



工业互联网产业联盟  
Alliance of Industrial Internet

# 测试床:工业互联网创新解决方案实践者

## Concept of Testbed: from the idea to implementation

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**Opportunities and Challenges:** the market is fast paced, but still in **pilot stage** and slowly revealing its true value

机遇与挑战：产业节奏在加速，但仍处于大规模试点阶段



">70% of IoT initiatives are still in the POC/pilot stage"

"By 2022, *IoT - enabled service models* could *save a trillion dollars* a year in maintenance and service costs."

From: Gartner

# All industries are struggling, Must **Integrate** Many Technologies and cultures, to make use of different models and ecosystem

## OT与ICT融合加速，需要新的产业发展模式，测试床是关键

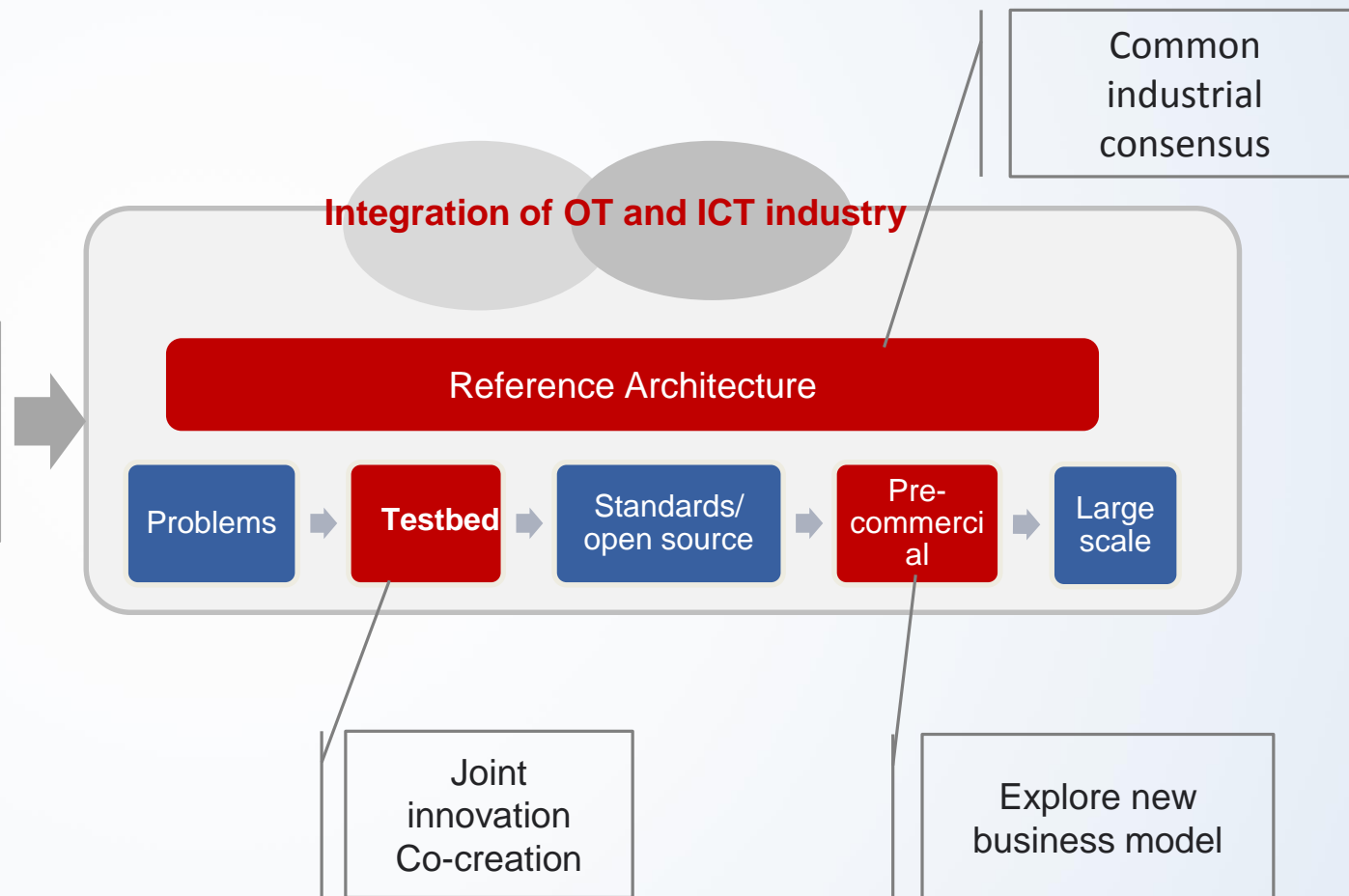
### Required Skills

1. IoT technology and engineering
2. Data science
3. Business models and business innovation
4. Vertical industry experience with both IT and R&D
5. Integration
6. Understanding of OT systems

**Heavy OT industry**

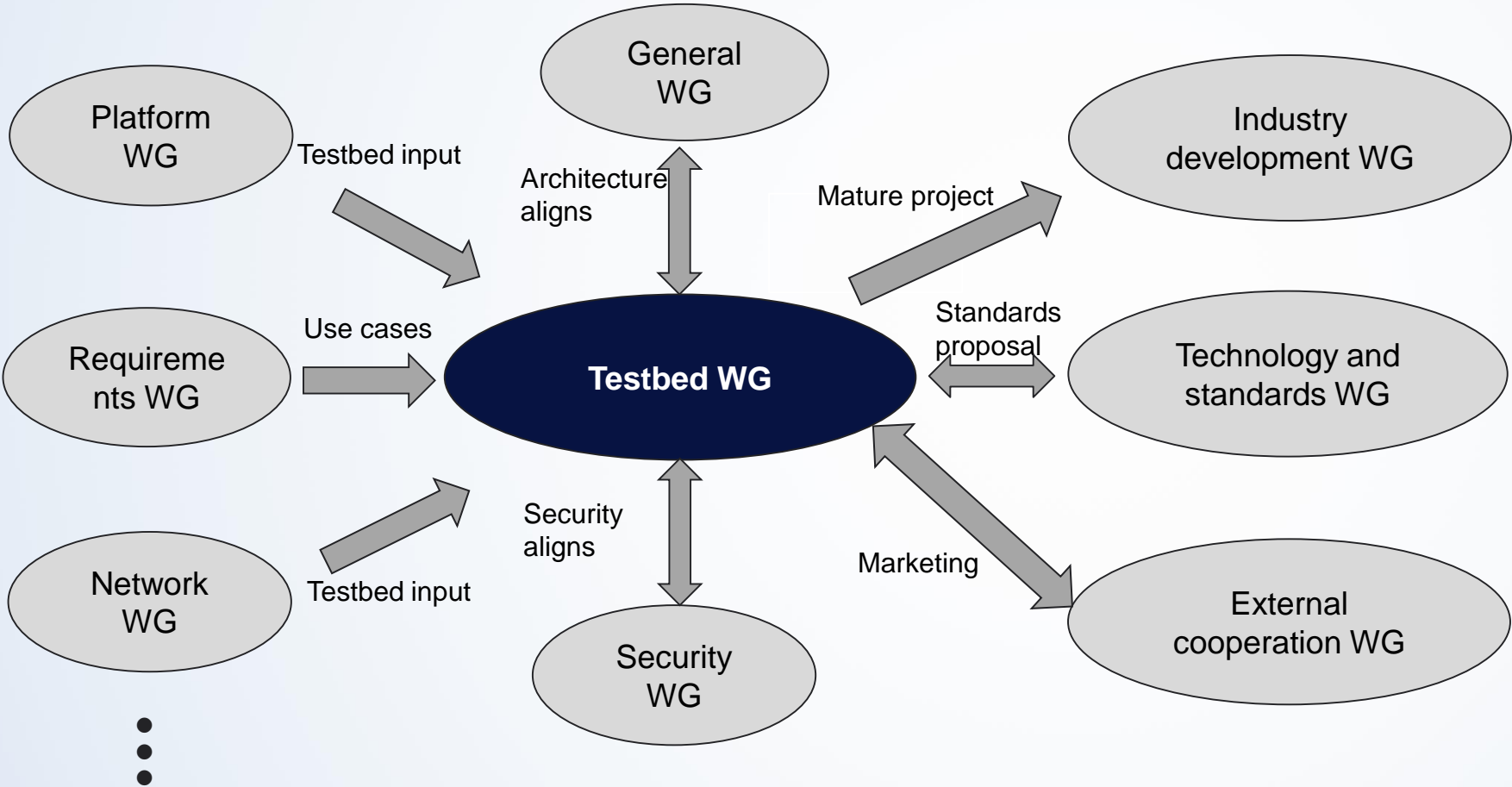
**Integration**  
•Different cultures  
•Different technology  
•Different models

**ICT industry**



# Overview of testbed in AII: **Collaboration** and Joint Innovation, from idea to implementation

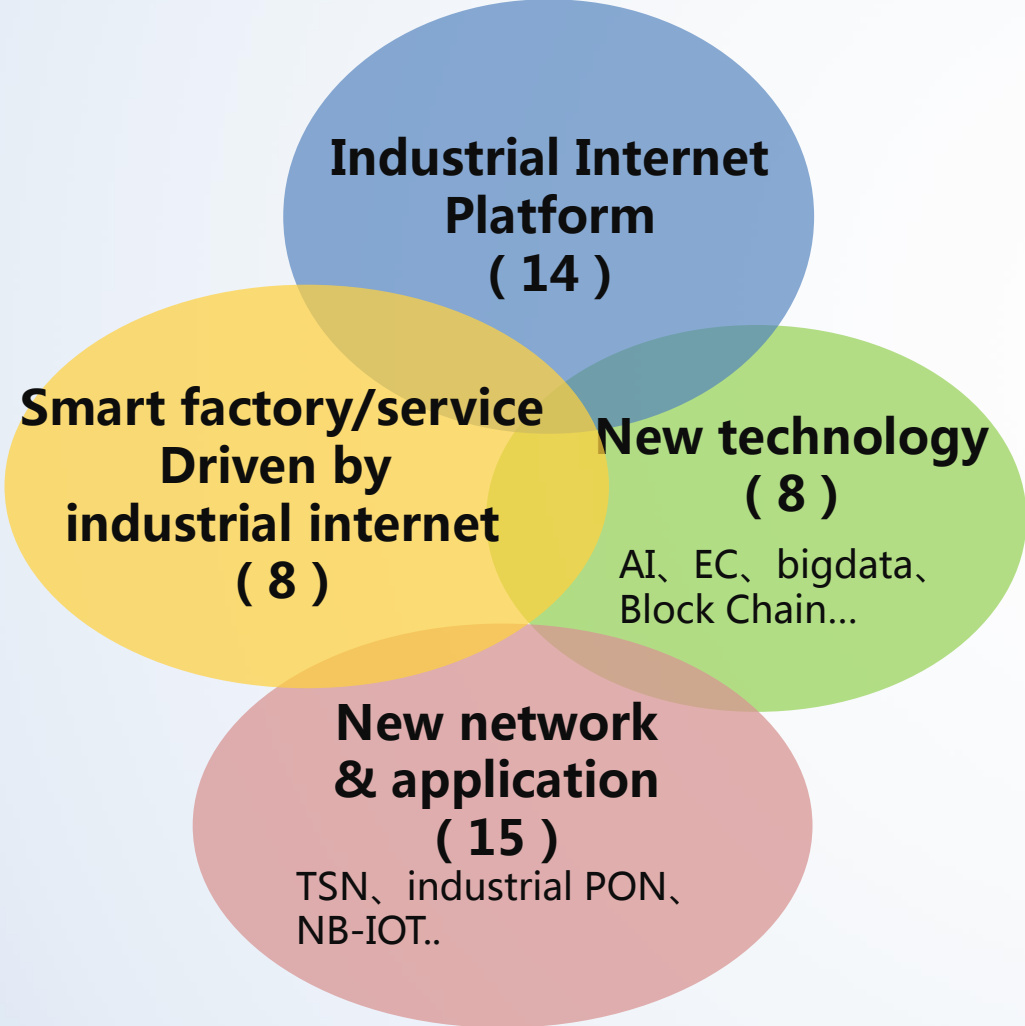
## AII测试床概览：协同和联合创新，从概念到产业落地的探索过程



Scope
<ul style="list-style-type: none"><li>• Explore best practices and promote demonstration</li><li>• Form a replicable innovative project with partners</li><li>• Manage the testbed to drive common testbed set</li><li>• Promote the Chinese standards</li><li>• International best practices collaboration</li></ul>



45 testbeds have been initiated, the platform and new network testbeds account for the largest proportion  
已经立项45个测试床，从创新上看平台、新型网络及应用类测试床占比最大，人工智能等新兴技术在逐步增多



- Collaborative manufacturing platform for small and medium-sized enterprises
- Remote health management of wind turbines based on XSOM industrial internet platform
- Industrial APP platform test bed based on intelligent numerical control system
- Predictive maintenance test bed
- Digital factory test bed based on industrial network connection
- Industrial Internet private network test bed based on SDN and SDP
- Equipment remote monitoring and diagnosis test bed based on industrial internet platform
- Flexible detection scheme for Industrial product appearance based on visual intelligence
- Real-time detection and optimization of product quality based on 5G and artificial intelligence
- NB-IoT shared washing machine test bed
- ROS robot wireless general platform test bed

**Latest 11 Test beds**

# Verticals aspect: discrete manufacturing move fast, horizontal testbeds create more value for the industry

## 从垂直行业看主要集中在离散制造业，基础共性测试床优秀比例最高



# Technology aspect: Emerging technologies such as artificial intelligence are increasing

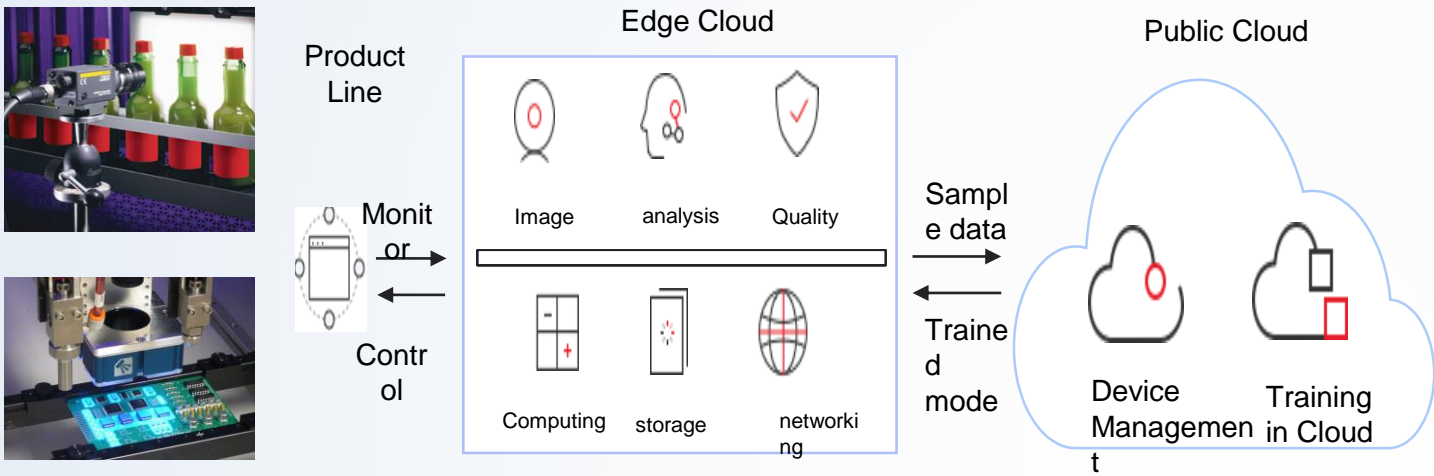
## 从技术上看网络类创新测试床最多，在优秀测试床中占比较大



# Visual Intelligent Industrial Product Appearance Flexible Detection

## Testbed

### 基于视觉智能工业品外观柔性检测测试床



Partner	Role
Huawei	Edge detection hardware devices. and public cloud training platform.
Foxconn	Film sample data and detection standards. the testbed related production and test environment.
intellifusion	Image detection algorithms and model and train the objects to be detected.
Hikvision	Devices such as industrial cameras and light sources, and collects PU images.
SoftStone	system integration and large-scale replication


- **Challenges and object:** The detection of industrial film products is based on artificial, detection by eyes and experience, low detection efficiency, high training cost, and missing detection. In this testbed, industrial film detection is manually upgraded to automation. The architecture and AI algorithm are used for innovation, which can be replicated in similar scenarios at low costs.
- **Expected:** Fully intelligent detection, detection rate 100%, detection speed matching production speed;
- **Innovation:** Introduce the AI technology to build a complete and replicable detection system based on the industrial cloud platform and device-cloud synergy.
- **Phase Plan:**
  - Phase 1: Foxconn production line inspection and requirement extraction
  - Phase 2: Data modeling and analysis Key algorithm design and effect simulation.
  - Phase 3: Testbed design and development, and onsite commissioning
  - Phase 4: Test and promote the effect of the real production line.
- **Current Progress and Next Steps:** Complete the Foxconn factory survey and requirements. Obtain the film product image and construct the AI algorithm sample library. Next, optimize and train algorithms to design a complete solution.




# Port industrial wireless automation platform Testbed

## 港口无线自动化平台测试床


- **Challenges:**The dispatching bank bridges, field bridges, trailers, and heavy forklifts of the central control room need to work together and monitor the operation progress in real time. Traditional connectivity is unreliable and the bandwidth is insufficient, which affects the security and throughput of terminal services and cannot carry the AGV unmanned communication bearer.
- **Objectives and innovation:**The testbed meet the service requirements of the port automation AGV horizontal transportation system in terms of end-to-end delay, service capacity, and coverage capability through the field networking and test of the port wireless automation testbed, With the big data, artificial intelligence, and new high-reliability industrial wireless interconnection technology, to improve the production efficiency of the wharf, reduce the cost of manpower maintenance.It provides an example of intelligent service management systems for automatic warehousing and large-scale industrial parks (such as steel mills, shipyards, and oil and gas parks) and industrial wireless networks with high reliability and low latency.



AGV




Robot




- AGV/Robot report real time position and information, get command at the same time


**Mobility Control**




TOS Terminals




Task Informations transfered instantly




**Dispatch Service**




Remote control by video



**Remote Control**



Voice Communication In Harsh Environment



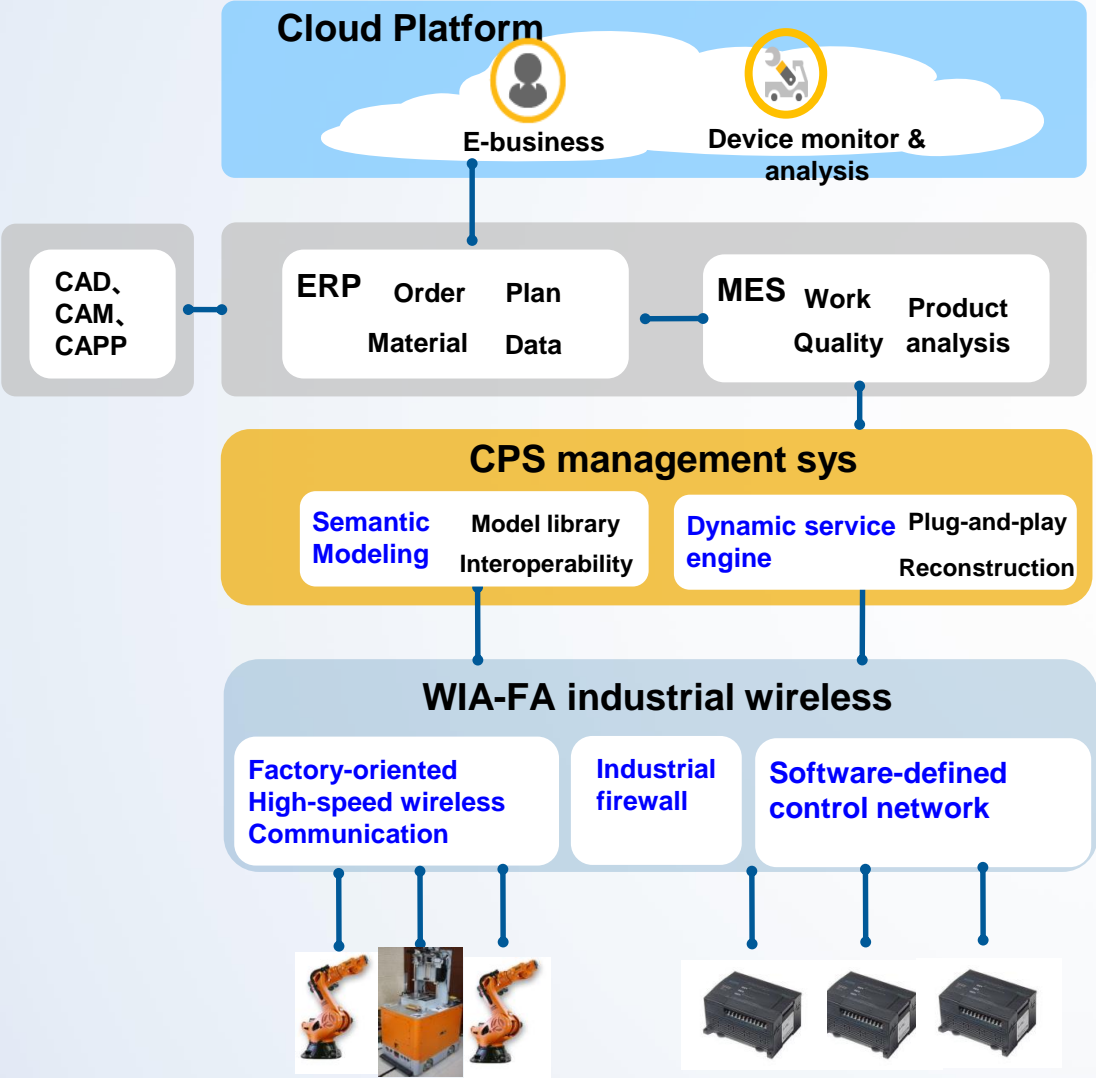
**Enterprise Voice**

Partner	Role
ZPMC	System Integration, AGV, RTG , and terminal horizontal transportation control system
Huawei	Base stations, service engines, and CPE vehicle-mounted terminals related to the eLTE-U cellular wireless private network.
BiNY Electric Co., Ltd	high pole lamps, lights, and intelligent light control software systems for ports.
Baipu Electirc	Installation service of vehicle-mounted antennas and devices

Reliable Connection, Low Latency, High Density  
Broadband + Narrowband + Voice

# Software-defined, reconfigurable, intelligent manufacturing

## 软件定义的可重构智能制造




### Architecture:

- Cloud-based enterprise and shop floor management software and service system
- Design and development platform
- CPs intelligent management and control system
- WIA based smart factory full-mesh network
- Reconfigurable modular processing and assembly system

### Testbed results:

- 100 ms adaptive reassembling of the network; model and rule combination delay in hundreds of milliseconds
- The device availability time is improved by 30%.
- The structure and control procedures of the production system are adjusted according to the changes of products and production requirements. The period is shortened by 60%.

Partner	Role
Shenyang Automation Institute	Industrial SDN, China Industrial Firewall, and CPS Intelligent Control Software
CIACT	Verify the architecture design, case analysis, and the demonstration platform.
SAP china	HANA platform, Hybris e-commerce platform、ERP、MES、PCO



## **我们的愿景和使命**

把数字世界带入每个人、每个家庭、每个组织，  
构建万物互联的智能世界。

Bring digital to every person, home, and organization  
for a fully connected, intelligent world.



# 融合·协作·共赢

## 共同把握工业互联网的历史机遇



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