
AWS
re:Invent

BLD208

Incident management in a distributed organization

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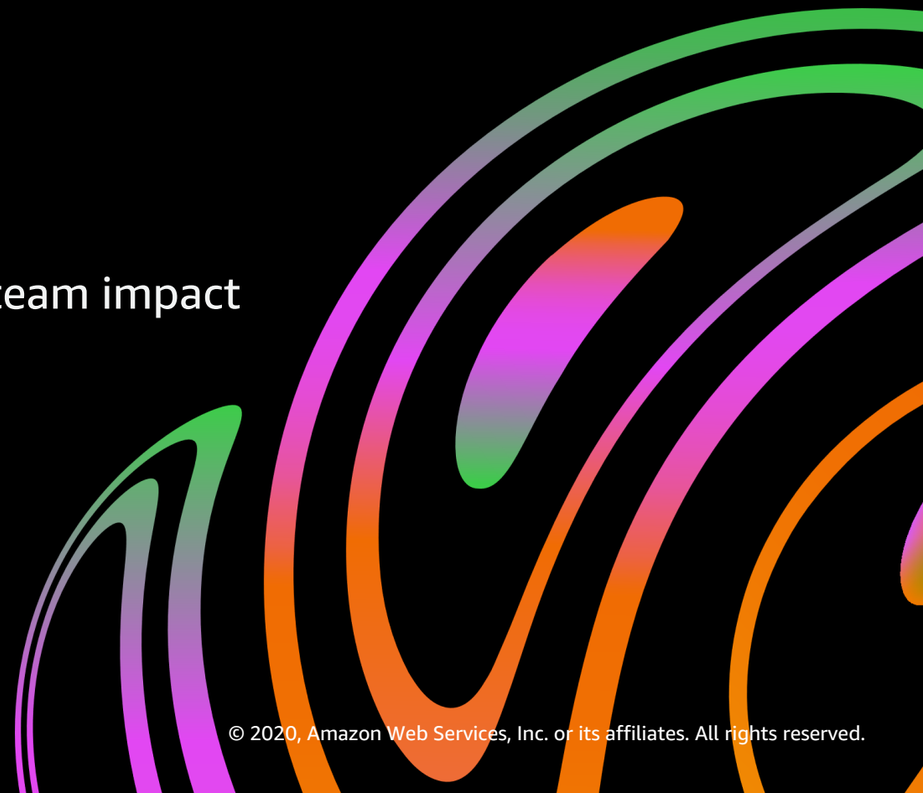
If you care about building and operating reliable and available applications...

this talk is for you.

Agenda : Let’s talk incident mitigation

- Introduction
  - Culture – Amazon leadership principles
  - Mechanisms

1. Customer Obsession
2. Ownership
   - Mechanisms – 2-Pizza Teams, Game Days, Ops Meeting
3. Bias for Action
   - Mechanisms: Immediacy tooling, tenets, aggregation, centralize cross team impact
4. Insist on Highest Standards / Learn and Be Curious
   - Mechanisms: Call leaders, COE, action items
5. Takeaways



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Get to know the Leadership Principles at Amazon

Our Leadership Principles aren't just inspirational quotes on the wall. Amazonians use them every day, whether we're discussing ideas for new projects or deciding on the best approach to solving a problem. It is just one of the things that makes Amazon peculiar.

Customer Obsession

Leaders start with the customer and work back-
wards. They work vigorously to earn and keep
customer trust. Although leaders pay attention
they obsess over customers.

Learn and Be Curious

Leaders are never done learning and always seek to improve themselves. They are curious about new possibilities and act to explore them.

Hire and Develop the Best

raise the performance bar with every
They recognize exceptional
hout the

Customer Obsession

Ownership

Invent and Simplify

Are Right, A Lot

Learn and Be Curious

Hire and Develop the Best

Insist on the Highest Standards

Think Big

Bias for Action

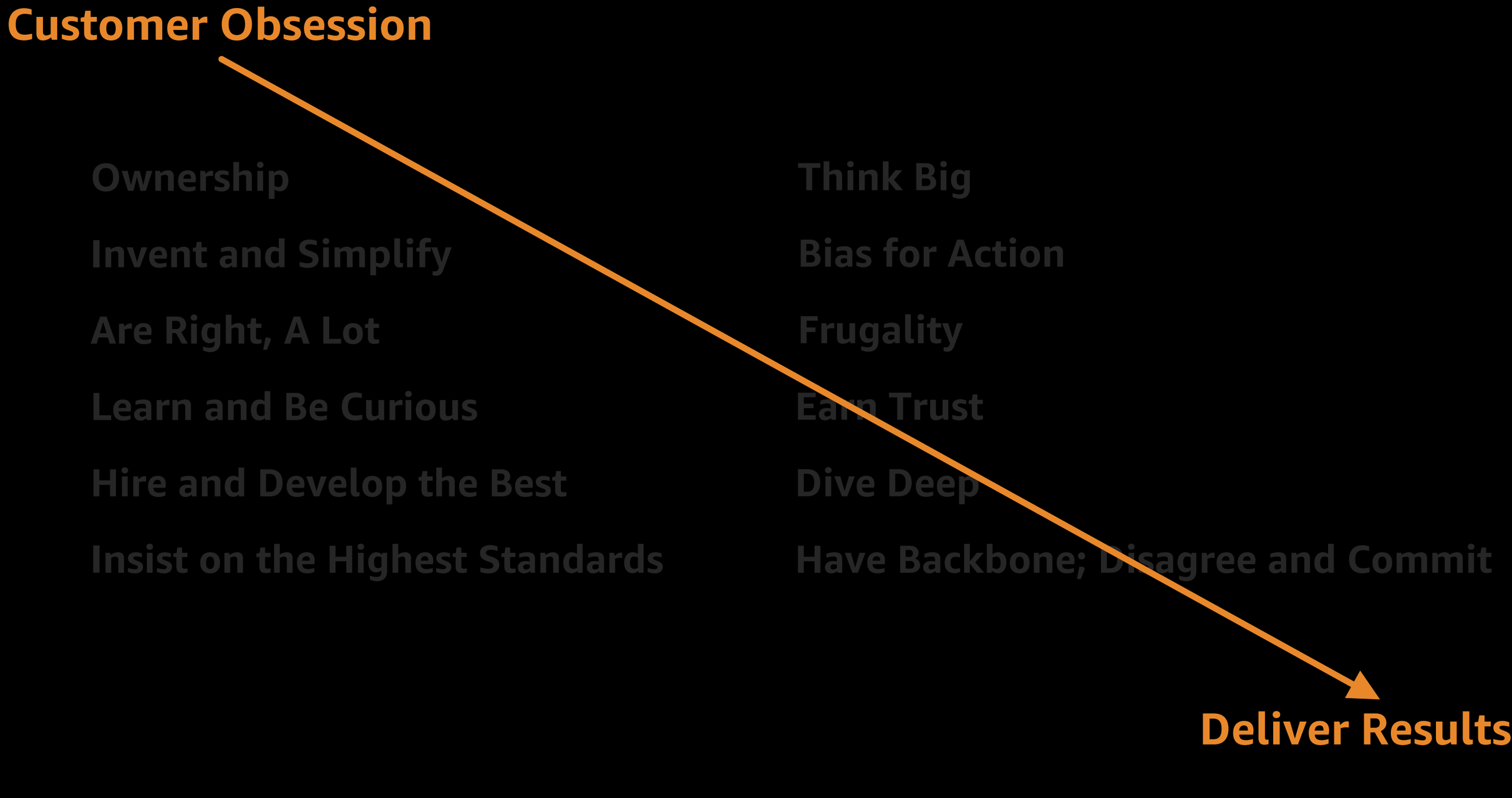
Frugality

Earn Trust

Dive Deep

Have Backbone; Disagree and Commit

Deliver Results


Customer Obsession
Ownership
Invent and Simplify
Are Right, A Lot
Learn and Be Curious
Hire and Develop the Best
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Frugality
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Have Backbone; Disagree and Commit
Deliver Results

Leadership (cultural) Principles + Mechanisms

You choose which is which!





"Good intentions never work, […]"



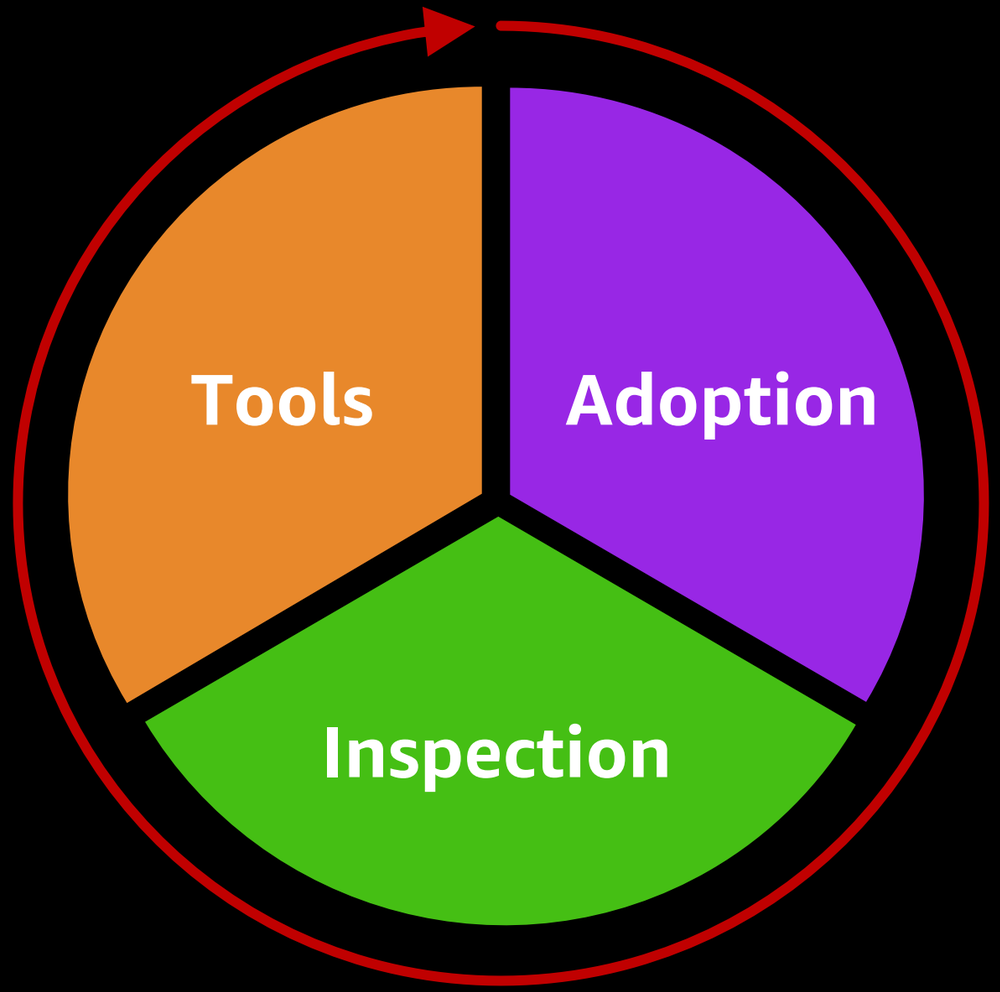
Jeff Bezos

CEO Amazon

"Good intentions never work, you need good mechanisms to make anything happen."

Jeff Bezos

CEO Amazon





Leadership Principles + Mechanisms + People

The journey to a modern, cloud-enabled enterprise is
mostly about transforming the people and how they operate.

Quick segue
BSS: Banana Stand Service

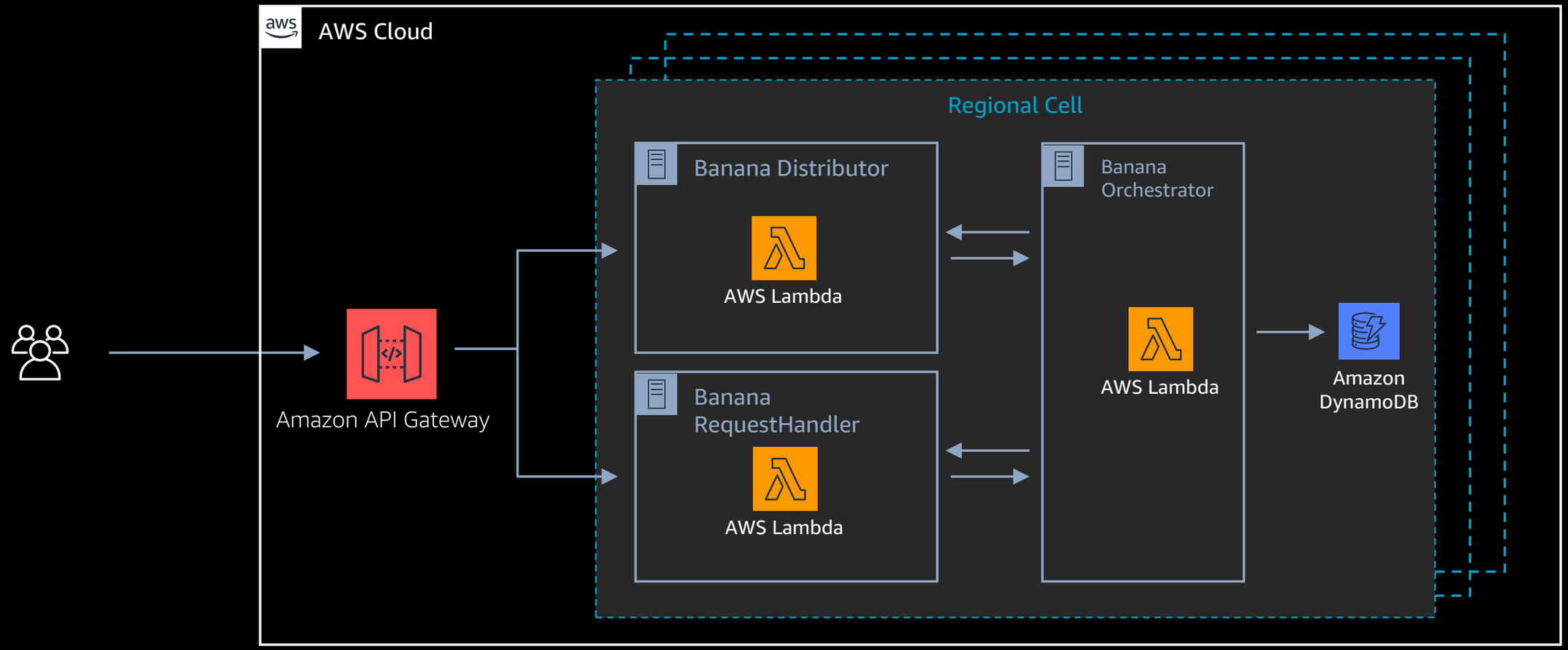
The BSS distributes
free bananas to the
community in Seattle

(it’s a real thing, check it out next time
you’re in Seattle!)



BSS: Banana Stand Service

MOCK ARCHITECTURE FOR CONTEXT



Ownership



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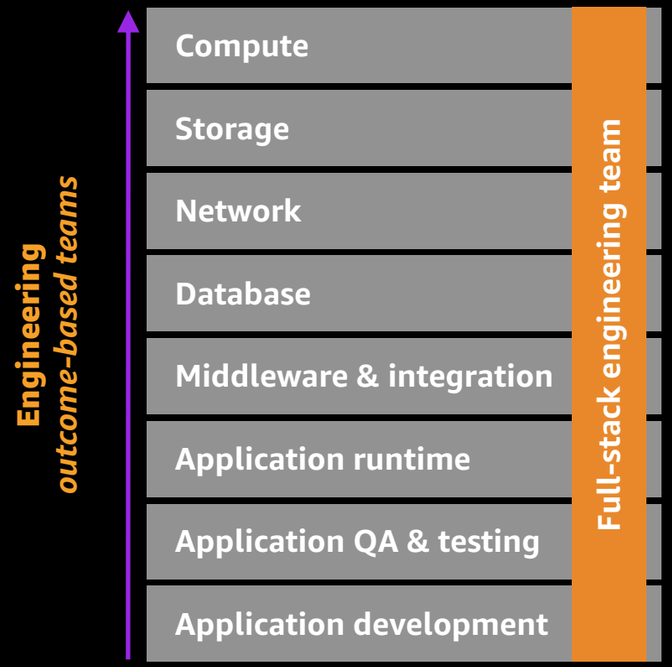


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Mechanism : 2-Pizza teams

Anatomy

1. Team of "Builders”
2. Focus on customer outcomes
3. E2E ownership



Operations

1. Self definition of KPIs
2. First contact for alarms
3. Self managed operational environment
4. Safe operations vs. manual / ad hoc
5. Automate as much as possible
6. Utilize standard services like Amazon CloudWatch, AWS CloudTrail, and more

Ownership

Real-world ownership

BLD 202

Owners-up : Building technology standards at Amazon scale

Marc Brooker

Sr. Principal Engineer, AWS



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Mechanism : Game Day

You test your service in pre-Prod, how about your people?

Owners need a safe environment to grow and develop their operational skills – give them one.

1. Make it fun, bring food, etc
2. Game master creates scenarios and takes notes
3. Scenarios are designed to be unlikely – test the limits of your runbooks
4. Whole team investigates, designated resolver presents
    - Prefer less experienced resolvers
    - Rotate the designate as scenarios progress
5. Don’t impact prod!











Ownership

Mechanism : Ops meeting

Weekly operational metrics review

1. Continuous inspection mechanism
2. Maintains focus on operations
3. Foundation of a healthy operations program
4. Accountability and learning, not blaming

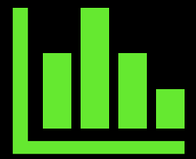
Typical agenda



Share and celebrate wins



Review operational events (COE)



Review service metrics



Org-wide improvements

Ownership

Spin the wheel!

HTTPS://AWS.AMAZON.COM/BLOGS/OPENSOURCE/THE-WHEEL/

The chosen team will:

- Walk through their operational dashboard
- Explain their operational performance
- Answer questions from leaders in the room



"Solutions don't always need to be complicated to be effective."

Ownership

Photo of original AWS Ops Wheel in Seattle © 2020 Oren Nachman. Used with permission.

Bias for action



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Mechanism : Tooling to drive immediacy

1. Individual engagement
   (Paging, emails, texts, etc)

2. Global awareness
   (Visual cues, chat rooms)

3. Event management tooling
   (Incident UI vs. Task UI, event chat room, etc)



Bias for action

Mechanism : Tenets

~~Resolve Impact~~
~~Root Cause~~
~~Fixing the Root Cause~~
~~Debrief~~
~~Relationship management~~
~~git blame~~
…

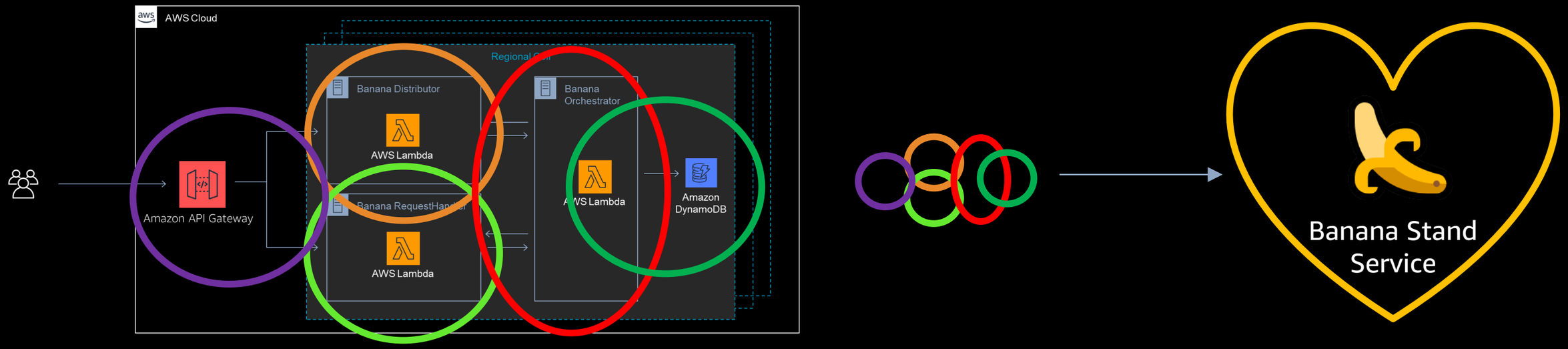
Mitigate Impact

Drive pre-incident training and meetings (**Game Days**, **Ops Meetings,** etc) to reinforce this idea

Bias for Action

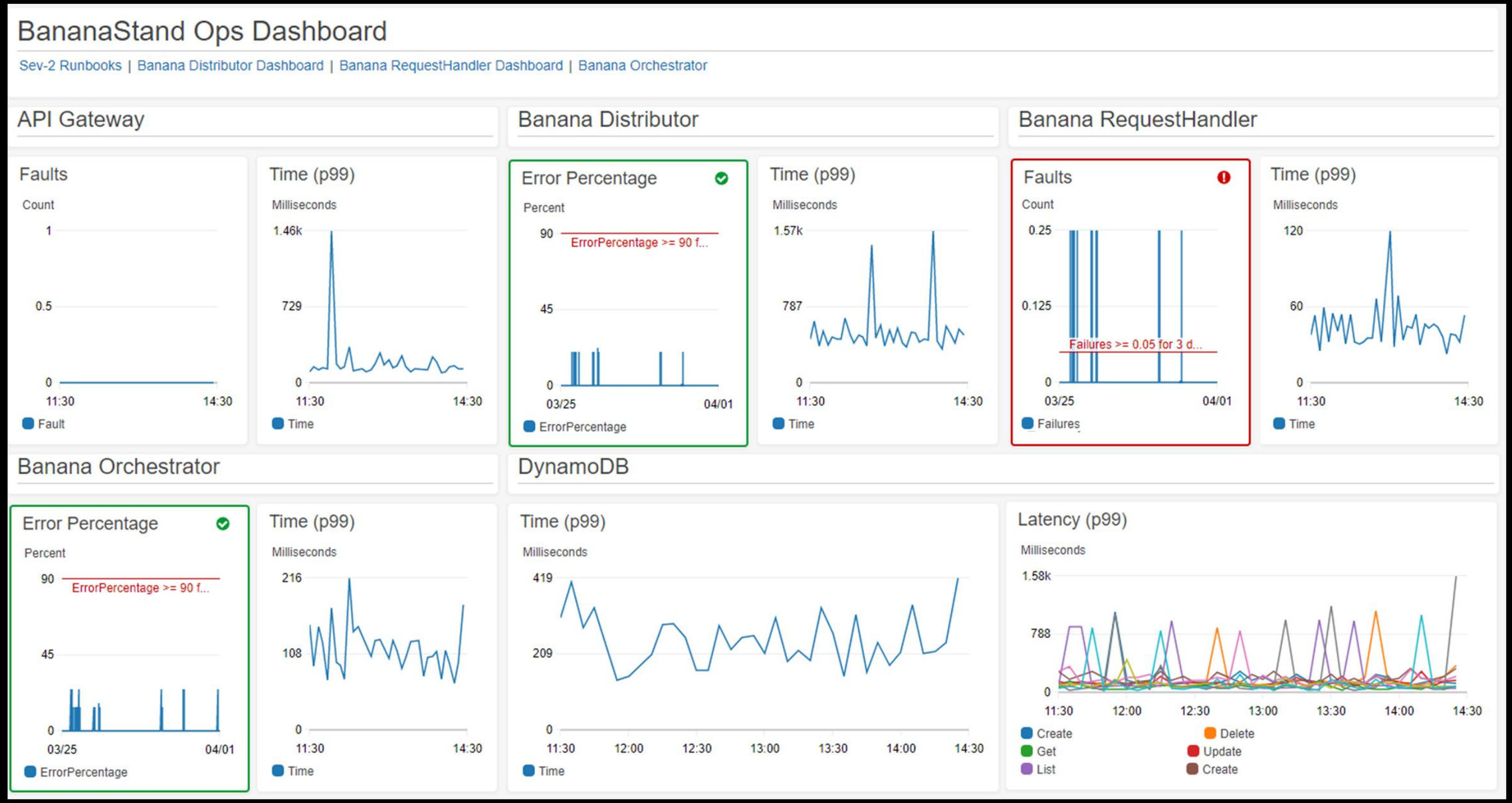
Mechanism : Detection of impact at scale

Use aggregation to detect impact across different, overlapping spheres

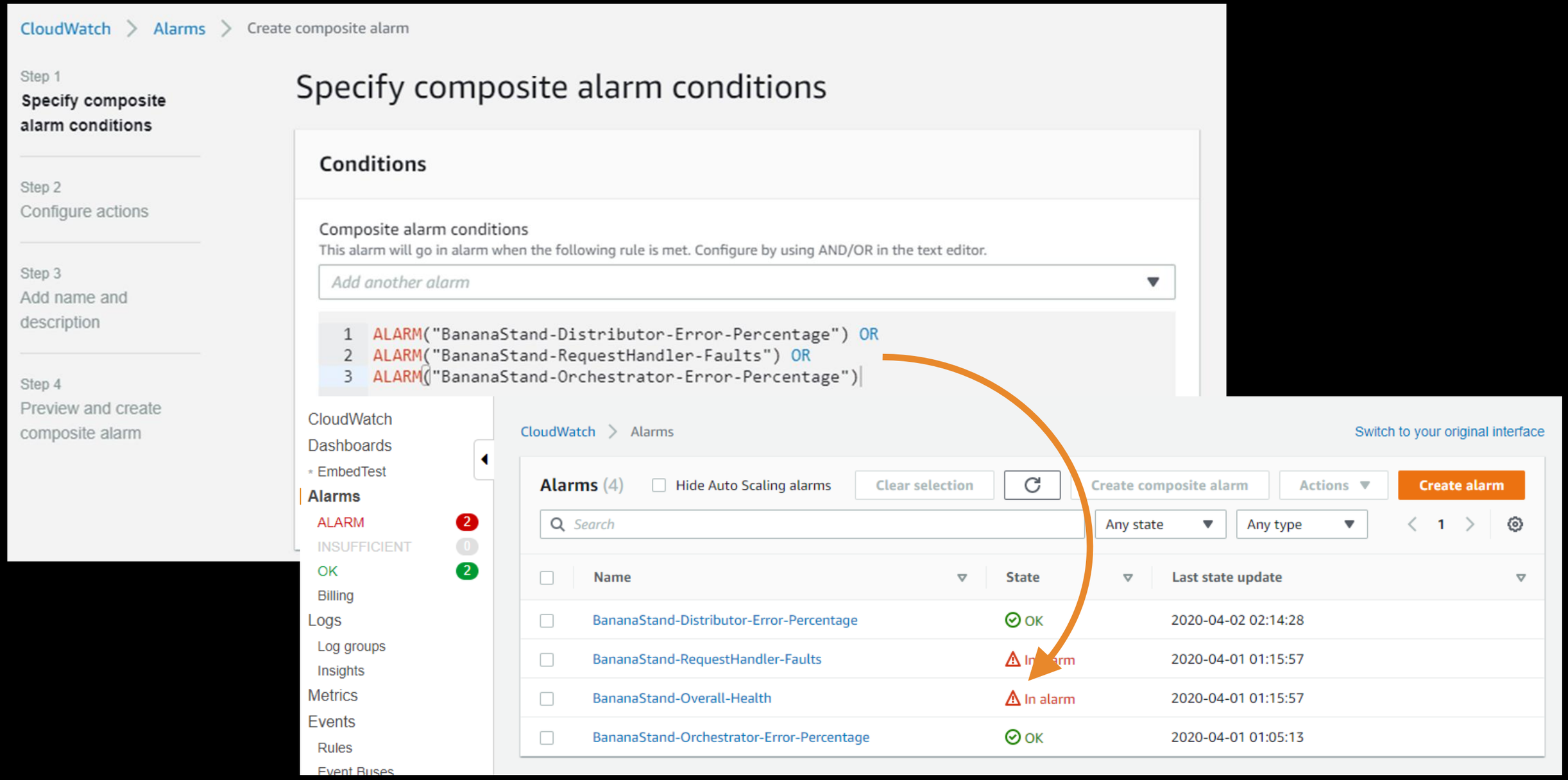


Bias for action

Amazon CloudWatch dashboards



Amazon CloudWatch composite alarms



Mechanism : Centralize handling of large-scale cross-team impact

Create a highly technical central team for coordination

During incident

- Identify aggregate impact
- Engage the correct teams
- Ensure logical flow of investigations
- Incident mitigation pulse checkers



Peace time

- Use KPIs to accelerate cross-team response
- Improve central tooling

Bias for action

Insist on the Highest Standards

&

Learn and Be Curious



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Mechanism: Call leaders

"Lead me, follow me,
or get … out of my way”

General George S. Patton

Insist on the Highest Standards
Learn and Be Curious

Mechanism: Call leaders

Decentralized non-SME incident mitigation SMEs

Responsibilities

- Decision maker
- Voice of the customer
- Ensure correct engagements and escalations
- Event leadership and pulse checker

Keys to success

- Keep it small (we recommend < 15 call leaders)
- Always maintain a cohort of shadows



Insist on the Highest Standards
Learn and Be Curious

Mechanism : Correction of Errors (COE)

Blameless mechanism to learn from our mistakes,
resolve root cause, and drive continuous improvement.

Areas of focus:

- Technical
- Process
- Documentation
- Everything else!

The key to a successful COE is being
open and transparent about what went wrong.



Insist on the Highest Standards
Learn and Be Curious

Anatomy of a COE

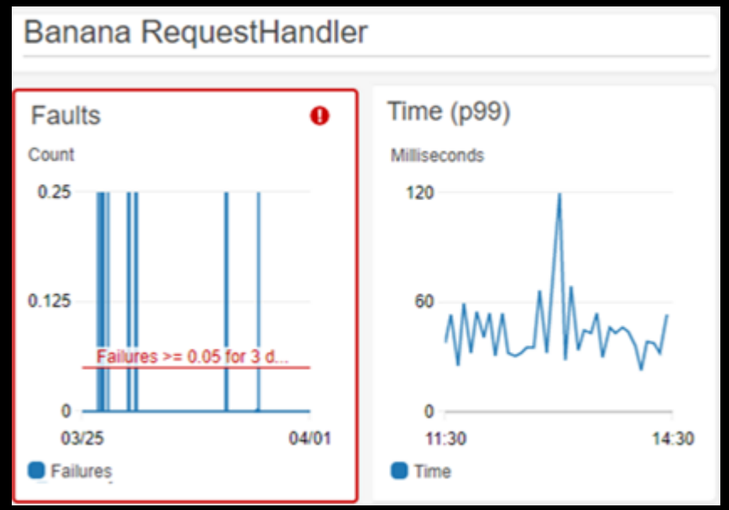
1

Summary: Who, What, Where, and Why?

BananaStand was unavailable for 90 minutes due to a misconfigured API Gateway

2

What data do you have to illustrate the impact?



3

What was the impact on customers and your business?

Customers were unable to collect their bananas for the duration of the impact

Insist on the Highest Standards
Learn and Be Curious

Anatomy of a COE

4

Incident Response Analysis

Event was detected via an Alarm, though time to detection could have been halved if we had alarmed on 1-minute metrics. Mitigation investigation was hampered by false positives in the logs which will need to be cleaned up to prevent delays in future incidents.

5

Post Incident Analysis

Incident was root caused by correlating deployments to impact time. Time to diagnosis could have been improved by adding deployment links to our runbooks.

6

Timeline

15:21 AEST – Impact start
15:24 AEST – Alarm fired and engagement sent
15:26 AEST – Resolver checked in
…

Insist on the Highest Standards
Learn and Be Curious

Anatomy of a COE

7

5(+) Whys

Customers can't get their bananas. **Why?** Because they're getting 5xx errors. **Why?** Because API Gateway can't contact our Lambdas. **Why?** API Gateway is misconfigured. **Why?** Because a misconfiguration was deployed. **Why?** Because we lack tests to validate configuration changes **(Solution – Add tests!)**

8

Lessons Learned

1. Test coverage needs to be expanded to include configuration changes
2. Tests need to hit our endpoints like an external customer (not just internally)
3. BananaStand resolvers need to Game Day bad deployment scenarios

9

Action Items

1. Improve test coverage as per the above
2. Update runbooks for bad deployment scenarios
3. Run Game Day

…

Insist on the Highest Standards
Learn and Be Curious

Takeaways

Earn the trust of your customers

- Empower your engineers
- Provide them with the training and tools they need to mitigate customer impact

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Use mechanisms

- Avoids “good intentions”
- Trust but verify

Mechanisms that work at Amazon

- BAU – OpsMeetings, Game Days
- Incident – Engagement, MTTM, aggregation, centralize large impacts, call leaders
- Post-incident – Blameless COE, tracked follow ups, problem management

Thank you!



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