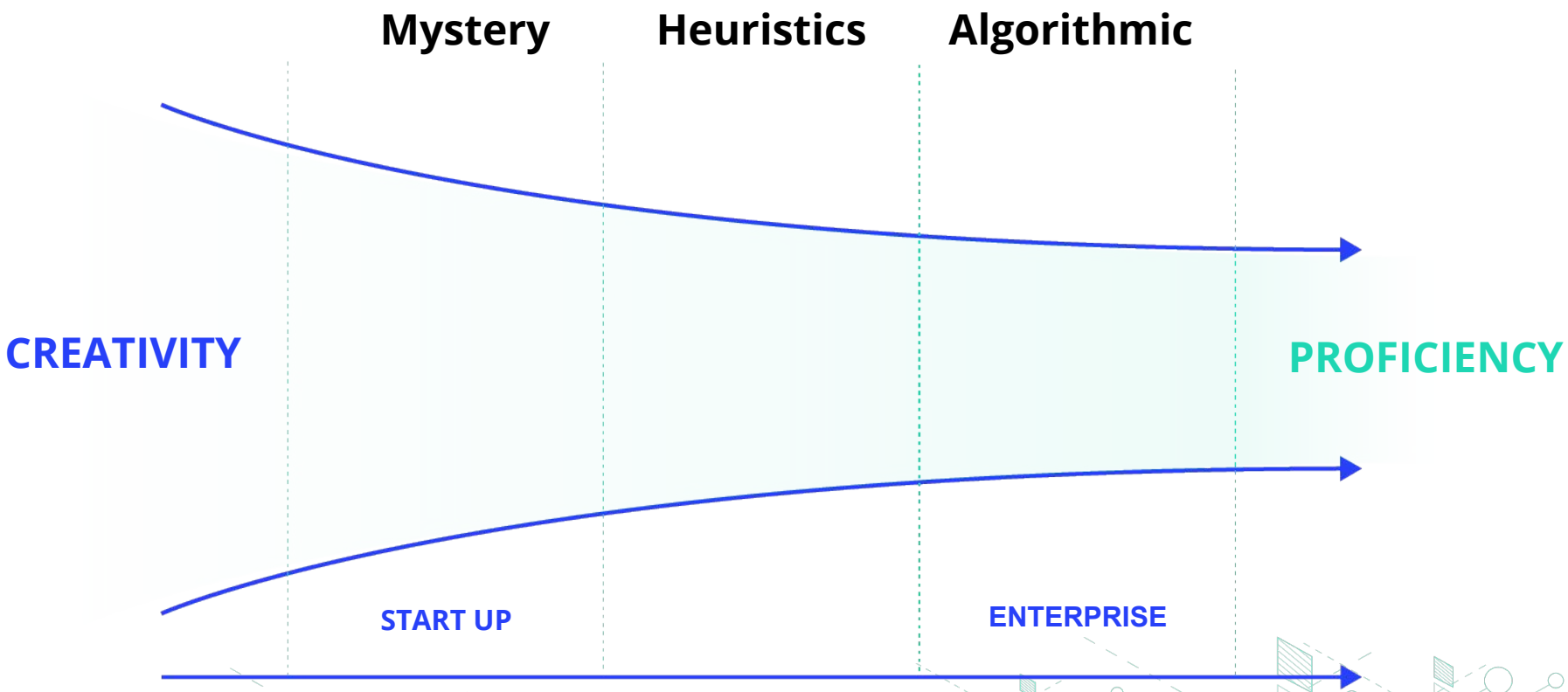
Jenny's third wakeup call

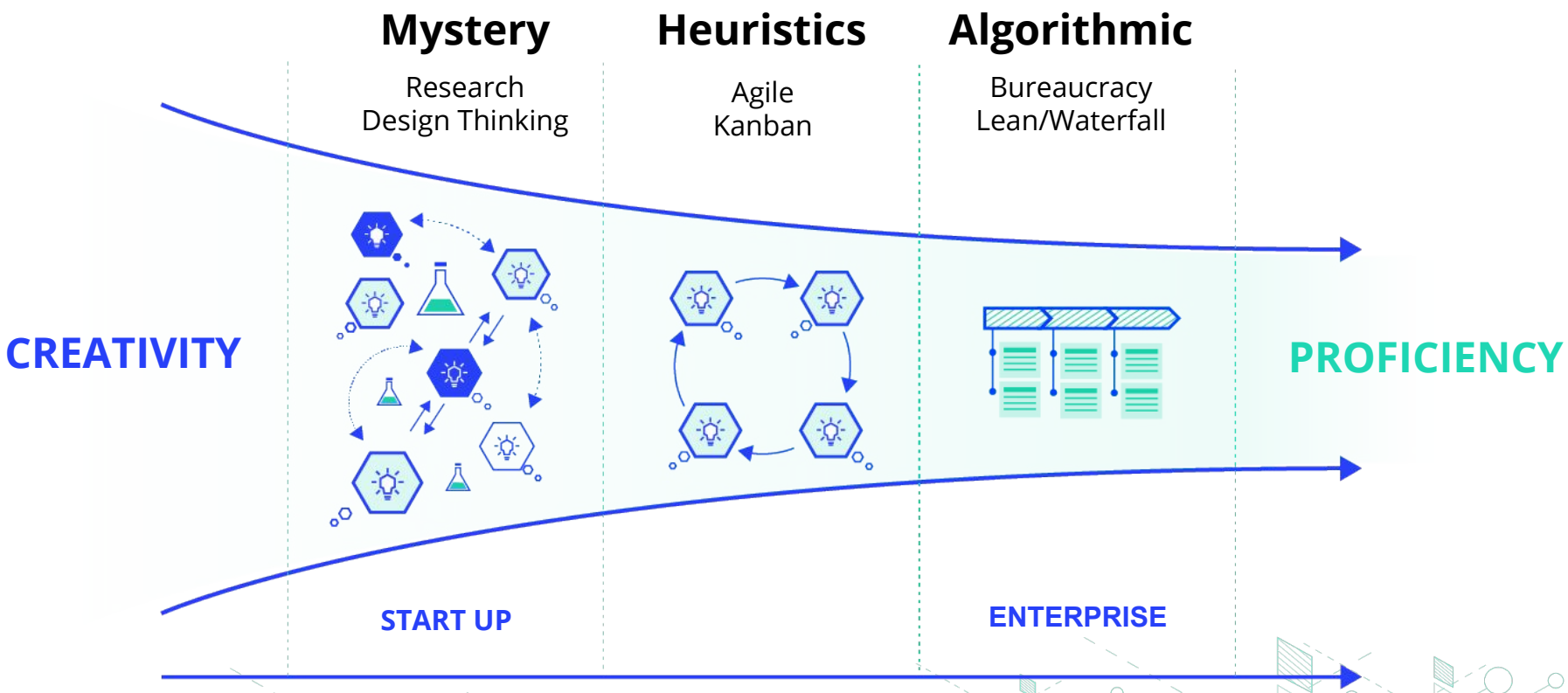


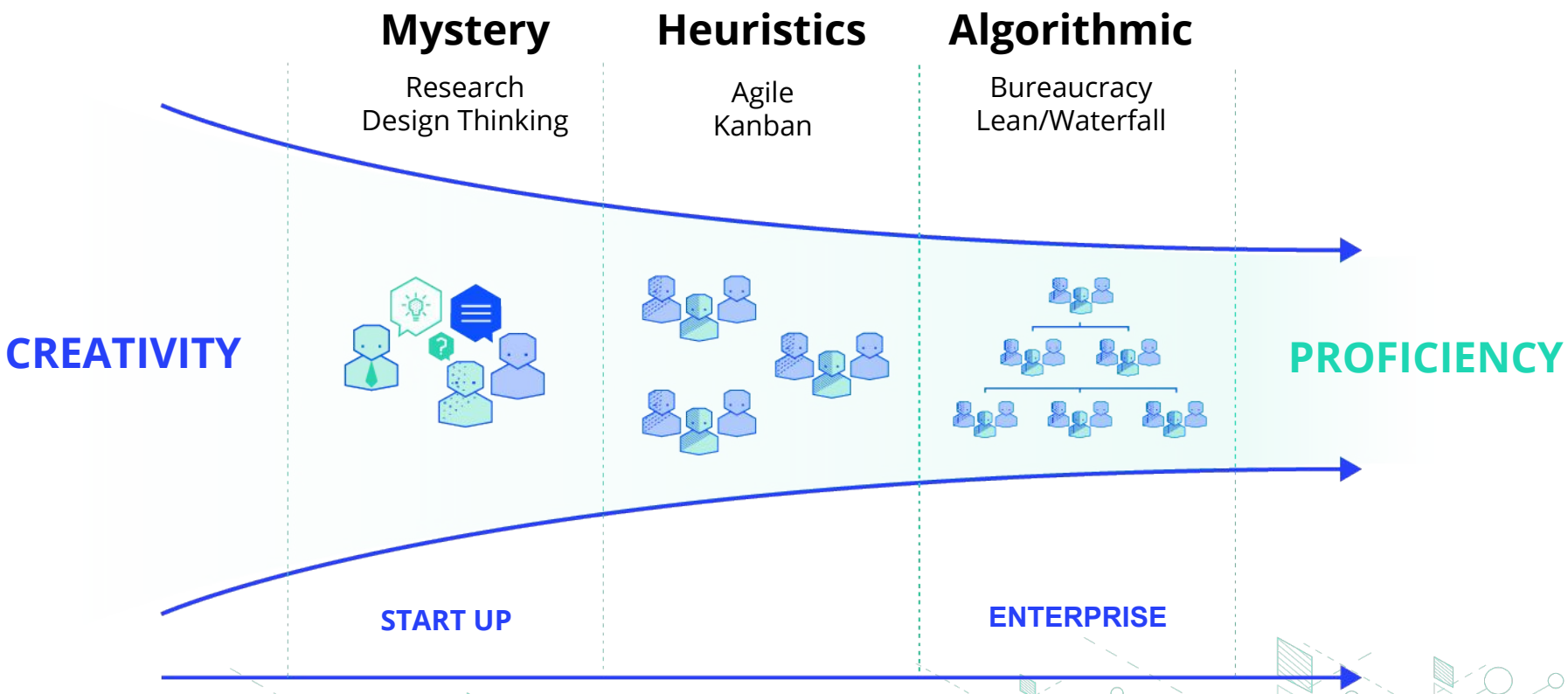
Let’s introduce some tools …

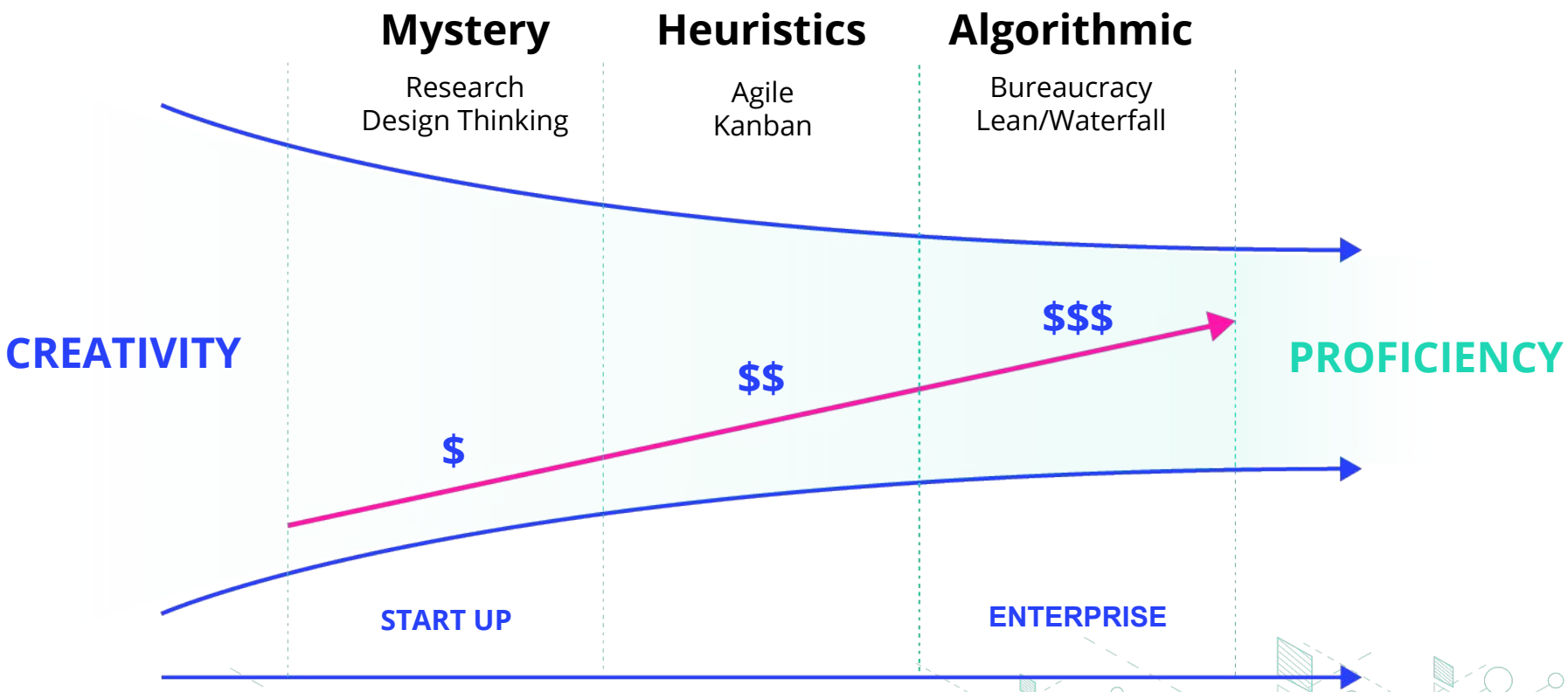
Tool no. 1

Creativity vs. Proficiency

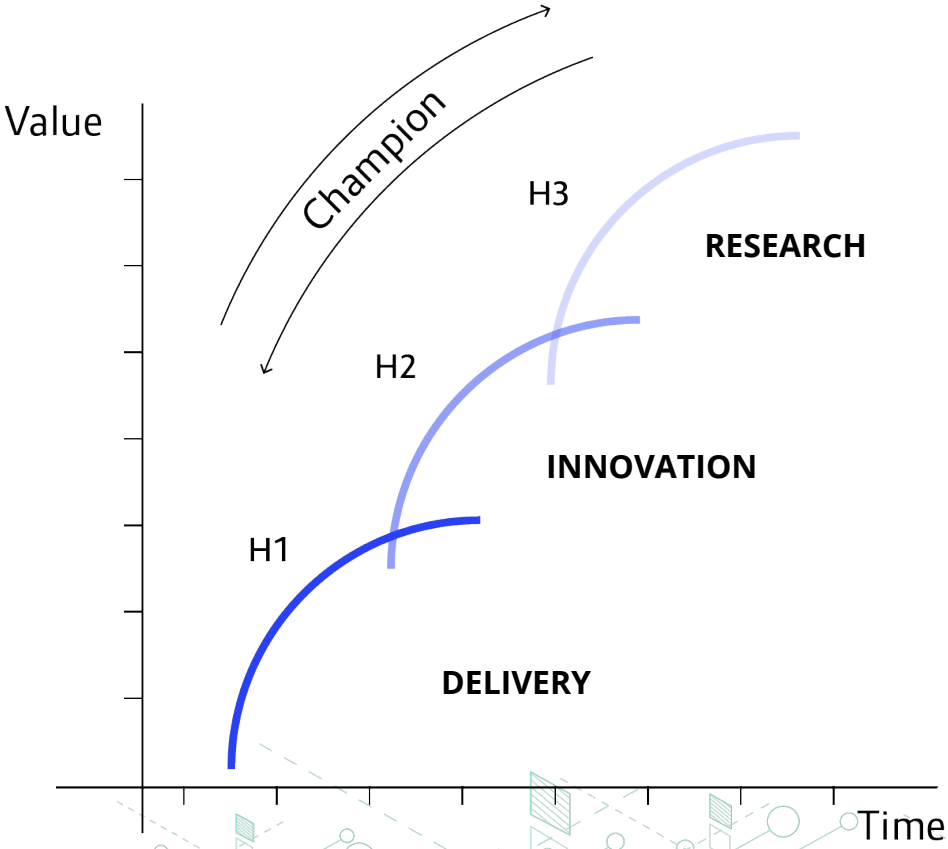

Mystery
Heuristics
Algorithmic
CREATIVITY
PROFICIENCY
START UP
ENTERPRISE

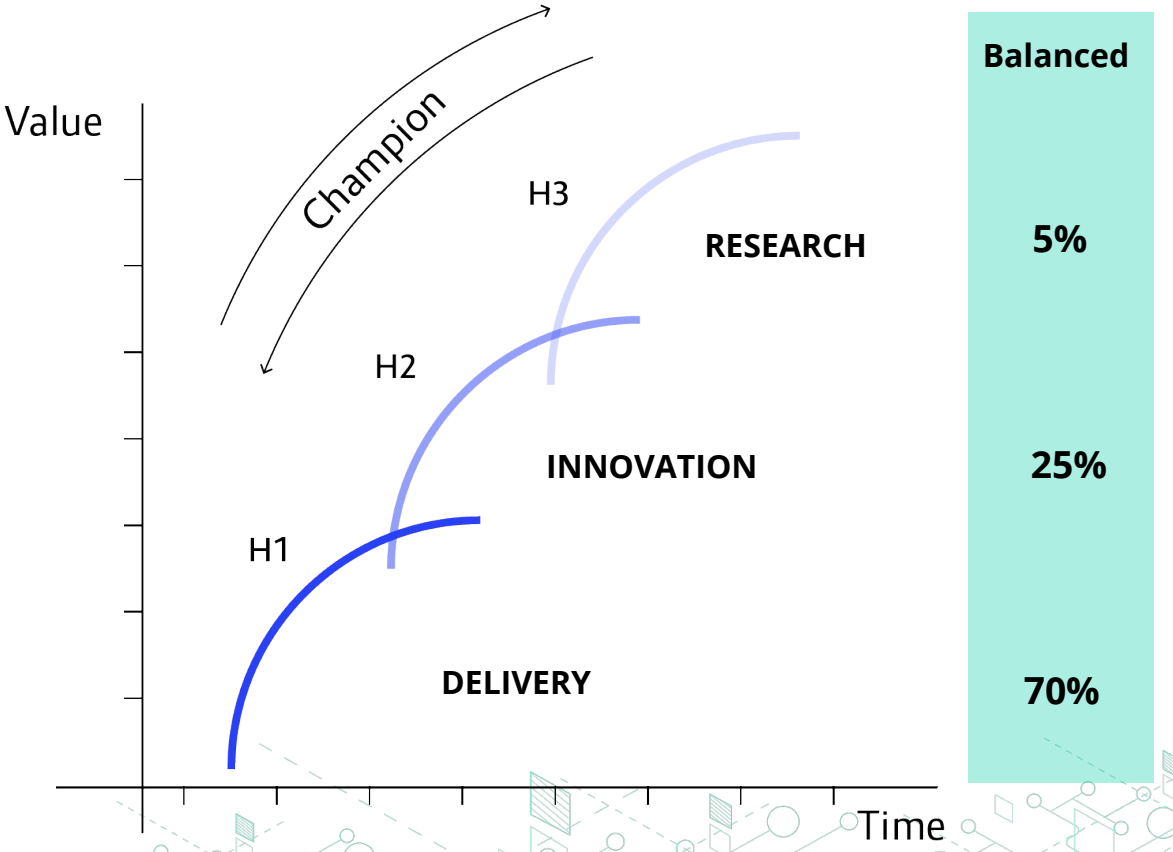

Mystery
Research
Design Thinking
Heuristics
Agile
Kanban
Algorithmic
Bureaucracy
Lean/Waterfall
CREATIVITY
PROFICIENCY
START UP
ENTERPRISE


Mystery
Heuristics
Algorithmic
Research
Design Thinking
Agile
Kanban
Bureaucracy
Lean/Waterfall
CREATIVITY
PROFICIENCY
START UP
ENTERPRISE

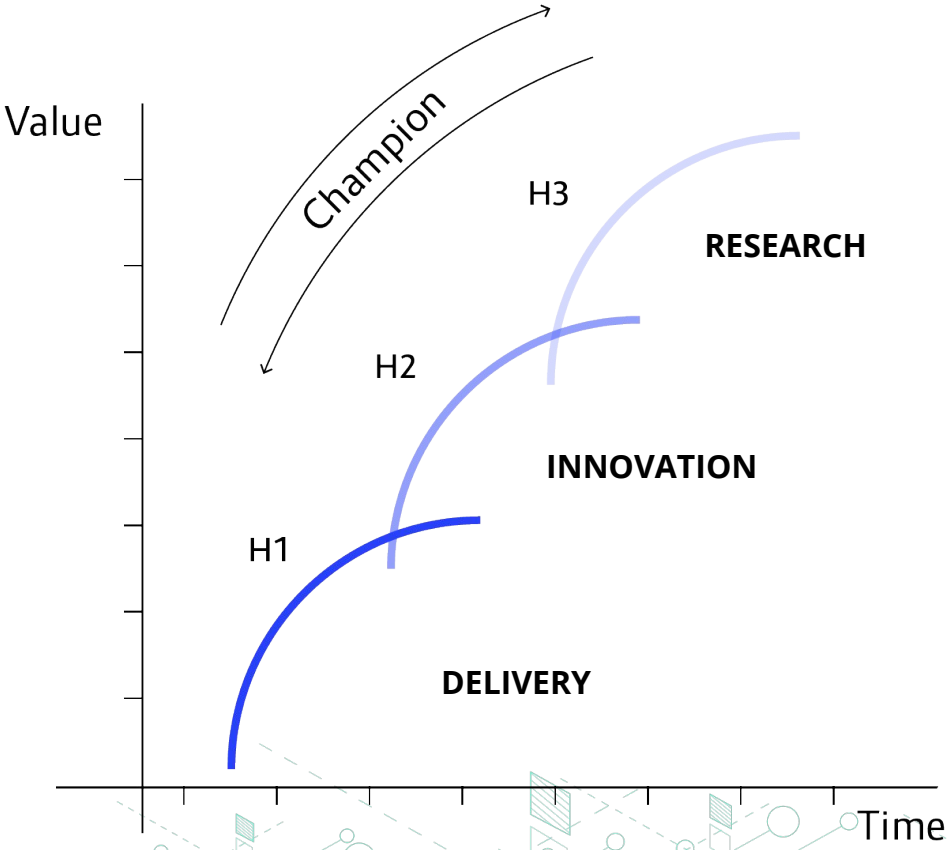

Mystery
Heuristics
Algorithmic
Research
Design Thinking
Agile
Kanban
Bureaucracy
Lean/Waterfall
CREATIVITY
PROFICIENCY
$
$$
$$$
START UP
ENTERPRISE

ice
water
phase transition
this is where you find success
STRATEGY
enterprise
PROFICIENCY
ALL BLACKS
NAVY SEALS
VISION
Creativity
startup
PIXAR
IDEO
HIGH REPETITION
HIGH FEEDBACK
SMALL SET OF RULES
EMPHASISE SUCCESFUL SKILS
PERSONAL SAFETY STANDARDS
exchange
INNOVATION
and
PROFICIENCY
PURPOSE
SUPPORT
SAFETY
AUTONOMY
TEAM DYNAMICS

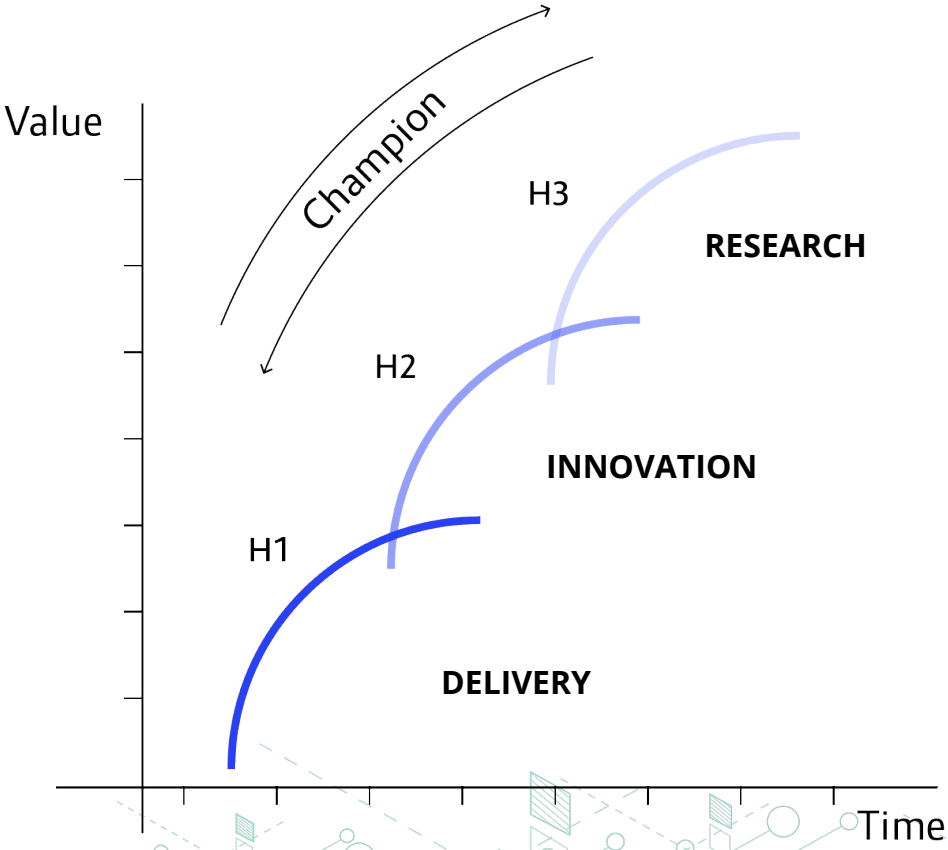

Value
Champion
H3
RESEARCH
H2
INNOVATION
H1
DELIVERY
Time



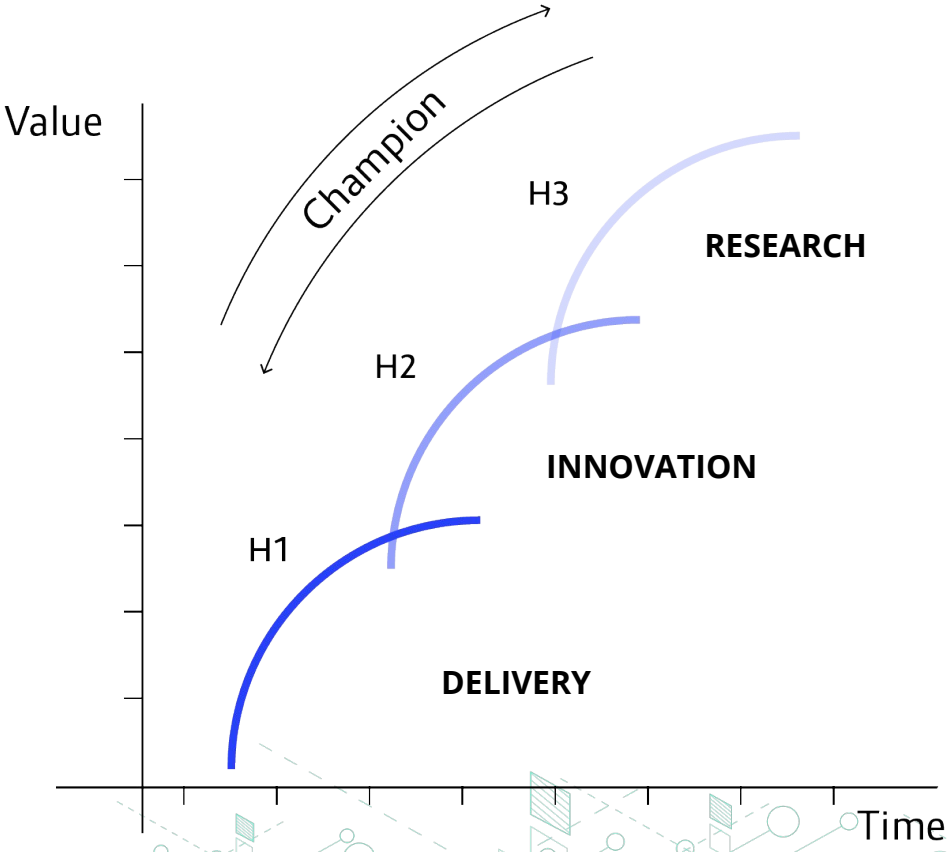
Balanced
5%
25%
70%



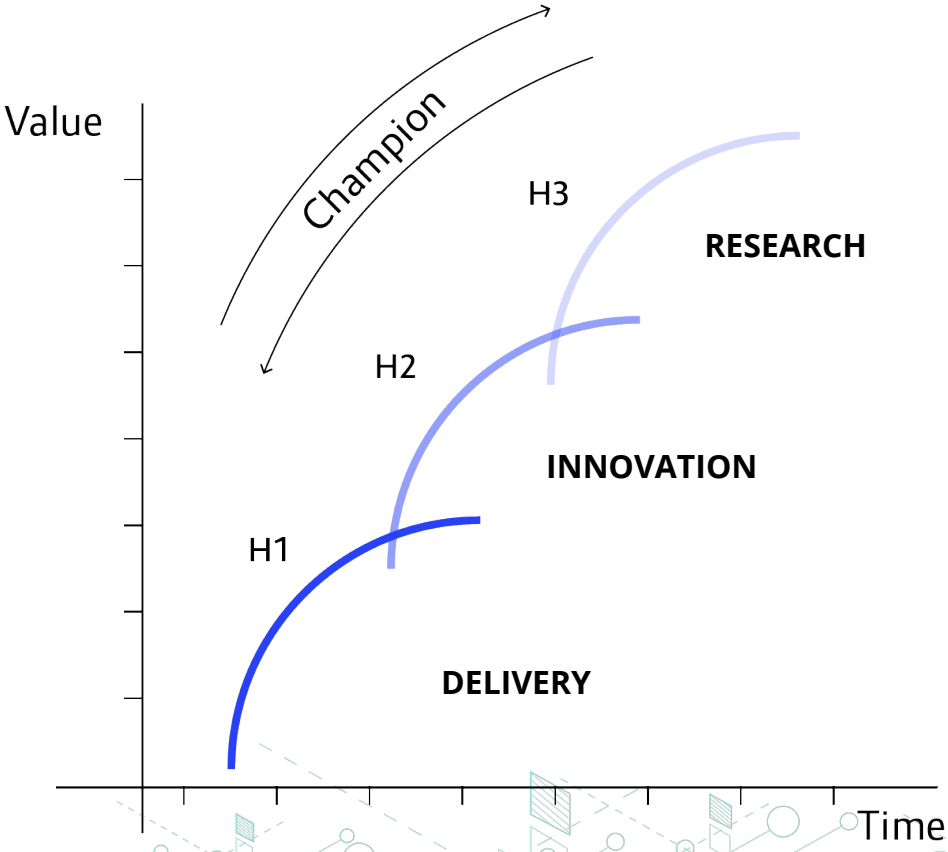
	Balanced	
RESEARCH	5%	1%
INNOVATION	25%	4%
DELIVERY	70%	95%



Balanced		
5%	1%	10%
25%	4%	80%
70%	95%	10%



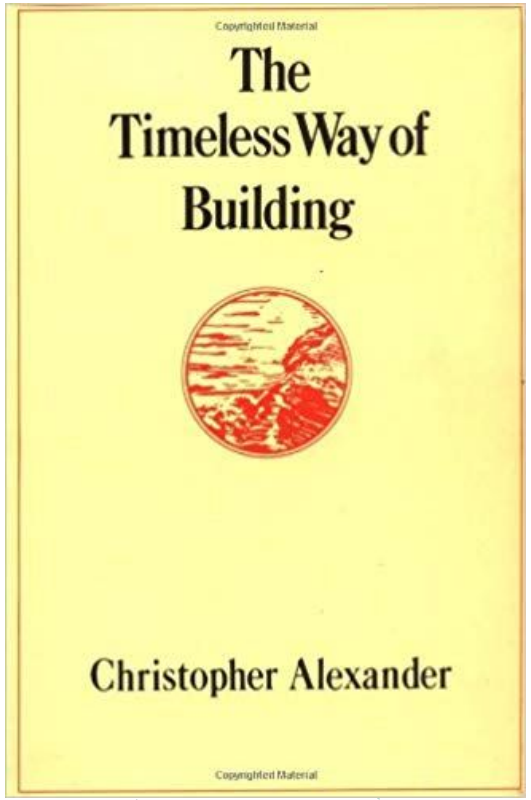
Balanced			
5%	1%	10%	100%
25%	4%	80%	0%
70%	95%	10%	0%



Balanced	Enterprise	Startup	University
5%	1%	10%	100%
25%	4%	80%	0%
70%	95%	10%	0%

Tool no. 2

Patterns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Christopher Alexander
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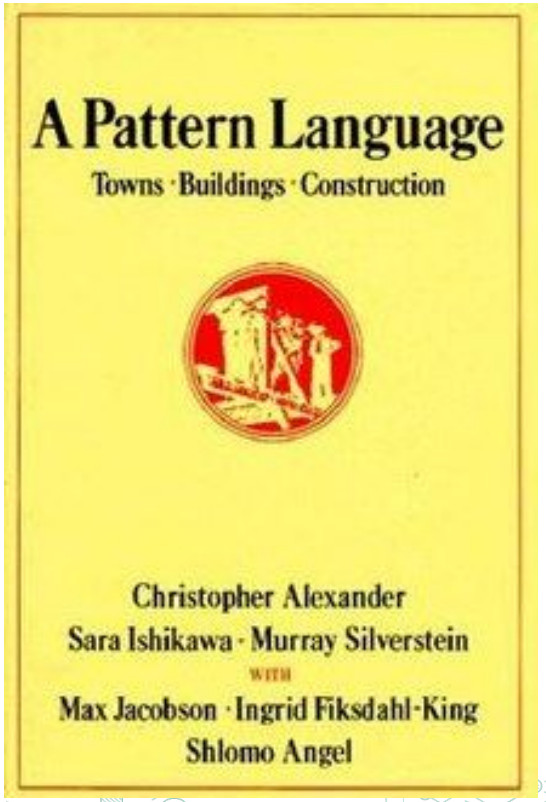
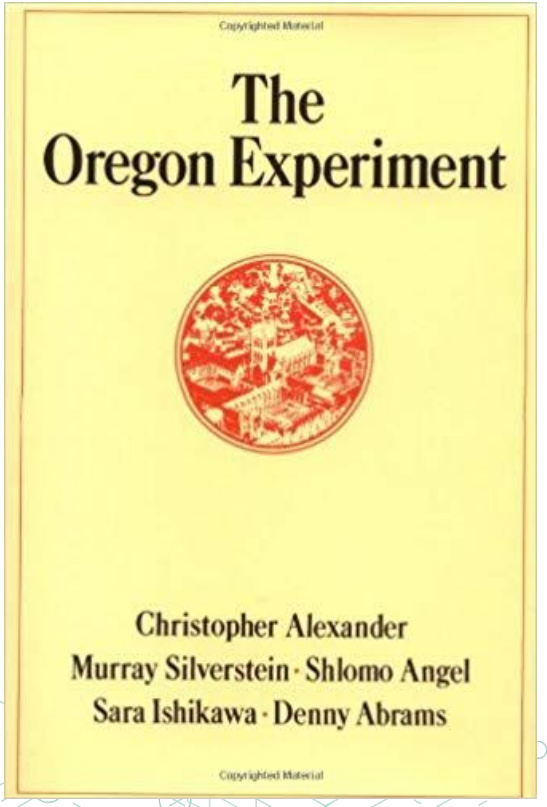

A Pattern Language
Towns · Buildings · Construction
Christopher Alexander
Sara Ishikawa · Murray Silverstein
WITH
Max Jacobson · Ingrid Fiksdahl-King
Shlomo Angel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The Oregon Experiment
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Patterns, Languages and Designs

Pattern is a Word:

Table
Chair
Sofa
...

Patterns, Languages and Designs

Pattern is a Word:

Table
Chair
Sofa
...

Patterns, Languages and Designs

Pattern is a Word:

Table
Chair
Sofa
...

Languages consist of Words:

Furniture language

Patterns, Languages and Designs

Pattern is a Word:

Table
Chair
Sofa
...

Languages consist of Words:

Furniture language

Designs are Stories:

There is a square table with 4 chairs and a sofa in a room.

Vision First

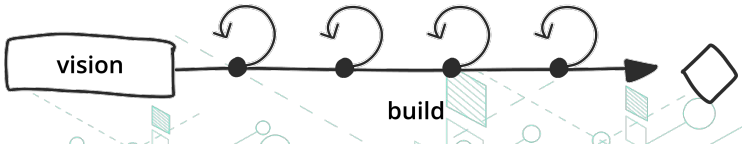
Defining a guiding vision as very first step helps set the right path through an uncertain environment.

The company needs to define a clear and achievable vision, which will later be translated into specific executable steps.

In this context:

The combination of limited experience and lack of extra time and flexibility for research leads to pursuing CN implementation using “well known ways”.

- Without an overall consistent vision, different teams will make independent and, frequently, conflicting architectural decisions
- In many companies, Enterprise Architects are responsible for creating a detailed architecture. Many Enterprise Architects lack sufficient theoretical or practical experience in the Cloud Native approach.
- Agile methodologies, widely adopted in the contemporary business world, create pressure to produce results early and onboard teams to new systems very quickly.



Therefore:

You should define and visualize the architecture of the whole system upfront.

It can either be requested from external sources or uncovered by series of small research and prototyping projects ranging from few hours to few days each.

It’s important to keep the vision high level to allow freedom of choice during implementation, yet also detailed enough to provide clear guidance (which will help avoid common pitfalls).

Consequently:

All teams have a clear guiding principle for the implementation phase.

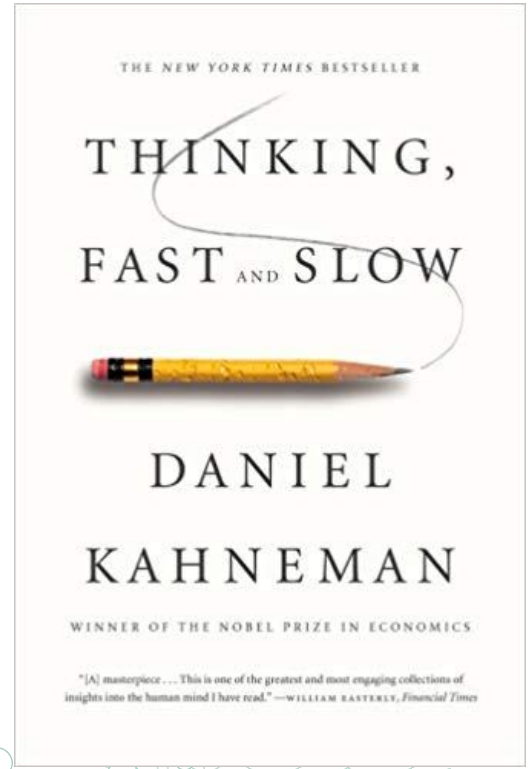
The teams can start producing the lower level architecture, and translate it to the backlog of tasks. Therefore, Executive Commitment paired with leadership by the Transformation Champion are essential to have in place for successful vision creation.

Cloud Native Pattern Language

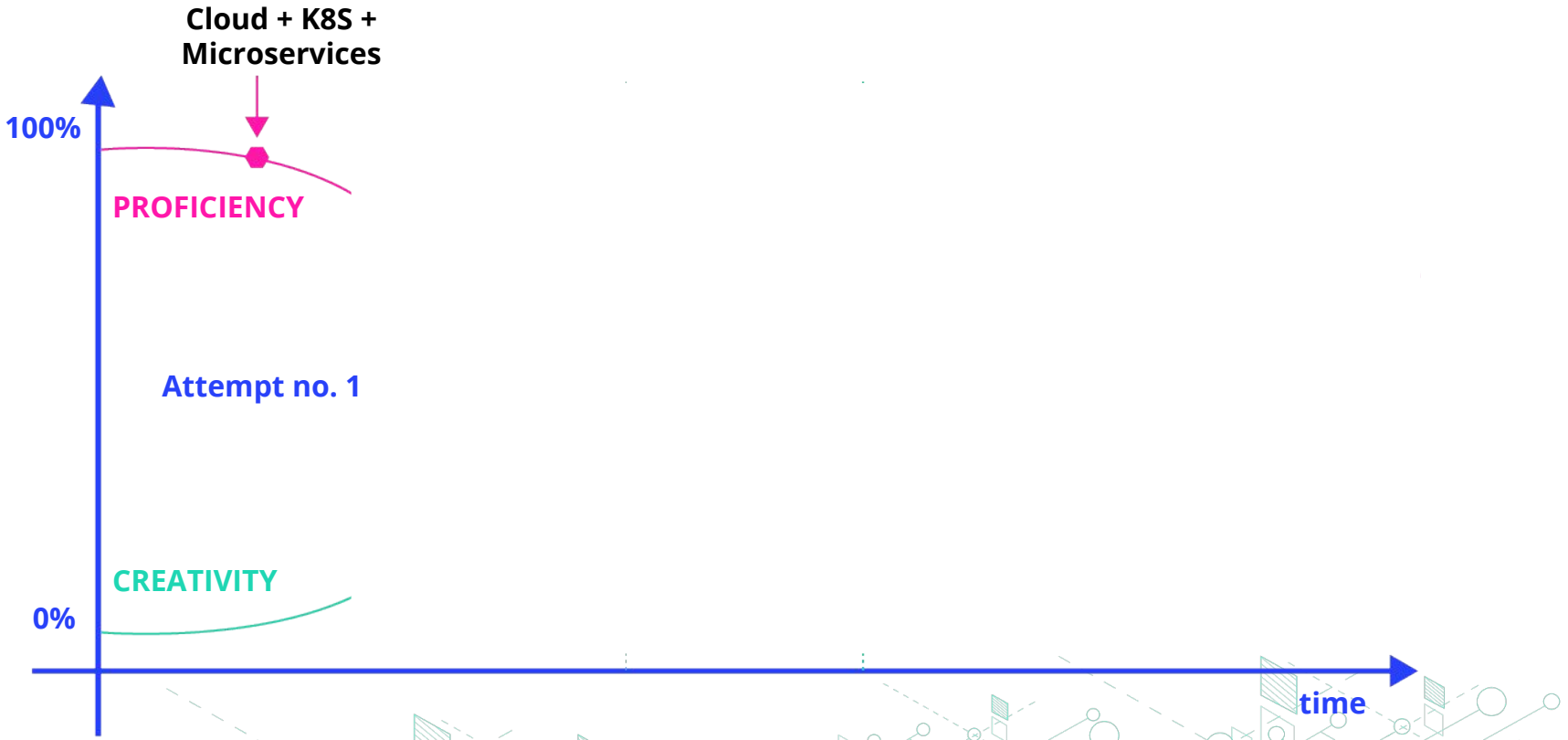
Tool no. 3

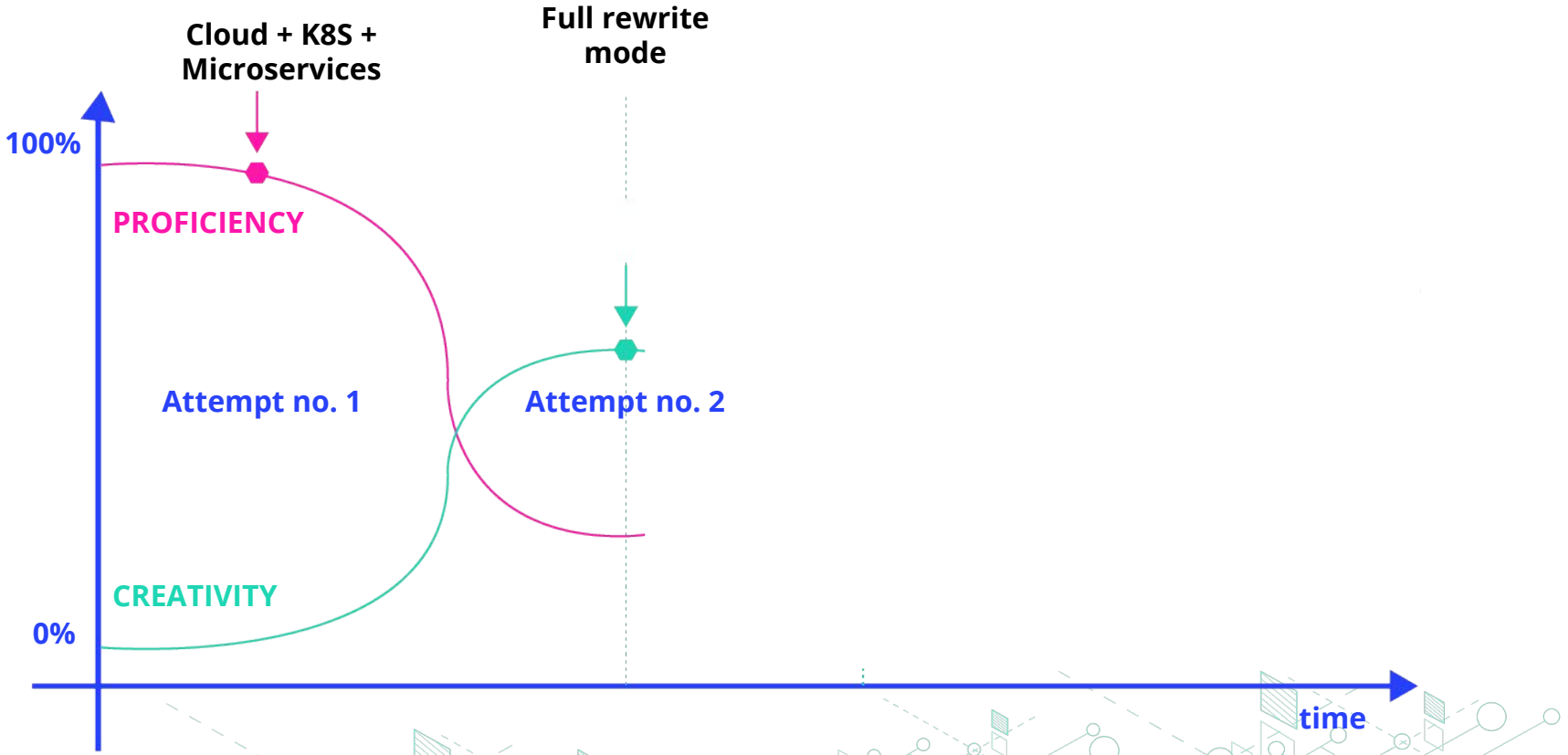
Cognitive Biases

Cognitive Biases



What happened so far?


Cloud + K8S +
Microservices
100%
PROFICIENCY
Attempt no. 1
CREATIVITY
0%
time


Cloud + K8S +
Microservices
Full rewrite
mode
100%
PROFICIENCY
Attempt no. 1
Attempt no. 2
CREATIVITY
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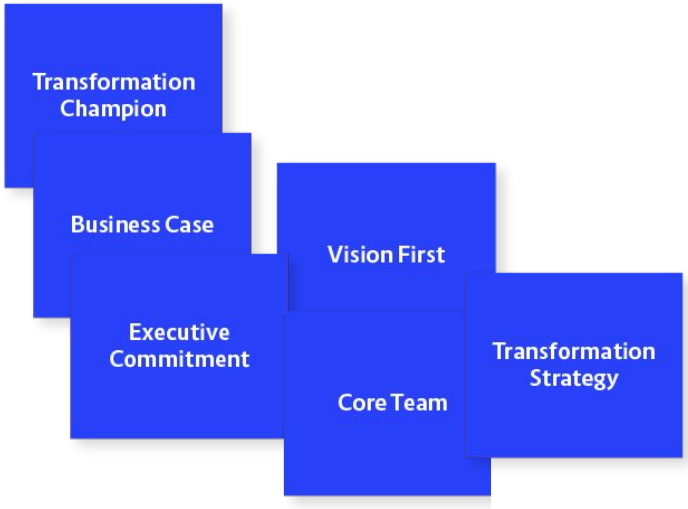
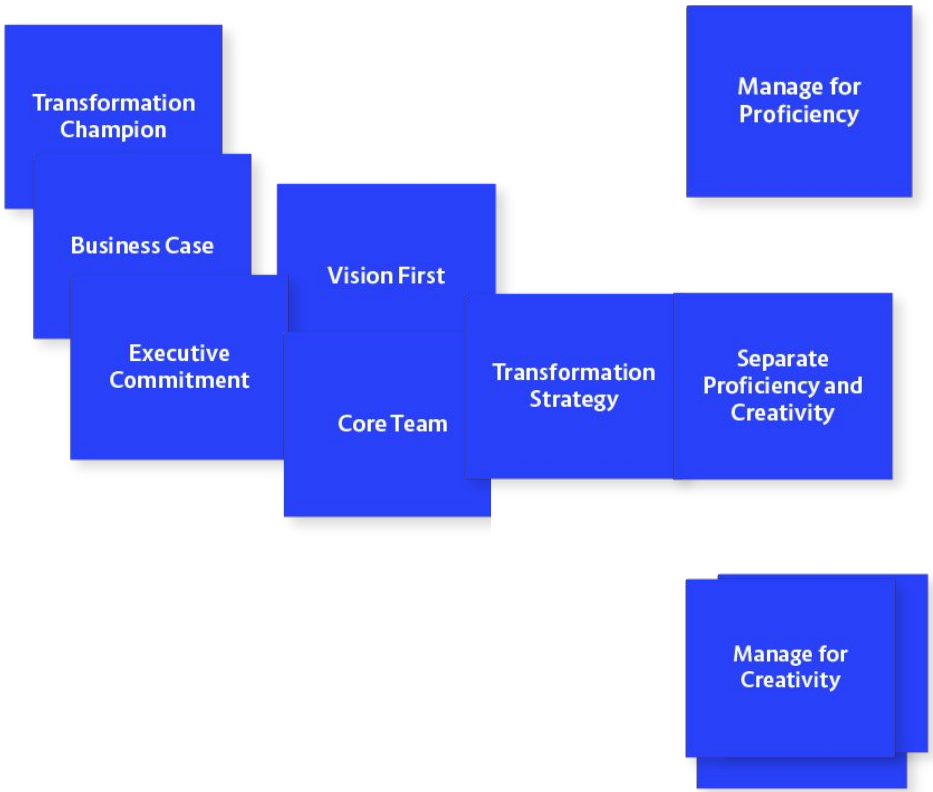
time

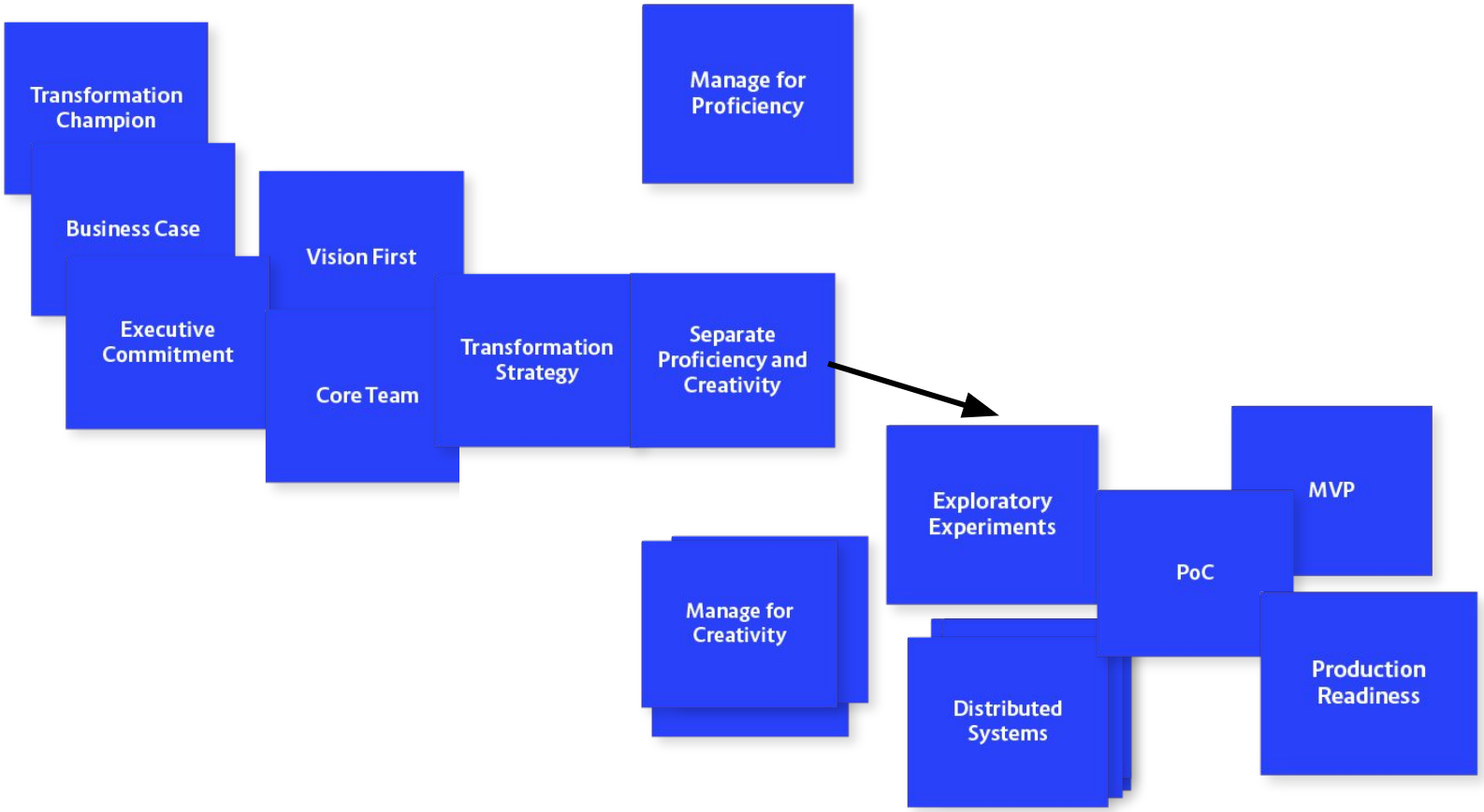
Design the Transformation

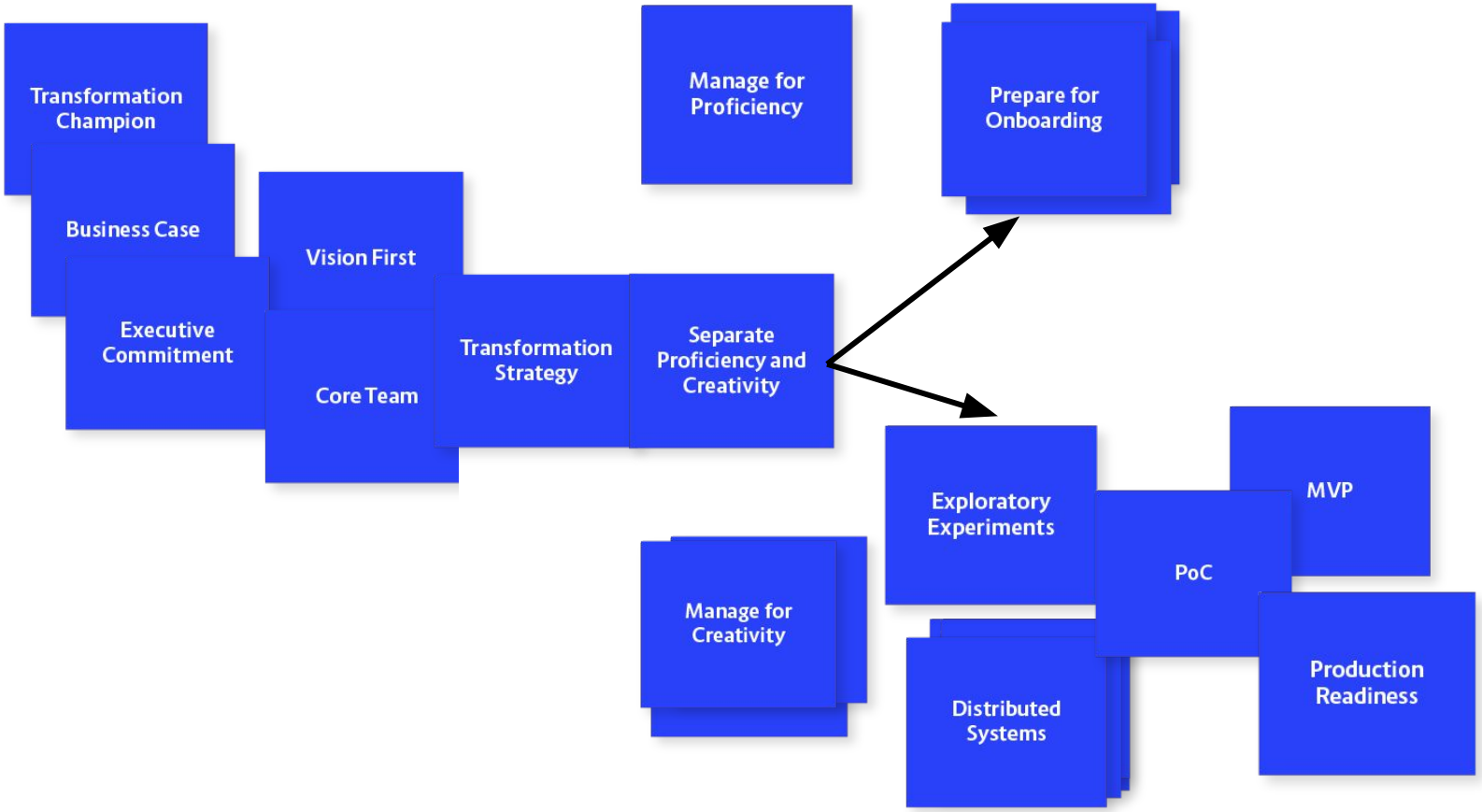
By using Cloud Native Patterns Language

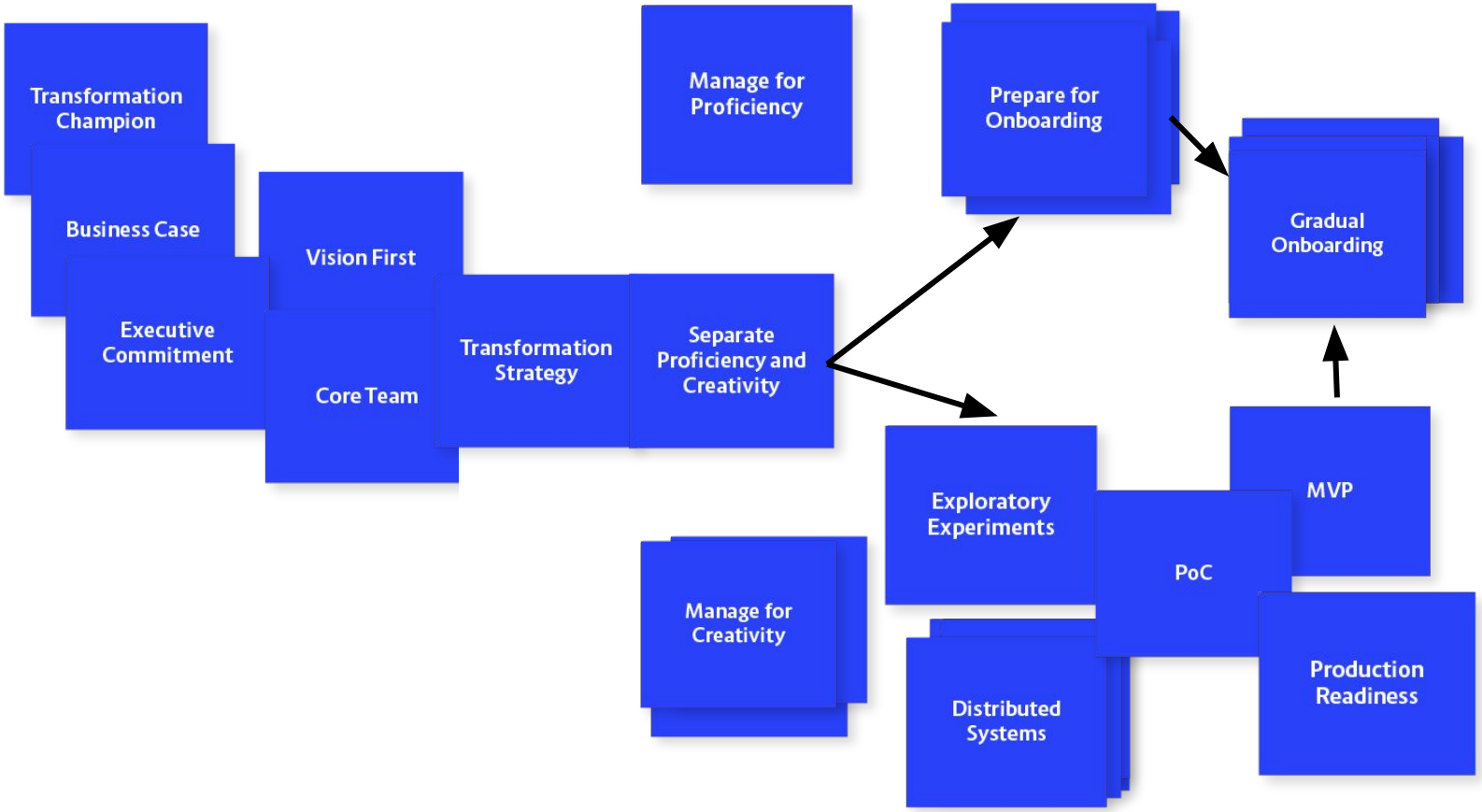
Transformation Champion
Business Case
Executive Commitment

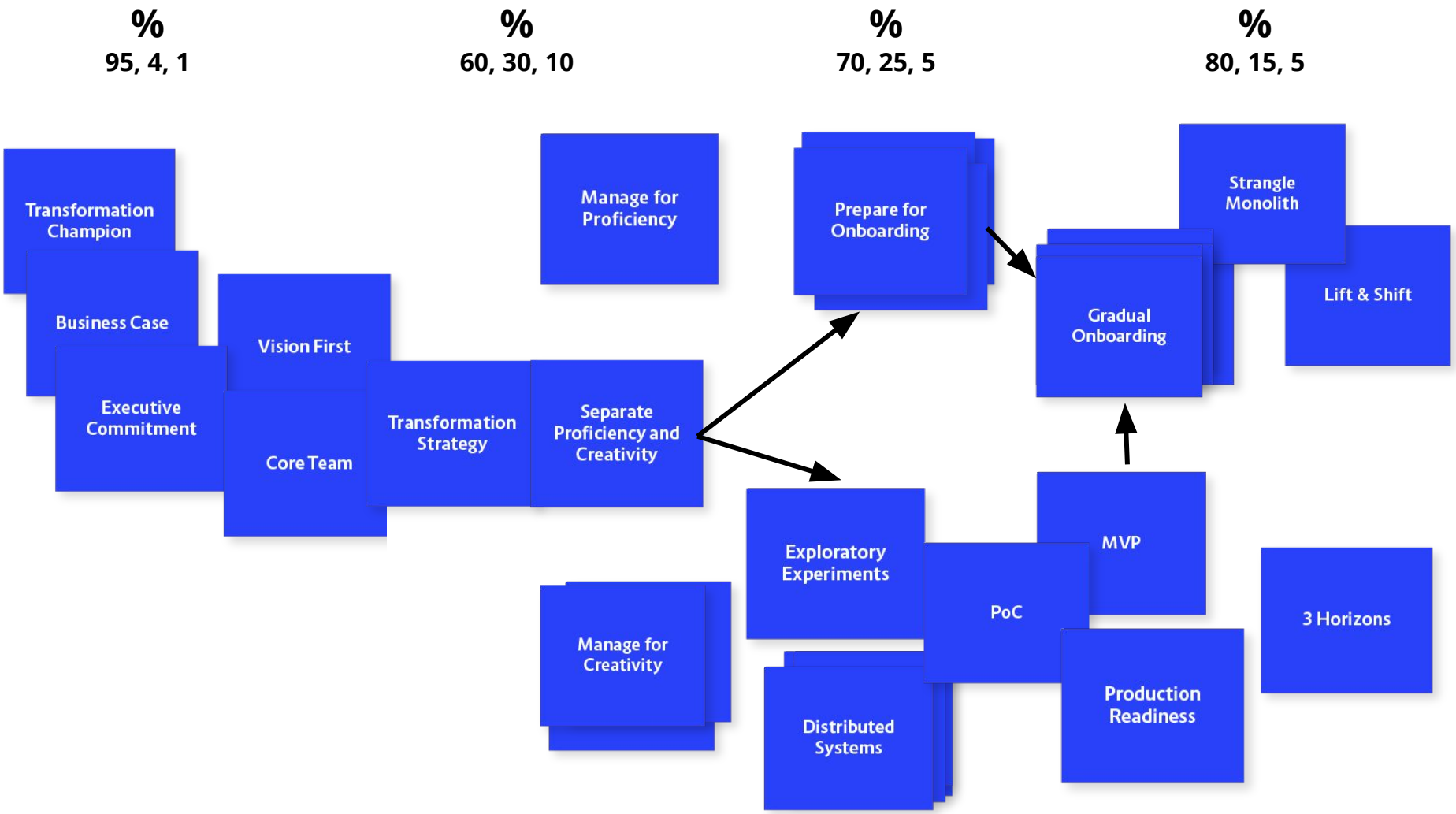

Transformation Champion
Business Case
Vision First
Executive Commitment
Core Team
Transformation Strategy


Transformation Champion
Business Case
Executive Commitment
Vision First
Core Team
Transformation Strategy
Separate Proficiency and Creativity
Manage for Proficiency
Manage for Creativity


Transformation Champion
Business Case
Executive Commitment
Vision First
Core Team
Transformation Strategy
Separate Proficiency and Creativity
Manage for Proficiency
Manage for Creativity
Exploratory Experiments
PoC
MVP
Distributed Systems
Production Readiness


Transformation Champion
Business Case
Executive Commitment
Vision First
Core Team
Transformation Strategy
Separate Proficiency and Creativity
Manage for Proficiency
Prepare for Onboarding
Manage for Creativity
Exploratory Experiments
PoC
MVP
Distributed Systems
Production Readiness


Transformation Champion
Business Case
Executive Commitment
Vision First
Core Team
Transformation Strategy
Separate Proficiency and Creativity
Manage for Proficiency
Prepare for Onboarding
Gradual Onboarding
Manage for Creativity
Exploratory Experiments
PoC
MVP
Distributed Systems
Production Readiness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Transformation Champion
Business Case
Executive Commitment
Vision First
Core Team
Transformation Strategy
Separate Proficiency and Creativity
Manage for Proficiency
Prepare for Onboarding
Gradual Onboarding
Strangle Monolith
Lift & Shift
Manage for Creativity
Exploratory Experiments
Distributed Systems
PoC
MVP
Production Readiness
3 Horizons

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70, 25, 5

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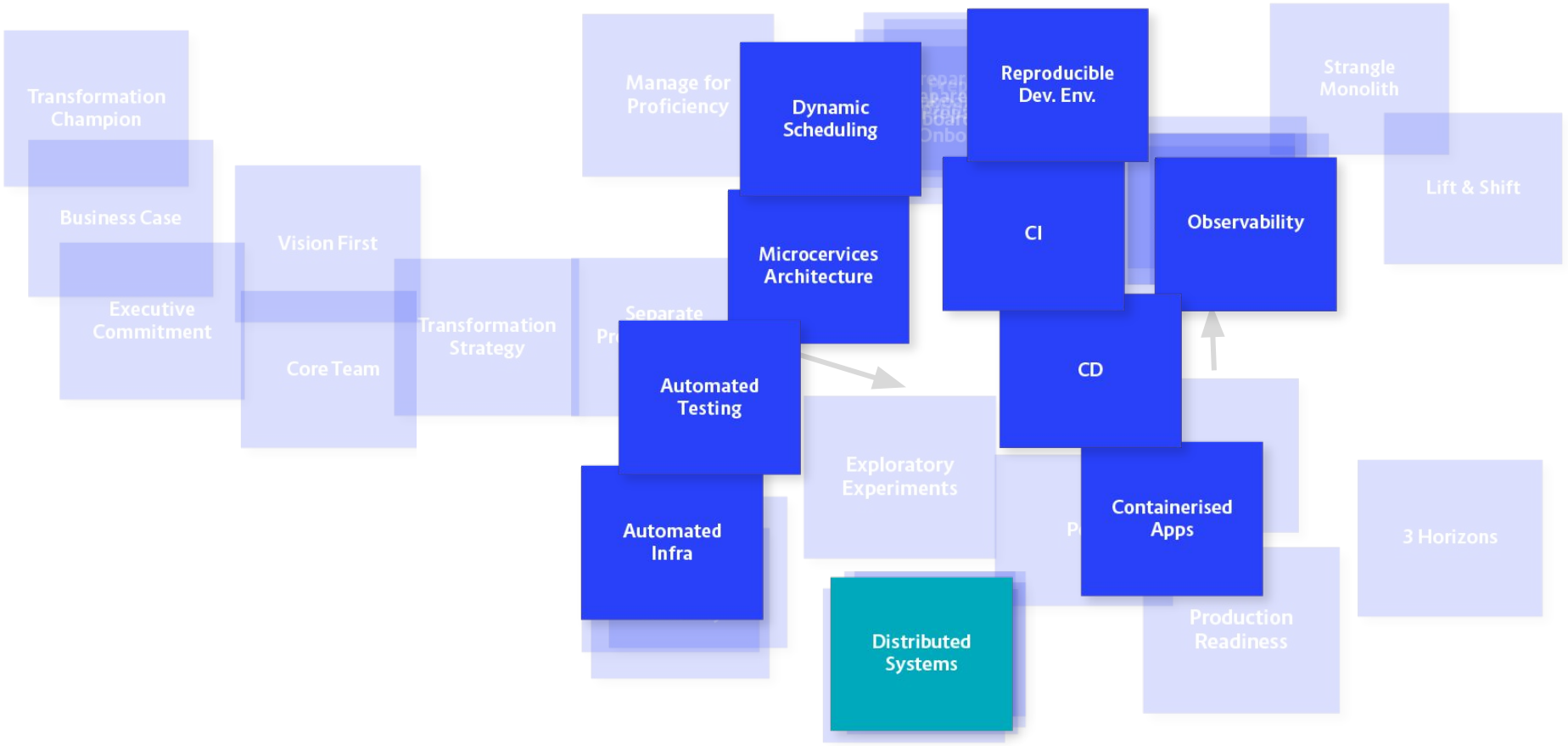
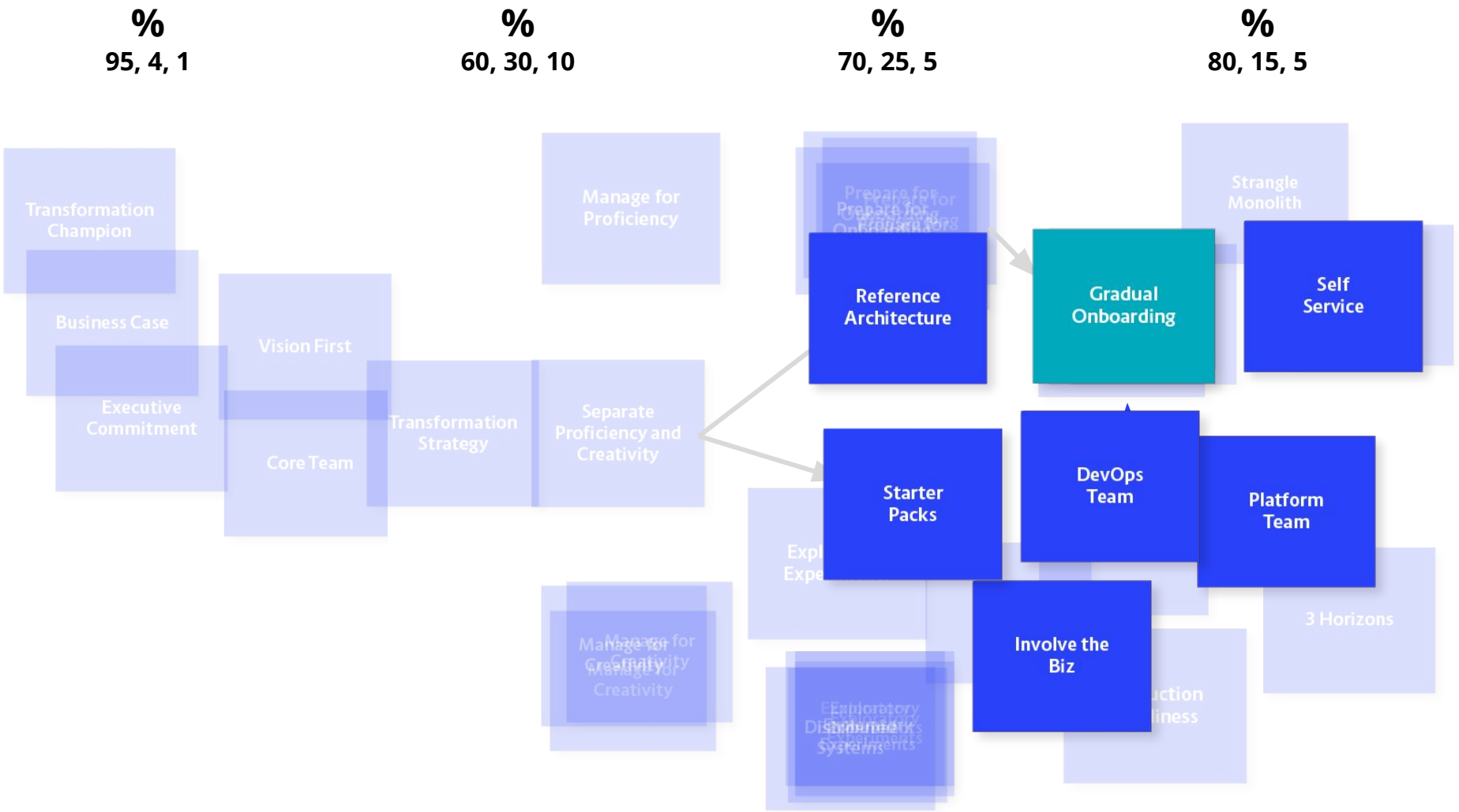
80, 15, 5

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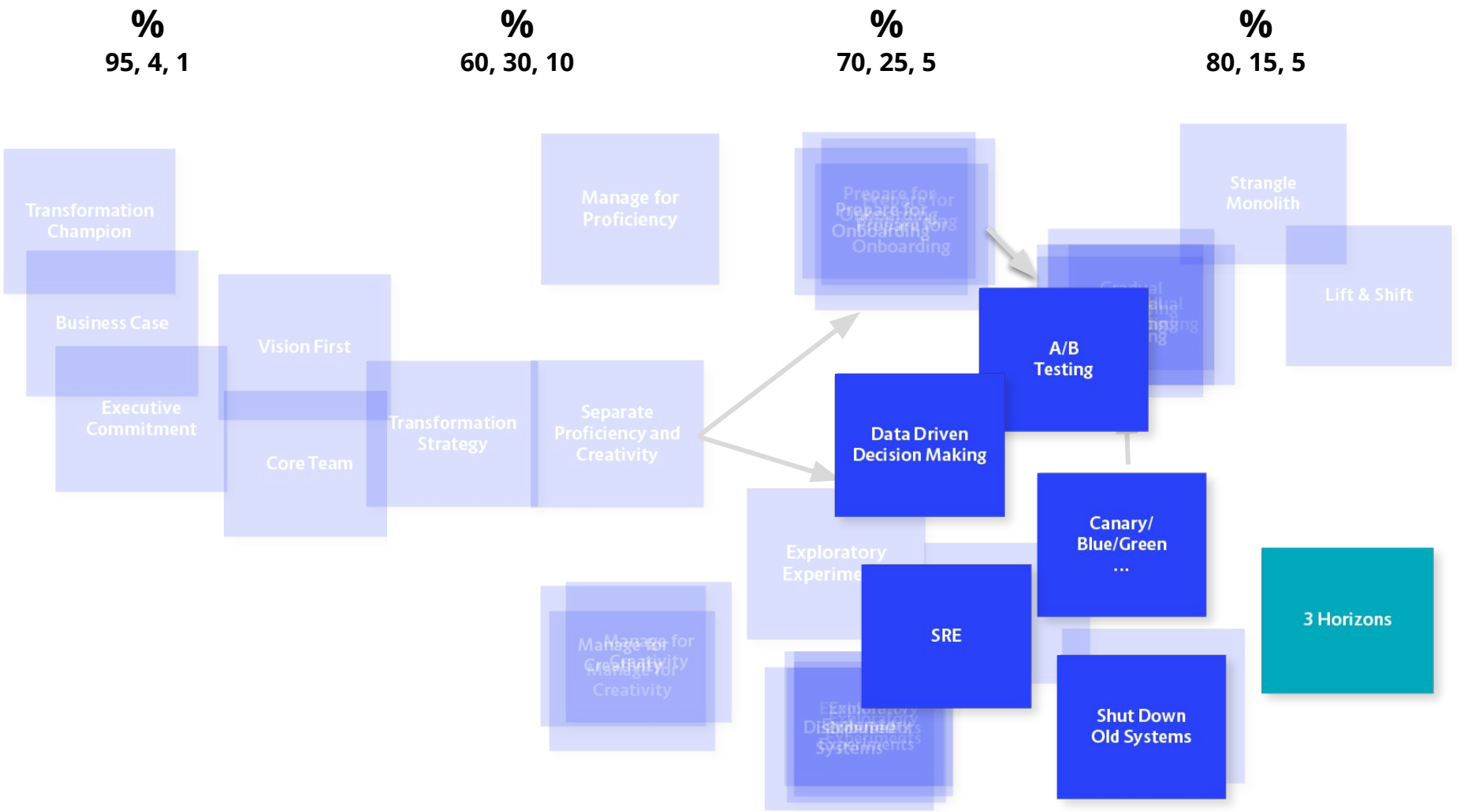
80, 15, 5
Transformation Champion
Business Case
Executive Commitment
Vision First
Core Team
Transformation Strategy
Manage for Proficiency
Separate Proficiency and Creativity
Reference Architecture
Starter Packs
Gradual Onboarding
DevOps Team
Involve the Biz
Strangle Monolith
Self Service
Platform Team
3 Horizons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60, 30, 10
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70, 25, 5
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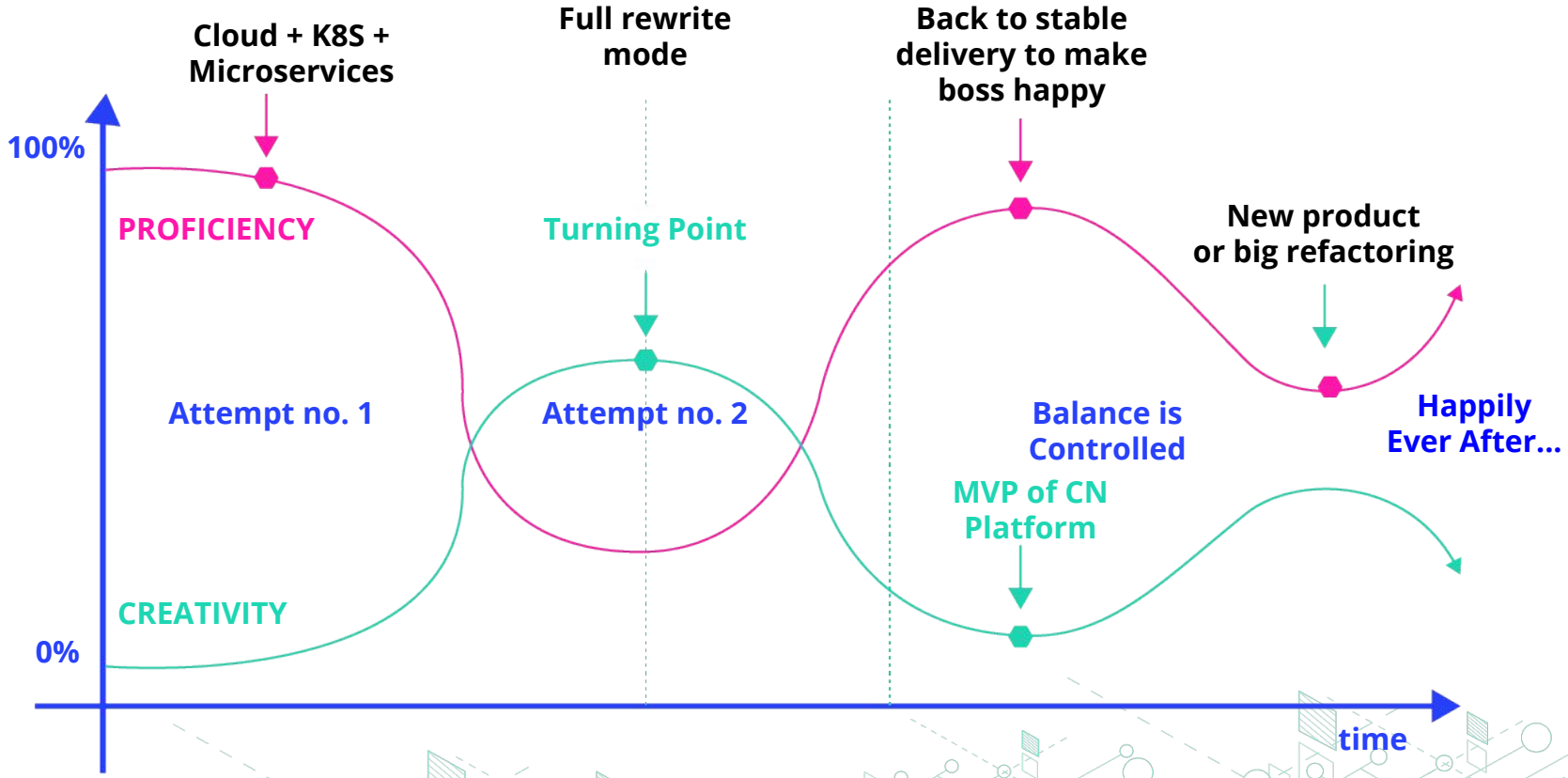
80, 15, 5
Transformation Champion
Business Case
Executive Commitment
Vision First
Core Team
Transformation Strategy
Manage for Proficiency
Separate Proficiency and Creativity
Prepare for Onboarding
Strangle Monolith
Lift & Shift
A/B Testing
Data Driven Decision Making
Canary/ Blue/Green ...
SRE
Shut Down Old Systems
3 Horizons

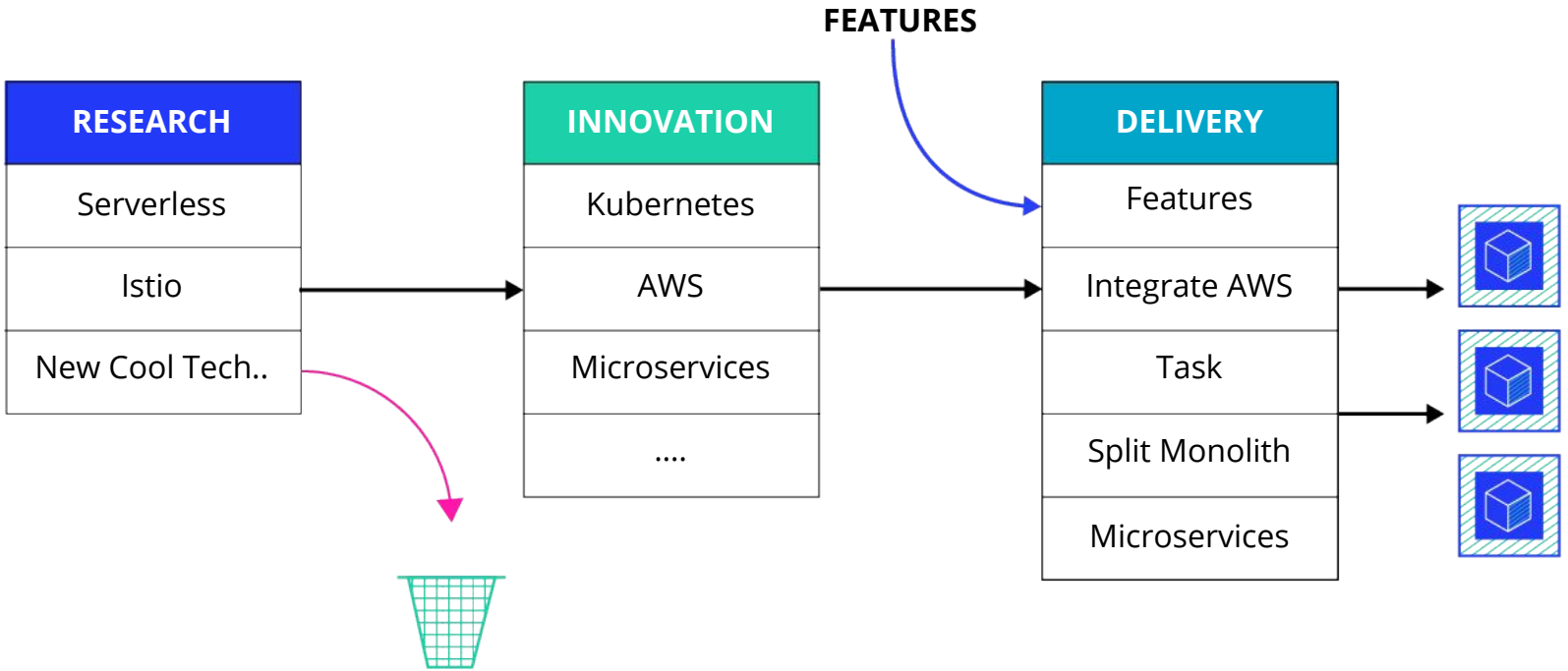
Culture Patterns

“Culture is a set of living relationships working toward a shared goal. It’s not something you are. It’s something you do.”

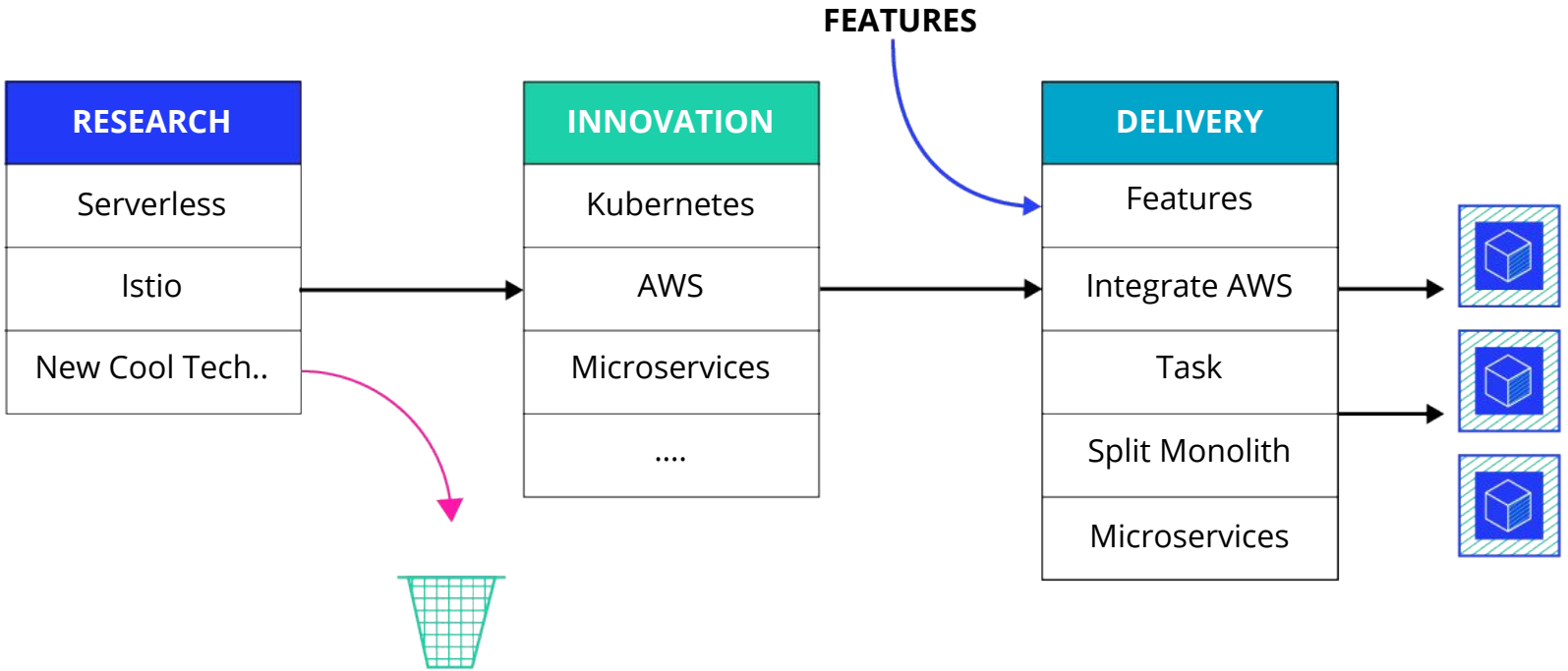
The Culture Code
Daniel Coyle


Cloud + K8S + Microservices
Full rewrite mode
Back to stable delivery to make boss happy
New product or big refactoring
100%
PROFICIENCY
Turning Point
Attempt no. 1
Attempt no. 2
Balance is Controlled
Happily Ever After...
MVP of CN Platform
CREATIVITY
0%
time

Cloud Native Innovation

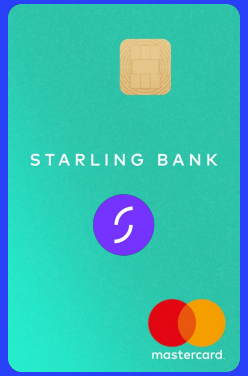


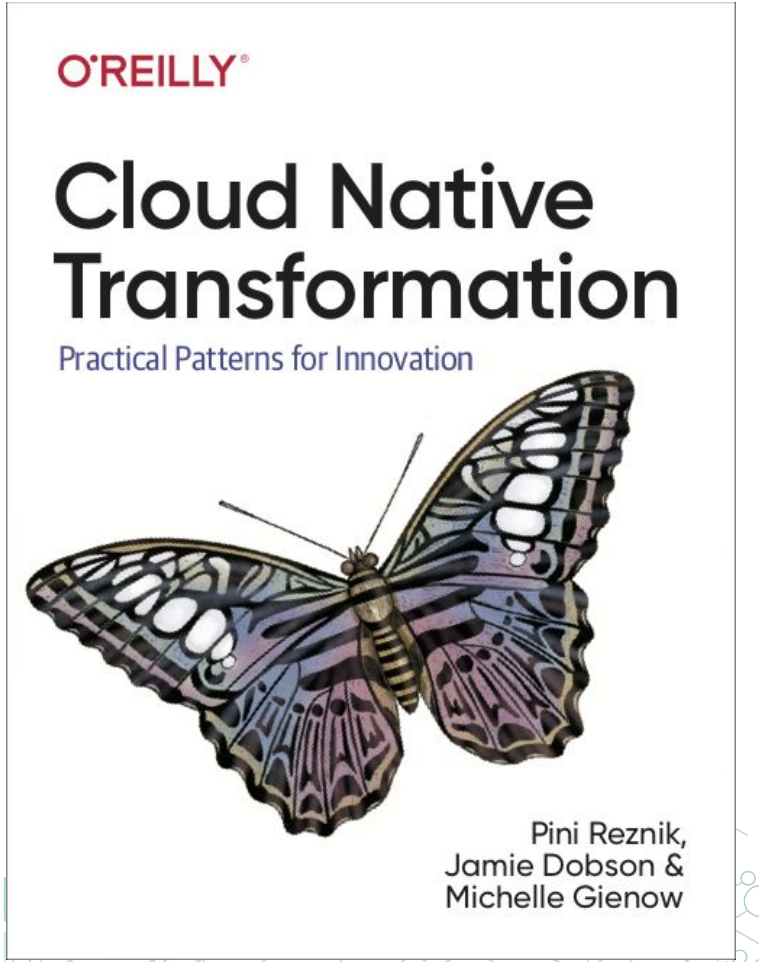
~~Cloud Native~~ Innovation



The Stranger is Coming...

... you are ready now!




O'REILLY
Cloud Native Transformation
Practical Patterns for Innovation
Pini Reznik,
Jamie Dobson &
Michelle Gienow

Questions?