

Agenda

AI on the Edge

- Demo
- Technical Benefits: Definition, Importance & Advantages
- The role of AI in Edge Devices: Insights, Personalization, Optimization & Shrink prevention
- Tools for Accelerating AI Application Development
- Optimization & metrics for on-device
- Examples
- Future Trends
- Questions

Product Demos

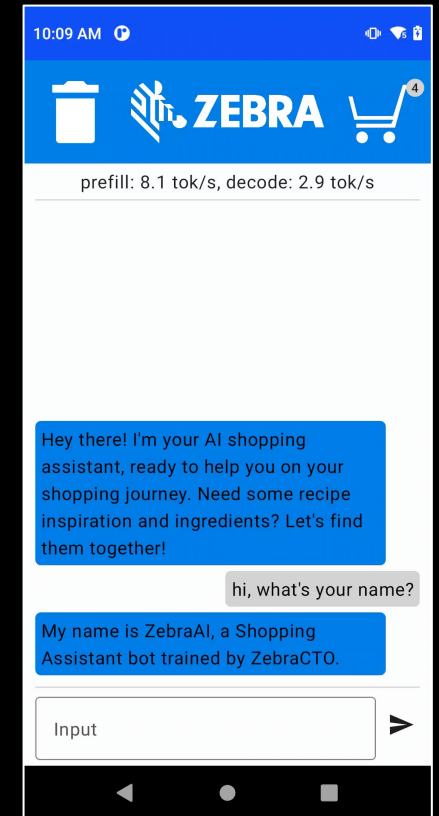
Running on-device

Product Recognition in a real store

Product Recognition – without the barcode

More in the AR Talk

“We expect 1.9 billion edge devices to ship with deep learning accelerators in 2025,” Linley Group principal analyst Linley Gwennap explained.



LLM on TC58

Technical Benefits

- **Low Latency and Real-time Processing:**
Improved user experience and **reduced cloud costs** / complexities
- **Reduced Bandwidth Usage & Cloud Costs:**
Not relying on customer's network or saturating it with images & video data plus removing/reducing cloud complexities
- **Privacy and Security:**
Data remains on device and reduces the risk of data breaches
- **Offline Functionality:**
Valuable for areas with reduced or lack of connectivity
- **Improved Energy Efficiency:**
Data transfer and processing reduced

“AI on edge devices means implementing AI capabilities directly on local devices without constant internet reliance or cloud processing.”



The role of AI in Edge Devices

A few examples:

- **Real-time Insights:**
Better decision making, improved customer experience, optimized operational efficiencies, early identification of issues...
- **Personalization:**
Active learning from behavior and improved customer experience.
- **Optimization:**
Real-time inventory visibility & staff efficiencies
- **Shrink Prevention:**
Detecting customer behavior and patterns / trends



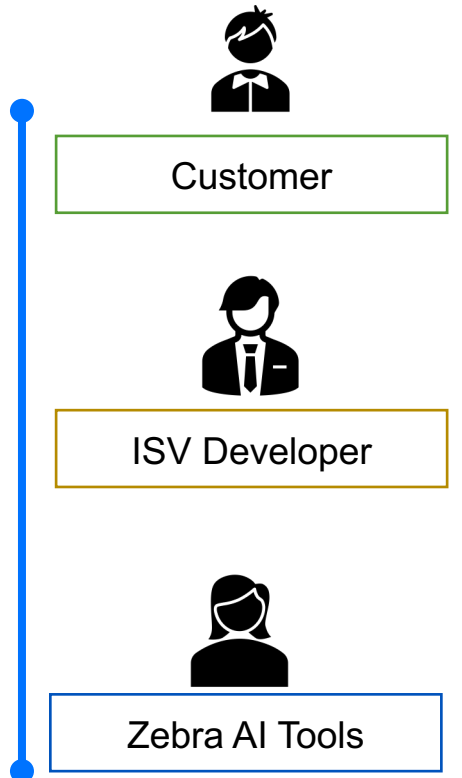
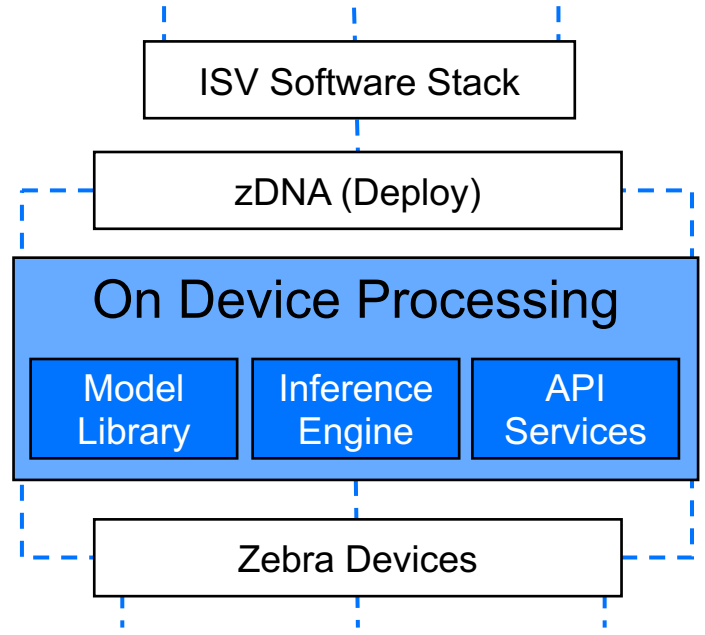
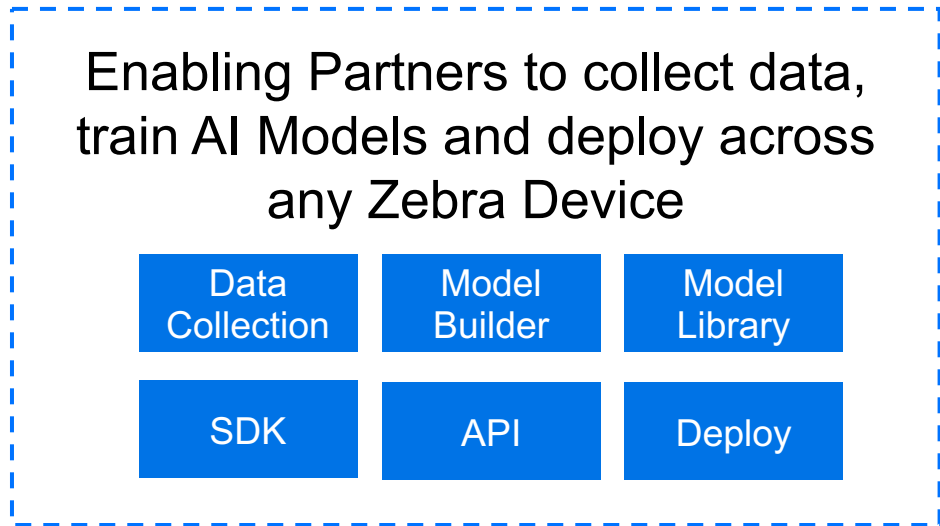
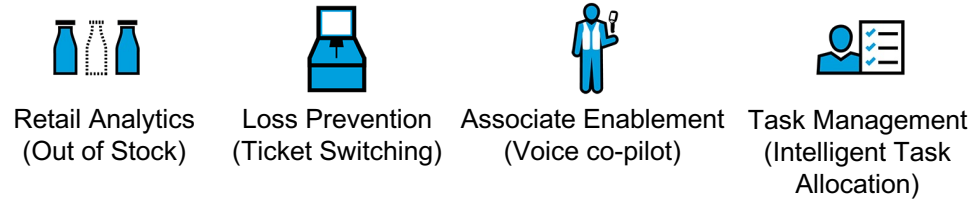
Example: Barcode Detection

Tools for Accelerating AI Application Development



Enabling Partners & ISVs

Device Stack – SDK & more...



Zebra's AI Development Framework



APPLICATION EXAMPLES	RETAIL	INDUSTRIAL	T&L	HEALTHCARE
Retail Analytics Loss Prevention Associate Enablement Task Management	Machine Vision Machine / Health Status	Last Mile Delivery	Patient Tracking & Task	

ISV & PARTNER ENABLEMENT
Data Collection Model Builder Model Library SDK API Deployment

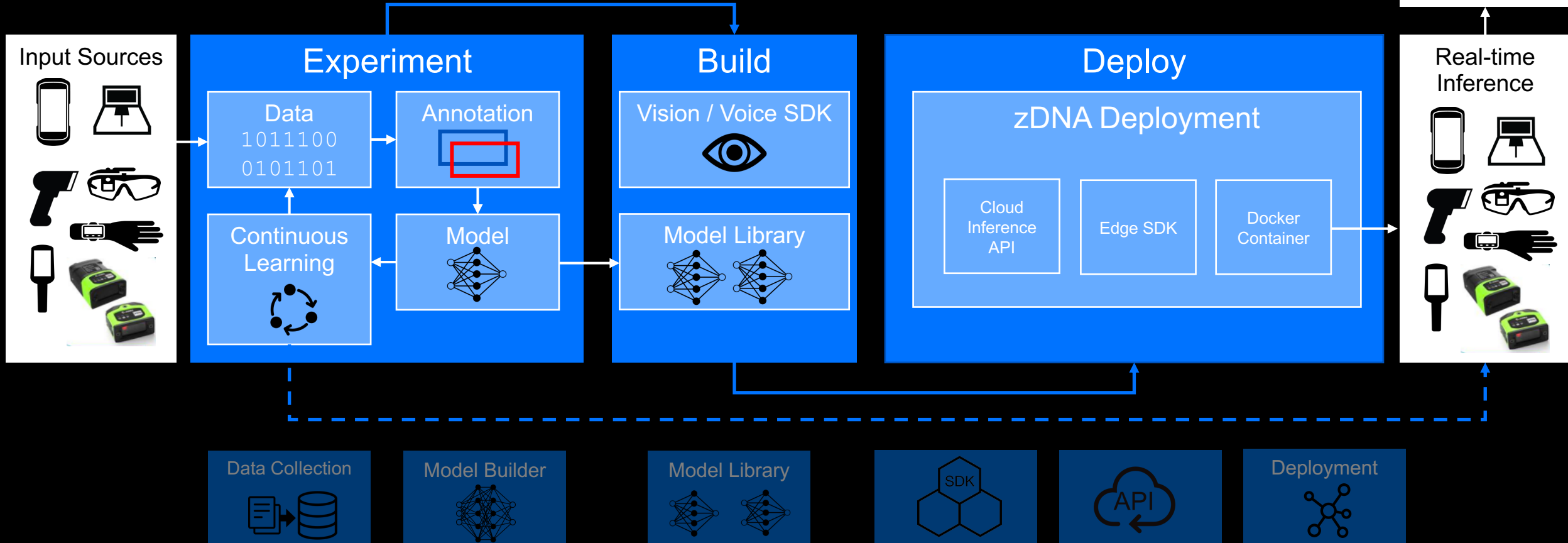
SERVICES, PRE-TRAINED MODELS & FUSION	VISION	VOICE	MACHINE LEARNING	SENSOR
Product Recognition Fresh Produce	Localizer OCR Ticket Switching	VoiceSDK Voice API	RL Orchestration Predictive Analytics Gen. AI	RFID Sensor

TOOLS / ATOM	DATA & TRAINING	DEPLOYMENT
Data Acquisition Data Management Annotation SaaS Managed Annotation (ADS) Model Builder	Model Library Model Management SDKs Edge AI Deployment Cloud APIs	

INFRASTRUCTURE	DEVICES	CHIPSETS	FRAMEWORKS & PARTNERS
		intel. NVIDIA arm NXP QUALCOMM®	OpenVINO® PyTorch TensorFlow Lite QUALCOMM® SNPE Dialogflow HUGGING FACE cerebras SenseML

End-to-end Pipeline

A mature AI Development Framework offers increased efficiency, enhanced model performance, scalability, robust governance, cost optimization, agility, and improved collaboration. These **benefits** collectively contribute to **driving business growth, competitive advantage**, and successful implementation of AI initiatives in the company.



Optimization & metrics

Product Recognition

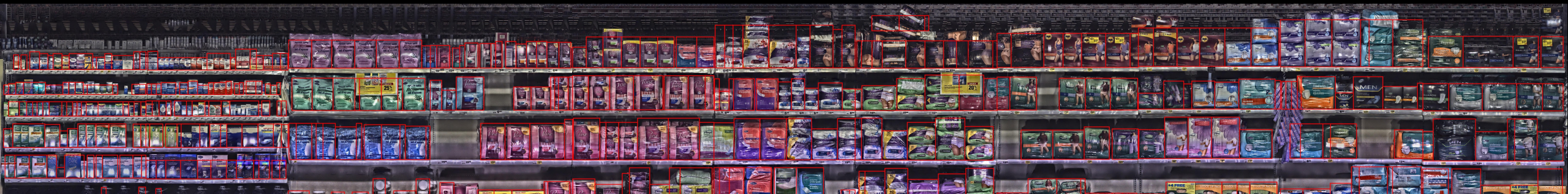
- Optimized for Zebra devices, partnership with Google and Qualcomm
- State-of-the-art techniques – quantization, model networks, layers used for output.
- Product/packaging updates learnt and federated from handheld devices and/or MP7000 (self checkout) – no human intervention

TC58 (QC 6490)

200k product database (~80Mb)

Example of performance:

- ~46ms to localise and perform a product recognition
- ~2.9s to localise and recognize 60 products (shelf module)
- Accuracy:
Top1: 86.6% Top2: 95% Top3: 97%



Examples

Self Checkout – running on-device



Fresh Produce Recognition



Ticket Switching

*Build business rules to
"nudge" customer or
alert staff*

- *Own bag*
- *Stacked Products*
- *Missed Scan*
- *Ticket Switch*

Future Trends

- More and more processing will be at the edge – 5G will help unlock
- Complex edge solutions will happen with less processing power e.g. quantization
- AI will drive personalization on device e.g. co-pilot
- MLOps will mature into a commodity
- Winners will be the partners that can drive the commercialization and show value to end customers



Thank You

ZEBRA and the stylized Zebra head are trademarks of Zebra Technologies Corp., registered in many jurisdictions worldwide. All other trademarks are the property of their respective owners.
©2023 Zebra Technologies Corp. and/or its affiliates. All rights reserved.