
AWS
re:Invent

PNU203

Fighting wildfire with artificial intelligence

Rolf Gibbels

Head Worldwide Business Development, Power & Utilities
AWS

Gabe Mika

Digital Strategy and Innovation Leader
San Diego Gas & Electric (SDG&E)

AWS re:Invent

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Digital transformation enables flexibility and system diversity across the value chain



Flexible generation



Flexible delivery



Flexible demand

Focus Areas	IT / OT Transformation – Work & Asset Management – Energy Supply Transition – Customer Engagement

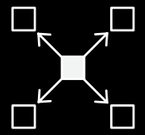
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AWS is powering the digital utility





Decarbonization



Decentralization



Digitization

Industry solution categories

AWS cloud services

AWS-enabled customer and partner solutions	**BUSINESS TRANSFORMATION**				
	IT TRANSFORMATION	OT TRANSFORMATION	WORK & ASSET MANAGEMENT	ENERGY SUPPLY TRANSITION	CUSTOMER ENGAGEMENT
	DATA INSIGHTS				
Core services	DATABASE	EDGE	ANALYSIS	AI / ML	VOICE & CHAT ALEXA, Amazon Lex, Connect
Foundation technology	STORAGE	ELASTIC COMPUTE	NETWORK	SECURITY	
Data capture, ingest, and integration	STREAMING, QUEUING & MESSAGING	IoT EDGE, CORE ANALYTICS	DATA CATALOGING AND ETL	EDGE COMPUTE AND STORAGE	

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Our customers and partners

The Power & Utilities industry encompasses the production, transmission, distribution, retailing, and management of electricity, gas and water serving the earth population of 7.7B

Utilities incl. OEM's



ISVs and GSI / SIs





Established in 1881 as the San Diego Gas Company serving 3,000 people



Nearly 140 years later, San Diego Gas & Electric (SDG&E) provides energy service to 3.6 million people in San Diego and southern Orange counties

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WHY INNOVATE?



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Faced with increasing risk and the need to rapidly decarbonize, industry fundamentals are changing

800% increase in size of California wildfires since 1970[1]

$11 trillion committed to fossil fuel divestment[2]

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Sources: [1]The Atlantic, [2]CPUC


EVERYTHING IN
OUR POWER
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SDG&E has received national recognition[1] for wildfire safety innovations and Best of the West award for electric reliability for the 14th consecutive year

Wildfire data enhancements

230+
Weather stations

100+
Cameras monitoring weather & fires

30,000+
Poles flown by Drone for inspection

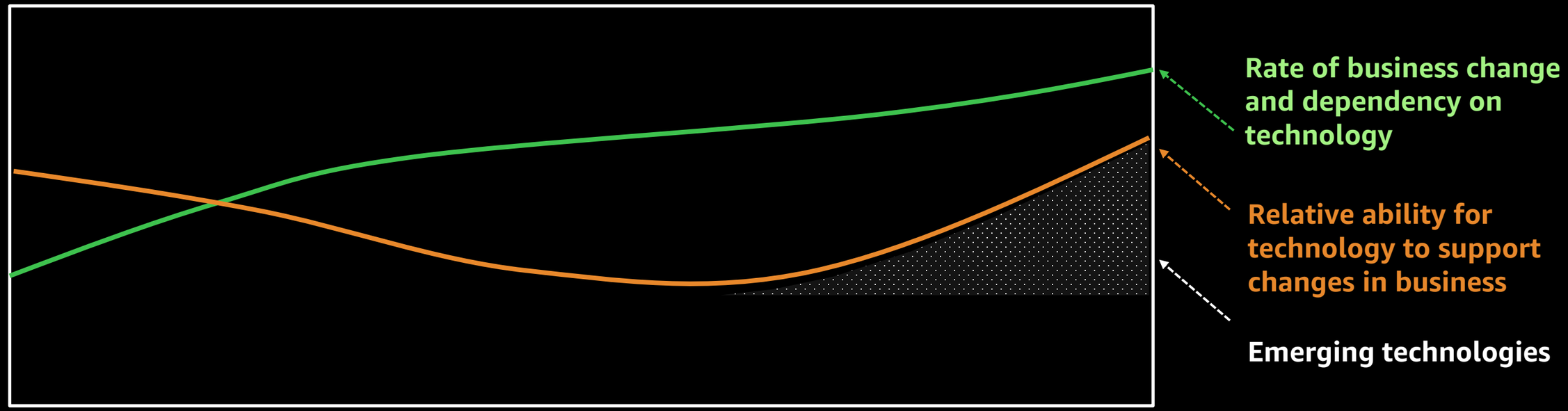
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Source: *[1] PA Consulting's ReliabilityOne™ awards*



The rate of business change

Over the past 20 years, the rate of business change has outpaced the ability for technology to support emerging business needs



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Innovation framework

LEARN
through rapid prototyping and proof of concepts,

PROVE
value through benefits case and analysis, and

SCALE
at an enterprise level to maximize business value

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Learn

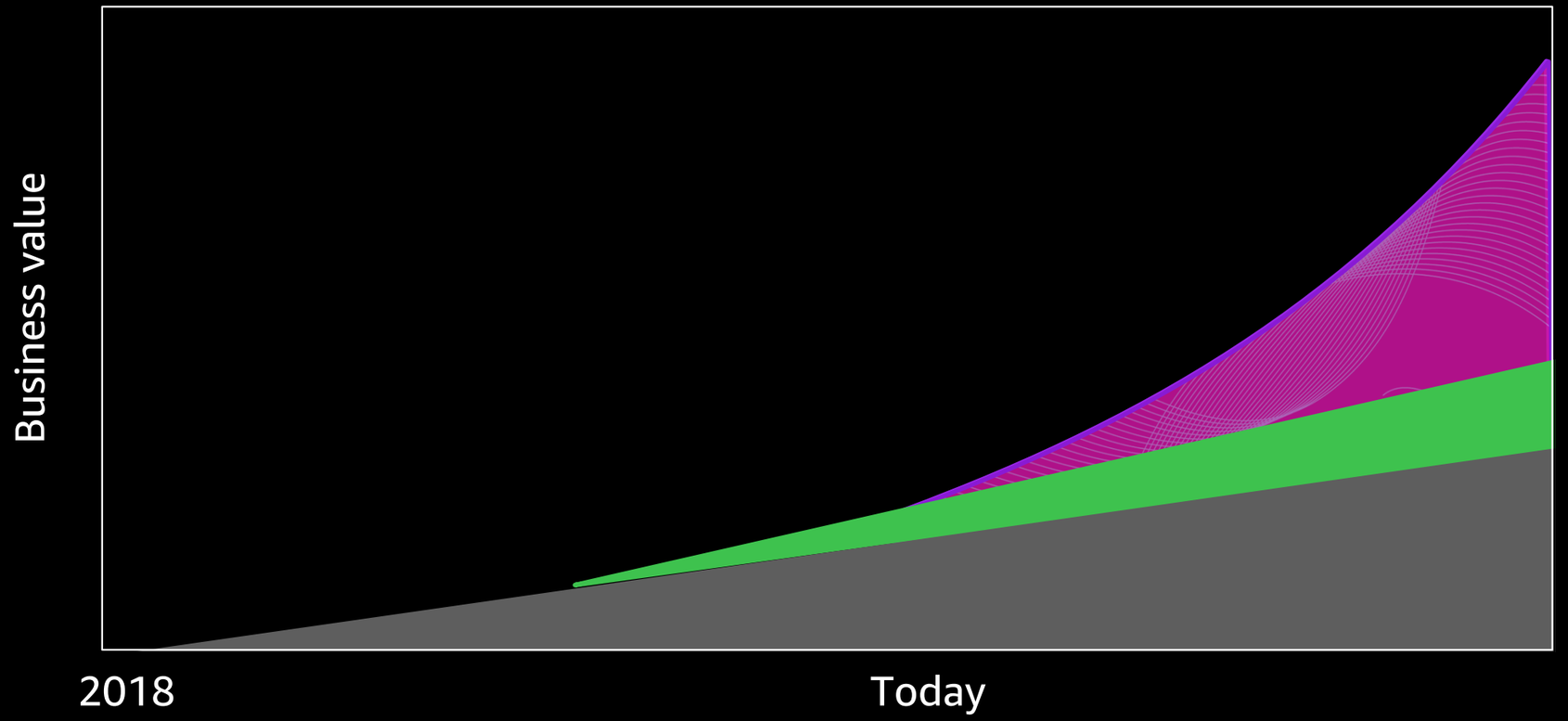
Focus on agile methodologies to deliver the most value as early as possible in order to have a point-of-view for an investment decision



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Prove

Investing in emerging technologies that drive business value through efficiencies and effectiveness to help “close the gap”

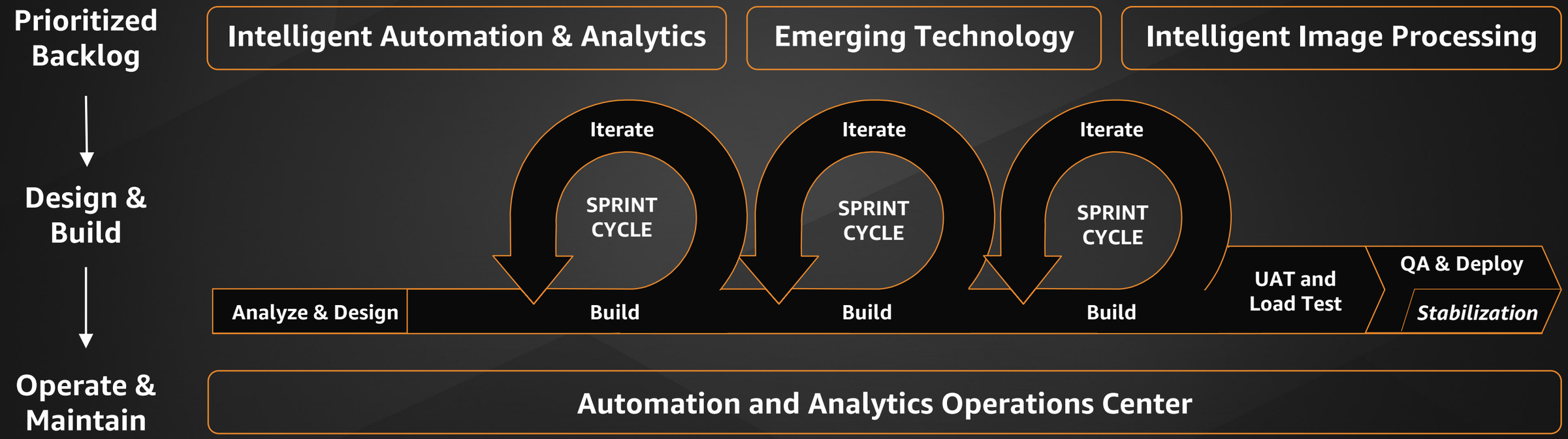


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Scale

“A good idea you can’t scale is a bad idea.”

-Pierre Nanterme



DIGITAL FACTORY

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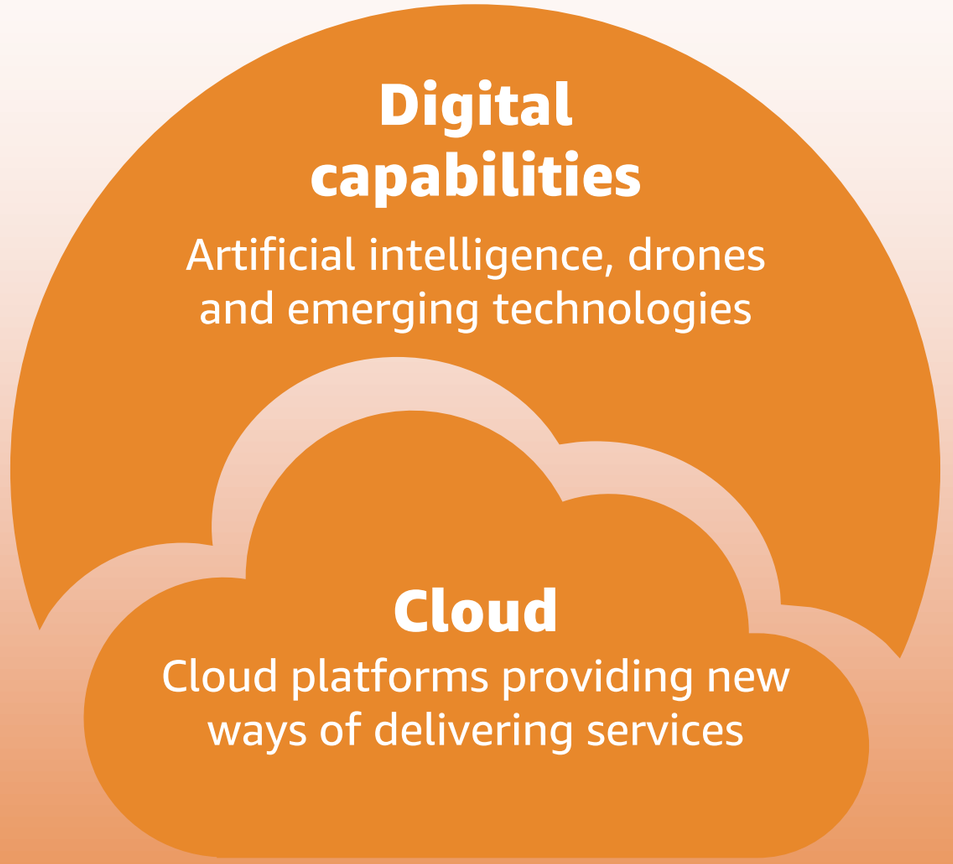
WHAT IS DRIVING VALUE?

Digital capabilities enable us to innovate with agility, reducing wildfire risk and climate impact

Key outcomes

- Informed decision making
- Speed to action
- Improved customer safety and reduced customer impact

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Using artificial intelligence to prevent wildfires



Weather analytics

+



Intelligent
image processing

+



Satellite imaging

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Weather analytics

“How might we leverage machine-learning forecasts to better prepare for severe fire weather?”

Understanding forecasts with machine learning leveraging terabytes of data to significantly improve point forecasts for all weather stations and associated circuit segments

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Intelligent image processing

“How might we automatically analyze millions of images from the field to detect asset damage?”

Analyzing millions of drone images by training machine learning models to identify asset damage, prioritize work, and **reduce wildfire risk**

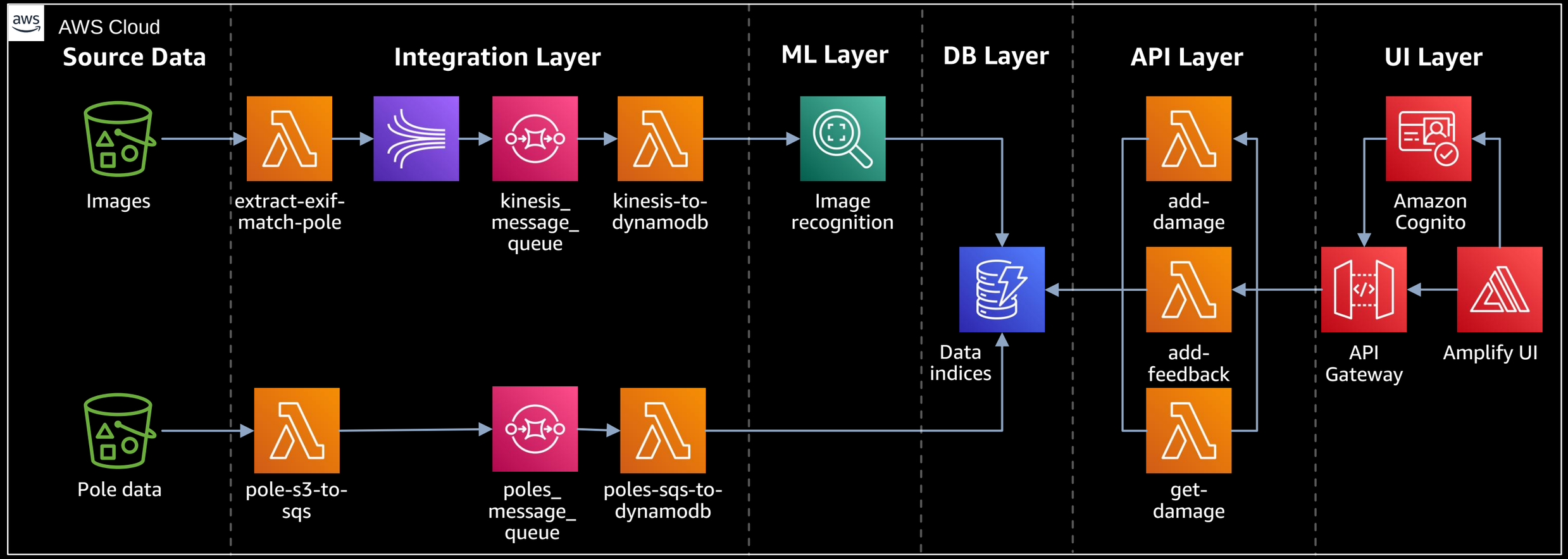
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VOLTAGE
HIGH
VOLTAGE

Intelligent image processing architecture



Legend

Amazon S3 bucket | AWS Lambda | Amazon SQS | Amazon Rekognition | Amazon DynamoDB | Amazon API Gateway | Amazon Cognito | AWS Amplify | Amazon Kinesis

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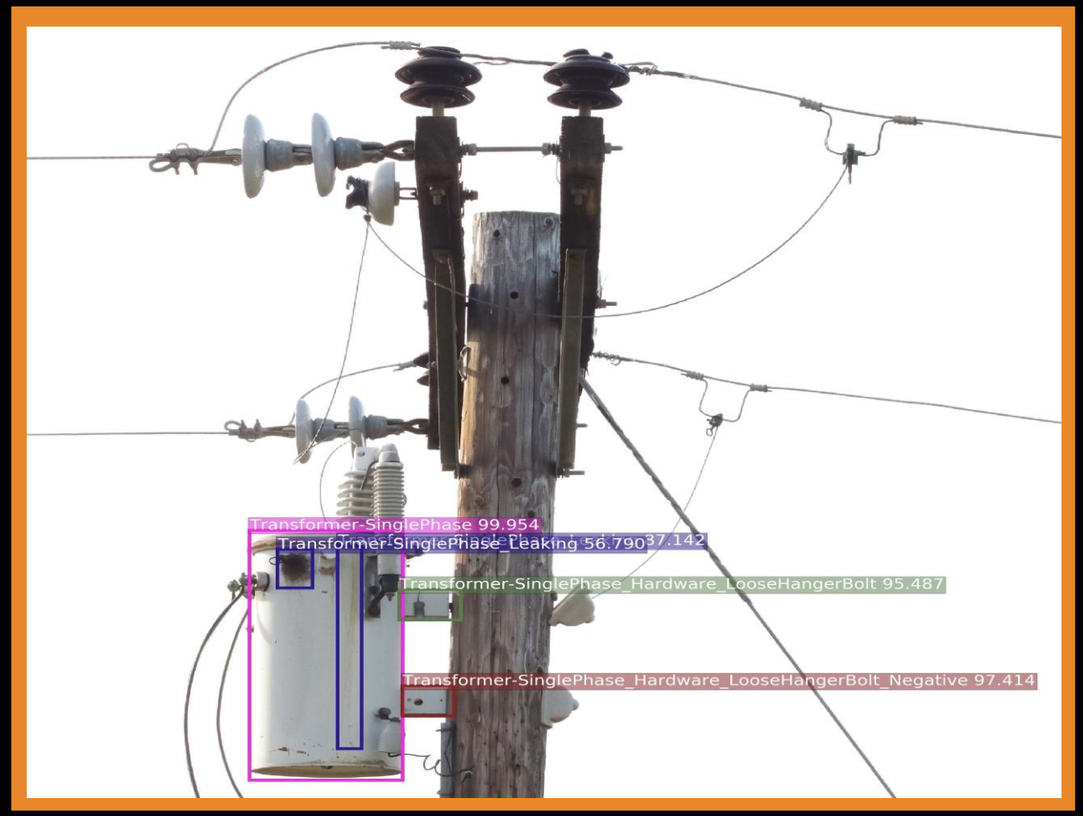
Asset and damage detection

Objective: Create a Human + Machine solution to augment manual image review through the use of machine learning to process images and identify high risk issues

ENTERPRISE IMAGE REPOSITORY
A centralized repository in S3 to store millions of images from drones, video, cameras, etc.

ASSET AND DAMAGE DETECTION MODELS
Electric grid asset detection and damage detection models to prioritize issues with the highest risk

VISUALIZATION USER INTERFACE
Map-based interface that enables visualization of images and model results



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Third-party equipment detection

Objective: Identify Communication Infrastructure Providers (CIP) and detect where there are third-party attachments on utility assets

OBJECT DETECTION MODEL

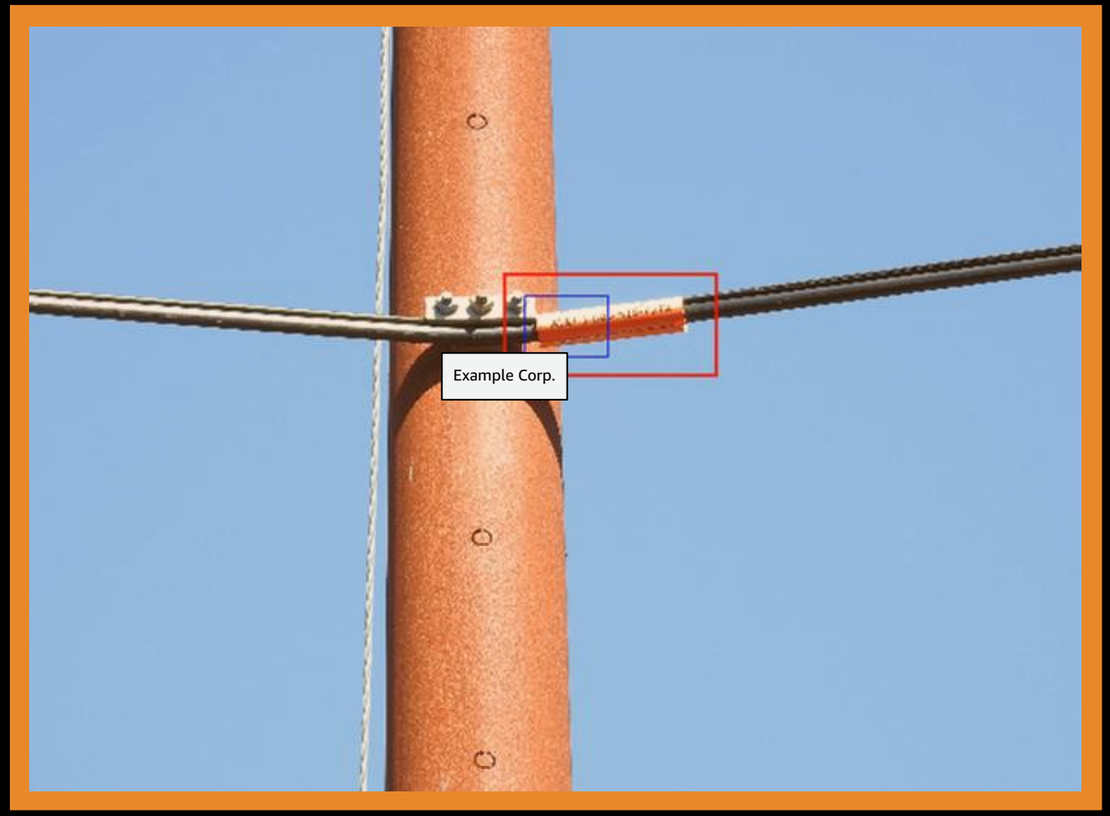
This model detects CIP tags, adds a bounding box to the image region where the tag is, and crops it out from the original image

OCR (“TEXT DETECTION”) MODEL

This model takes the cropped image regions from the object detection model and predicts if there is provider text present

WIRE DETECTION & BUSINESS LOGIC

Computer vision capability to detect unique provider identifiers and apply business logic to infer provider when no tag is present



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Satellite imaging

“How might we use satellite imagery to further combat wildfire through vegetation analysis and hotspot detection?”

Building machine learning models that incorporate lidar data, vegetation management data, operational model forecasts, and GIS data to identify high-risk vegetation encroachment before a red flag event occurs

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“How might we provide customers with the information and resources they need in the channel they prefer during an emergency?”



Artificial Intelligence + Humans

“AI systems aren’t replacing us; rather, they are amplifying our skills and collaborating to achieve productivity gains that have previously not been possible.” — Paul R. Daugherty







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Thank you!

Gabe Mika

Digital Strategy and Innovation Leader
SDG&E

https://www.linkedin.com/in/gabe-mika/

Rolf Gibbels

Head Worldwide Business Development, Power & Utilities
AWS

https://www.linkedin.com/in/rolfgibbels/

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