Personal career timeline

- **Energy Sector**: 1996
- **System Integrator**: 1998
- **Capital One**: 2000
- **aws**: 2017
Compelling reasons to move Cloud

- Agility/dev productivity
- Data center consolidation
- Large scale compute intensive workloads
- Digital transformation
- Cost Reduction
- Facility or real-estate decisions
- Acquisitions or divestitures
- Colocation or outsourcing contract changes
What if you could **devote more resources** to the things that matter and **move faster** while being **more secure**?
Largest Number Of Enterprise Customers
What we’ll cover:

- Modern Product Development
- How Amazon achieves flow
- How to transform your Enterprise IT
Methods and Principles of Modern Product Development

- **Design Thinking**
  Interface to customer and feedback loop

- **Agile Teaming**
  The organizational glue that keeps release cycle moving continuously

- **DevOps**
  Interface for getting stuff built and released
Design Thinking is just...

- **User Centered Design**
  - **BRING THE OUTSIDE IN**
    - Gain empathy & insight through direct observation
  - **BUILD TO LEARN**
    - Conduct simple, fast, and frugal tests with real users
  - **PINPOINT THE PAIN POINT**
    - Frame problems from the user’s POV; target unmet needs
  - **RADICAL IDEAS, REAL IMPACT**
    - Generate ideas that solve the pain point innovatively
Practical Principles: Design Thinking

1. First gain empathy
2. Then frame the problems
3. Now you can ideate
4. Run simple, fast, frugal tests

Bring the outside in
Pinpoint the pain point
Radical ideas, real impact
Build to learn
Agile Teaming
Focus: respond quickly to feedback

Agile Principle
Learning over following a plan

SCRUM
Continuously groomed backlog
No changes to work plan made during sprint
Product increment: must be completed, integrated and tested

Each Agile framework has a way of bringing feedback into its workstream
Agile Teaming
Focus: respond quickly to feedback

KANBAN

Agile Principle
Learning over following a plan

Finish task and pull forward next work item
Uses work-in-progress (WIP) limits and cycle-time to manage flow of new development
Adapted from Toyota Production System

Each Agile framework has a way of bringing feedback into its workstream
Agile Teaming
Focus: respond quickly to feedback

XP – Extreme Programming

- Emphasizes technical excellence as a way to remain agile
- Pair programming and code reviews are common methods
- Frequent checkpoints - Allows for constant feedback on customer requirements

Each Agile framework has a way of bringing feedback into its workstream
Practical Principles: Agile

1. Rip the Band-Aid off, but have mercy
2. Keeping it real…and small
3. Show something every sprint
4. Trap: Agile by the book
DevOps
Focus: promote and enable fast feedback

DevOps Principles
Automate all things
Eliminate handoffs
Establish guardrails

All of these reduce cycle time and allow builders to focus on product, quickly deploying and collecting feedback
Putting the Pieces Together: Finding Organizational Flow

- Design Thinking
- Agile Teaming
- DevOps
MVP
Minimum Viable Product: What is the smallest thing you can test to prove the unproven parts of your idea

Start with value hypothesis and growth hypothesis
Run small experiments to see if there is both value and demand
Bias towards many small tests vs. larger, extended ones
Persevere or pivot early based on results

“One accurate measurement is worth more than a thousand expert opinions.”
- Admiral Grace Hopper
Most Tests Occur Late In Process

Typical Release Testing

- Concept
- Dev
- Deployment: Functional, Acceptance, Performance, Security/Compliance
- Production: Monitor, Respond to Defects/Incidents
Continuous Testing

**Concept**
- Hypothesis
- A/B
- MVP

**Development**
- Functional
- Acceptance
- Performance
- Security/Compliance

**Production**
- Prod Testing
- Chaos Engineering
- User Testing Feedback

**Deployment**
- Functional
- Acceptance
- Performance
- Security/Compliance
- Canary

Always Be Testing
How Amazon Achieves Flow

Working Backwards
From the customer

Two Pizza Teams
Run what you build

Microservices
Speed and agility
Working backwards from the customer

- Write the Press Release: Think big and focus on the customer need
- Write the FAQ: Customer and internal stakeholder
- Define the user interaction and write the manual
Amazon Achieves Speed and Agility with Two-Pizza Teams

Small, decentralized teams are nimble

Own/run what you build
Monoliths: Slow and Rigid

Monolithic Application

Delivery Pipeline

Build  Test  Release
Microservices: Speed and Agility

Developers ➔ Microservices ➔ Delivery Pipelines

Build ➔ Test ➔ Release

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Microservices Principles

- Single Purpose
- API-based
- Highly-decoupled

http://
Impact of Cloud on Product Development

- Reducing Cost of Failure
- Rapid Adoption of New Capabilities
- Quickly Scaling Winning Ideas
Traditional Enterprise IT

**Information Security**
- CISO
- Encryption, Key Management, Identity Management, Firewalls, IDS, DDoS

**Products & Services**
- CTO/VP Applications
- Digital Products, Brand Websites, Mobile Applications, Point of Sale Systems, Commerce

**Back Office Systems**
- CIO/VP Corp Systems
- E-mail, Productivity, Collaboration, HR, Finance, ERP

**End User Computing**
- VP IT Support
- Desktop Support, Device Management, Telephony, IT Support

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  - VP Infrastructure

- **PMO**

- **Engineering**

- **Operations**

- **Design**

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Future of Enterprise IT – Hybrid state

Information Security

Products & Services
CTO/VP Applications

Back Office Systems
CIO/VP Corp Systems

End User Computing
VP IT Support

Infrastructure/Delivery
VP Infrastructure

Cloud CBO & CCoE
Single-threaded leader

“Declare a **Bold** Cloud Objective”
2-pizza cloud business office

Single-Threaded Leader

- Procurement
- Legal
- CISO
- CFO
- Head of Infrastructure
- Head of Delivery
- Engineering
- Risk Leader
- Audit Leader
- HR

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Step 1: Build a two-pizza Cloud Tiger Team

“If you can't feed a team with two pizzas, the team is too large.”
- Jeff Bezos
Step 2: Staff your Cloud Tiger Team

- Product Manager
Step 2: Staff your Cloud Tiger Team

- Lead Architect
Step 2: Staff your Cloud Tiger Team

- Infrastructure Engineers
- Leadership
Step 2: Staff your Cloud Tiger Team

- Infrastructure
- Leadership
- Security Engineers
Step 2: Staff your Cloud Tiger Team
Step 2: Staff your Cloud Tiger Team

- Application Engineers
- Infrastructure
- Leadership
- Security
- Operations
Step 2: Staff your Cloud Tiger Team

- Applications
- Infrastructure
- Leadership
- Security
- Operations
Get clear on your objectives

Cost objectives
Security objectives
Compliance objectives
Availability objectives
Feature & TTM objectives
Get clear on your objectives

5-Year On-Premise vs. Cloud Costs = (GAAP) savings of 68.9%
Get clear on your objectives

Customer data
Platform, applications, identity, & access management
Operating system, network, & firewall configuration
Client-side data encryption & data integrity authentication
Server-side encryption (file system &/or data)
Network traffic protection (encryption/integrity/identity)

Compute | Storage | Database | Networking
--- | --- | --- | ---

AWS Global Infrastructure

Customer is responsible for security **in** the cloud
AWS is responsible for security **of** the cloud

Customer
AWS

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Get clear on your objectives

AWS has a deep set of security tooling

<table>
<thead>
<tr>
<th>Networking</th>
<th>Encryption</th>
<th>Identity &amp; management</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Private Cloud</td>
<td>Key Management Service</td>
<td>IAM</td>
<td>Service Catalog</td>
</tr>
<tr>
<td>Isolated cloud resources</td>
<td>Manage creation and control of encryption keys</td>
<td>Manage user access and encryption keys</td>
<td>Create and use standardized products</td>
</tr>
<tr>
<td>Web Application Firewall</td>
<td>CloudHSM</td>
<td>SAML Federation</td>
<td>Config</td>
</tr>
<tr>
<td>Filter malicious web traffic</td>
<td>Hardware-based key storage</td>
<td>SAML 2.0 support to allow on-premises identity integration</td>
<td>Track resource inventory and changes</td>
</tr>
<tr>
<td>Shield</td>
<td>Server-Side Encryption</td>
<td>Directory Service</td>
<td>CloudTrail</td>
</tr>
<tr>
<td>DDoS protection</td>
<td>Flexible data encryption options</td>
<td>Host and manage Microsoft Active Directory</td>
<td>Track user activity and API usage</td>
</tr>
<tr>
<td>Certificate Manager</td>
<td></td>
<td>Organizations</td>
<td>CloudWatch</td>
</tr>
<tr>
<td>Provision, manage, and deploy SSL/TSL certificates</td>
<td></td>
<td>Manage settings for multiple accounts</td>
<td>Monitor resources and applications</td>
</tr>
</tbody>
</table>

Compliance:
- Service Catalog
- Config
- CloudTrail
- CloudWatch
- Inspector
- Macie

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### Certifications & attestations

| Cloud Computing Compliance Controls (C5) | DE ✔ |
| Cyber Essentials Plus | GB ✔ |
| DoD SRG | US ✔ |
| ENS High | ES ✔ |
| FedRAMP | US ✔ |
| FIPS | US ✔ |
| IRAP | AU ✔ |
| ISO 9001 | 🌐 ✔ |
| ISO 27001 | 🌐 ✔ |
| ISO 27017 | 🌐 ✔ |
| ISO 27018 | 🌐 ✔ |
| ITAR | US ✔ |
| K-ISMS (Korea) | ✔ |
| MLPS Level 3 | CN ✔ |
| MTCS | SG ✔ |
| PCI DSS Level 1 | ✔ |
| SEC Rule 17-a-4(f) | US ✔ |
| SOC 1, SOC 2, SOC 3 | 🌐 ✔ |

*DE = industry or global standard* 

### Laws, regulations, and privacy

| Argentina Data Privacy | ✔ |
| CISPE | EU ✔ |
| FERPA | US ✔ |
| GDPR | EU ✔ |
| GLBA | US ✔ |
| HIPAA | US ✔ |
| HITECH | 🌐 ✔ |
| IRS 1075 | US ✔ |
| ITAR | US ✔ |
| My Number Act | JP ✔ |
| Data Protection Act–1988 | GB ✔ |
| VPAT/Section 508 | US ✔ |
| Privacy Act [Australia] | AU ✔ |
| Privacy Act [New Zealand] | NZ ✔ |
| PDPA—2010 [Malaysia] | MY ✔ |
| PDPA—2012 [Singapore] | SG ✔ |
| PIPEDA [Canada] | CA ✔ |
| Spanish DPA Authorization | ES ✔ |

### Alignments & frameworks

| CIS (Center for Internet Security) | 🌐 ✔ |
| CJIS (US FBI) | US ✔ |
| CSA (Cloud Security Alliance) | 🌐 ✔ |
| EU-US Privacy Shield | EU ✔ |
| FFIEC | ✔ |
| FISC | JP ✔ |
| FISMA | US ✔ |
| G-Cloud | GB ✔ |
| GxP (US FDA CFR 21 Part 11) | US ✔ |
| ICREA | 🌐 ✔ |
| IT Grundschutz | DE ✔ |
| MITA 3.0 (US Medicaid) | US ✔ |
| MPAA | US ✔ |
| NIST | US ✔ |
| Uptime Institute Tiers | 🌐 ✔ |
| Cloud Security Principles | GB ✔ |
# Get clear on your objectives

<table>
<thead>
<tr>
<th>Availability</th>
<th>Downtime per year</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>95% (1-nine)</td>
<td>18 days 6 hours</td>
<td>Batch processing, data extraction, load jobs</td>
</tr>
<tr>
<td>99% (2-nines)</td>
<td>3 days 15 hours</td>
<td>Internal tools, project tracking</td>
</tr>
<tr>
<td>99.9% (3-nines)</td>
<td>8 hours 45 minutes</td>
<td>Online commerce</td>
</tr>
<tr>
<td>99.99% (4-nines)</td>
<td>52 minutes</td>
<td>Video delivery, broadcast systems</td>
</tr>
<tr>
<td>99.999% (5-nines)</td>
<td>5 minutes</td>
<td>Telecom industry (ATM Transactions)</td>
</tr>
</tbody>
</table>
Get clear on your objectives

\[ A = Ax \times Ay \]
Get clear on your objectives

### Availability in series

<table>
<thead>
<tr>
<th>Component</th>
<th>Availability</th>
<th>Downtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part X</td>
<td>99% (2-nines)</td>
<td>3 days 15 hours</td>
</tr>
<tr>
<td>Part Y</td>
<td>99.99% (4-nines)</td>
<td>52 minutes</td>
</tr>
<tr>
<td>X and Y Combined</td>
<td>98.99%</td>
<td>3 days 16 hours 33 minutes</td>
</tr>
</tbody>
</table>

\[ A = A_X \times A_Y \]
Get clear on your objectives

\[ A = 1 - (1 - AX)^2 \]
Get clear on your objectives

\[ A = 1 - (1 - AX)^2 \]

<table>
<thead>
<tr>
<th>Component</th>
<th>Availability</th>
<th>Downtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>99% (2-nines)</td>
<td>3 days 15 hours</td>
</tr>
<tr>
<td>Two X in parallel</td>
<td>99.99% (4-nines)</td>
<td>52 minutes</td>
</tr>
<tr>
<td>Three X in parallel</td>
<td>99.9999% (6-nines)</td>
<td>31 seconds</td>
</tr>
</tbody>
</table>
Get clear on your objectives

Availability Zone A

Availability Zone B

Availability Zone C

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AWS Region

Availability Zone A

Availability Zone B

Availability Zone C
Multi-AZ—well-architected

Availability Zone A

Availability Zone B

Availability Zone C

APPLICATION

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Get clear on your objectives

100+ Services...
Scale beyond the “two-pizza” team

Engineering teams will specialize in an area, but will have a common set of skills shared across all product teams.
Trust, but verify
Trust, but verify

Verify

Capital One
Cloud Custodian

cloudtamer.io

turbot

CloudCheckr

CloudPassage

evident.io

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Thank You!