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NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

INO204

Leading beyond line of sight: Amazon’s two-pizza teams

Daniel Slater (he/him)

Worldwide Lead, Culture of Innovation, Digital Innovation
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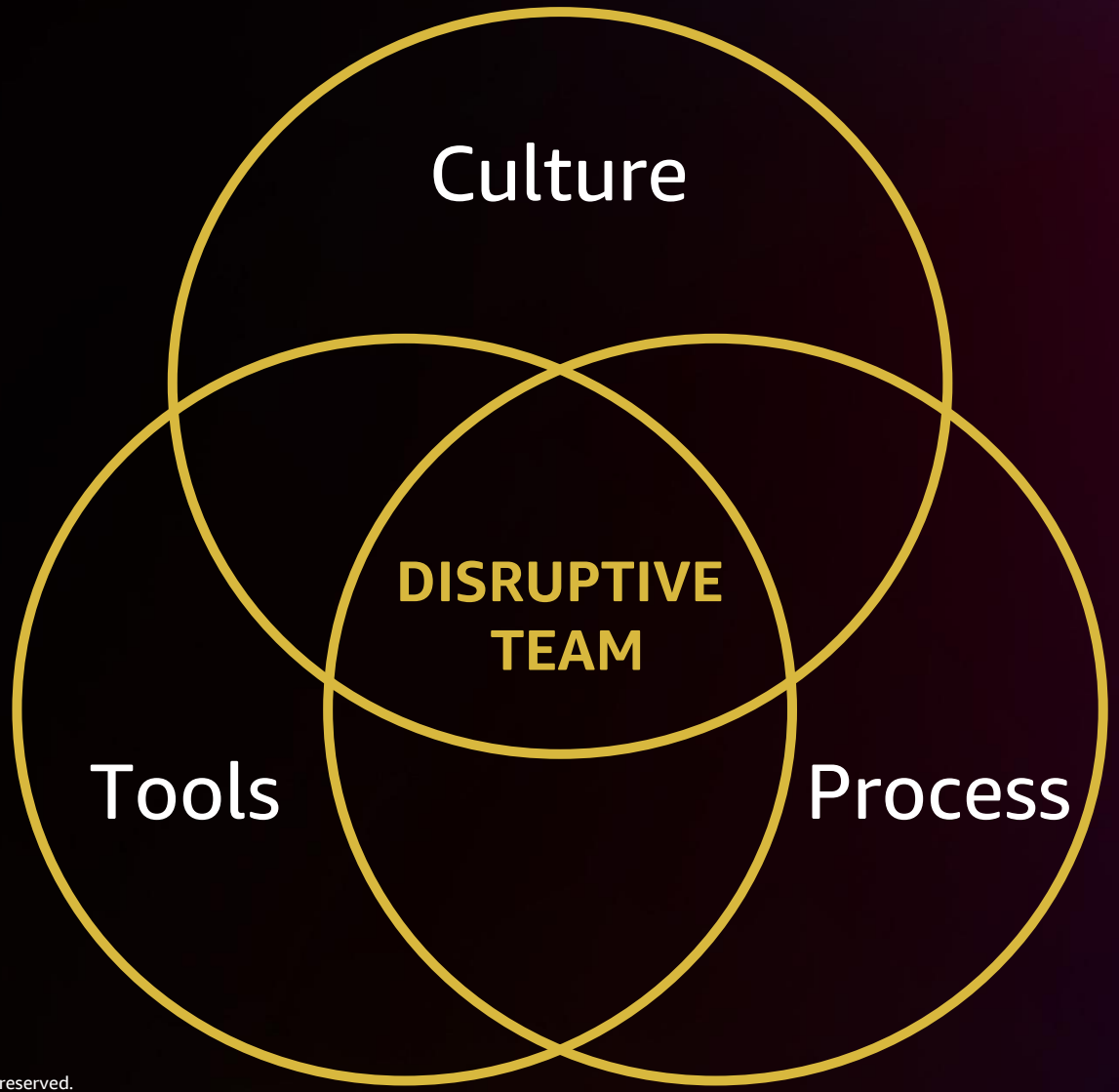
"As a company, one of our greatest cultural strengths is accepting the fact that if you are going to invent, you're going to disrupt."

Jeff Bezos

Founder and Executive Chair, Amazon.com

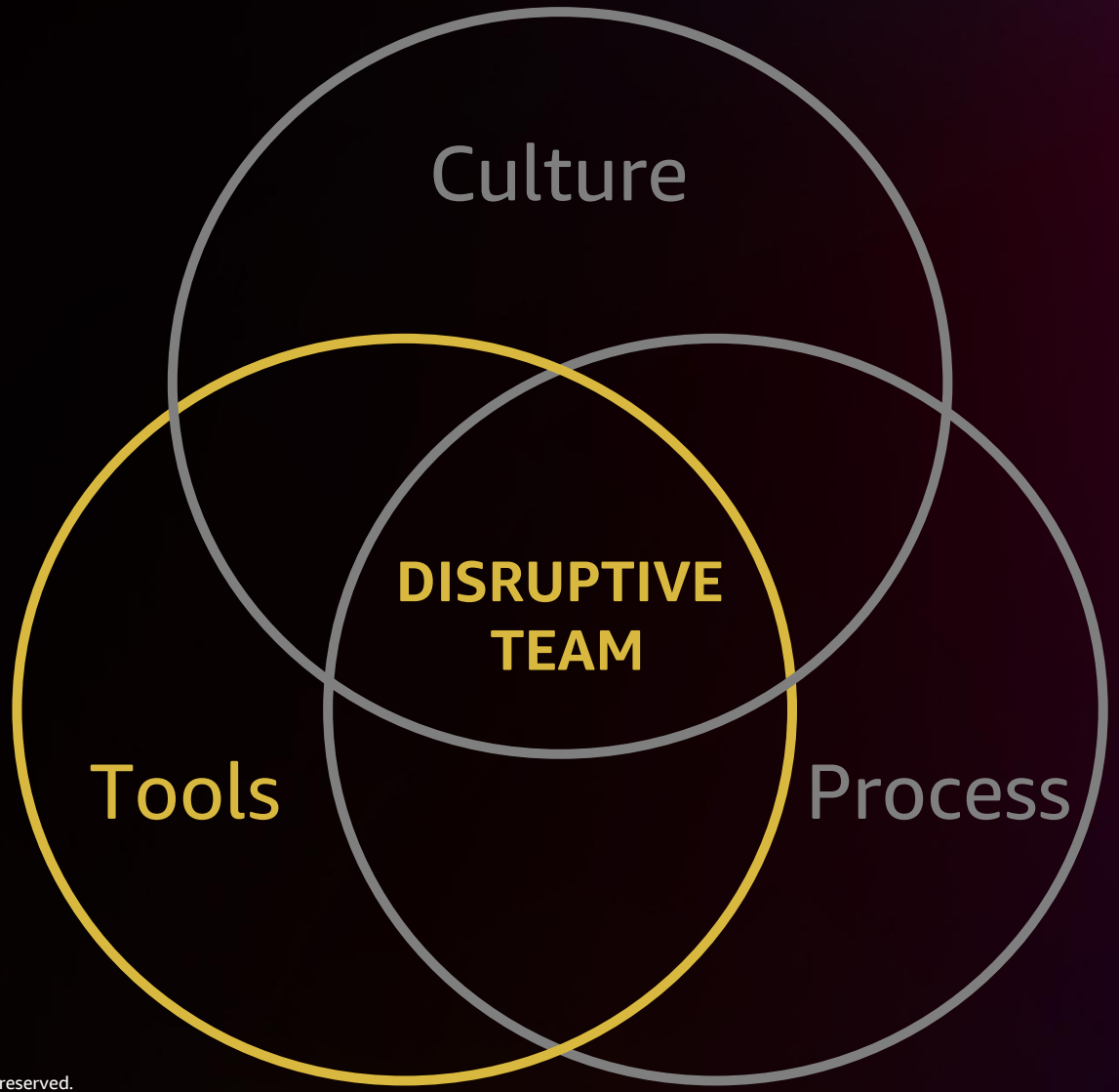
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Elements of a disruptive team



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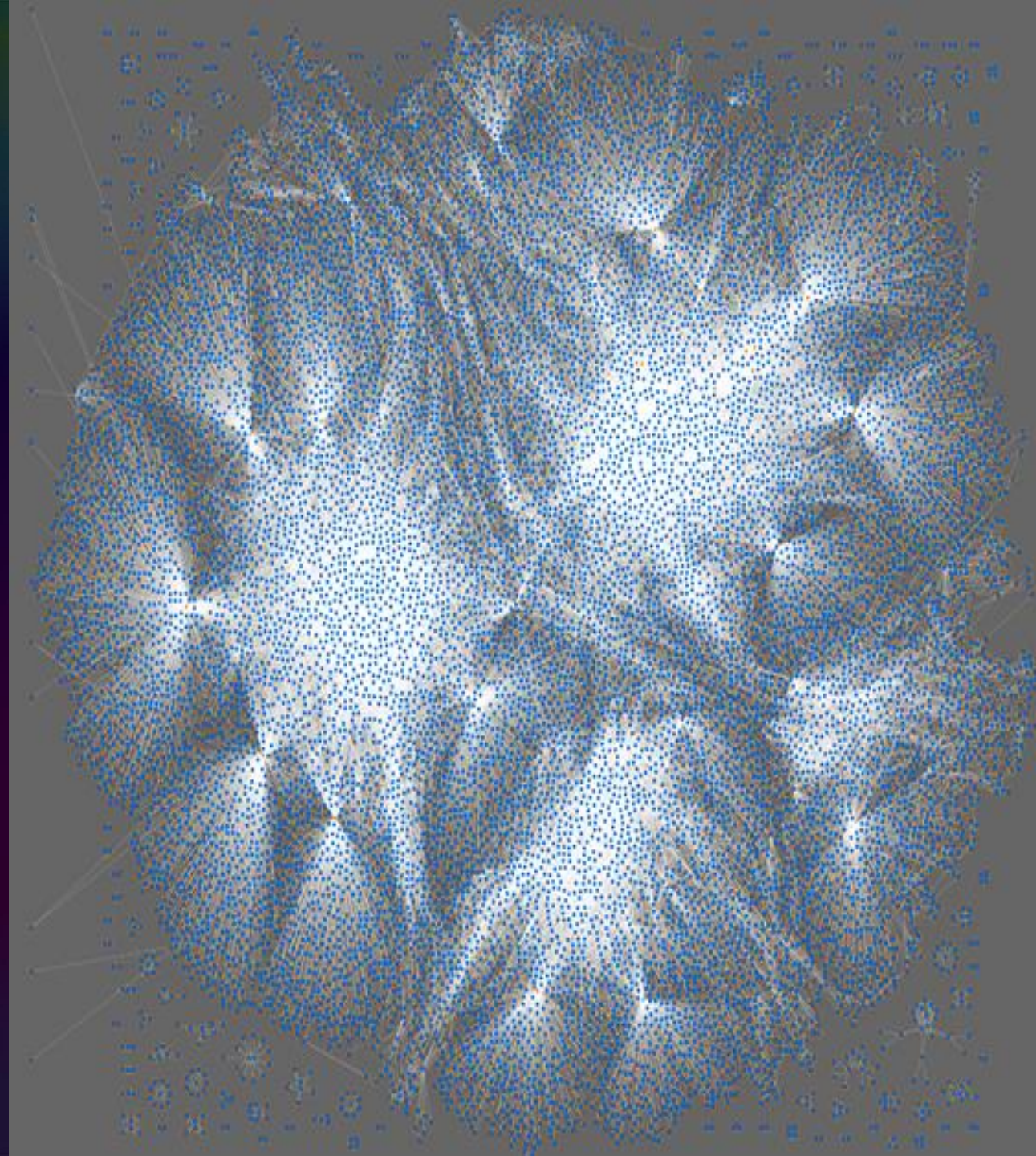
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A shift to microservices

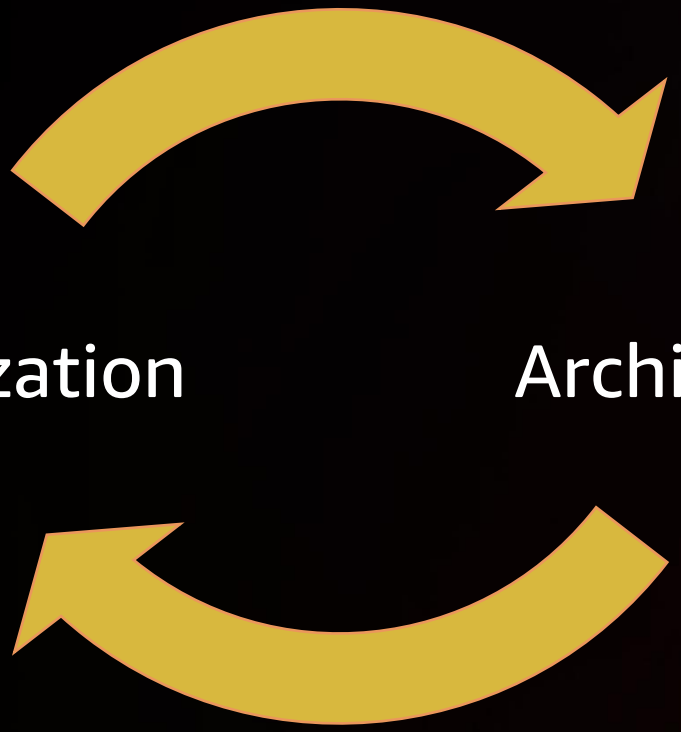
- Decoupled architecture of single-purpose services
- Business logic and data only accessible through hardened APIs
- Increased speed, agility, and innovation



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Conway's law

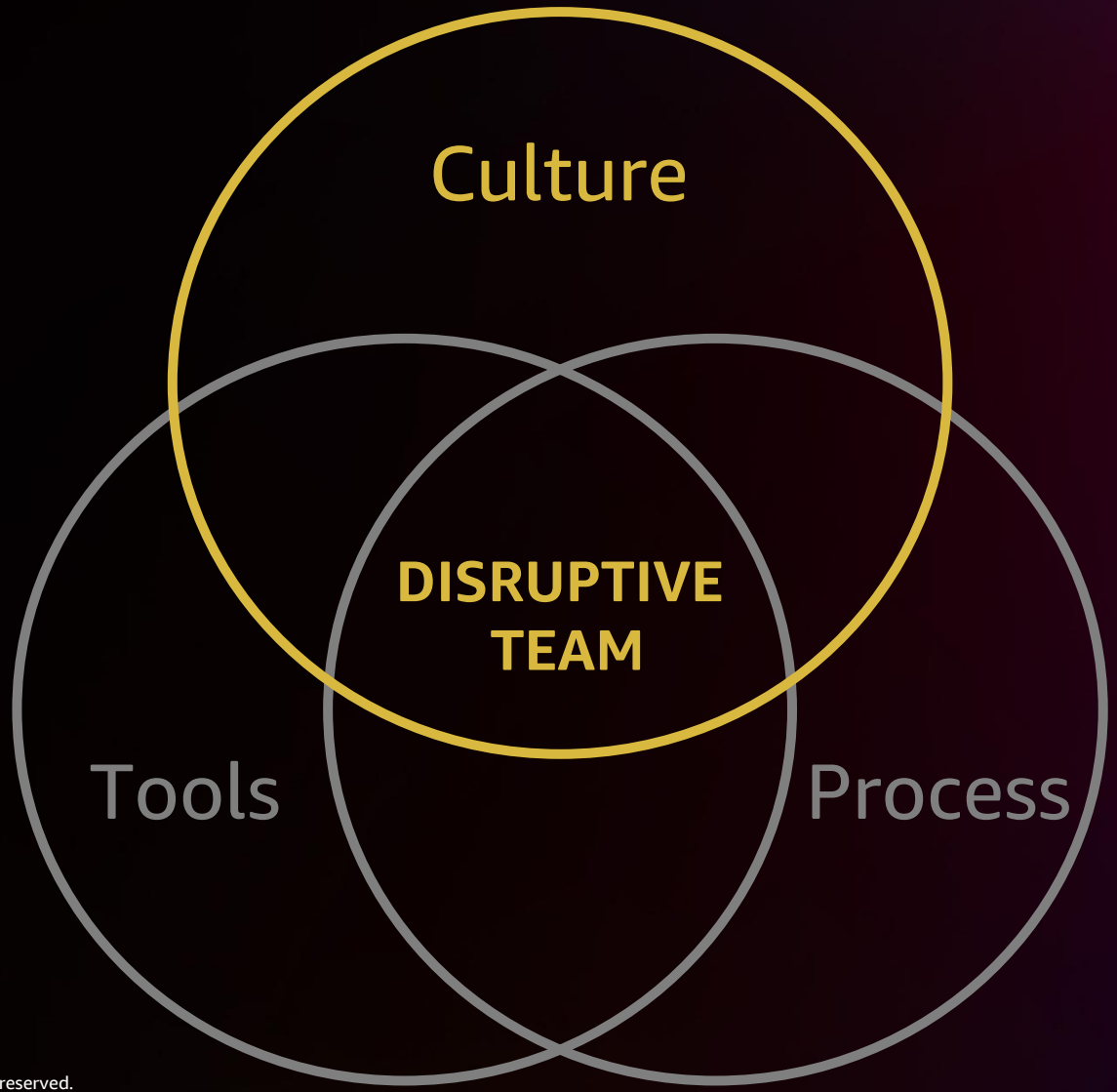


"Organizations who design systems are constrained to produce designs which are copies of the communication structures of these organizations."

Melvin Conway

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Leadership Principles



. . . unless you know better ones. Please be a leader.

Invent and simplify

Leaders expect and require innovation and invention from their teams and always find ways to simplify. They are externally aware, look for new ideas from everywhere, and are not limited by "not invented here." As we do new things, **we accept that we may be misunderstood** for long periods of time.

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Leadership Principles



. . . unless you know better ones. Please be a leader.

Frugality

Accomplish more with less. **Constraints breed resourcefulness, self-sufficiency and invention.** There are no extra points for growing headcount, budget size, or fixed expense.

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Leadership Principles



Bias for action

Speed matters in business. Many decisions and actions are reversible and do not need extensive study. We value calculated risk-taking.

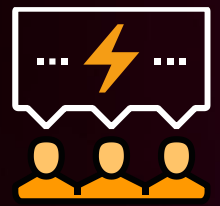
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Two-pizza teams are fast and agile, fostering **ownership** and **autonomy**



Small, decentralized, nimble teams

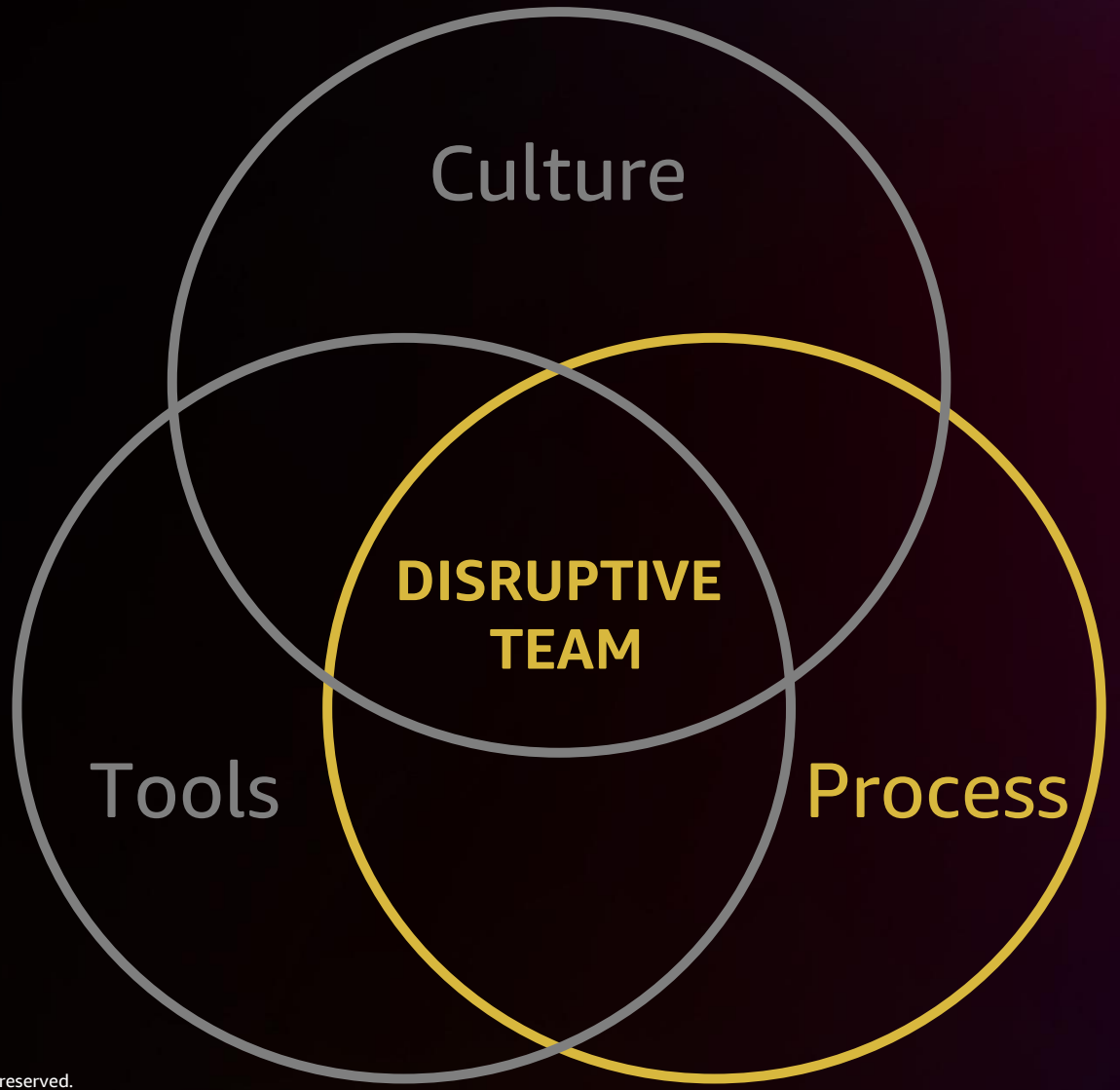


Own and run what you build

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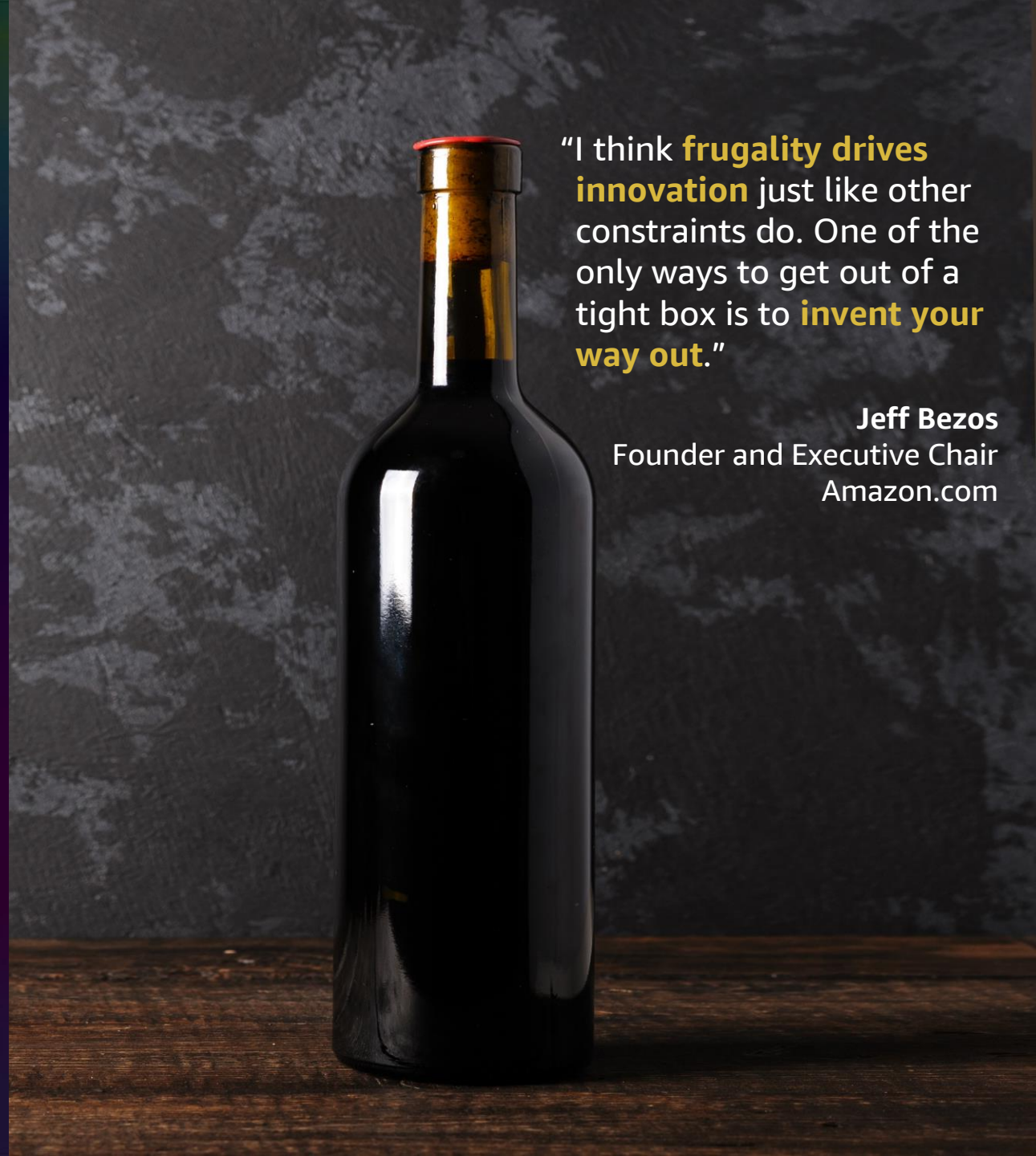
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The what and why of two-pizza teams

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Smaller teams

- Decrease dependencies and avoids bottlenecks
- Stay closer to customers … to invent on their behalf
- Drive disruptive innovation through frugality



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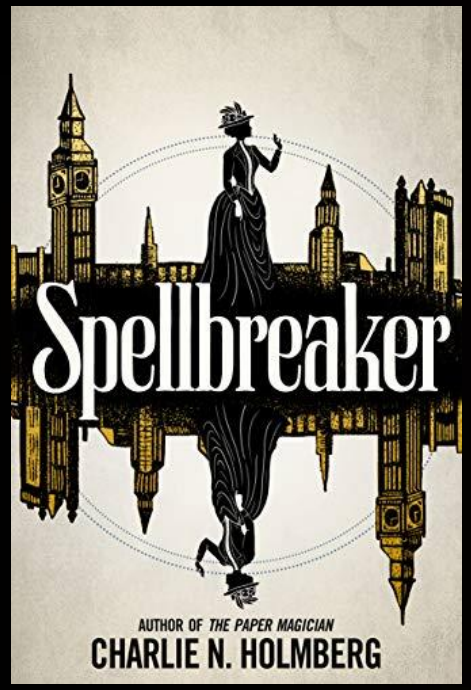
Issues with two-pizza teams

- Antithetical to most organization models
- Not always appropriate for every need
- Duplication of effort

$$2 > 0$$

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Example: 2>0



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Single-threaded owners and single-threaded leaders

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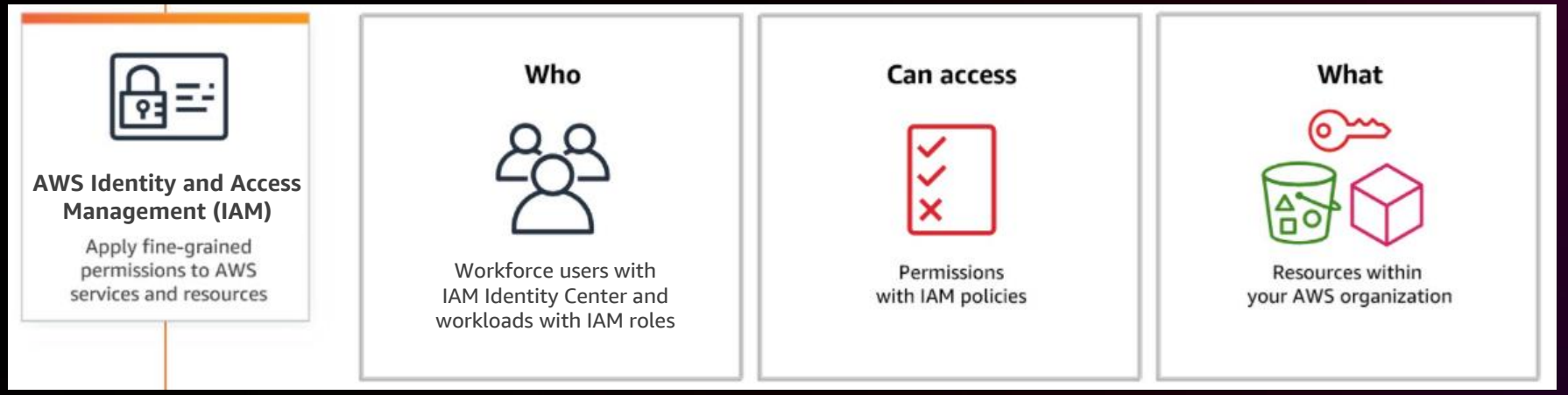
Single-threaded ownership

- Maximize delivery to customers
- Focus on one specific thing – for one specific customer
- Resourced appropriately for full E2E ownership
- Own what they launch
- Accelerate disruptive innovation – at a lower cost of failure

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Single-threaded leaders

- **Not** a leader of single-threaded team
- Has a single-threaded focus . . . but not resource control
- Best applied to cross-cutting objectives across the organization



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As business scales, team mitosis occurs



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Return policy: Eligible for Return, Refund or Replacement

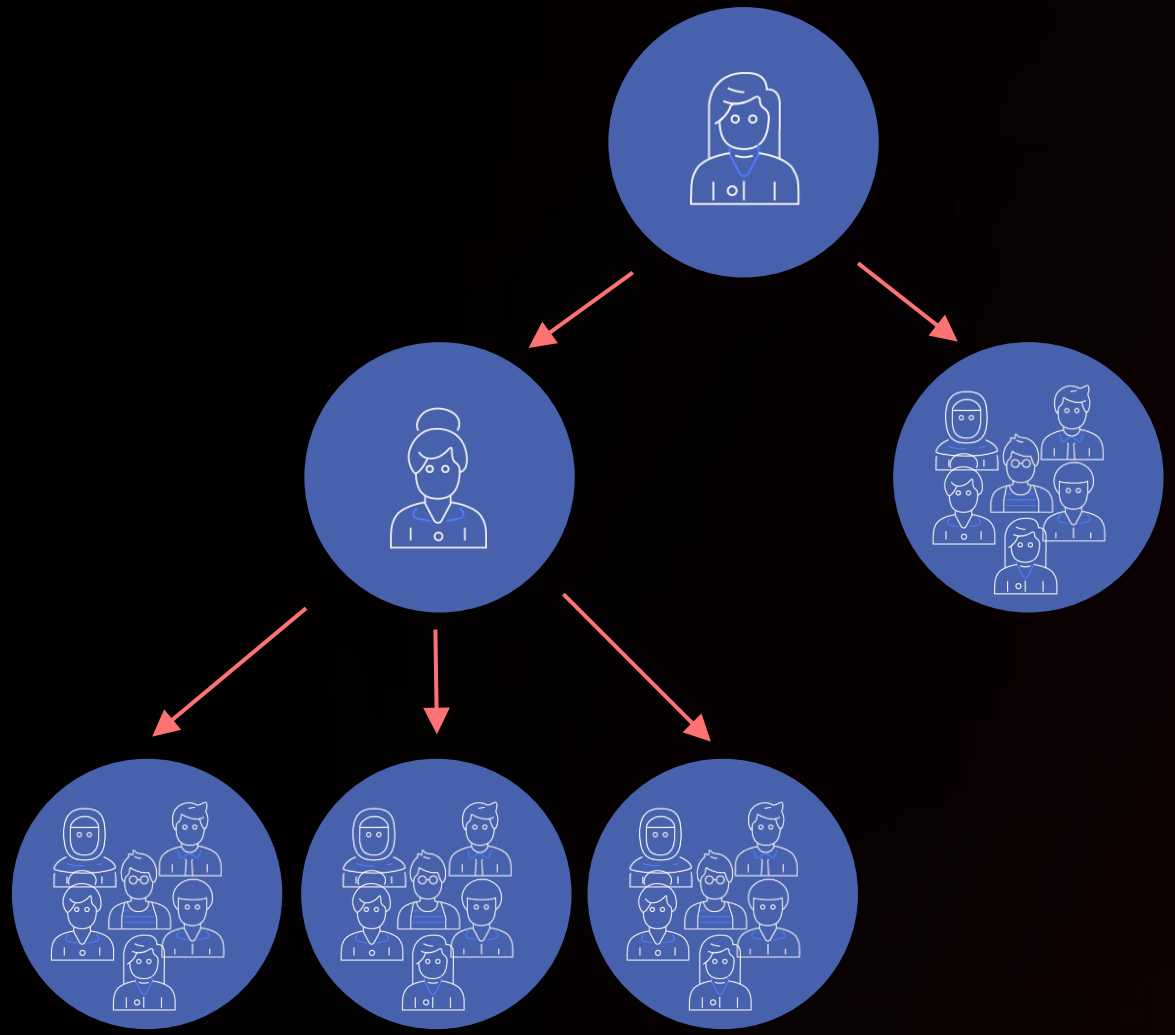
Support: Free Amazon product support included

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Link device to your Amazon account to simplify setup.
Why is this important?

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Leading single-threaded teams



- Logically grouped to maintain ownership
- Keeps two-pizza teams focused on their customers
- Brings business-level accountability and helps with prioritization and resourcing

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Operational metrics reviews

- Continuous inspection mechanism
- Maintains focus on operations
- Foundation of a healthy operations program



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Mechanisms two-pizza teams use for disruptive innovation

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knowing that Amazon will send them the right sized diaper at the right time.

Babies need an average of about 3,800 disposable diapers across seven sizes in three years, and remain in a size anywhere between a few weeks to several months. A baby might need just one box of size 1 diapers but need as many as eight boxes of size 4 diapers. To complicate matters, weight – and not age – is the best predictor of a baby's diaper size.

With Amazon's Subscribe & Save program, customers previously created diaper subscriptions in a specific size which was replenished until the customer decided it was time to move up a size. This meant that parents needed to anticipate the change in diaper size and either cancel their existing subscription to create a new one, or go to the Manage Your Subscriptions page to update the existing diaper subscription with the new size. This caused endless frustration for parents, added to the stress of having a new baby, and the experience ran counter to the concept of a subscription that should run smoothly with minimal touch points.

With the introduction of the new auto-sizing feature, customers who subscribe to diapers will be asked to provide their child's weight, in addition to the existing child info. They will then be able to set up a single subscription that will take them through the various sizes at the right time. Customers will be notified before the next box of diapers is due to ship that it has automatically sized up – if it's too soon, there will be a simple one-click process to keep the current size.

"I love using Subscribe & Save. But for my older child, I have had to return boxes that were one size too small, which actually increased my work load," says Mara Steiner, who has used Subscribe & Save for her baby needs for several years. "As I expect my second child, I am very excited at the thought of having the right size diapers show up at my door each month. New parents have enough to do without having to keep calculating which size of diapers they should be buying for their baby."

"We want parents to always have the right sized diaper for their child at the right time," said Greg, director of Subscribe & Save. "This single subscription experience for diapers will ensure that customers can depend upon Subscribe & Save to do the work for them, and never have to worry about changing size as their children grow."

Amazon's Subscribe & Save ships thousands of items to their customers on a regular basi
additional discounts. With the diaper subscription service, the program has simplified the
new parents.

To learn more about Subscribe & Save's diaper subscriptions auto-sizing, go to www.amaz
subscription

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Auditing and feedback loops

Strategic

- PR/FAQs

Operational

- Correction of Errors (CoE)

New launch

- Operational Readiness Reviews (ORR)

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Working Backwards: A mechanism for disruptive innovation

Use it to get clarity, not to document what you've already decided to do

The structure of a PR/FAQ

Press release

AWS Announces General Availability of Amazon Location Service

New service makes it easier for customers to add location functionality to their applications without compro
on privacy or security at as low as 1/10th the cost of the most common location-based service (LBS) provi

SEATTLE--(BUSINESS WIRE)--Jun. 1, 2021-- Today, Amazon Web Services, Inc. (AWS), an Amazon.com co
(NASDAQ: AMZN), announced the general availability of Amazon Location Service, a new service that ma
easier and more cost-effective for customers to add location functionality to their applications without
compromising on user privacy or data security. With Amazon Location Service, customers can embed loc
functionality in their applications using data from location-based service (LBS) providers Esri and HERE
Technologies to provide maps, points of interest, geocoding (converting location information to a point
map), route planning, geofencing (creating virtual perimeters), or asset tracking. Amazon Location Servic
low as 1/10th the cost of the most common LBS providers, and customers pay only for the number of use
requests, assets tracked, or devices managed. To get started, visit: https://aws.amazon.com/location/

Location data is vital for companies of all sizes and across every industry to support a range of use cases
asset tracking, route planning, and location-based marketing experiences) that rely on the explosion of
connected devices in the world today. However, due to privacy and security compromises, cost-prohibit
pricing, and a difficult integration process, many companies face significant barriers when integrating loc
functionality into their applications. For example, some LBS providers impose licensing terms that give th
provider the rights to access, use, and commercialize a customer's location data (e.g. the position of use
facilities, or vehicles). Additionally, the pricing from LBS providers often makes it too expensive for custo
use location functionality in all of the ways a customer may want to use it. Even when the licensing term
price are less prohibitive, onboarding an LBS provider requires customers to invest significant resources
integrating data and building supporting tools before using the provider's location data in an application
more advanced use cases like asset tracking or geofencing, a customer may need to build the solution fr
scratch, which can add months of development time. Furthermore, some customers may want to use an

FAQ

FAQ – Customer

1. What is Amazon Location Service?
Amazon Location Service is a fully managed service that makes it easy for developers to add location functionality, such as maps, points of interest, geocoding, routing, tracking, and geofencing to their appli without sacrificing data security, user privacy, data quality, or cost.

2. Why should I use location data in my applications?
Location functionality is increasingly used in business and consumer applications. You can use location s to solve problems such as displaying data on top of a map to provide geographic context, determining tr time and distance, looking up points of interest, and constraining actions to specific locations. The use of location functionality enables capabilities such as map-based visualizations, asset tracking, location-base customer engagement, and delivery or ride-sharing applications. Visit the Amazon Location Services Cus page for real world examples.

3. What can I do with Amazon Location Service?
With Amazon Location Service, you have access to cost-effective location-based services (LBS) using high data from global, trusted providers Esri and HERE, and you can easily integrate maps, points of interest, geocoding, routing, tracking, and geofencing in to your applications. Amazon Location Service enables yo bring sophisticated location-enabled applications to production quickly, without the high cost of custom development. Its affordable data, including tracking and geofencing capabilities, and built-in metrics for monitoring reduce your costs and development time. Additionally, Amazon Location Service integrates v several AWS services to further speed application development. For more information on AWS integrati Q: How does Amazon Location Service integrate with other AWS services? Also, visit the features page to more about each of the Amazon Location Service Features.

4. Where is Amazon Location Service available?
Amazon Location Service is available today in US East (N. Virginia), US East (Ohio), US West (Oregon), Eu

Visuals



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Auditing and feedback loops

Strategic

- PR/FAQs

Operational

- **Correction of Errors (CoE)**

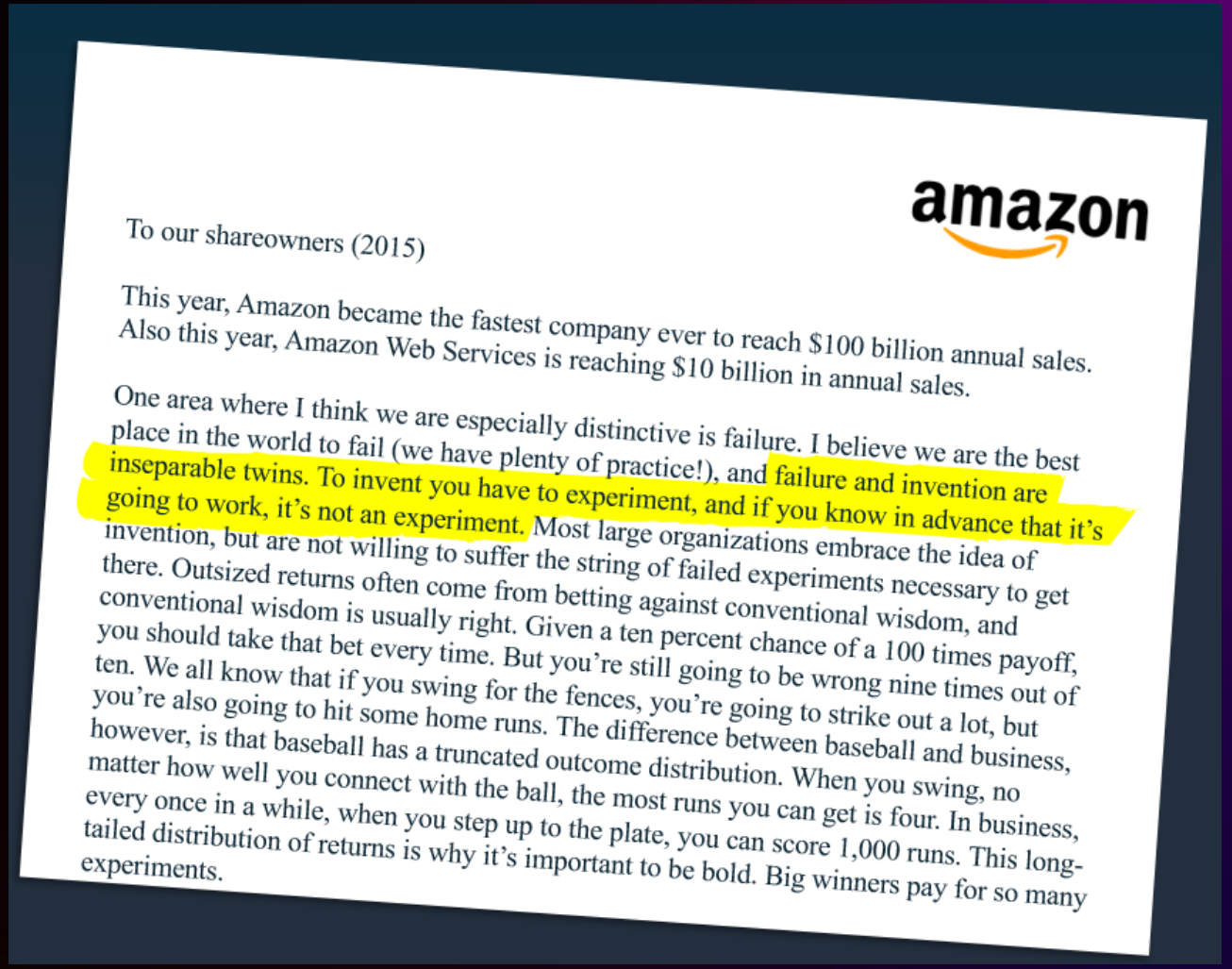
New launch

- Operational Readiness Reviews (ORR)

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Correction of Errors (CoE)

- CoEs are mechanisms to
  - Learn from failure
  - Identify contributing factors to failures
  - Drive **continuous improvement** and **improve resiliency**



amazon

To our shareowners (2015)

This year, Amazon became the fastest company ever to reach $100 billion annual sales. Also this year, Amazon Web Services is reaching $10 billion in annual sales.

One area where I think we are especially distinctive is failure. I believe we are the best place in the world to fail (we have plenty of practice!), and failure and invention are inseparable twins. To invent you have to experiment, and if you know in advance that it's going to work, it's not an experiment. Most large organizations embrace the idea of invention, but are not willing to suffer the string of failed experiments necessary to get there. Outsized returns often come from betting against conventional wisdom, and conventional wisdom is usually right. Given a ten percent chance of a 100 times payoff, you should take that bet every time. But you're still going to be wrong nine times out of ten. We all know that if you swing for the fences, you're going to strike out a lot, but you're also going to hit some home runs. The difference between baseball and business, however, is that baseball has a truncated outcome distribution. When you swing, no matter how well you connect with the ball, the most runs you can get is four. In business, every once in a while, when you step up to the plate, you can score 1,000 runs. This long-tailed distribution of returns is why it's important to be bold. Big winners pay for so many experiments.

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Anatomy of a CoE

- What happened?
- What data reflects what happened?
- What was impact on customers and the business?
- What are the contributing factors?
- What lessons can we learn?

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Auditing and feedback loops

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- **Operational Readiness Reviews (ORR)**

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Operational readiness review: Architecture

Criticality	Question
High	Provide a table with all customer-facing APIs, an explanation of what each does, and the components and dependencies of your service that each API impacts.
High	Construct a failure model listing soft and hard failures for each of your system's components and dependencies.
High	What are forecasted estimates for customer demand? Have you tested services to ensure they can handle estimates?
High	In the case of logical/physical data corruption, how do you recover your data and service?
High	If your service is temporarily deactivated/shut down, what is RTO (recovery time objective) for restarting your service?
Medium	What is the retry/back-off strategy for each of your service's dependencies?
Medium	If your service suffers loss of data, have you defined your RPO (recovery point objective)?
Medium	Do you use any resources shared across redundant zones? E.g., if your service is regionally redundant, what resources are shared across those regions?
Low	Are certificates used within your system stored in AWS Certificate Manager (ACM)? If not, where are they stored?

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ORR: Release quality/procedures

Criticality	Question
High	What mechanisms are you utilizing to deploy to your production systems?
High	What mechanisms ensure all code changes (software, configuration, infrastructure, and operational tooling) are reviewed and approved by someone other than the code author?
High	What changes (software, configuration, and infrastructure) are performed manually? Have these changes been modeled in a preapproved template prior to implementing?
High	Does your service's canaries call your service through public endpoints to validate happy path functionality for all public and private APIs, critical customer scenarios, and UIs in all regions?
Medium	Are your deployments first staged in a preproduction or staging environment before reaching a production environment?
Medium	Do your deployments automatically roll back incorrect deployments before they breach SLAs?
Medium	Do you prevent your system from deploying to too many hosts at once?
Medium	Are your deployments staggered?
Low	Do you publish your canary errors to an independent metric? Subsequently, do you alarm on this metric?
Low	How is traffic diverted from a host before shutting down the processes?

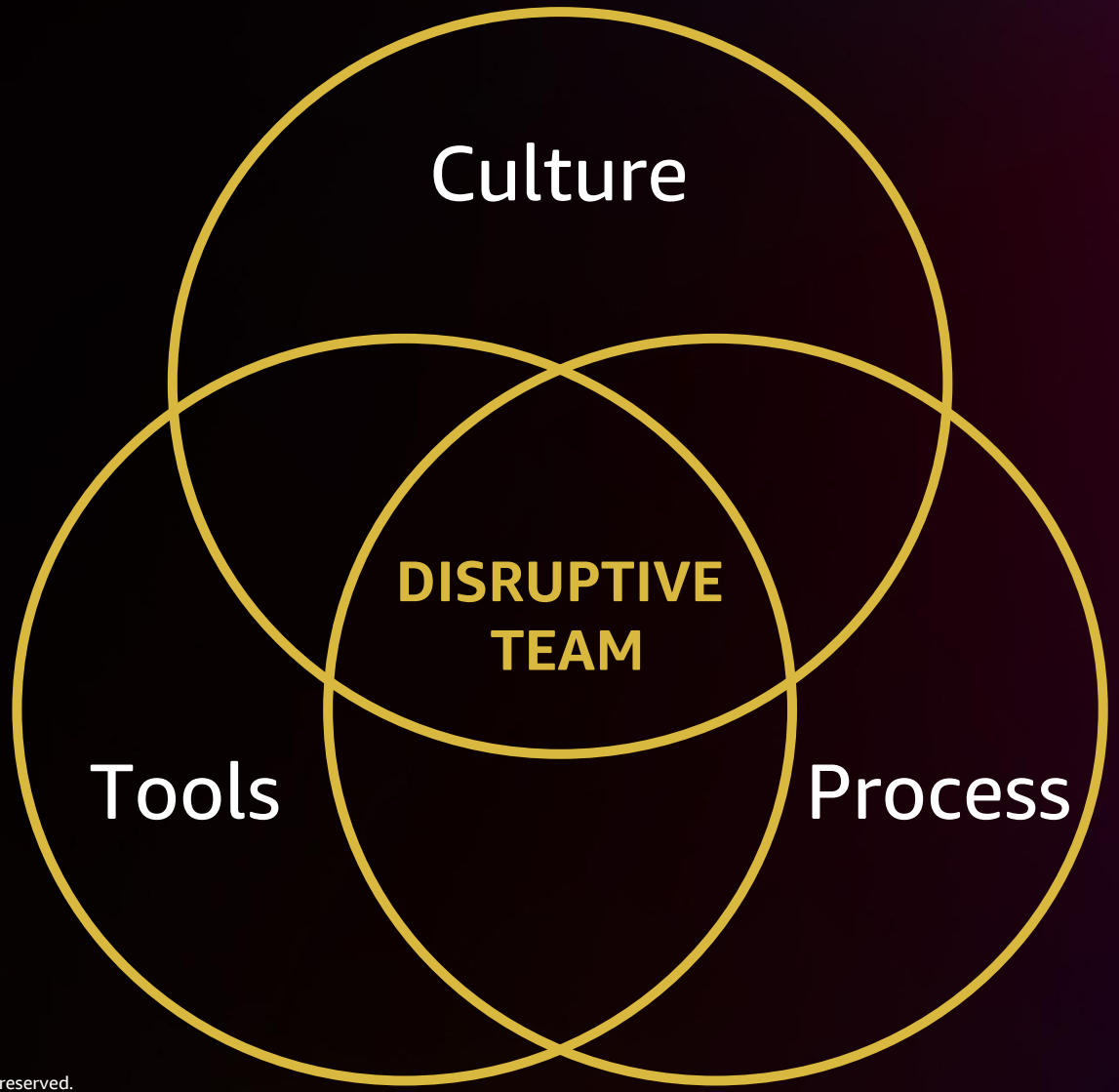
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ORR: Incident/event management

Criticality	Question
High	What operational goals or KPIs (latency, throughput/TPS, etc.) have you identified for your service?
High	What automated alarms does your system have? Do you have documented runbooks/SOPs to investigate/troubleshoot each?
High	Do you monitor and alarm on CPU utilization, memory utilization, and disk usage on all hosts?
High	Do you have an on-call rotation configured? Are they trained to process runbooks? Do they know escalation paths?
Medium	Do you have an SLA defined for on-call response? What oncall SLA for alarms on critical service health metrics?
Medium	Do you monitor and alarm on frontend components? For throttling errors or on JVM metrics? For missing metrics?
Medium	Do you have metrics that are not suitable for alarming (e.g., nonuniform but important metrics)? How are you monitoring such metrics?
Medium	Does your system queue requests? Do you take preventative measure to ensure that your queue does not exceed a predetermined size?
Low	Are any alarms suppressed or ignored as part of routine operational procedures, such as during deployments?
Low	Have you automated the gathering of customer impact and duration?

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INO102 Amazon’s culture of innovation

Breakout session

INO103 How to increase resilience and prevent burnout

Breakout session

INO104 AI/ML at Amazon.com

Breakout session

INO201 Rapid transition from idea to solution

Chalk talk

INO202-R/INO202-R1 Working backwards in action: Starting with your customers

Workshop

INO203 Emotional intelligence can supercharge innovation

Breakout session

INO204 Leading beyond line of sight: Amazon’s two-pizza teams

Breakout session

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