



INNOVATE

AI/ML EDITION

Amazon.com's use of AI/ML to enhance the customer experience

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AWS

“We consider customers to be loyal to us – right up until the second that someone else offers them a better service.”

Jeff Bezos
Founder and CEO of Amazon
1998 Letter to Shareholders

Customer promise: Prime One-Day | Prime Now



What is involved in meeting that promise



400 million products
forecasted every day

300+ fulfillment centers, 200,000+ robots,
19,000 trailers, and 30,000+ delivery vans



Accurate delivery promise
(1 billion+ packages shipped to Prime customers last year)

How does Amazon.com
get the right items
in the right place ...
before the customer
clicks the "Buy" button?

Obvious



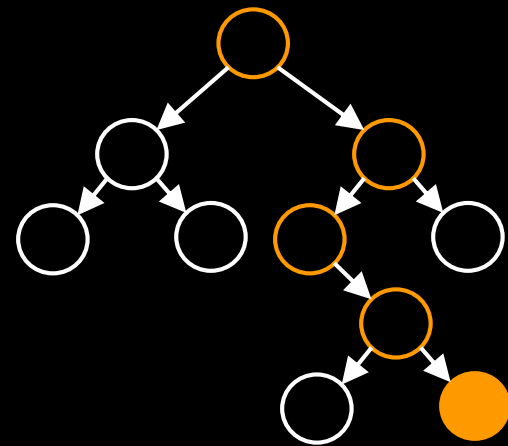
Not so obvious



Predicting product demand at Amazon.com

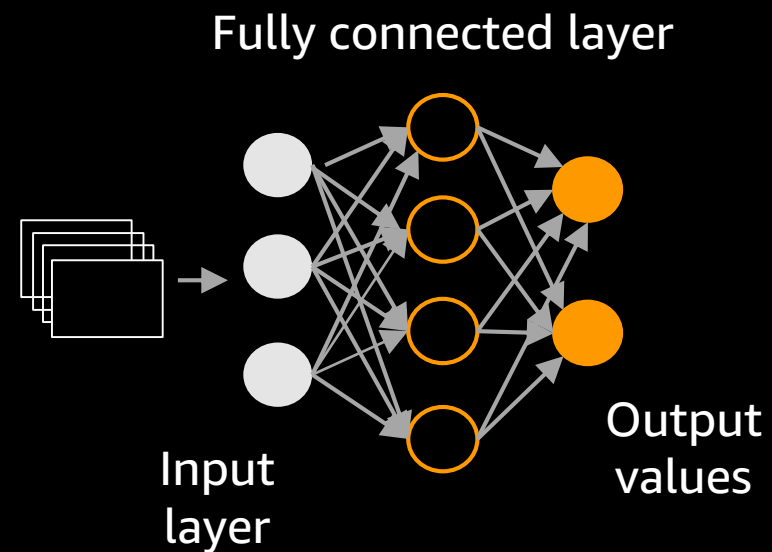
Circa 2007

Decision tree algorithm-driven model



Today

Convolutional neural networks



Billions of training data

Powerful nonlinear relationships

Automated feature engineering

Forecast 400M+ items every day

A symphony of humans and robots

Randomly stowed items

+ Robots bringing pods to humans

+ Computer-guided picking

= Accelerated order fulfillment



Predicting product demand at Amazon.com

Less of this



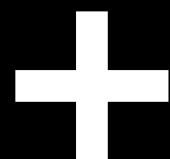
A lot more of this



75% lighter
than similarly sized boxes
take up
40% less space
during shipping

Replacing guesses with data-driven logic

Basic decision-making rules



Visual inspection of top products

Handle small fraction of products

Untapped data

Limits to what an individual can observe

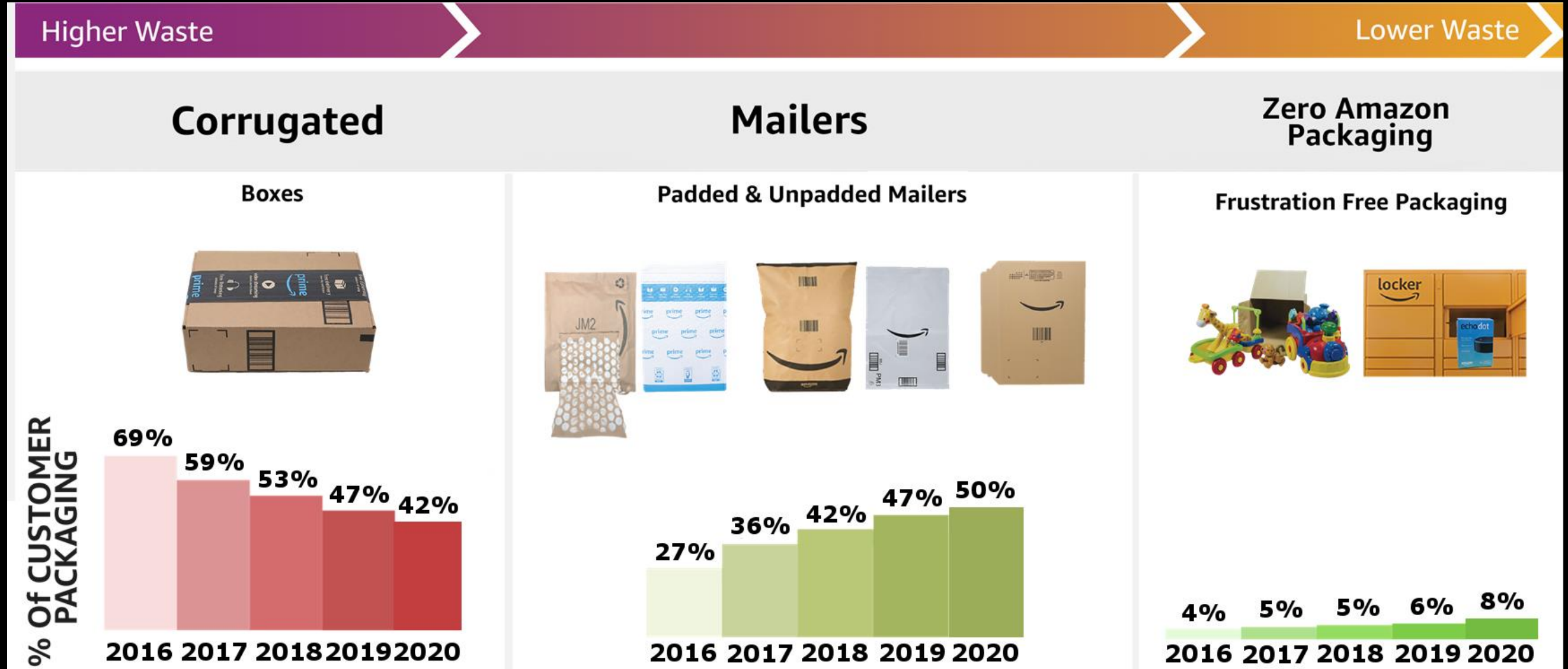


Ability to process all products Amazon sells

Apply complete set of intelligence generated in the delivery process

Handle non-obvious use cases (e.g., collectable)

Optimizing packaging saves ~~money~~ Earth



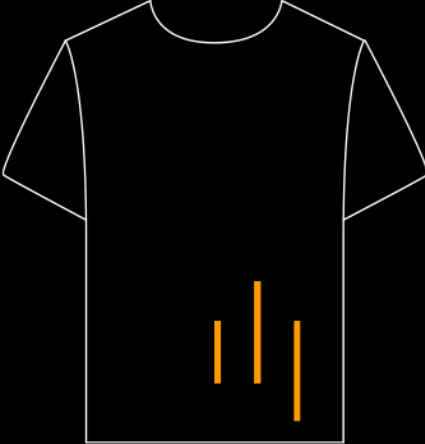
New ideas in production



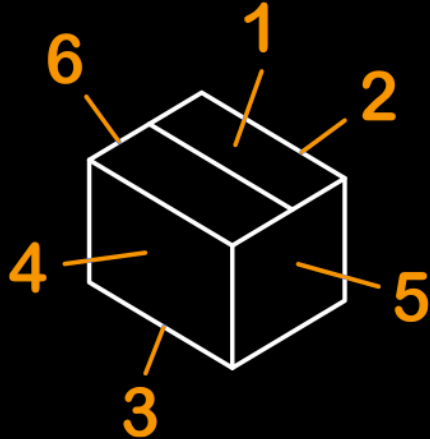
Suitable for paper bag?



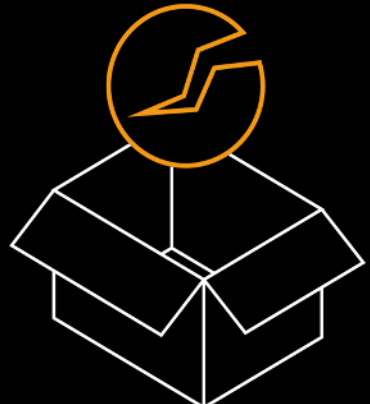
Might leak?



Foldable?

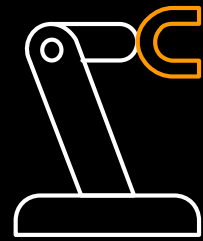


No Amazon package needed?



Prone to damage?

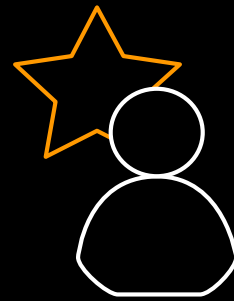
AI/ML + Amazon = better customer service



Automation



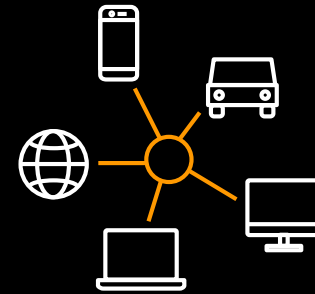
Supply chain automation



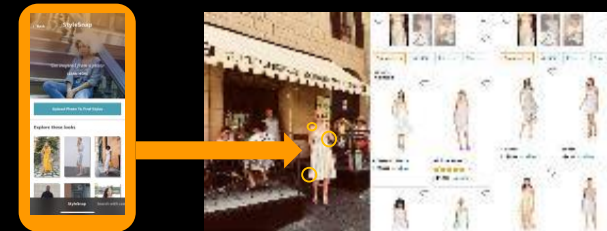
Augmentation



Personalized Amazon Prime Video recommendations



Enrichment



StyleSnap – match the style in the picture



Invention



No checkout lines – ever

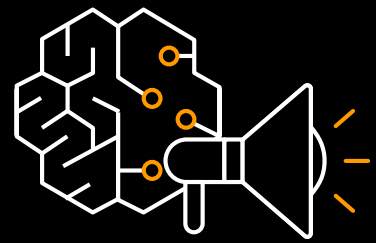
What lessons did we learn that were most important to get right?

It's (always) the basics

What are the most common challenges with AI/ML adoption?

Challenge	% of Respondents
Skills of staff	56%
Understanding AI benefits and uses	42%
Data scope and quality	34%
Finding use cases	26%
Integration complexity	26%
Defining the strategy	25%
Security or privacy concerns	20%
Measuring the value	17%
Governance issues or concerns	13%
Finding funding	12%

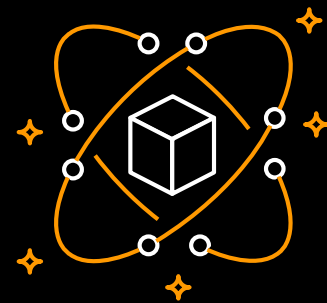
New ideas in production



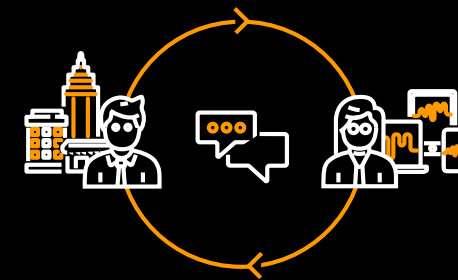
ML-first
mindset and
culture



Enabling
teams for the
mission



Powerful data
platform

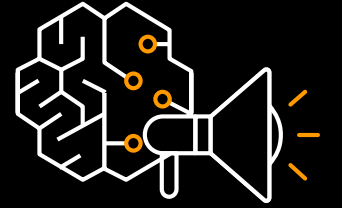


Choosing the
right first
project



Scaling

Start with a simple question



ML-first mindset
and culture

How will you use machine learning?

("We won't" is not an acceptable answer)

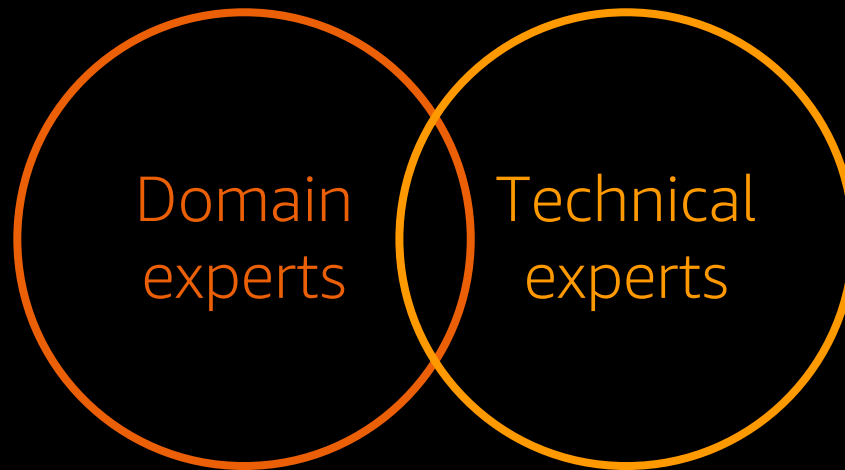
Break down the silos



Product manager
Requirements / validations



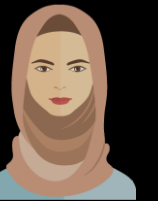
Research scientist
Cutting-edge theories and applications



Data scientist
Model development and testing



Data engineer
ML data foundation and performance



ML platform engineer
Model production and optimization



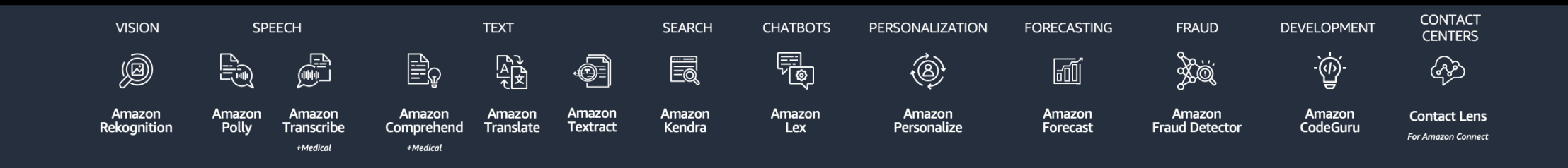
Apply the right tool for the job



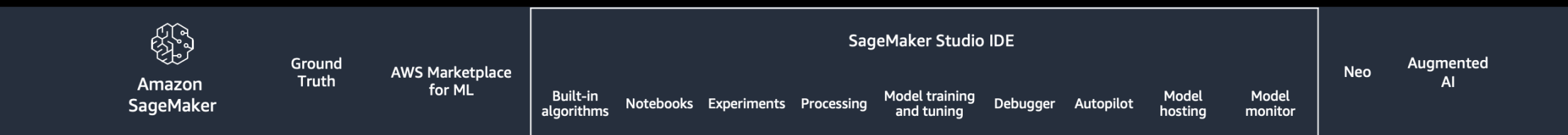
Example – AWS AI/ML service stacks

Enabling teams for the mission

AI SERVICES



ML SERVICES



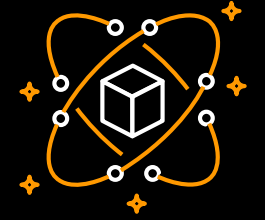
ML FRAMEWORKS & INFRASTRUCTURE



Simple, powerful and ready to use

Control and flexibility at the most granular levels

Data fuels ML-driven innovations



Powerful data
platform

Amazon.com's big data marketplace

Innovation happens
at the edge

Bring your own
clusters / queries

Self-service discovery
and subscription

Speed and substance are critical



Choosing the right
first project

1. Real and significant problems?
2. New and differentiated solution?
3. Already have a lot of untapped data?
4. Success in the first 6–10 months?
5. Sustained attention and support?

Remove that bottleneck



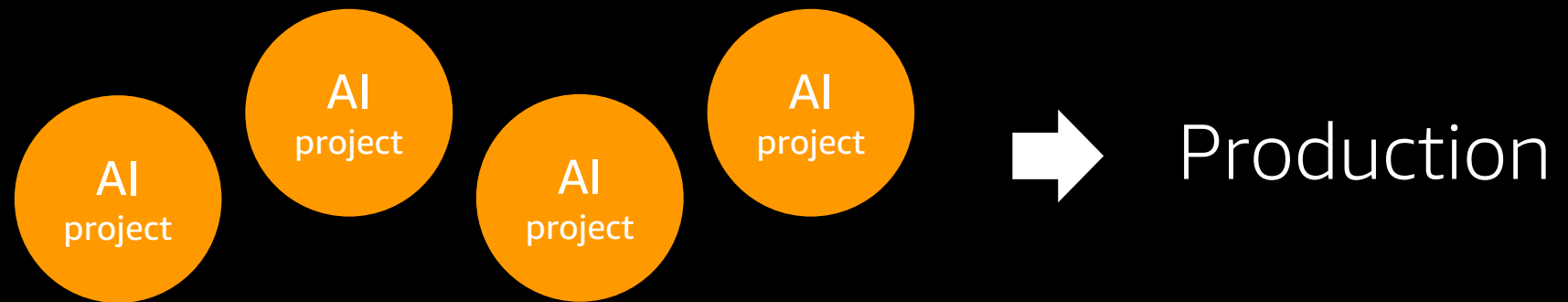
Scaling

of AI projects
next year

x2

% of solutions
in production

40%



Research ... model training ... validation (lots of initiatives)

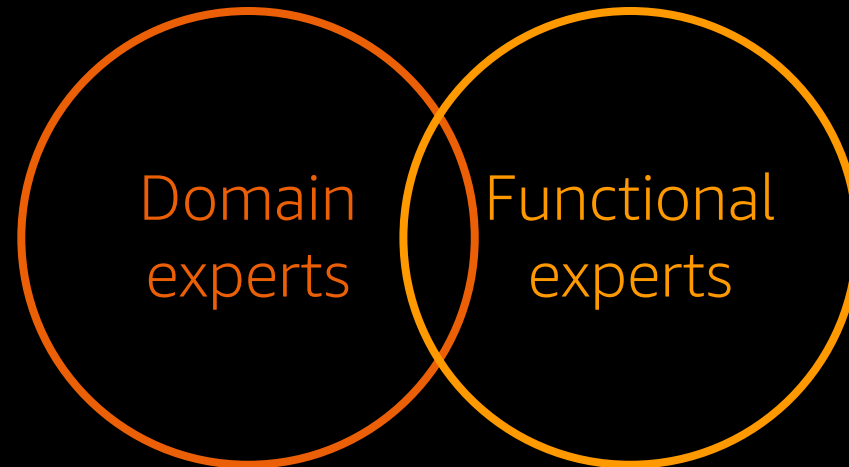
Break down the silos



Scaling

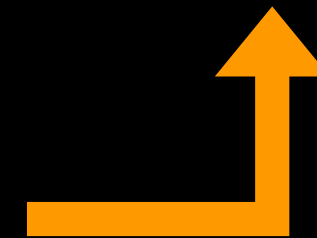
1. Lack of common mentality / priorities
2. Teams in silos, not cross-functional

3. Undefined and unmeasured business outcome



6. Lack of an integrated end-to-end data pipeline and production platform

4. Unique aspects of ML delivery methods
5. Governance, compliance, and security



Summary

1. AI/ML + Amazon = **better customer service**
2. Amazon leverages ML across **all operational areas**
3. Building an ML-driven innovation engine requires a “**system of enablers**”
4. Automating the end-to-end process accelerates the **path to production**

Dive deeper into innovation

View some of our other **Innovation Track sessions**

- **INO201** – Amazon’s culture of innovation
- **INO202** – Innovating with Amazon
- **INO203** – Amazon.com’s architecture evolution and AWS strategy
- **INO204** – Solving societal challenges with digital innovation on AWS
- **INO205** – Amazon.com’s use of AI/ML to enhance the customer experience
- **INO206** – Working backwards: Amazon’s approach to innovation
- **INO207** – Two-pizza teams: Organizing for innovation

To further explore Amazon’s approach to innovation, please contact your AWS account team

Thank you!

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Please complete
the session survey