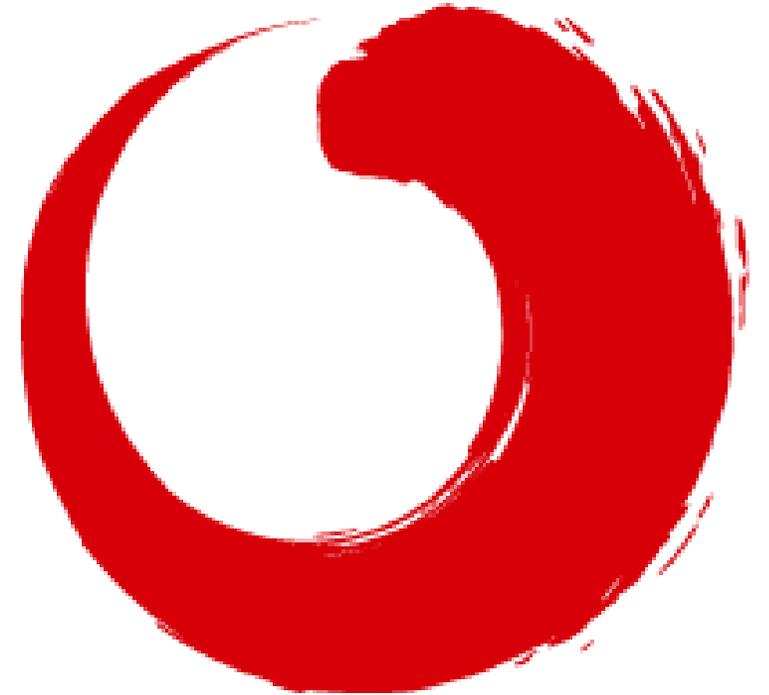


# Action Prowave

Your Global ODM Partner





## 2010

Founded in Shanghai. Launched a 3G tablet in collaboration with **China Telecom**, highlighted at MWC Barcelona.



## 2018

Teamed up with **Lenovo New Vision** to develop AR glasses based on Qualcomm platforms. Developed handheld scanner for **Newland**.



## 2023

Collaborated with **JD.com** to develop a handheld scanner. Initiated research into foldable smartphone technology.



## 2014

Ventured into the realm of mobile scanning and smart mobile POS. Started a decade long collaboration with **Honeywell**.



## 2021

Crafted high-precision terminal for the BeiDou navigation system with **CHCNAV**. Handheld scanner esteemed by clients like **JT Express**, **ZTO Express**.

# Leadership Team



**Zhicong Zhu, ODM GM**

Zhicong is a Computer Science graduate from the University of Electronic Science and Technology, and started his career at ZTE Communications. With over 20 years in the communication sector, his expertise in R&D and supply chain management spans from consumer devices to industrial-grade products. At Action, Zhicong is dedicated to crafting products fit for real-world applications.



**Richard Yang, CEO**

Richard, a Xidian University alumni and guest professor, is a communications industry veteran. He was Huawei's WCDMA chief engineer and holds 16 patents. As Action's founder in 2010 and CEO since, he's built a reputation for ODM solutions, from consumer goods to industrial terminals. Richard is keen to boost Action's offerings with AI and global manufacturing capabilities.

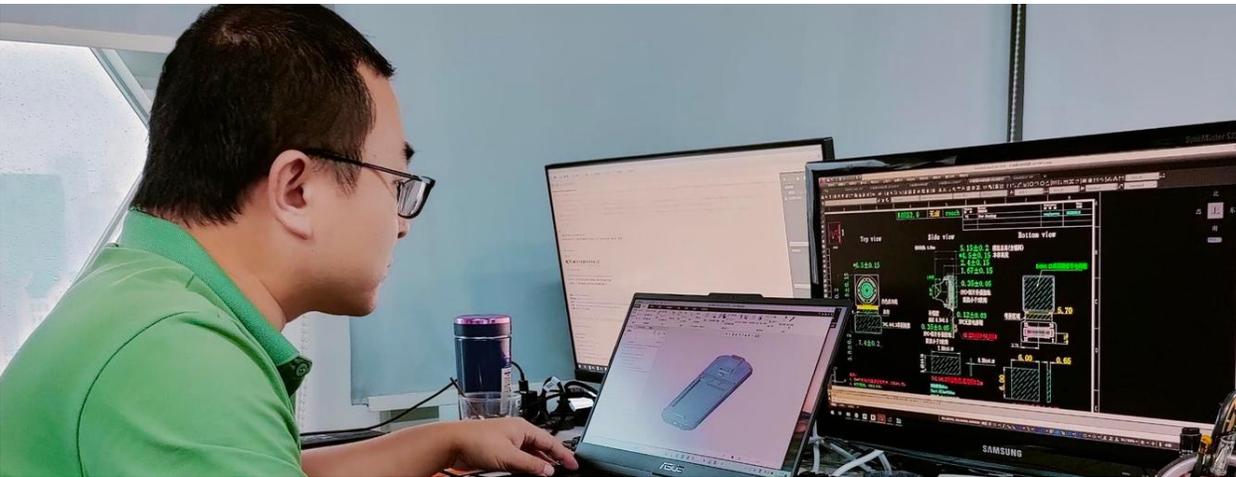


**Luna Yang, CTO**

Luna made her way to the US to study Robotics with a Master's at Carnegie Mellon University. After rocking it for five years as a machine learning engineer at Aurora Innovation and accoladed by Business Insider as a rising star in self-driving vehicles, she joined her father to take on the next big thing in smart terminals. She spearheads AI algorithms and explores global business avenues.

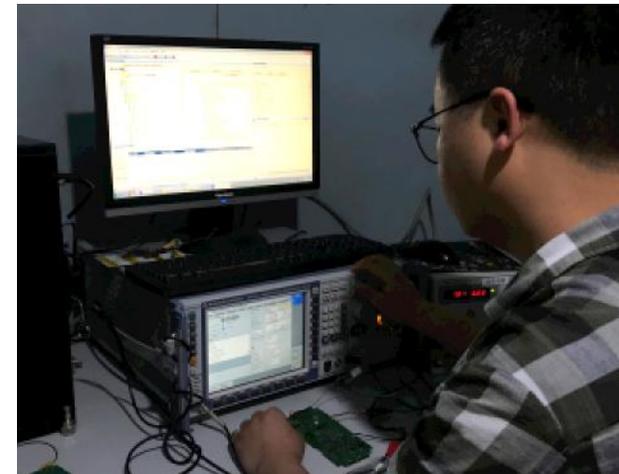
# Hardware Design

At Action, our decade-long journey in hardware design spans everything from mainboard to the entire device.



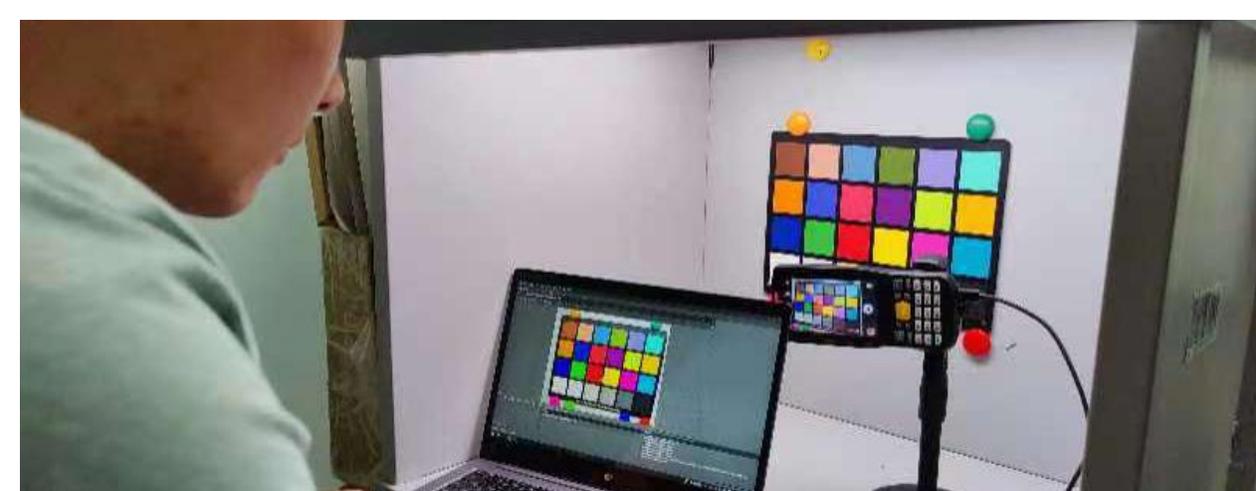
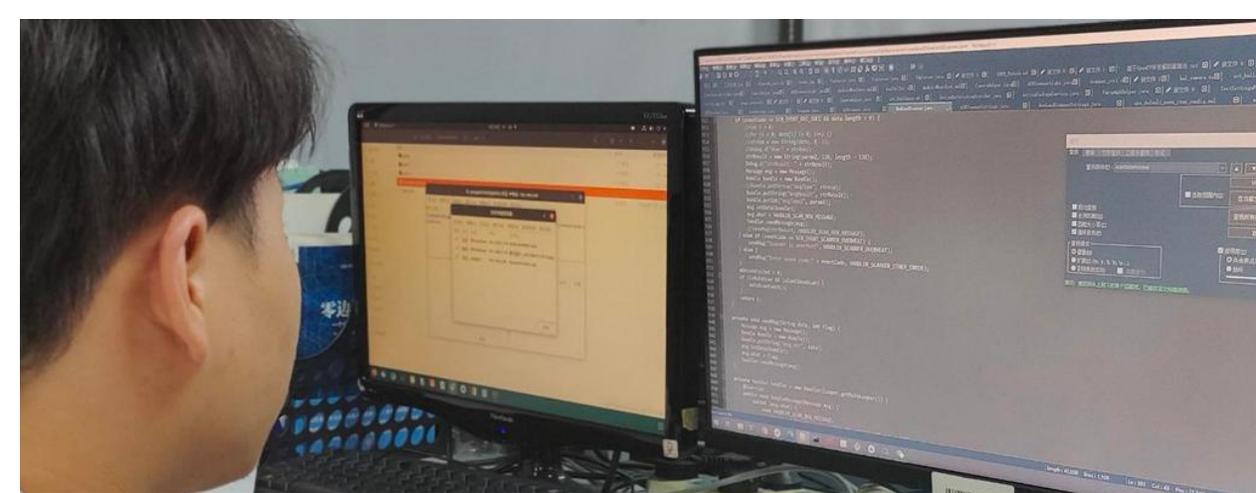
# Comprehensive Testing

We ensure the highest quality by coupling each step of development with rigorous testing.



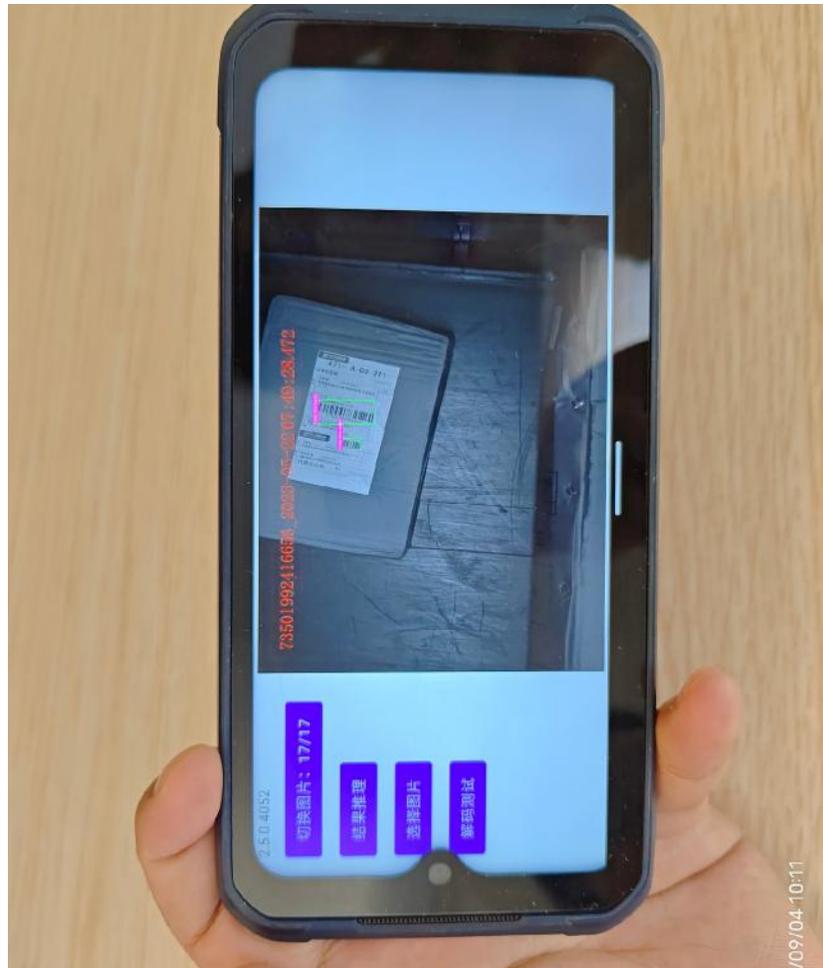
# Software Development

We craft custom Android system, software and drivers for specialized industrial terminals.

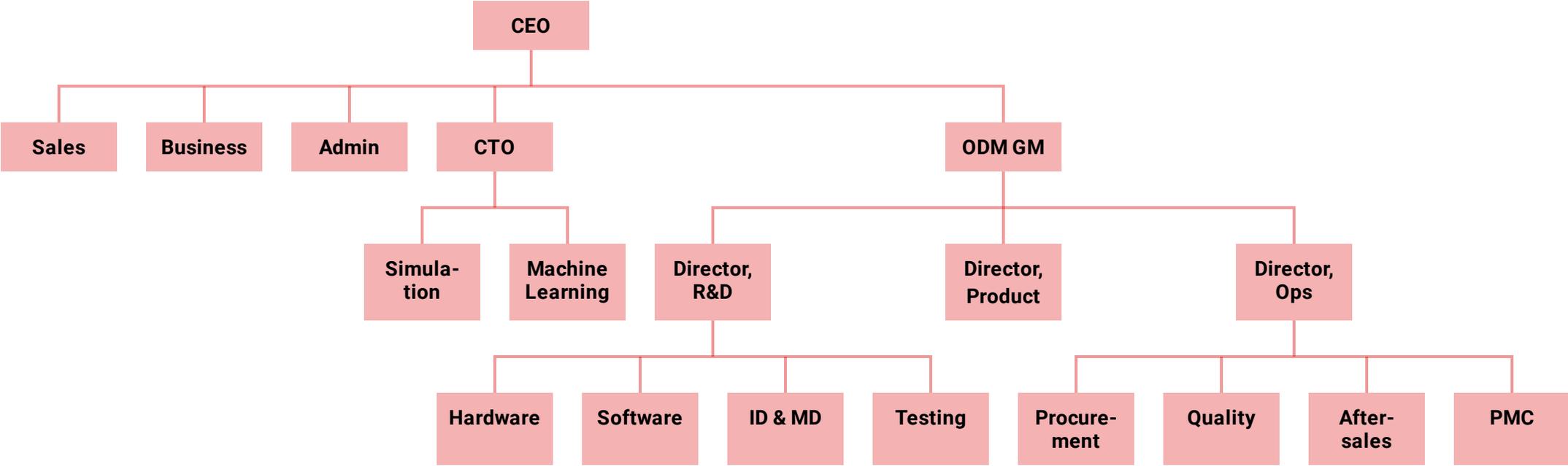


# Artificial Intelligence Research

We develop proprietary artificial intelligence and machine learning algorithms with world-class research.



# Comprehensive ODM organizational structure



# **Why Choose Us as Your Global ODM Partner**

# Why Choose Action as Your Global ODM Partner

- 1 | We Design for Manufacturing and Assembly**
- 2 | We Deliver Globally**
- 3 | We Innovate in Every Aspect**

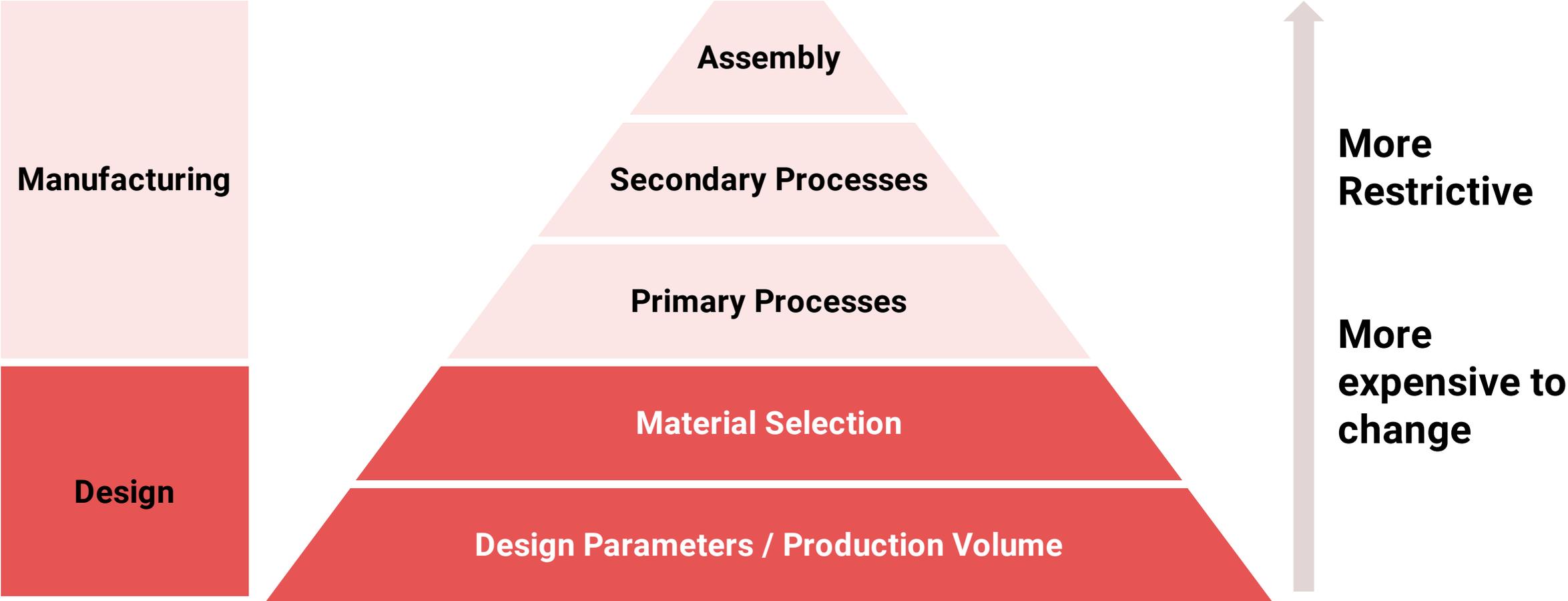
# Why Choose Action as Your Global ODM Partner

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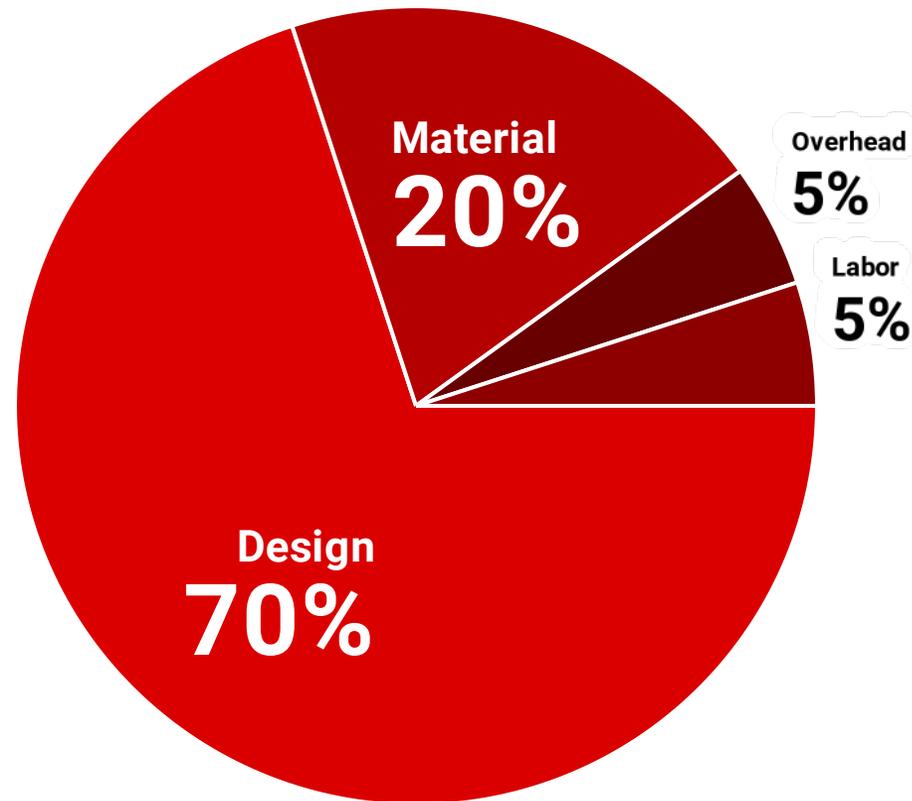
DfMA

# The Problem

# The Manufacturing Pyramid

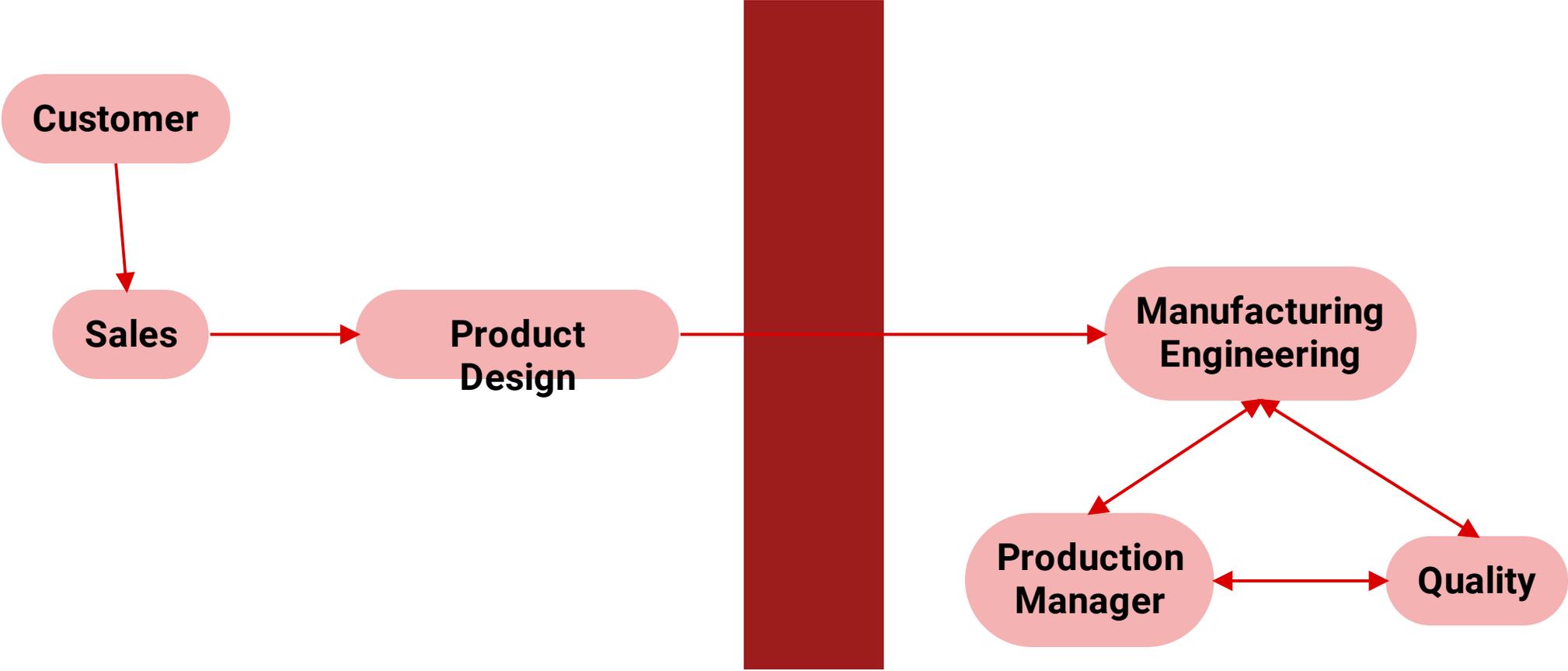


# Product Cost is Influenced by ...

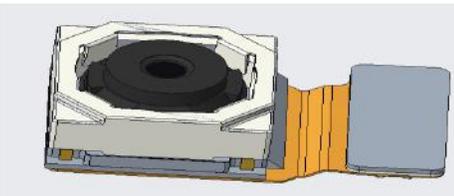
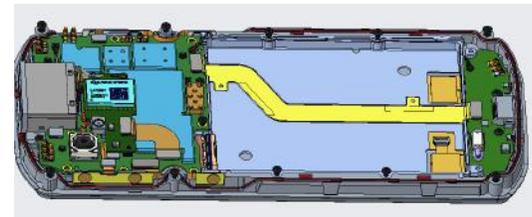
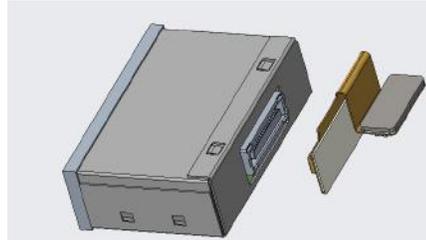
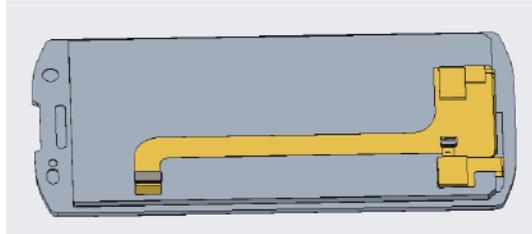
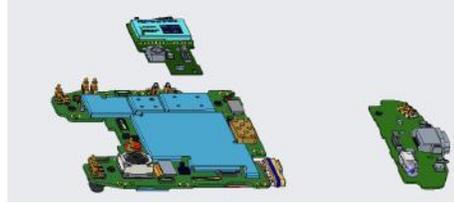
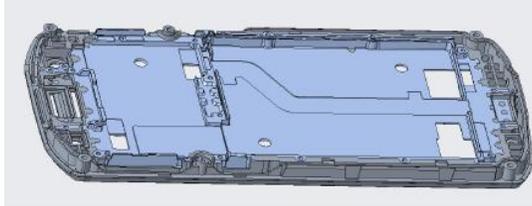


**90% of the product cost is determined by the bottom of the pyramid!**

# "Over the Wall" Design Process



# Case Study: Current PDA Design

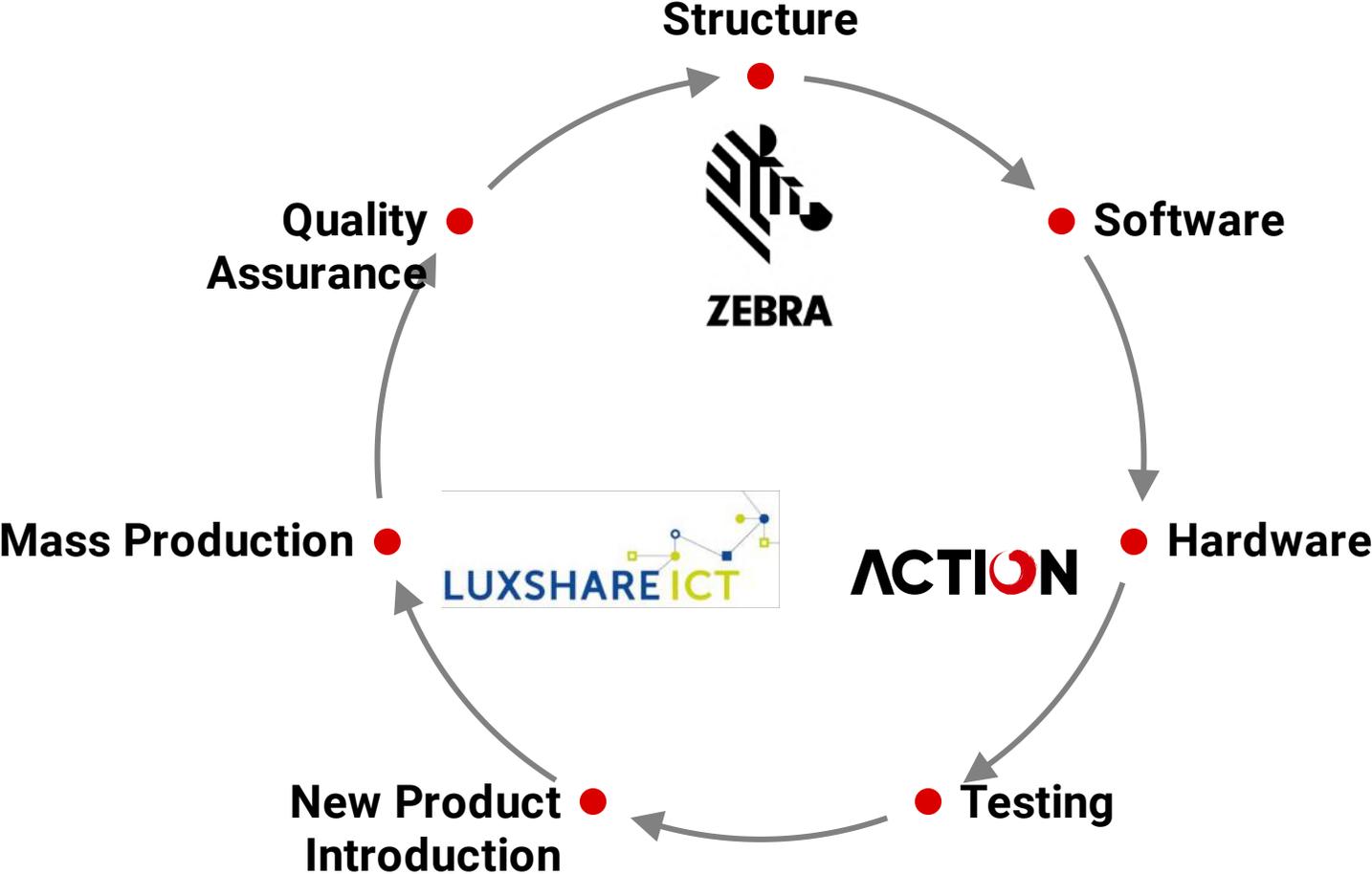


- Lots of parts (3 PCBs)
- Non-standard connection via flexible PCB
- Hard to automate
- Managing variations is a headache
- Not designed with assembly process in mind

**DfMA**

# **The Solution**

# Current Engineering



# Manufacturing and Assembly from the Get-Go

## Design for Manufacturing

---

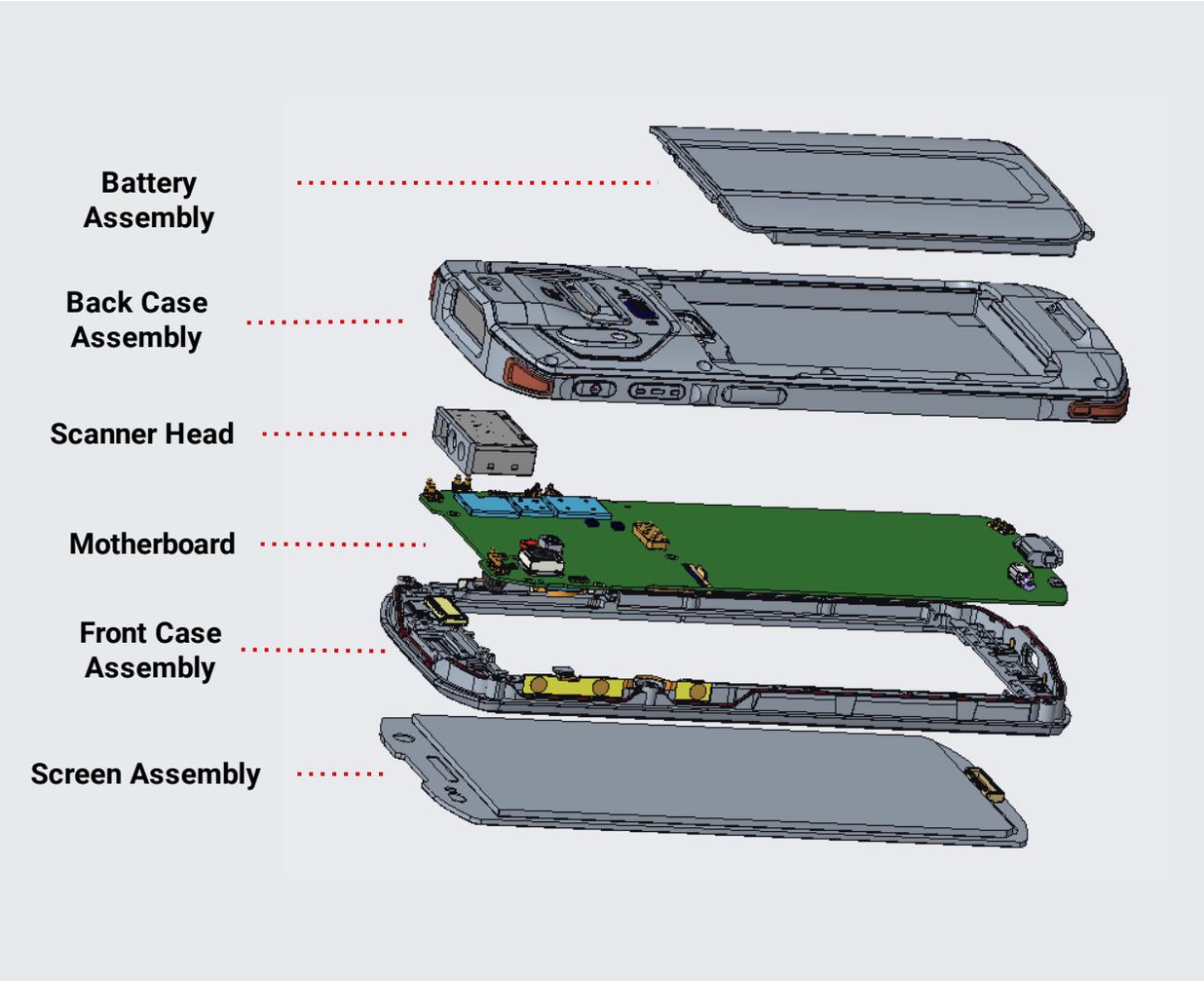
- **Standard materials and components**
- **Standardize design**
- **Use materials that are easy to process**
- **Designed to expected level of production**

## Design for Assembly

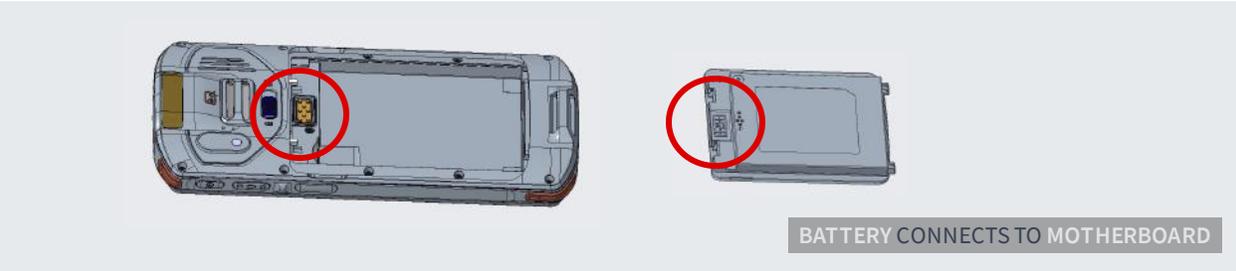
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- **Reduce part count and part types**
- **Modularize parts**
- **Automation ready**

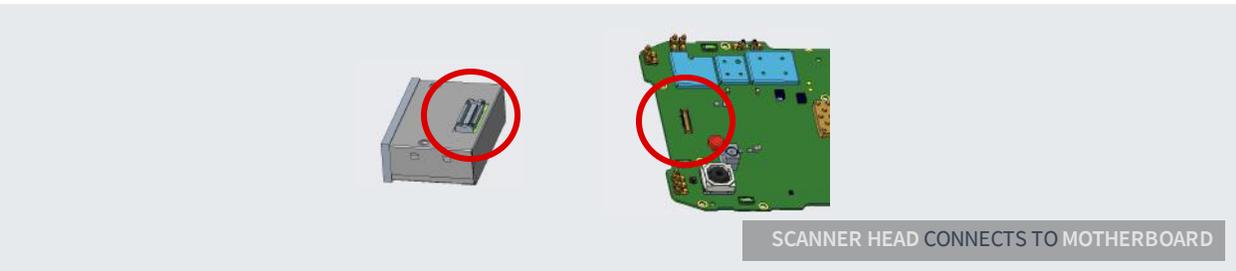
# Case Study: A Simplified PDA Design



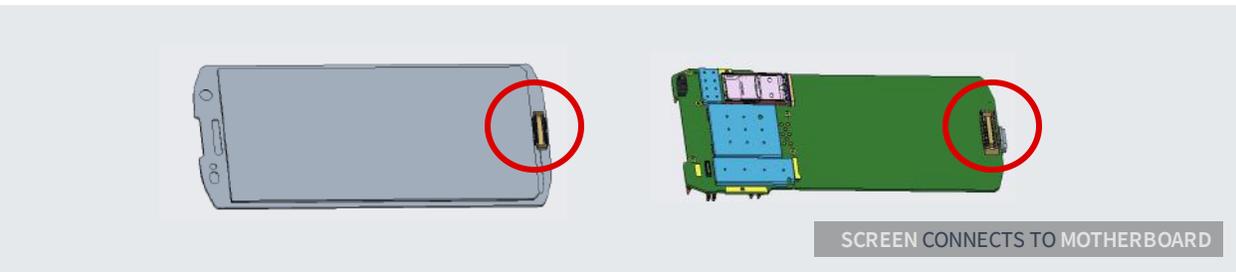
**EXPLODED VIEW DIAGRAM**



**Battery solder pad connected to a POGO PIN**

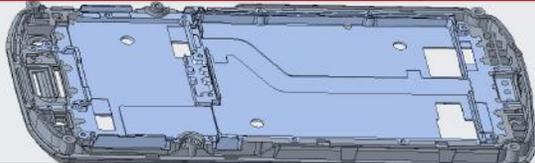
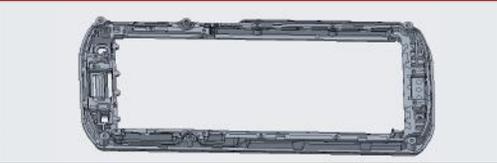
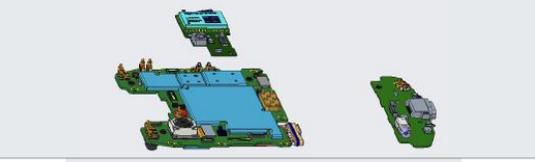
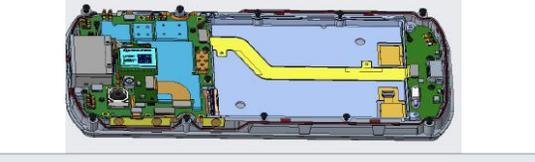
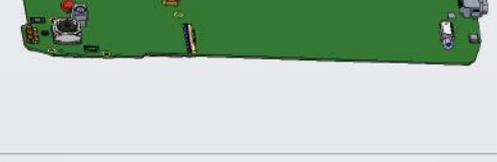
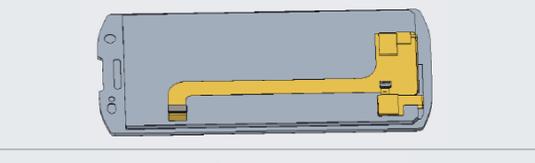
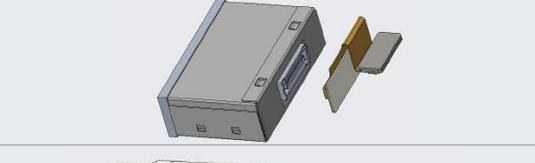
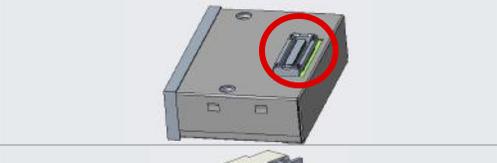
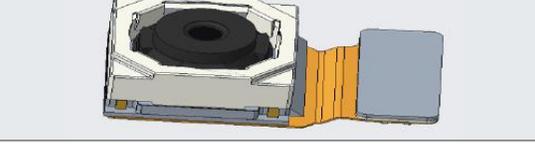
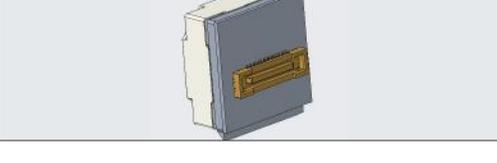


**Scanner connected to motherboard using a B-TO-B connector**



**Screen connected to motherboard using a B-TO-B connector**

# Before and After Simplification

No.	Part	Before	After	Notes
1	Front Cover / Bracket			<ul style="list-style-type: none"> <li>- The aluminum alloy bracket is removed. The PCB adopts a new special material, and is integrated with the middle frame.</li> <li>- 3 PCBs are combined into 1.</li> <li>- Each module connects using connectors and is surface-mounted onto the main PCB.</li> </ul>
2	PCB			
3	Type C Connector			
4	Screen			<p>Eliminate the Flexible Printed Circuit design and use a custom connector design to connect to the motherboard</p>
5	Scanner			
6	Camera			

DfMA

# The Result

# With DFMA, We Achieve...

- ✓ **simpler**, more **reliable** products
- ✓ **lower costs** for manufacturing and assembly
- ✓ **automated** assembly line
- ✓ **higher flexibility** to product variations
- ✓ **faster response** to client requests

# Why Choose Action as Your Global ODM Partner

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- 2 | **We Manufacture and Deliver Globally**
- 3 | We Innovate in Every Aspect

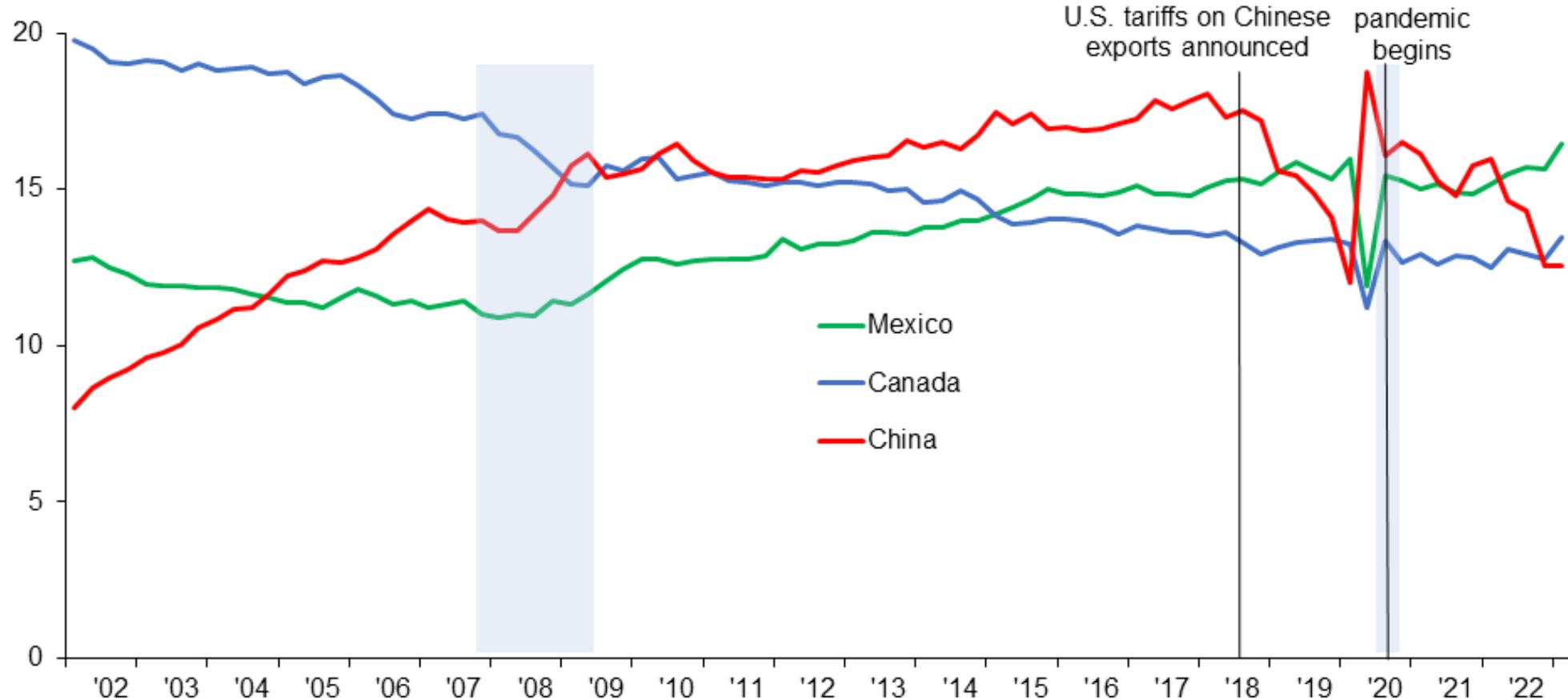
**Global Delivery**

# **The Problem**



## Chart 2 Mexico surpasses China as main U.S. manufacturing trading partner

Share of total U.S. manufacturing trade (percent)



NOTES: Seasonally adjusted, quarterly data. Figures also include April 2023. Shaded areas denote recessions. Total manufacturing trade is the sum of manufacturing exports and imports.

SOURCE: Census Bureau.

**Global Delivery**

# **The Solution**

# Modern Manufacturing Facilities Around the Globe

Worldwide Factories

25

21 @China, 4 @Vietnam

Manufacturing R&D Centers

7

Kunshan, Dongguan, Taiwan, Chuzhou

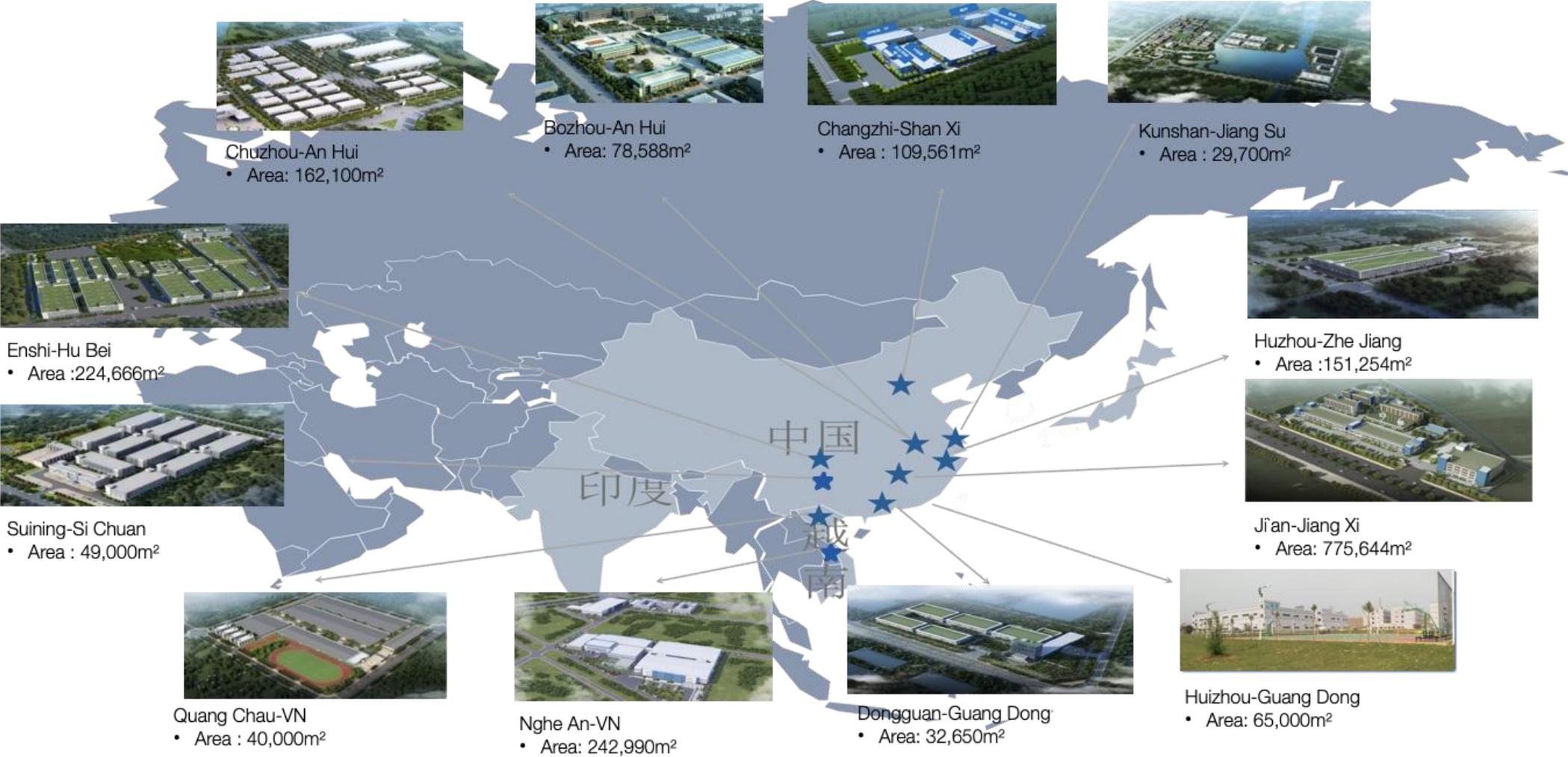
Total Employees

60,000+

Factory employees around the globe

# Modern Manufacturing Facilities Around the Globe

Not shown on Map: Factories in Mexico and India



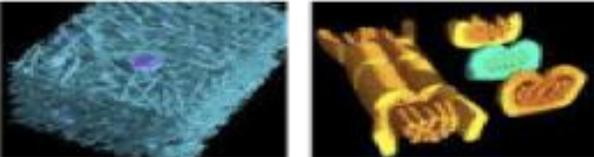
# Comprehensive Testing Facilities



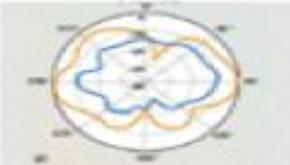
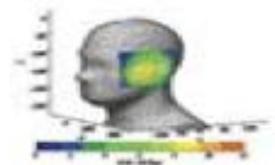
LAB DISTRIBUTION



DEPTH-OF-FIELD 3D MICROSCOPE



X-RAY COMPUTED TOMOGRAPHY



ANECHOIC ROOM



CHEMISTRY



ELECTRICAL PARTS



STRUCTURE REPORTS

# Rigorous Quality Control Process

We employ rigorous quality assurance processes at every step, from idea to mass production

## Research and Development

*Mechanical Design*

*FEA Design*

*Hardware Design*

*Firmware Design & APP*

## New Product Introduction

*Process Develop*

*Automation Develop*

*Traceability Develop*

## Mass Production

*Online Testing*

*Failure Analysis*

*Automation*

# Quality Control During R&D



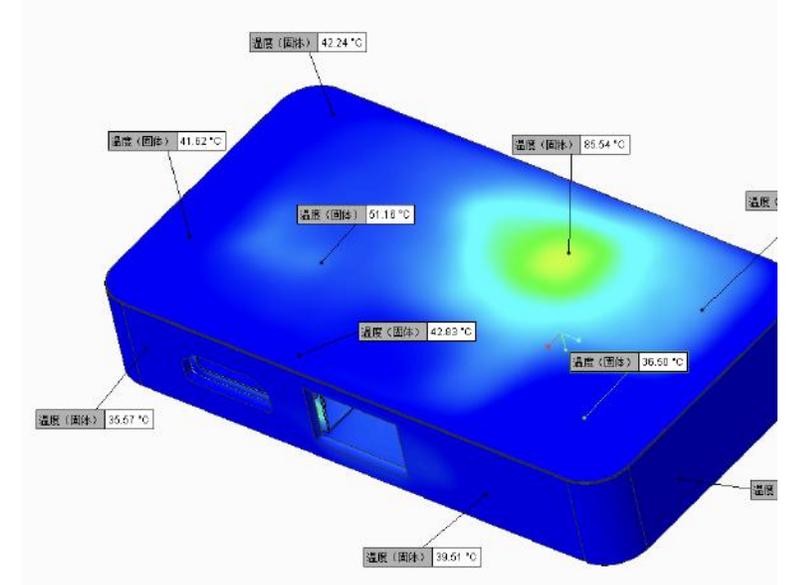
## Design Validation

- ✓ Electrical test
- ✓ SI test
- ✓ Compatibility test



## Reliability Test

- ✓ Mechanical
- ✓ Electronic
- ✓ Environmental
- ✓ Chemical



## FEA Simulation

- ✓ SI simulation
- ✓ Thermal simulation
- ✓ Structures simulation
- ✓ Mold flow analysis

# Quality Control During New Product Introduction



## Test Station Develop

- ✓ Test flow/test plan develop
- ✓ Test board/fixture develop and tuning
- ✓ Test software develop and debug
- ✓ Test process optimization



## Failure Analysis

- ✓ Fully FA including ME/EE/RF/Acoustic
- ✓ Full FA equipment/tools to support standardized FA flow and quick analysis
- ✓ Functional team to support FA/CA



## Quality Assurance

- ✓ Incoming quality and supplier manage
- ✓ Process and output quality manage
- ✓ Quality analysis with MIL/Minitab/JMP tools PMP/SIP/MSOP define and control
- ✓ Full function lab for testing

# Online Testing During Mass Manufacturing



## PCBA Function Test

- ✓ Firmware Update
- ✓ Voltage and current test
- ✓ HDMI2.1/DP1.4  
3840\*2160/144Hz
- ✓ TYPE C full function  
3840\*2160/120Hz



## Continuity Test

- ✓ Open
- ✓ Short
- ✓ Resistance
- ✓ Capacitance
- ✓ Impedance



## On-load Test

- ✓ Standby power consumption test
- ✓ USB output 4.5W/7.5W
- ✓ TYPE C output  
10W/15W/100W
- ✓ TYPE C fast charge 100W



## Final Function Test

- ✓ Firmware Check
- ✓ HDMI 3840\*2160/144Hz
- ✓ DP 3840\*2160/60Hz
- ✓ VGA 2560\*1080/60Hz
- ✓ USB3.0 Read/Write

# Quality Assurance Capability



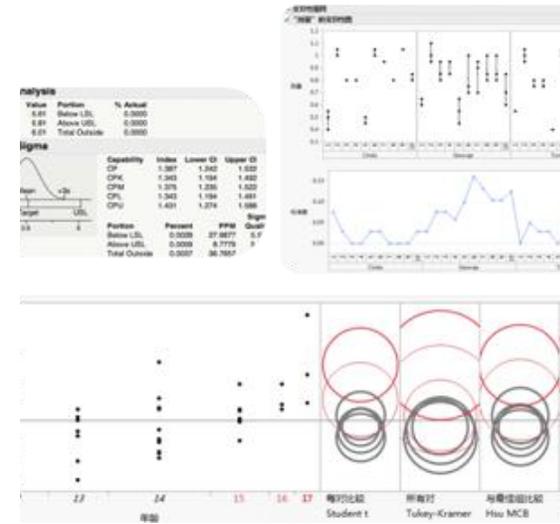
## Quality System

- ✓ System Certification
- ✓ Product Certification



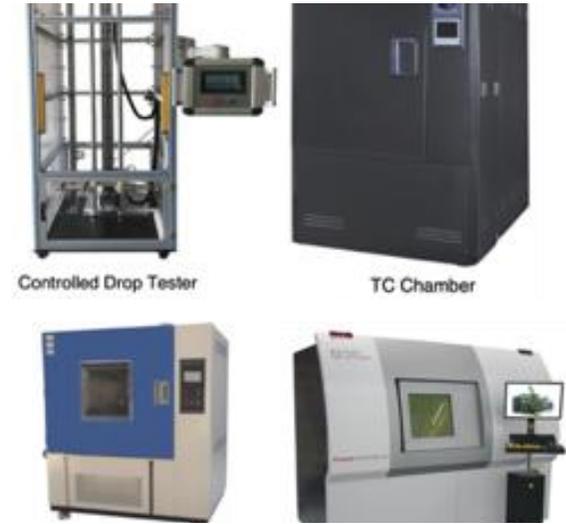
## Continuity Test

- ✓ CMM
- ✓ 3D Scanner
- ✓ OMM & Laser
- ✓ Loading Tester
- ✓ Micrometer/Balance/Gauge



## Statistical Techniques

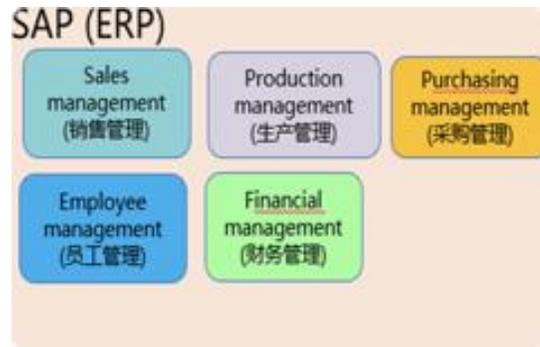
- ✓ Process Performance
- ✓ Measurement System Analysis
- ✓ SPC Control
- ✓ Factor Analysis



## Reliability/ORT

- ✓ Mechanical Test
- ✓ Chemical Test
- ✓ Environmental Test
- ✓ Electrical Test
- ✓ Failure Analysis Tester

# Product/Production Manage System



## SAP System

- ✓ Purchasing Management
- ✓ Production Management
- ✓ Sales Management
- ✓ Financial Management
- ✓ Employee Management

## MES System

- ✓ Material Management
- ✓ Process Management
- ✓ Equipment Management
- ✓ Quality Management
- ✓ Dashboard Generation
- ✓ Product Traceability

## PLM System

- ✓ New Product Implement Manage
- ✓ Cost/Quotation Manage
- ✓ Drawing Design Review
- ✓ Engineering Change Manage
- ✓ Sampling, Pilot Run

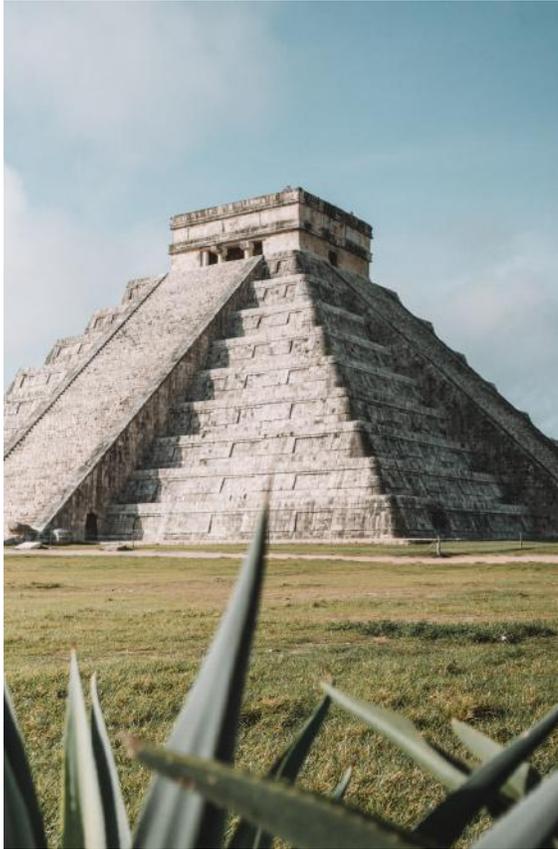
## EDI System

- ✓ Electronic Data Interaction
- ✓ Various SKUs Shipment Manage
- ✓ Real-time Order Management
- ✓ Customized Application

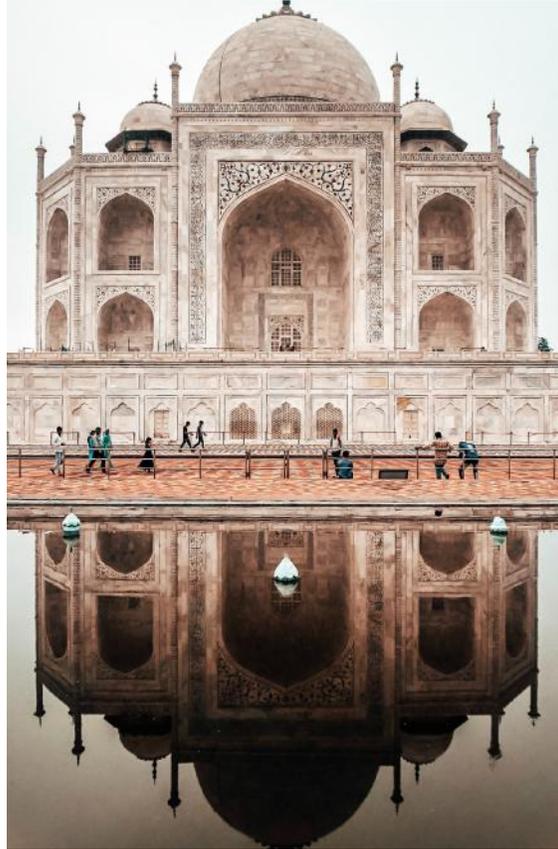
**Global Delivery**

# **The Result**

# Manufacture Locally, Deliver Locally.



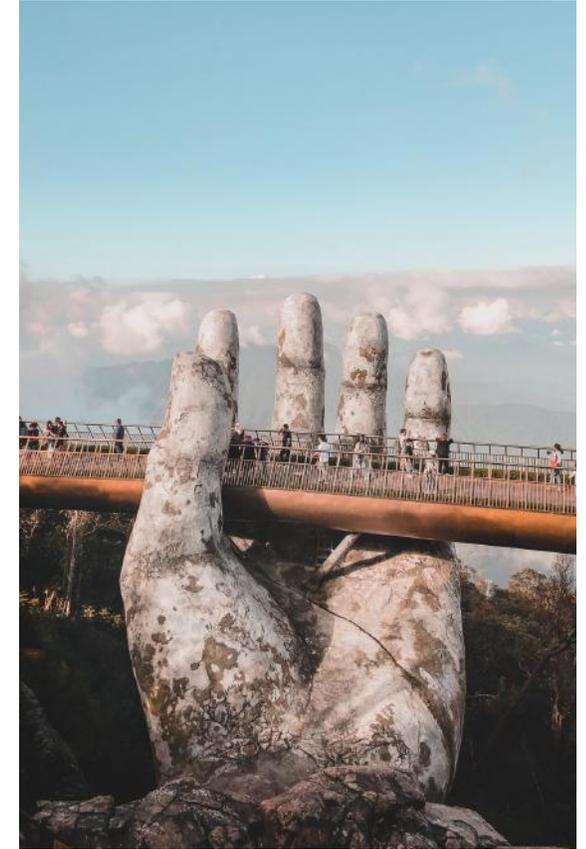
**Mexico**



**India**



**Malaysia**

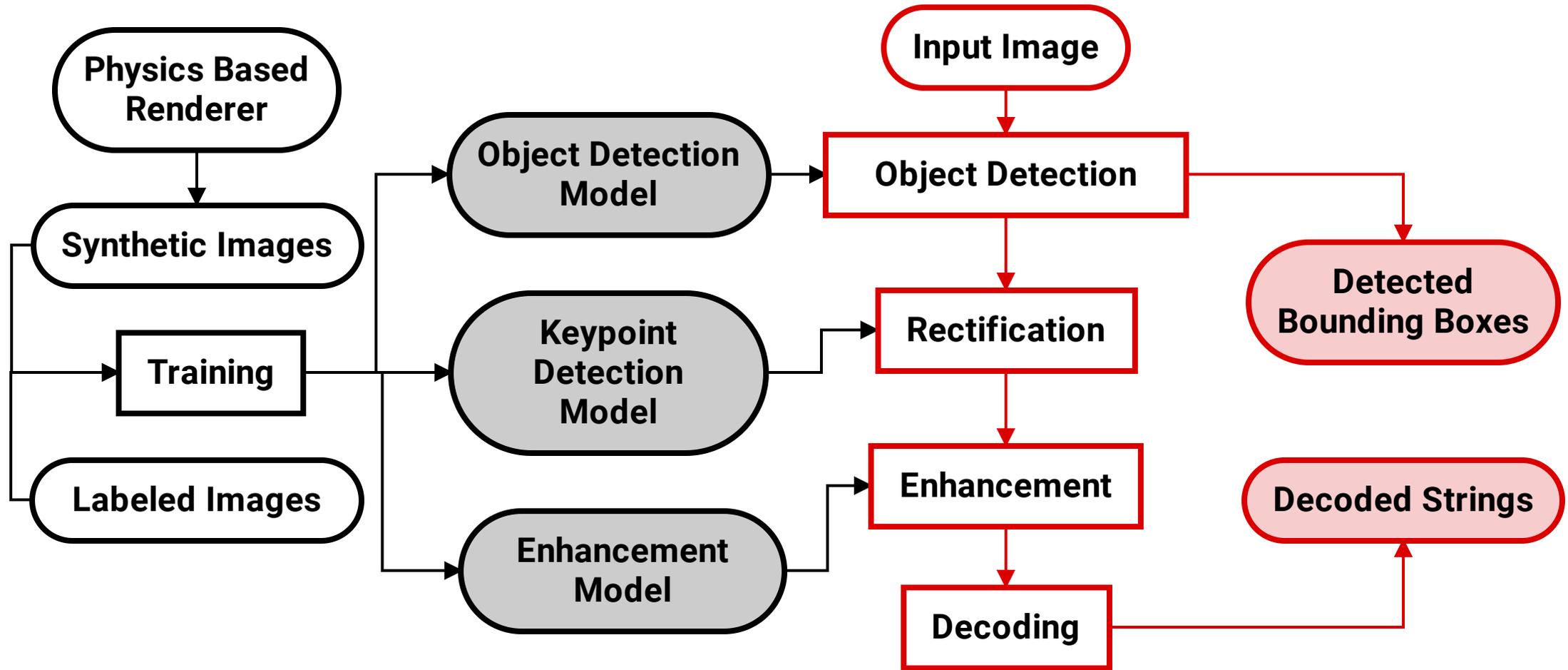


**Vietnam**

# Why Choose Action as Your Global ODM Partner

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# A Unified Deep Learning Framework for Barcode Scanning





# Your Vision, Our Expertise.

Partner with a global ODM leader.

CASE STUDY

# Trusted By Clients for Over a Decade

# We are trusted by





**Let's do  
great things  
together.**

**[info@action-prowave.com](mailto:info@action-prowave.com)**

**ACTION**