

DevOps The Toyota Way

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DEVOPS
ENTERPRISE
SUMMIT

2022

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The Toyota Way



There is no "best", only "better"


– Akio Toyoda


Toyota Production System (TPS)

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- **Core principles**

- ★★★ High Quality

-  Low Cost

-  Shortest lead-time

- **Core purpose**

- Eliminate waste
- Continuous Improvement



The need for a journey

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- Market demand
- Role of software
- Richer features



*Toyota Way –Genchi Genbutsu and Kaizen
– Go & see first-hand and Improve continuously*

Organic growth of Software

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- Siloed systems
- Locally optimized lifecycles
- Large number of applications

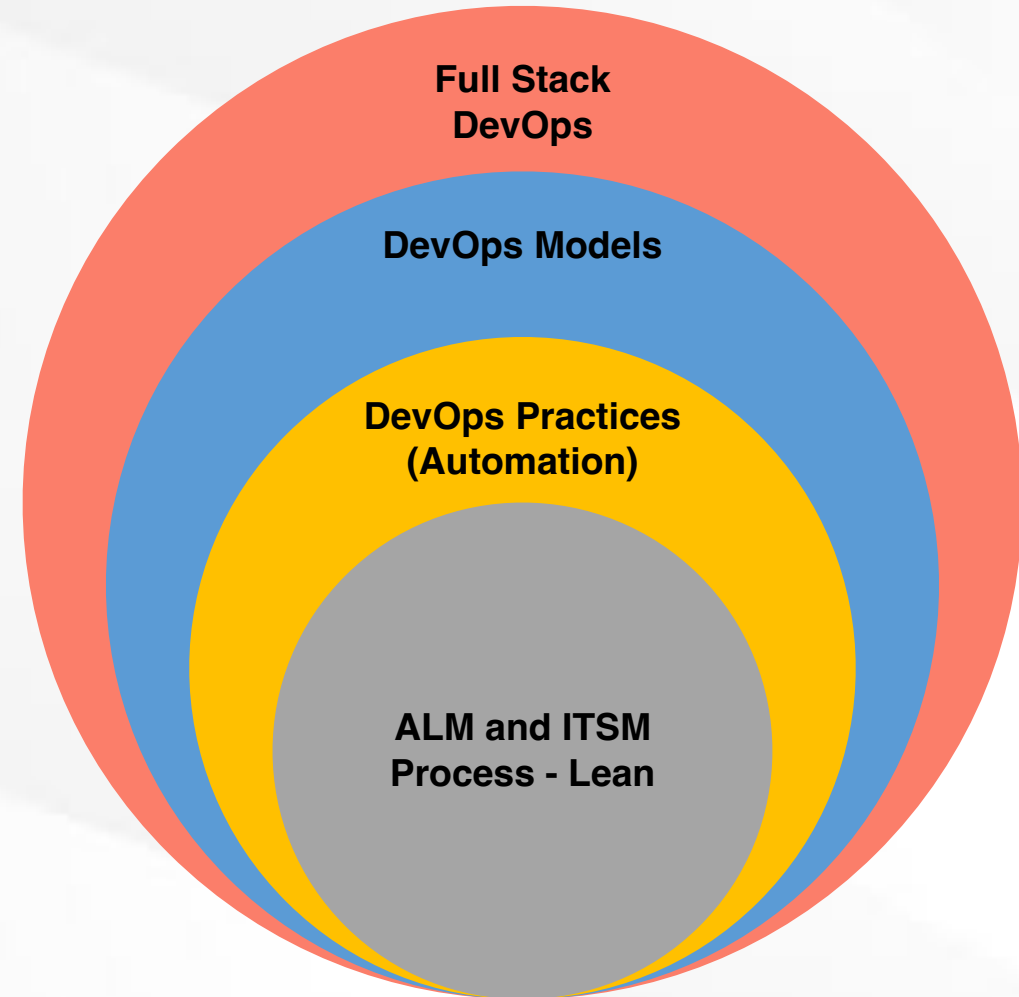


Toyota Way – Eliminate Muda
Muda is waste

Implementing the Toyota Way - DevOps

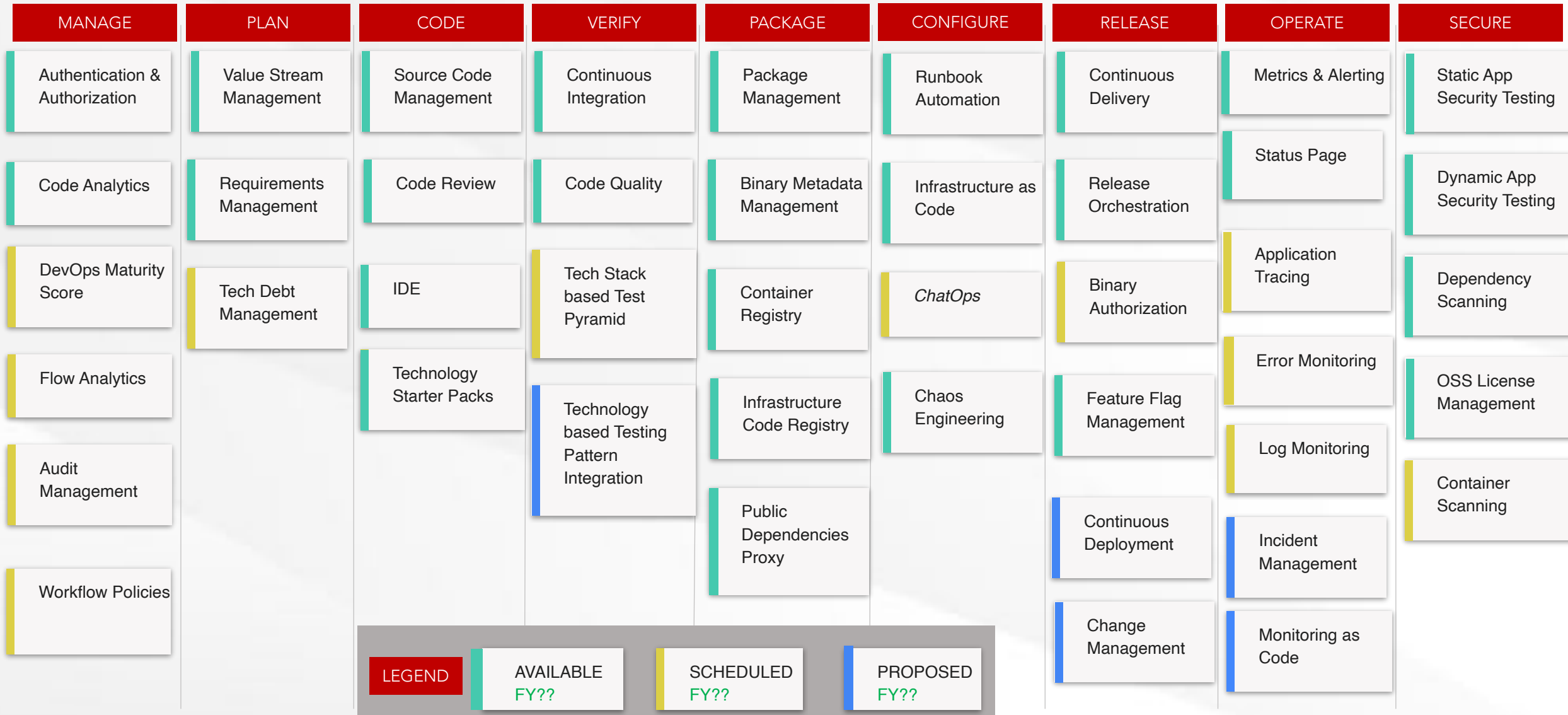
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- Planning the process
- Order of **CAMS** at Toyota
 - Automation
 - Measurement
 - Culture
 - Sharing



Planning the process

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First objectives

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- Scope - Cloud vs. On-prem
- Vision
 - Velocity of adoption
 - Reliability
 - Cost-Efficiency
- Tools



Road to DevOps

Tools



Tool chain – CI

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- Scalable build slaves
- Flexible build engine
- Heterogenous repository
- Security tools



Rush to production

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☆☆☆ Low Quality

High cost

Inefficient lead time

Toyota Way
Genchi Genbutsu
Kaizen



Challenge

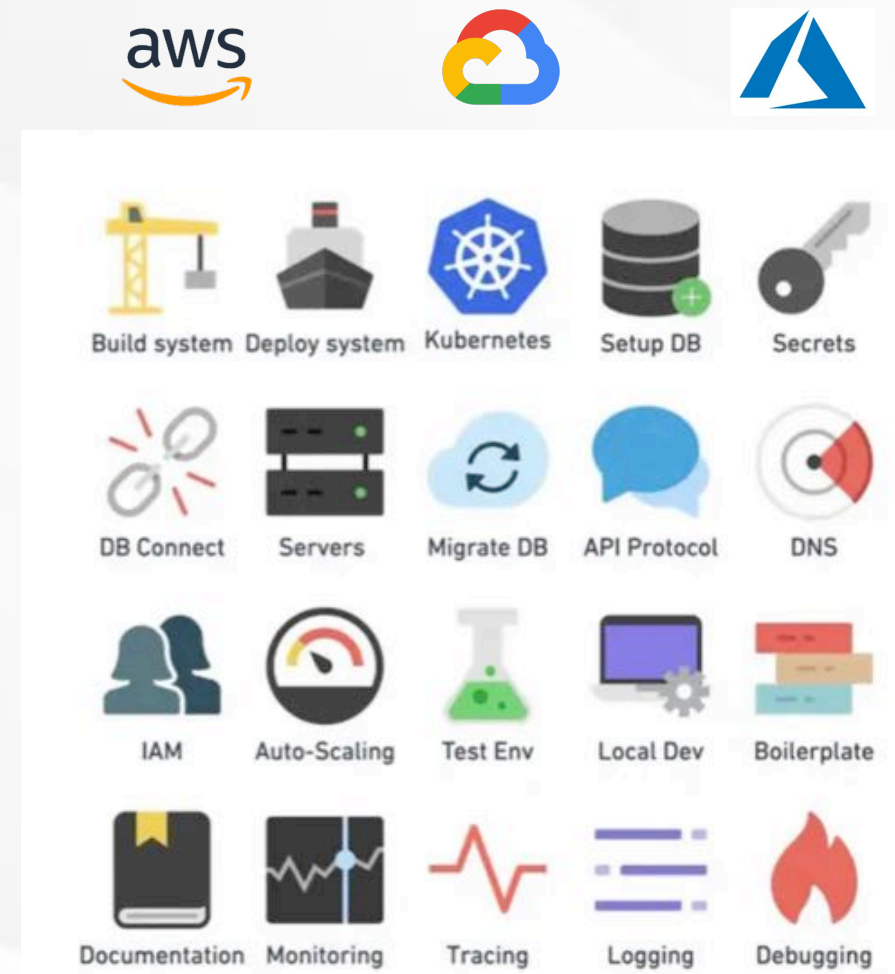
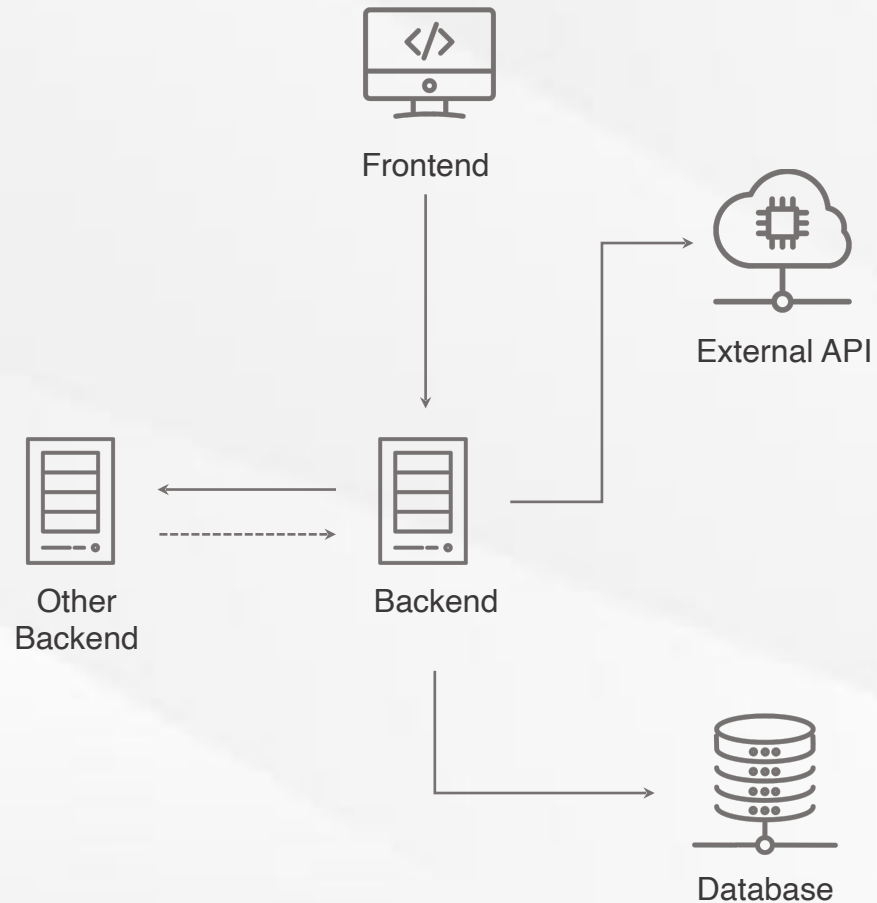
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- Modern software is richer.
- Lots of moving parts.
- Slow to build.



Genchi Genbutsu: Dev role expected vs actual

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Toyota Way – Kaizen (continuous improvement)

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Make it simple for product teams to produce high-quality digital products that matter.



Turn to success

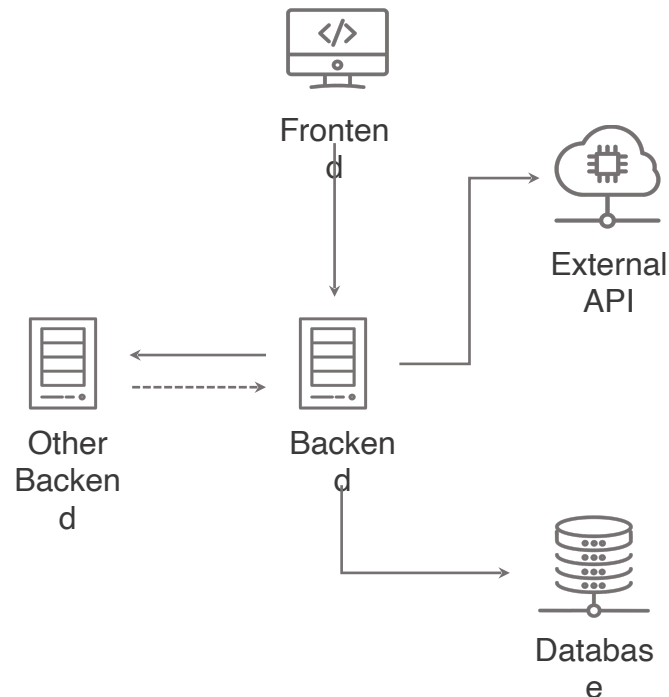
Culture



2 Platform approach

Digital business platform
(owned by application team)

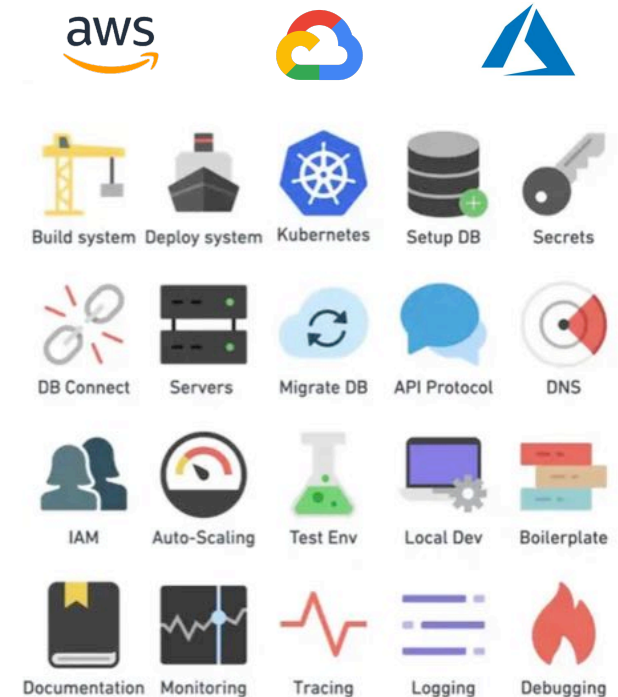
Foundational technology platform
(provided by platform team)



X as template

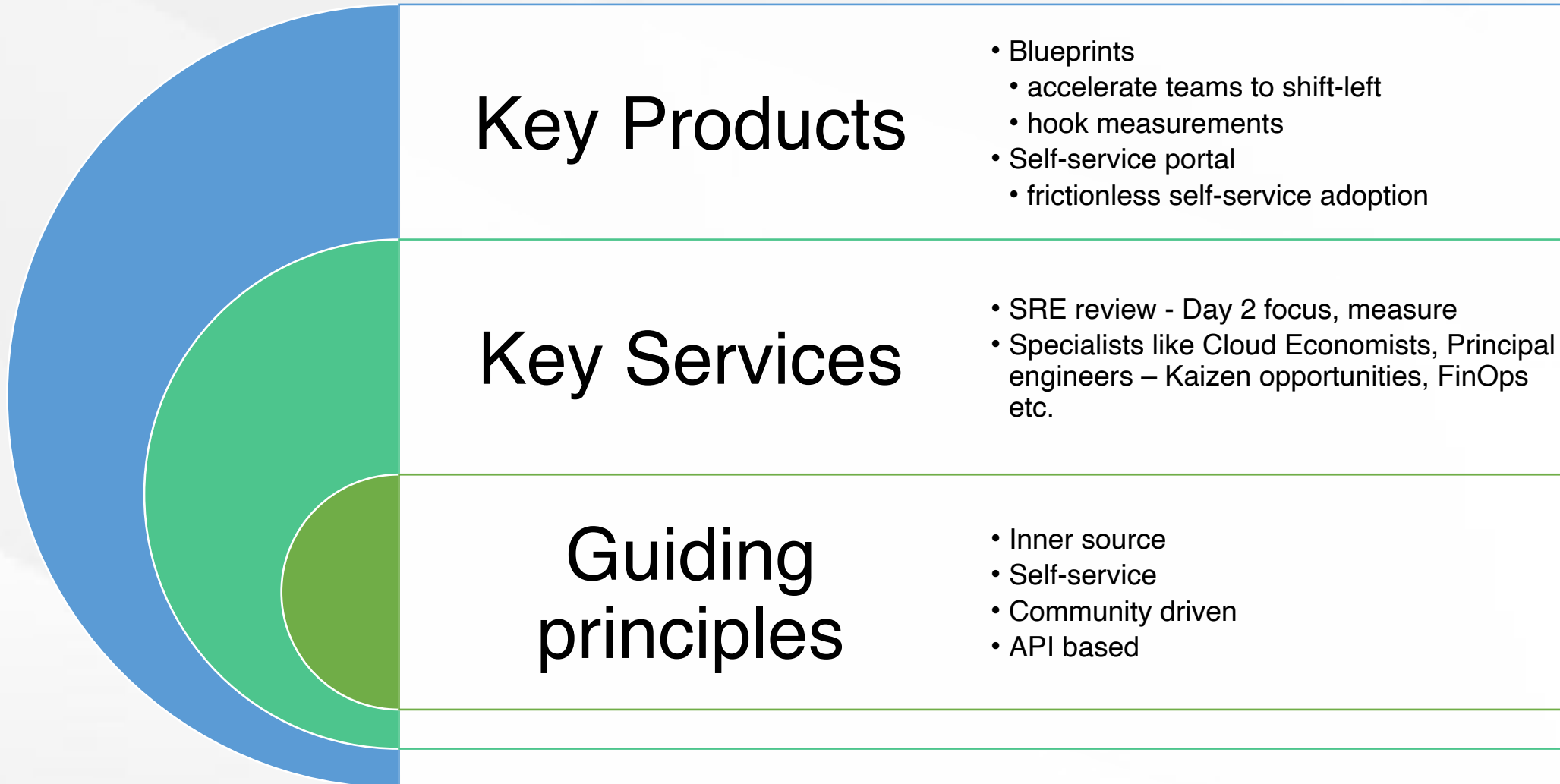
X as Code

Service Level X



Platform team composition - Products & services

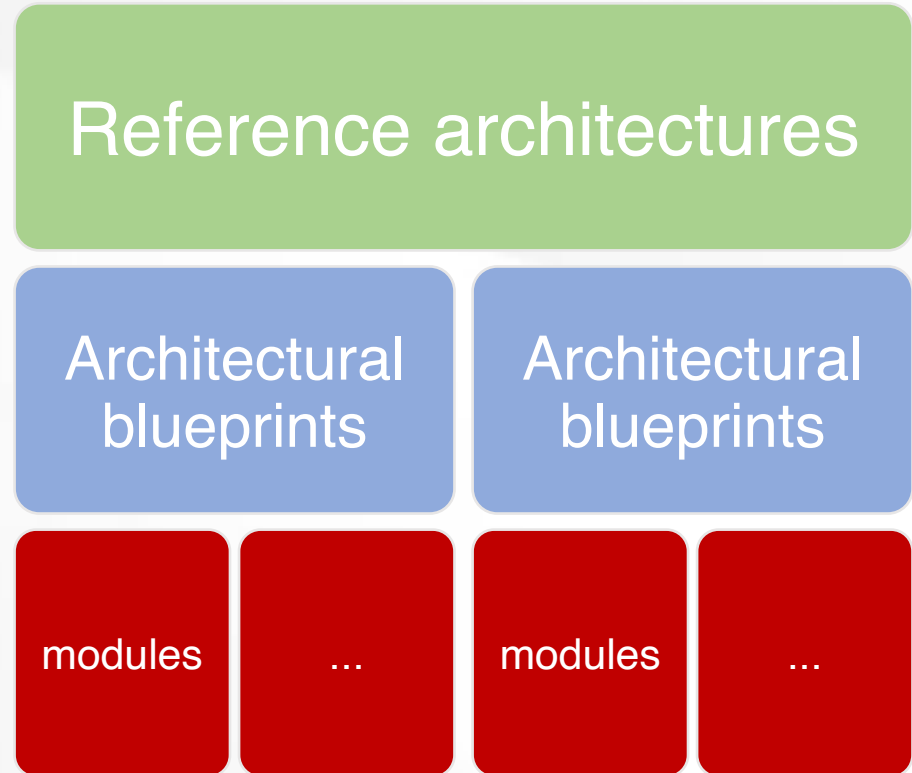
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Blueprints

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- Opinionated and supported path to build something.
- Examples:
 - Module
 - Terraform for s3
 - Architectural blueprint - SPA
 - S3 with CF + WAF + observability hooks + failover hooks
 - CI/CD pipelines
 - Reference architecture
 - Angular app + CF + WAF + CI/CD + lambda AuthN/Z + RUM metrics + logging + tracing + failover



Self-service portal

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Self-service blueprints



Software Catalog



Education and training



Economics and FinOps



SRE and Metrics

Blueprints on self-service portal: Chofer

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Key measurements

1. Rate of adoption
2. Rate of drop
3. Friction points

★★★☆☆ Good Quality



Cost efficient



Improved lead time

The screenshot displays the Chofer Cloud Portal interface. On the left is a dark sidebar with navigation links: Home, TechDocs, Blueprints (selected), Cost Center, Blogs, Training, and FAQs. Below these are Notifications and a user profile for Deepthi Bhat. The main content area features a 'Reference Architecture' section for 'COTS Infrastructure' with a 'Well Architected Score' of 41/45. This section includes a grid of WA pillar scores: Operational Excellence (3/4), Security (8/8), Reliability (10/12), Performance Efficiency (8/8), Cost Optimization (4/5), and [TMNA] Security Accreditation (8/8). Below this are three 'Architecture Blueprint' cards: 'ECS Blueprint for Containerized Apps', 'ECS Schedule Batch Job', and 'Single Page Application (SPA)'. Each card includes a brief description, a 'Learn More' link, and a 'CREATE' button. At the bottom of the page, there are tabs for 'Architecture', 'Ecs', 'Ecs-Blueprint', and 'Aws'.

Technology of choice:

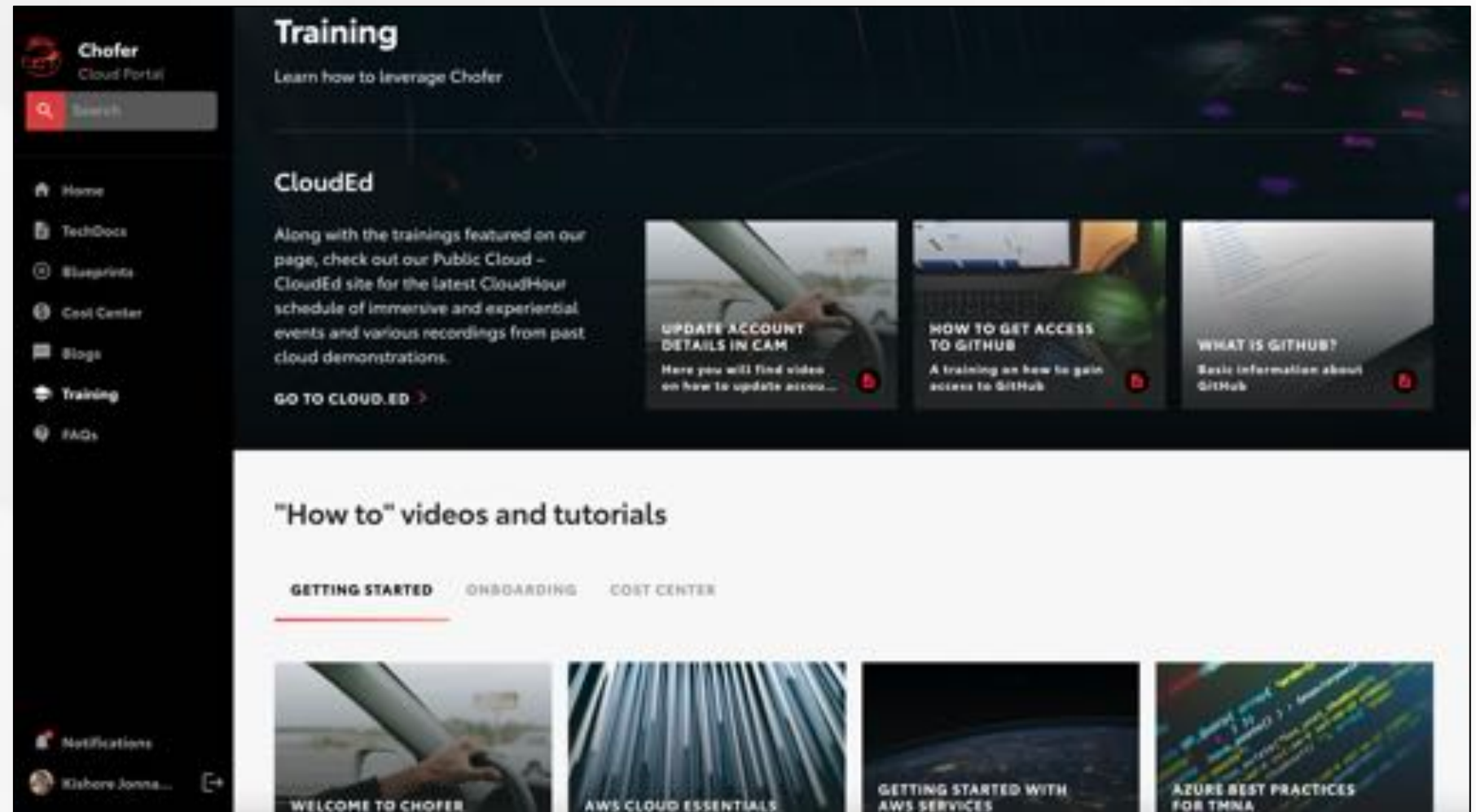
 Backstage

Guided and Community based training

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Key measurements

1. Number of clicks
2. Rate of new content
3. Time spent
4. Feedback items



Insights with single pane of glass

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Key measurements

1. No. of metrics
2. Freq of update
3. No. of dimensions
4. # of personas

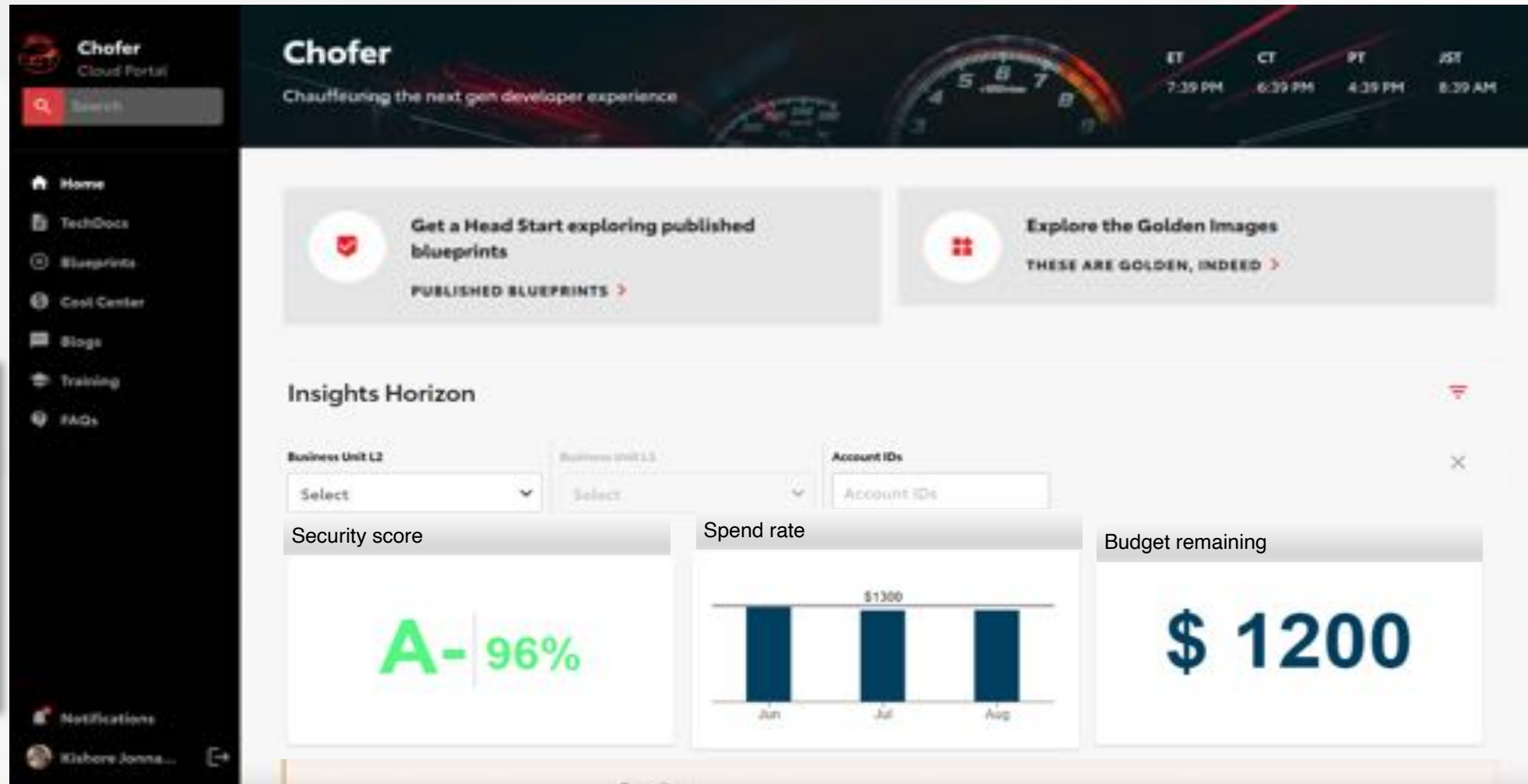
★★★★ High Quality



Cost efficient



Efficient lead time



Big 'O' on lead time

A sample feature : Deploy an API using springboot on a k8 cluster in a secure subnet exposing only 443 port with *encryption* in transit & rest. *Firewall* and DDOS protection are implied. Hooks into *observability* tools is also implied. *Resiliency* is required.

Application teams without blueprints

Assuming n such features
Deployed m times

Effort for each team, E can be measured as:

$$E(1) = O(m \cdot \log(n))$$

Assuming there are t such teams working independently, the total effort across the organization :

Day 1
 $E(t) = O(t \cdot m \cdot \log(n))$ avg case

Day 2
Assuming there are p upgrades to the template which is deployed q times :

$$E(t) = O(t \cdot p \cdot q \cdot \log(n)), \text{ avg case}$$

Teams using well-architected blueprints

Assuming n such features
Deployed m times with an improved iteration.

Effort for each team can be measured as $E(1) = O(m + k)$ where k is the time to integrate with a blueprint

Assuming there are t such teams the total effort across the organization :

Day 1
 $E(t) = O(t \cdot (m + k))$ avg case

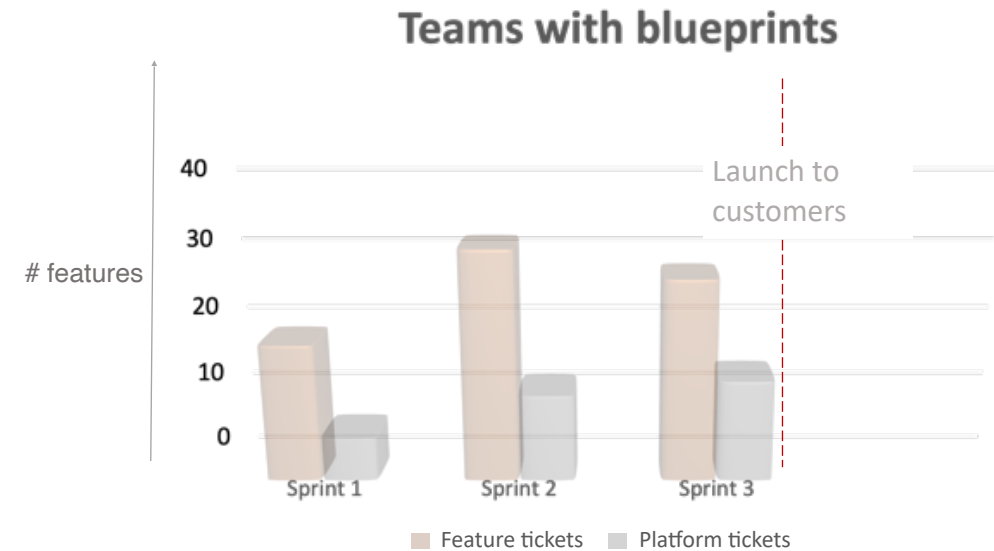
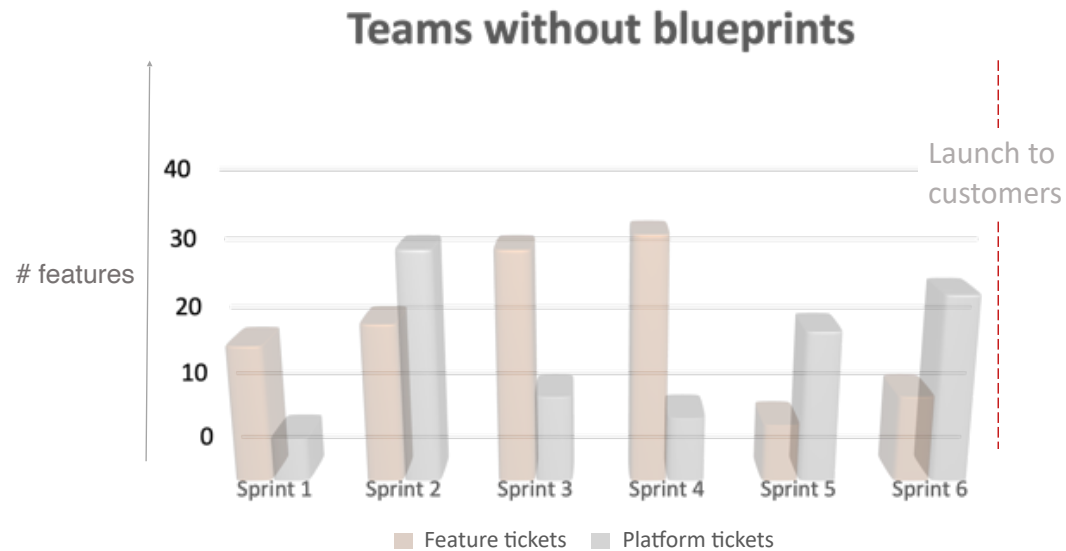
Day 2
The platform upgrades are transparent to the teams. The effort is minimal assuming upgrades are backward compatible:

$$E(t) = O(1)$$

$$E(t) = O(t \cdot 1), \text{ avg case}$$

Team productivity blueprints vs. no blueprints

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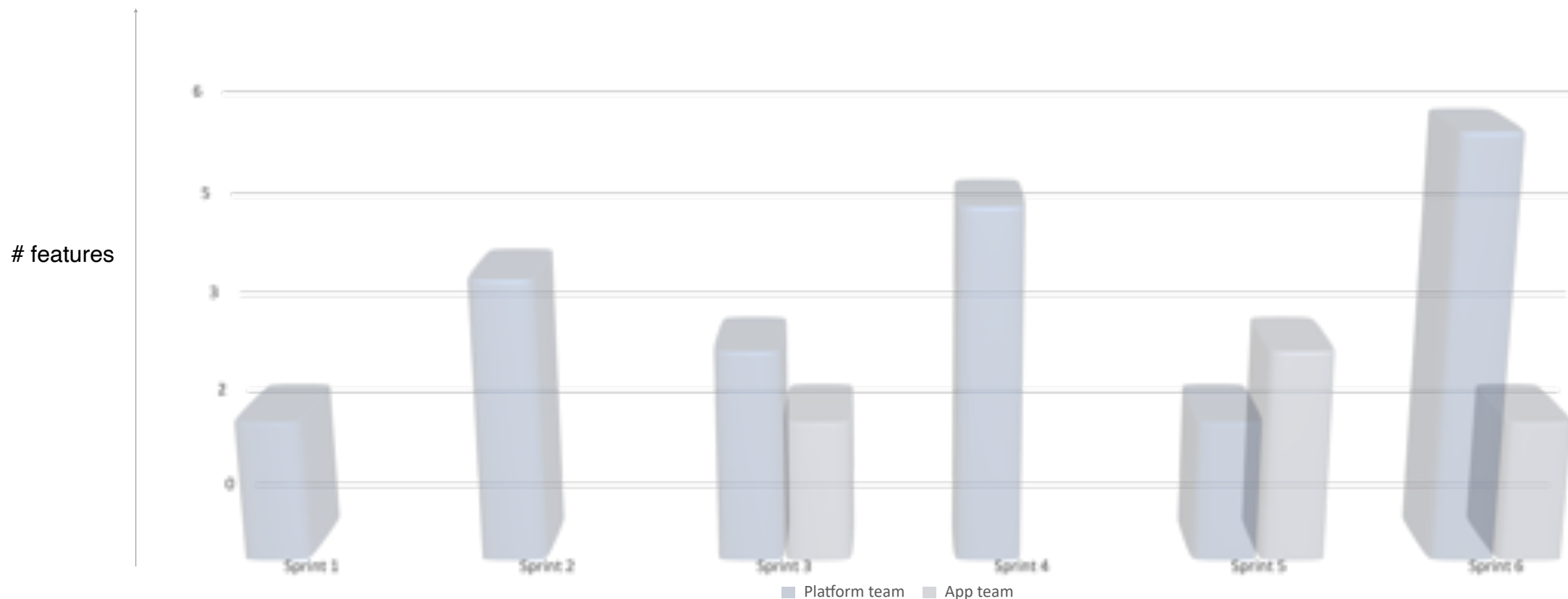


Conclusion: Using well architected blueprints **shortened** lead time by **~8 weeks**

Velocity of platform features

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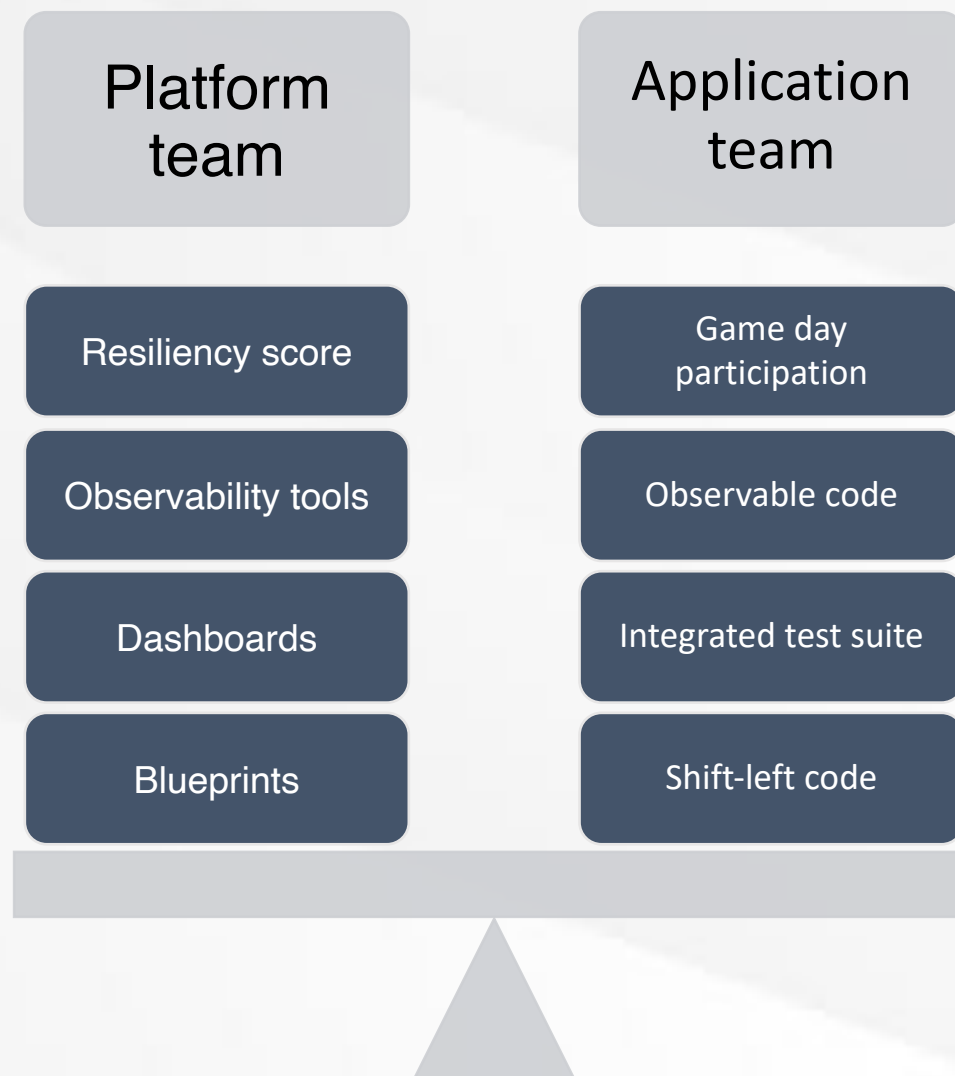
Platform features - Dedicated Platform SME vs General App developer



Conclusion: Lead time for well-architected platform features is shorter with dedicated teams by ~6 weeks

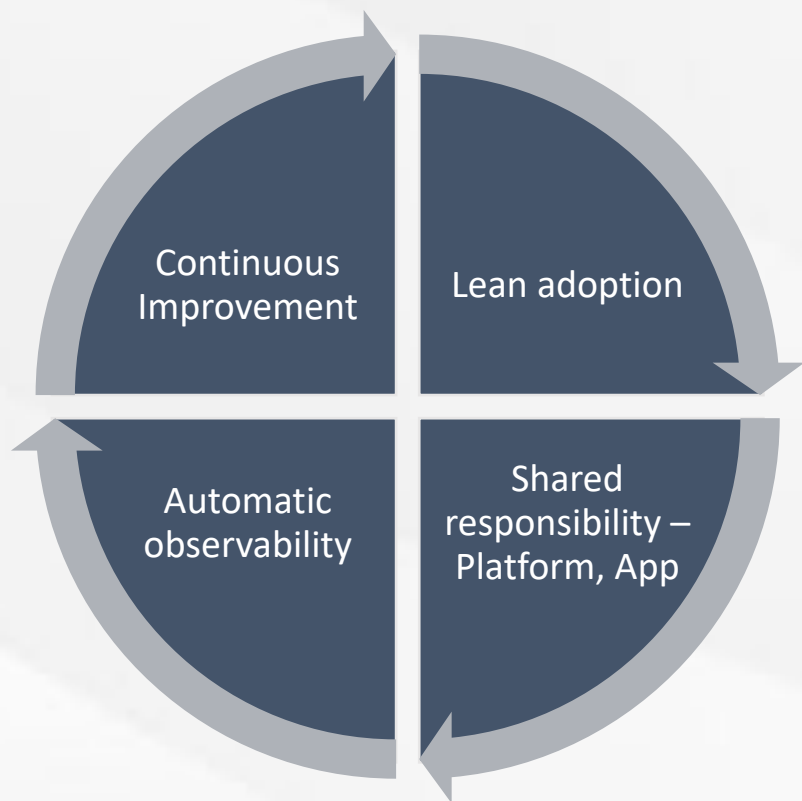
Shared responsibility model

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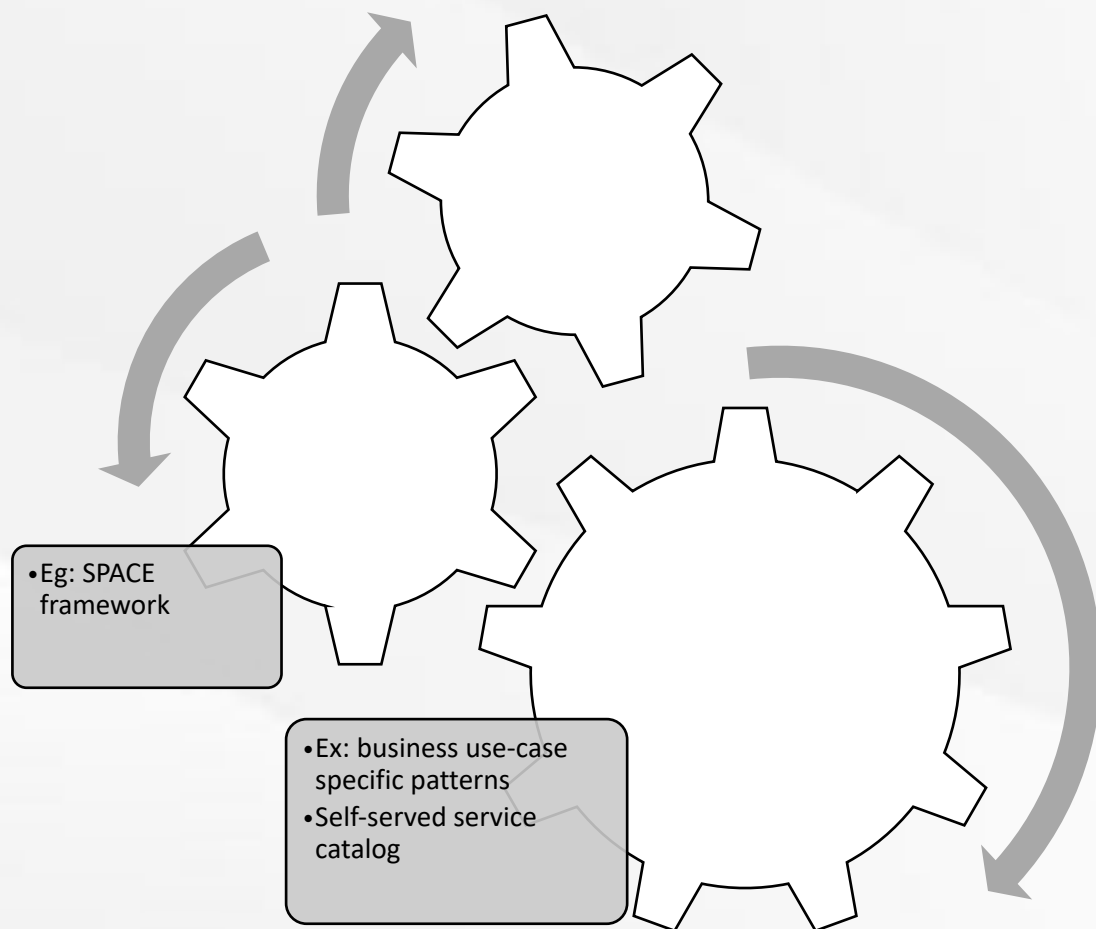
Summary

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Make best better ...

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Thank you

Contact:

LinkedIn: <https://www.linkedin.com/in/kjonnala>

We are hiring : <https://careers.toyota.com>

