Using Kubernetes to Speed Development and Deployment of Edge Computer Vision Applications

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Delivering Best AI at the Edge

- From Research to Real World—Faster
- Why Containerization?
- Computer Vision in the Real World
- Confidence in Iterations
- Adaptability, Speed, and Reliability

From Research to Real World—Faster

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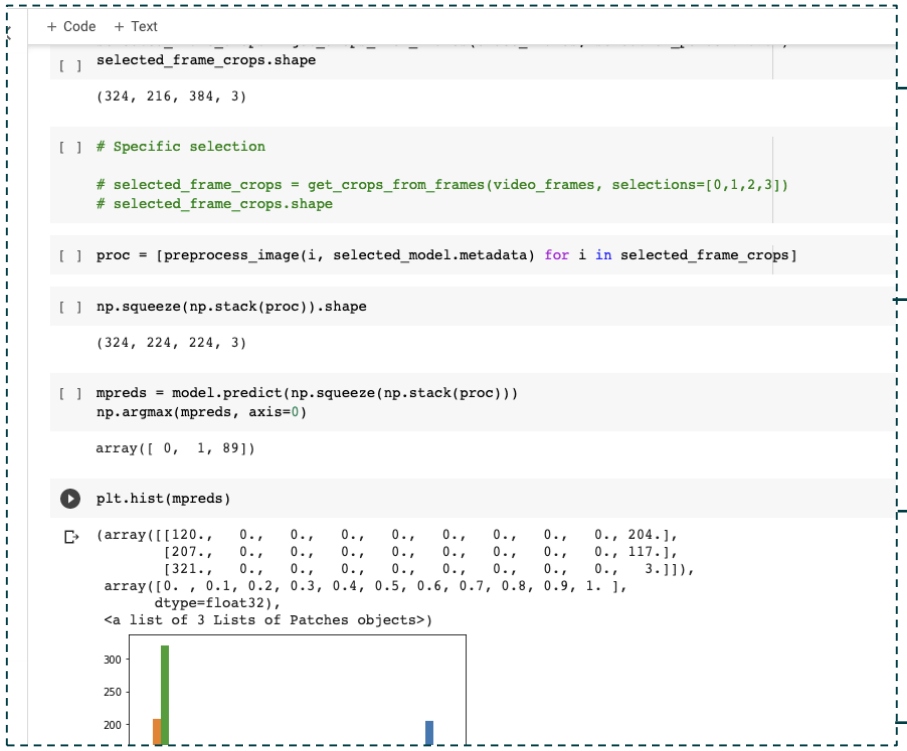
From Notebooks to Chipsets



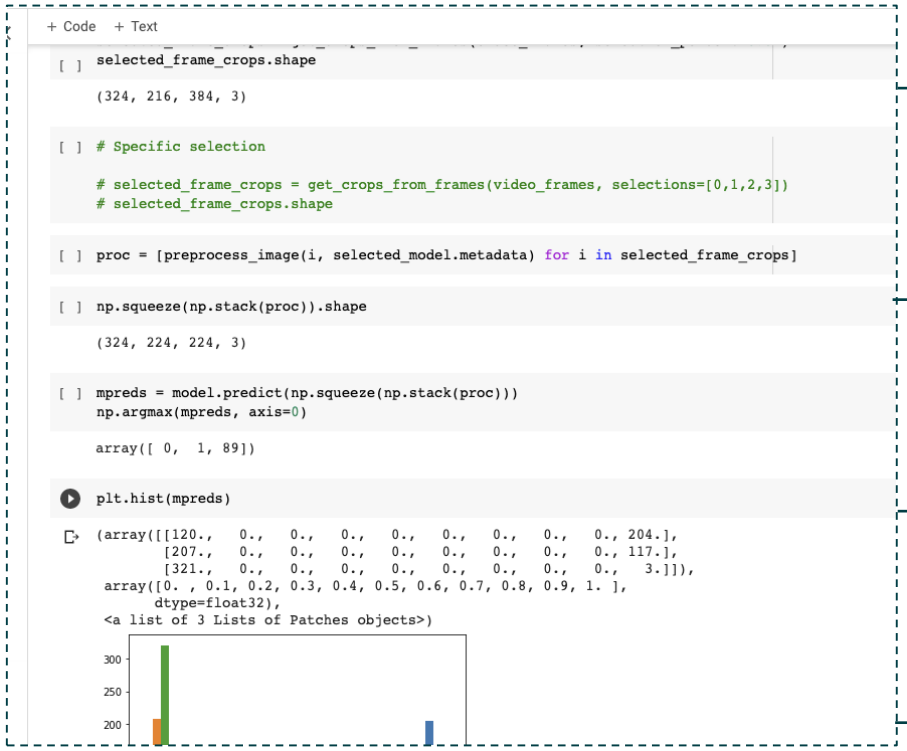
ARM based edge devices

Small form appliances

Multi-socket rack servers

Data centers

Vision AI with Containers



Low power, low memory and compute

Consumer-grade CPU/ GPU

Xeon + Nvidia RTX

Xeon + Tesla T4 grid

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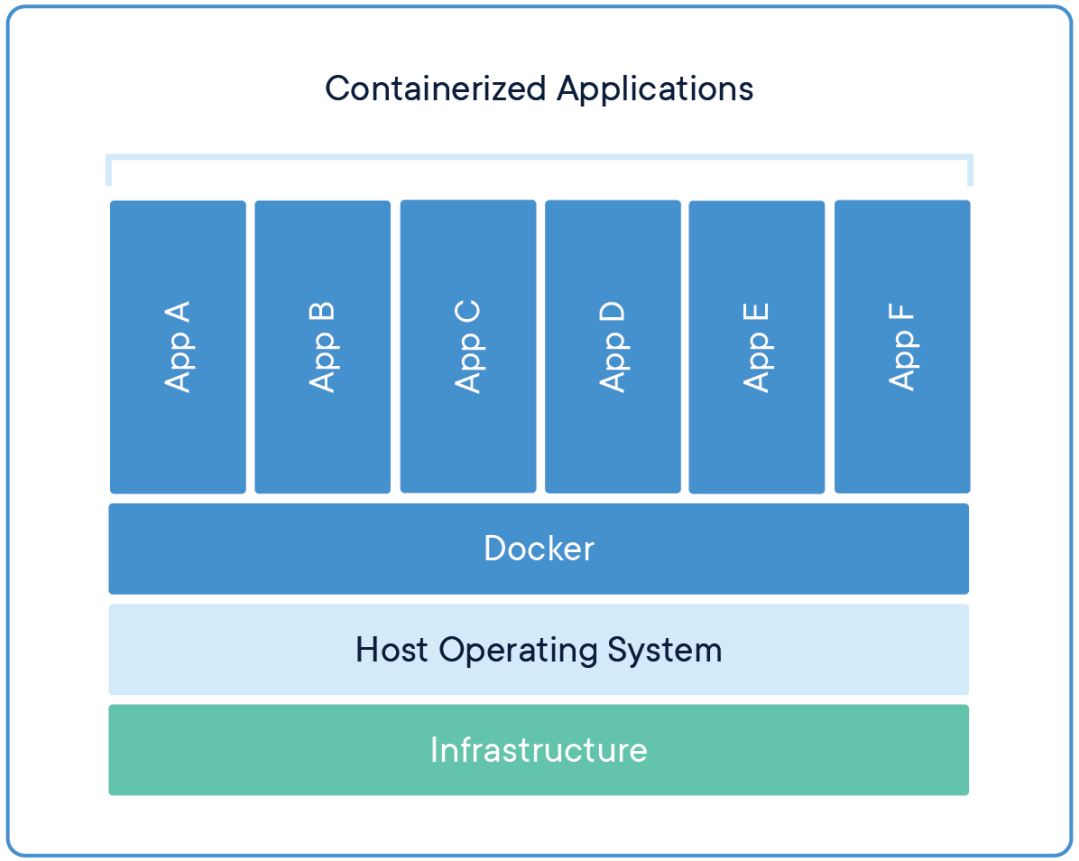
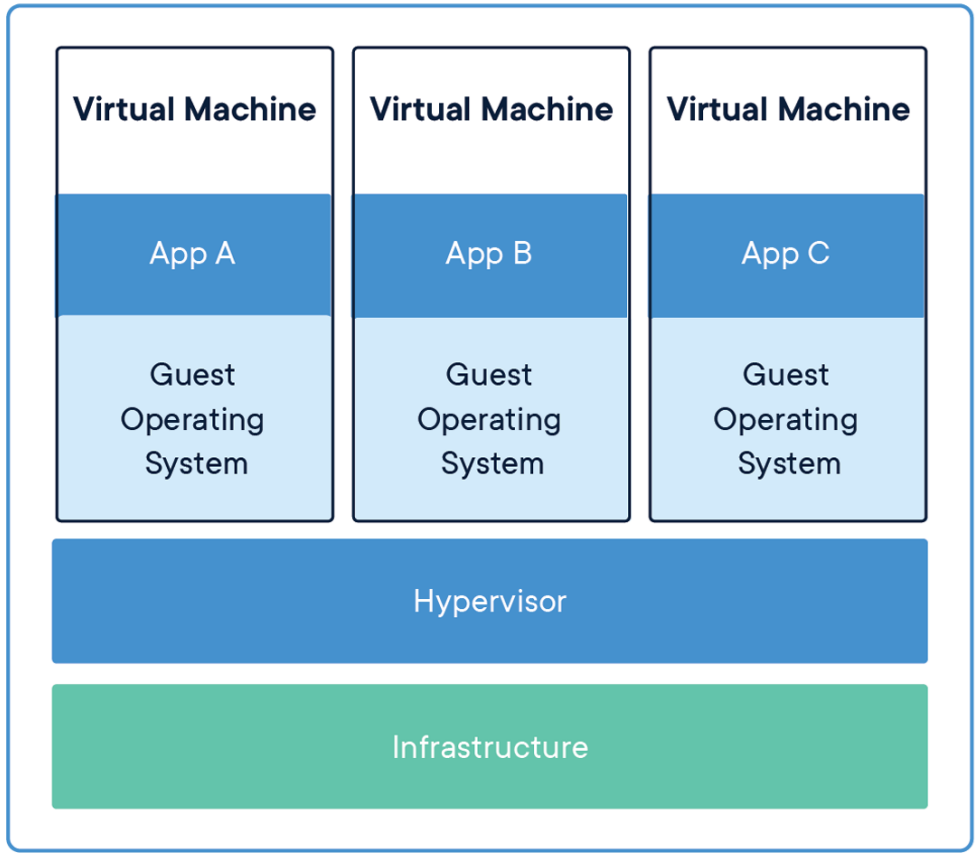
Why Containerization?

Fast, Flexible, Portable

- A **container** is a packaged unit of code, dependencies, and environment.
- Once built, the image can be shipped on any supporting runtime.
- A runtime or orchestrator controls deployment and lifecycle of containers.
- **Kubernetes** is a portable, extensible open-source ecosystem for orchestrating containerized workloads and services.

Understanding Abstraction with Containers





Source: https://www.docker.com/resources/what-container

Build, Configure, Deploy—Anywhere

```
FORM python:3.8
RUN apt-get update && \
        apt-get install -y sudo \
        build-essential curl \
        libcurl4-openssl-dev \
        libssl-dev wget \
        python3-pip \
        git && \
        pip3 install --upgrade pip

COPY requirements.txt .
…
```

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: dep-wq-1
  labels:
    app: dep-wq-1
spec:
  template:
    metadata:
      labels:
        app:
…
```

```
kubectl config get-contexts

kubectl config use-context ...

kubectl get pods

kubectl get services

kubectl apply -f pods.yaml

kubectl apply -f services.yaml
…
```

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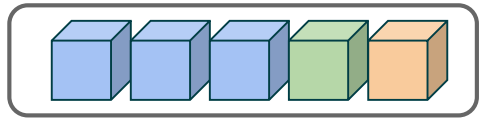
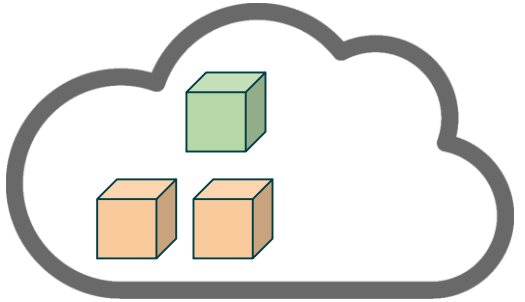
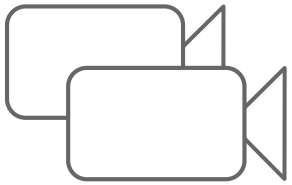
Hybrid Video AI Pipeline







Video operations

Data operations

ML operations

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Computer Vision in the Real World

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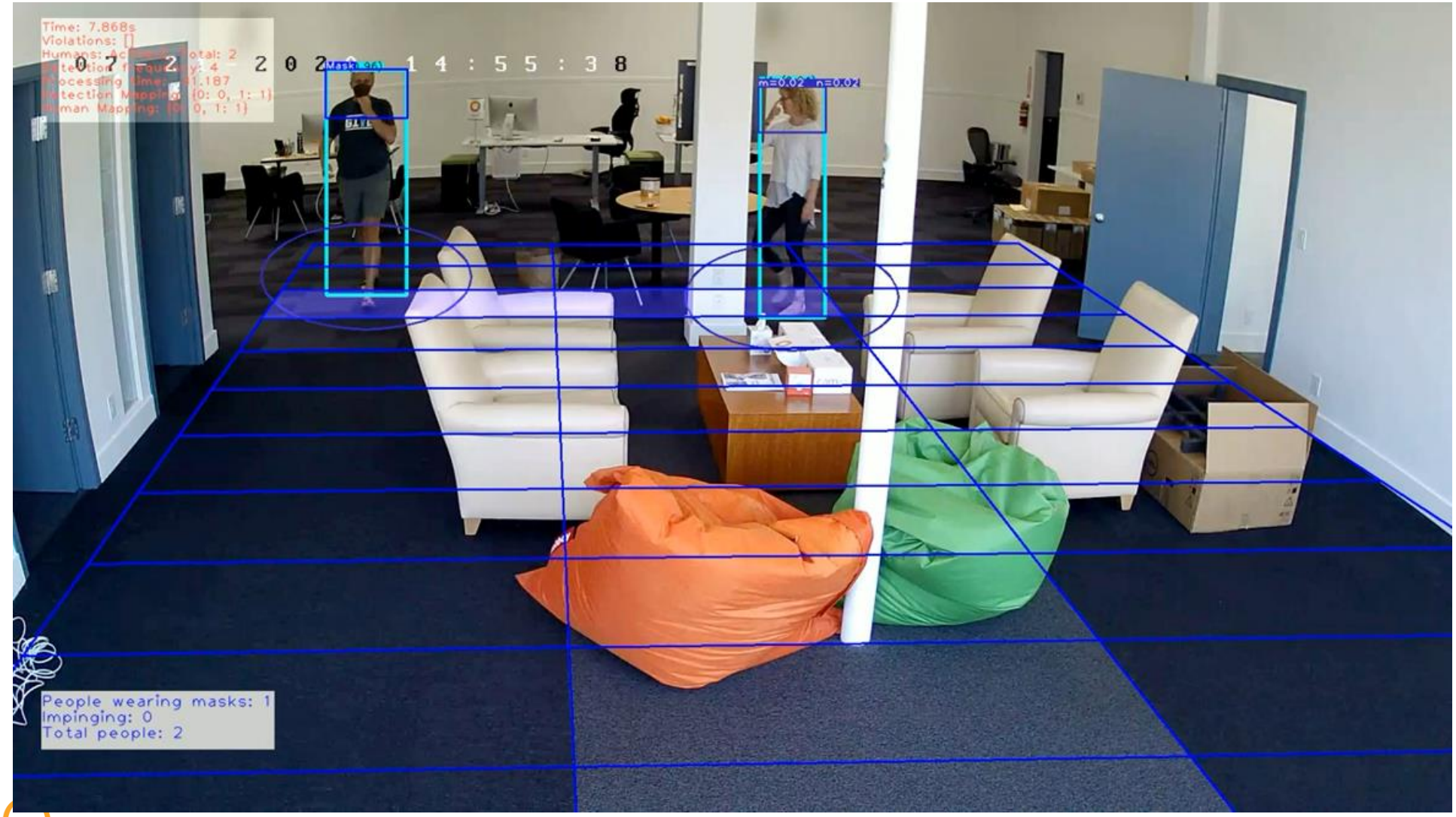
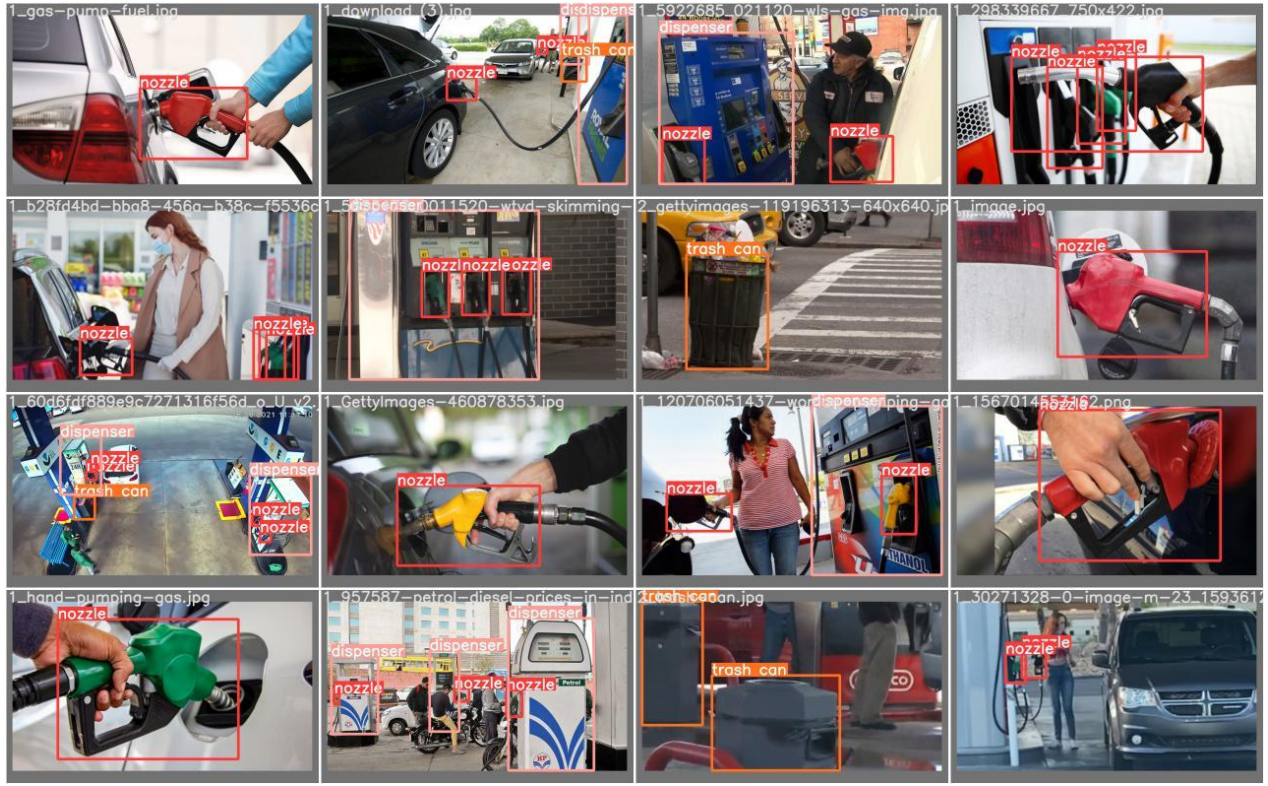
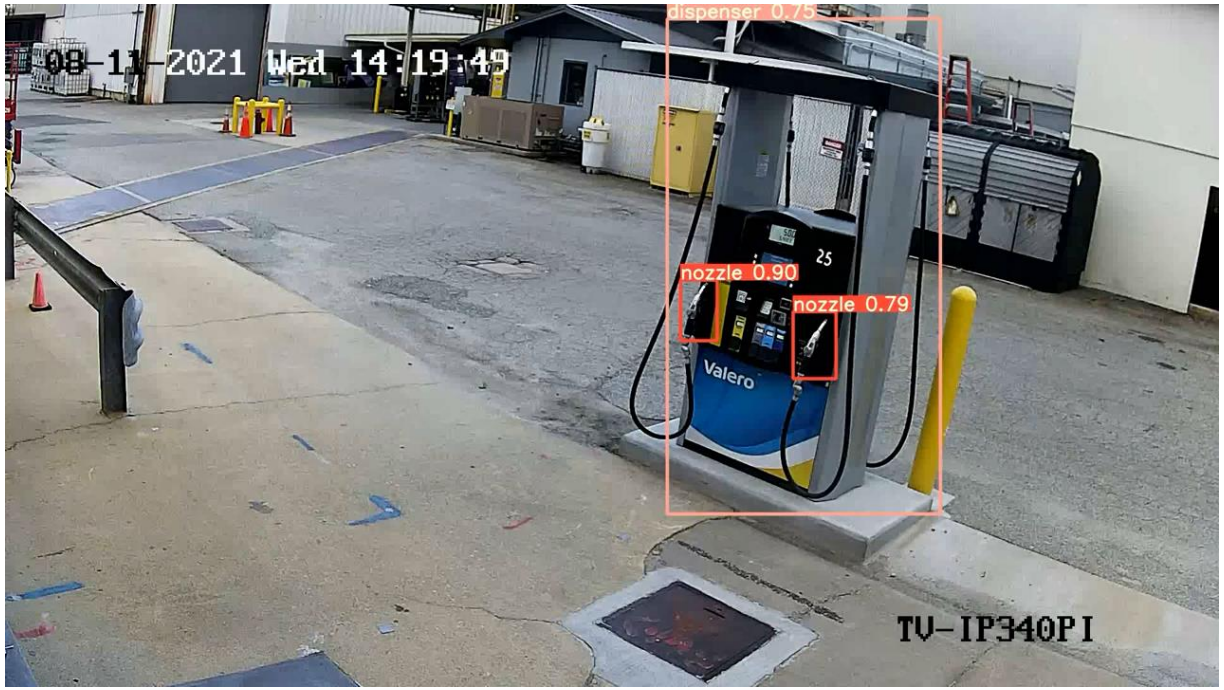
Video Vision AI At Work



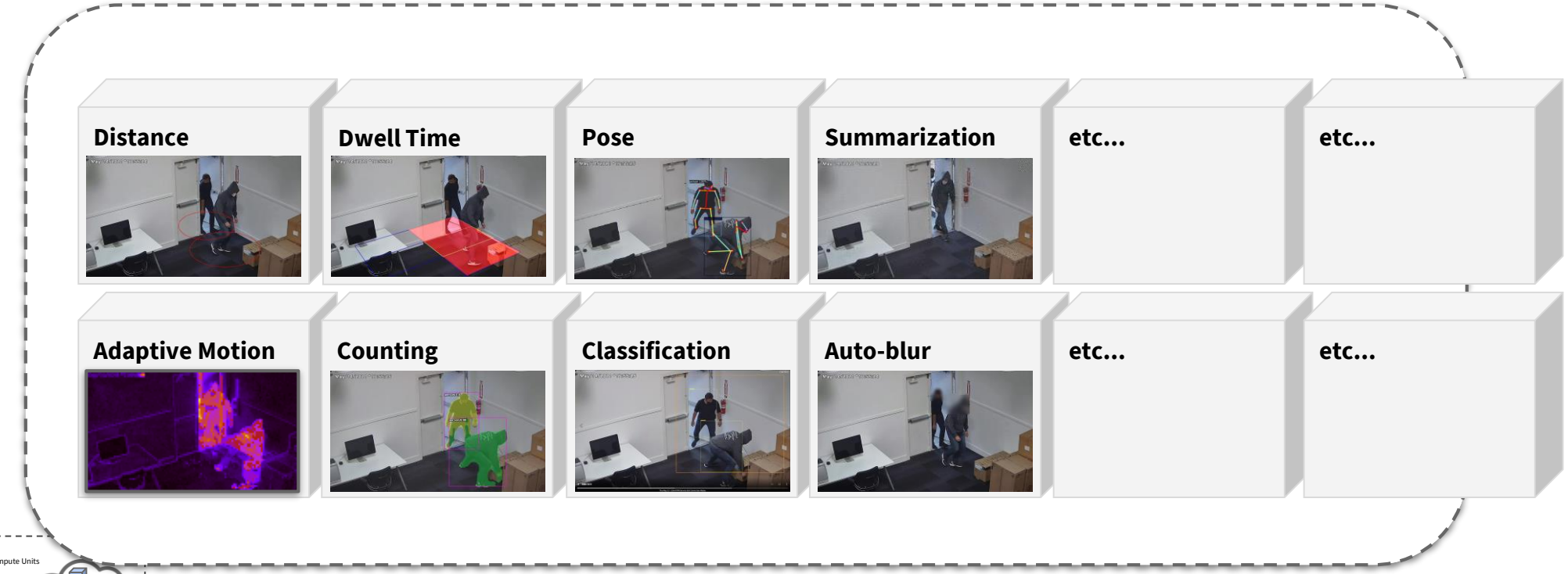
Custom AI Deployments in One Week





Courtesy: Gilbarco Veeder-Root

Future-Proof systems



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Confidence in Iterations

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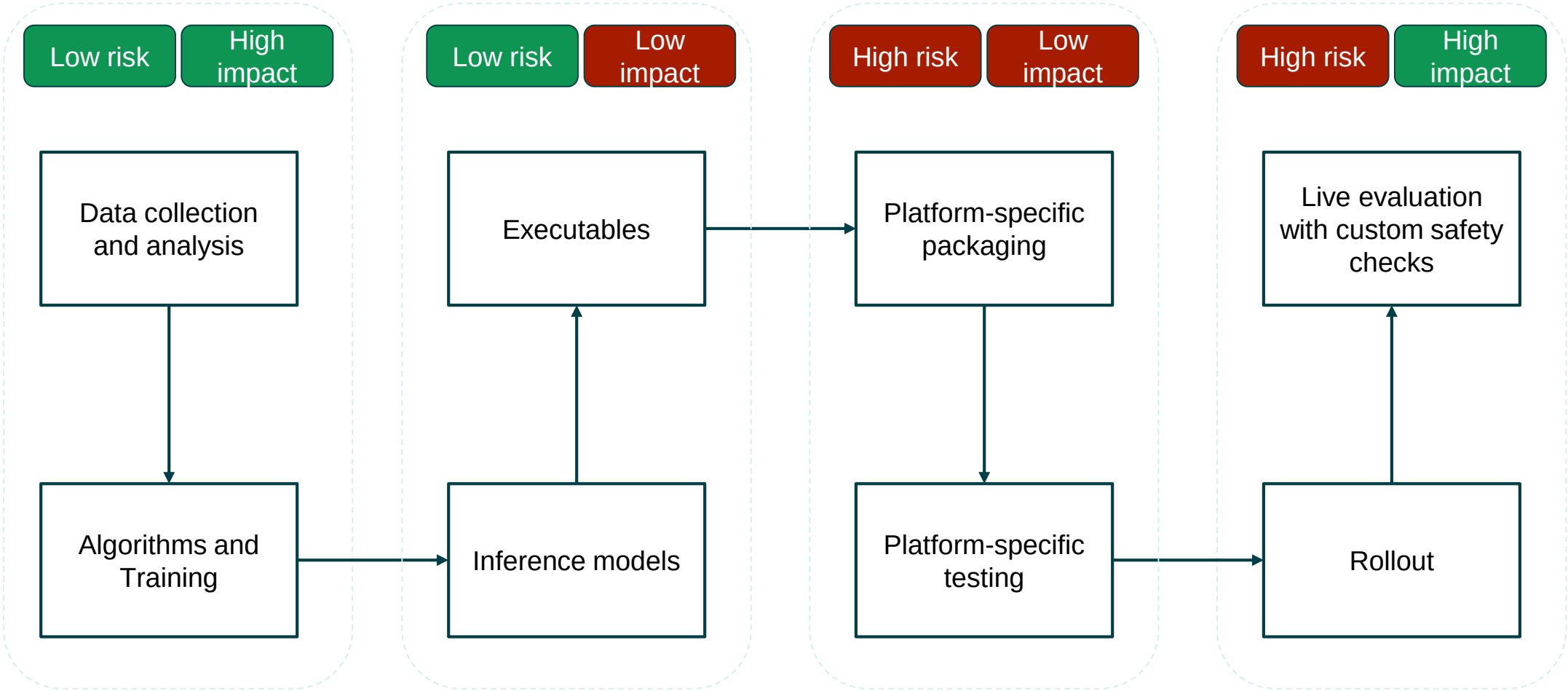
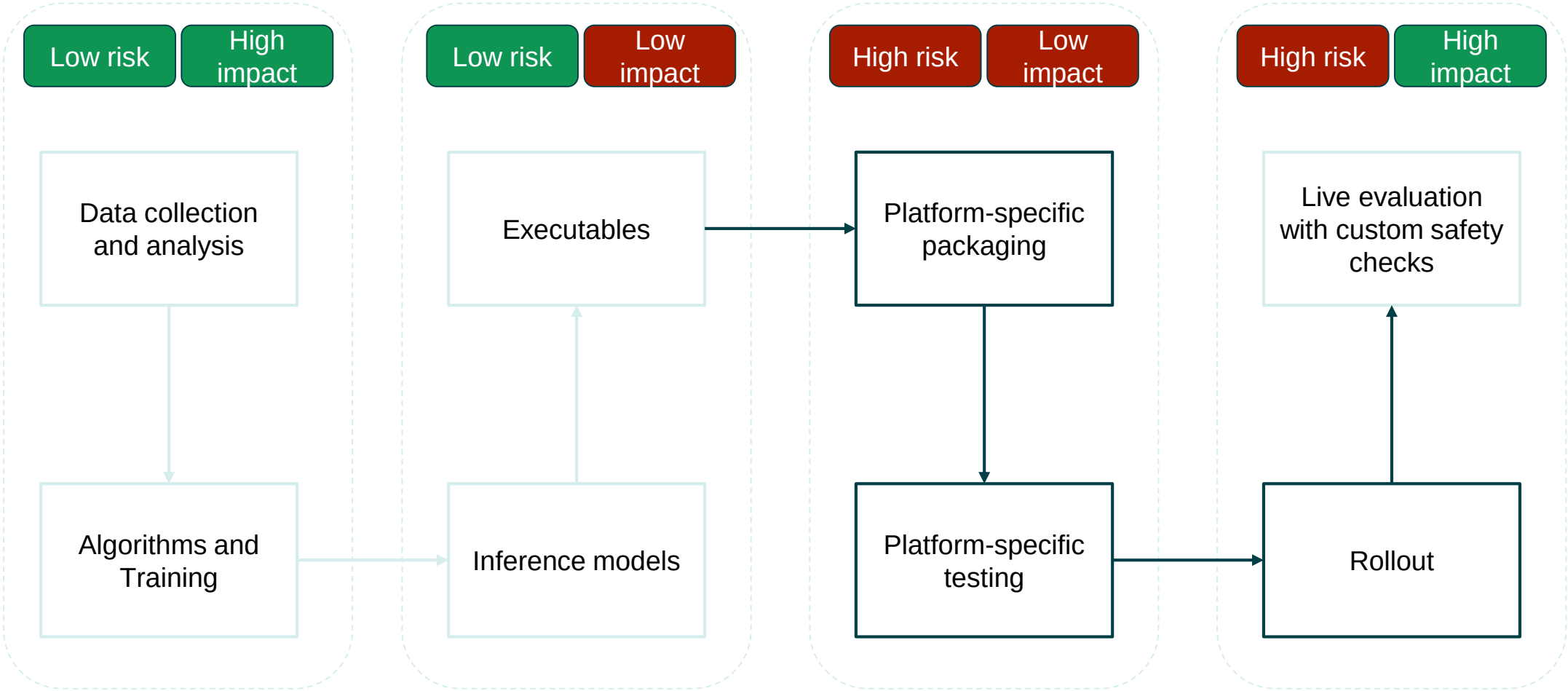
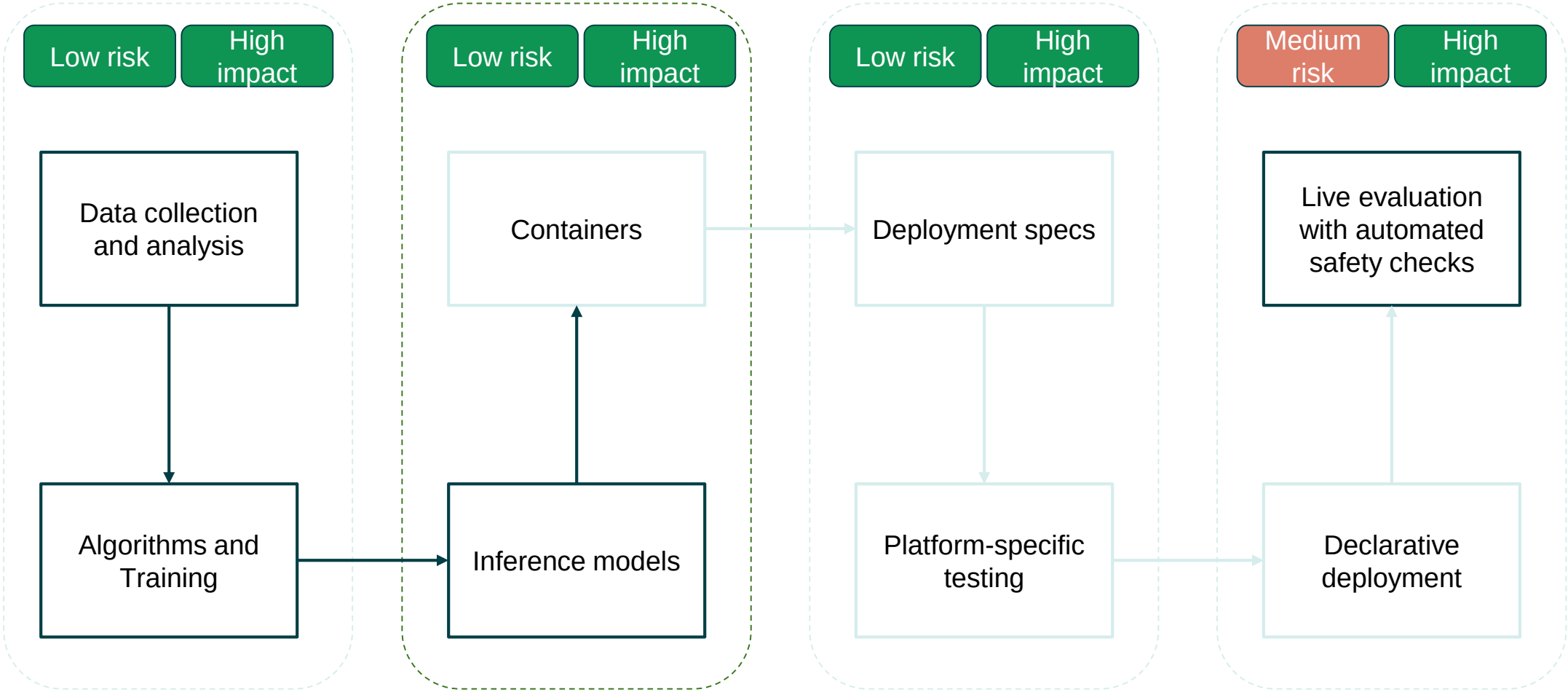
Traditional Deployment Process



Traditional Deployment Risk and Reward



Containerized Deployment Process



Key Takeaways

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Modular Infrastructure—Faster, More Flexible, More Reliable

- **Adaptability**

  Containerization speeds ongoing refinements required by real-world vision AI production applications

- **Speed**

  Agile pipeline operations are critical when moving from research notebooks to chipsets

- **Reliability**
  - With containerization, the painful process of development, packaging and deployment becomes predictable and consistent

Resources

Learn more about

Camio

camio.com

Kubernetes

kubernetes.io

Please contact for any questions or discussions

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