



Test Research, Inc.
www.tri.com.tw

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- **Establishment: April, 1989**
- **Founder & CEO: Jason Chen**
- **Capital: TWD 2362 million
(USD 78 million)**



Main Product Line



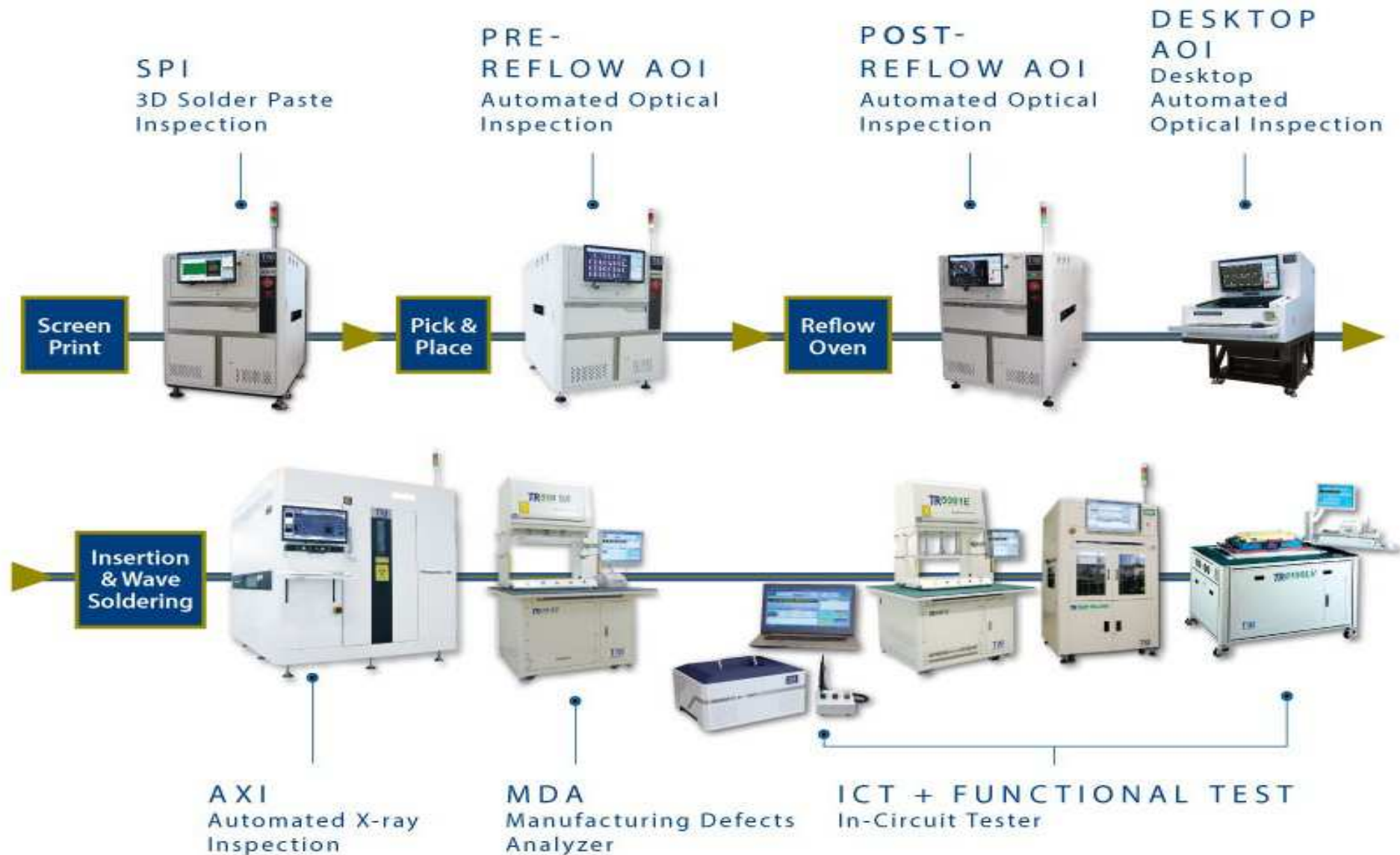
☆ **IT(Image Tester)**

- ☆ **SPI(Solder Paste Inspection)**
- ☆ **Pre-reflow AOI / Post-reflow AOI**
- ☆ **AXI(Automatic X-ray Inspection)**

☆ **BT(In-Circuit Board Tester)**

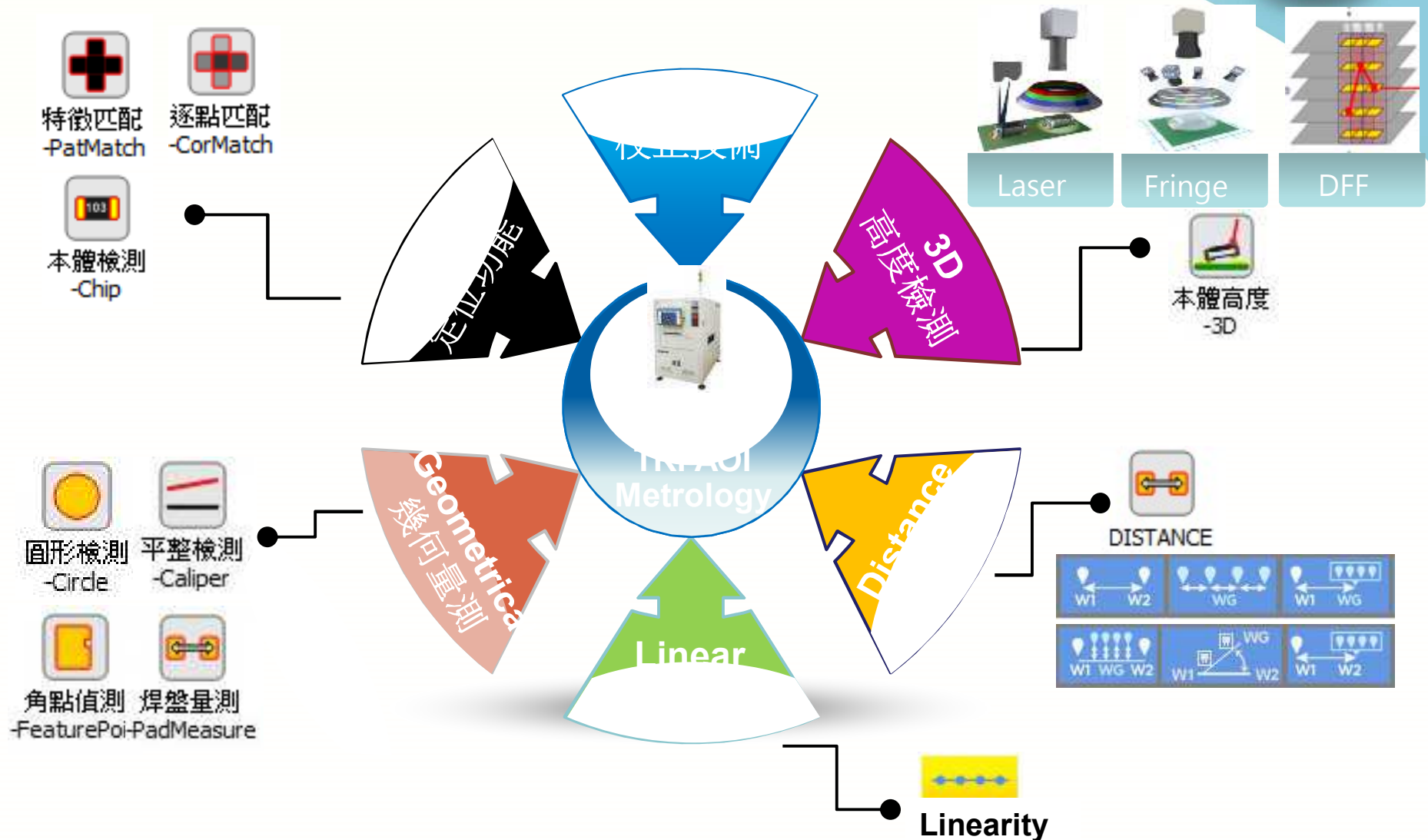
- ☆ **MDA**
- ☆ **ICT**

One Stop Solution Provider in PCBA Production



Integration of Vision Technologies for the Demands :

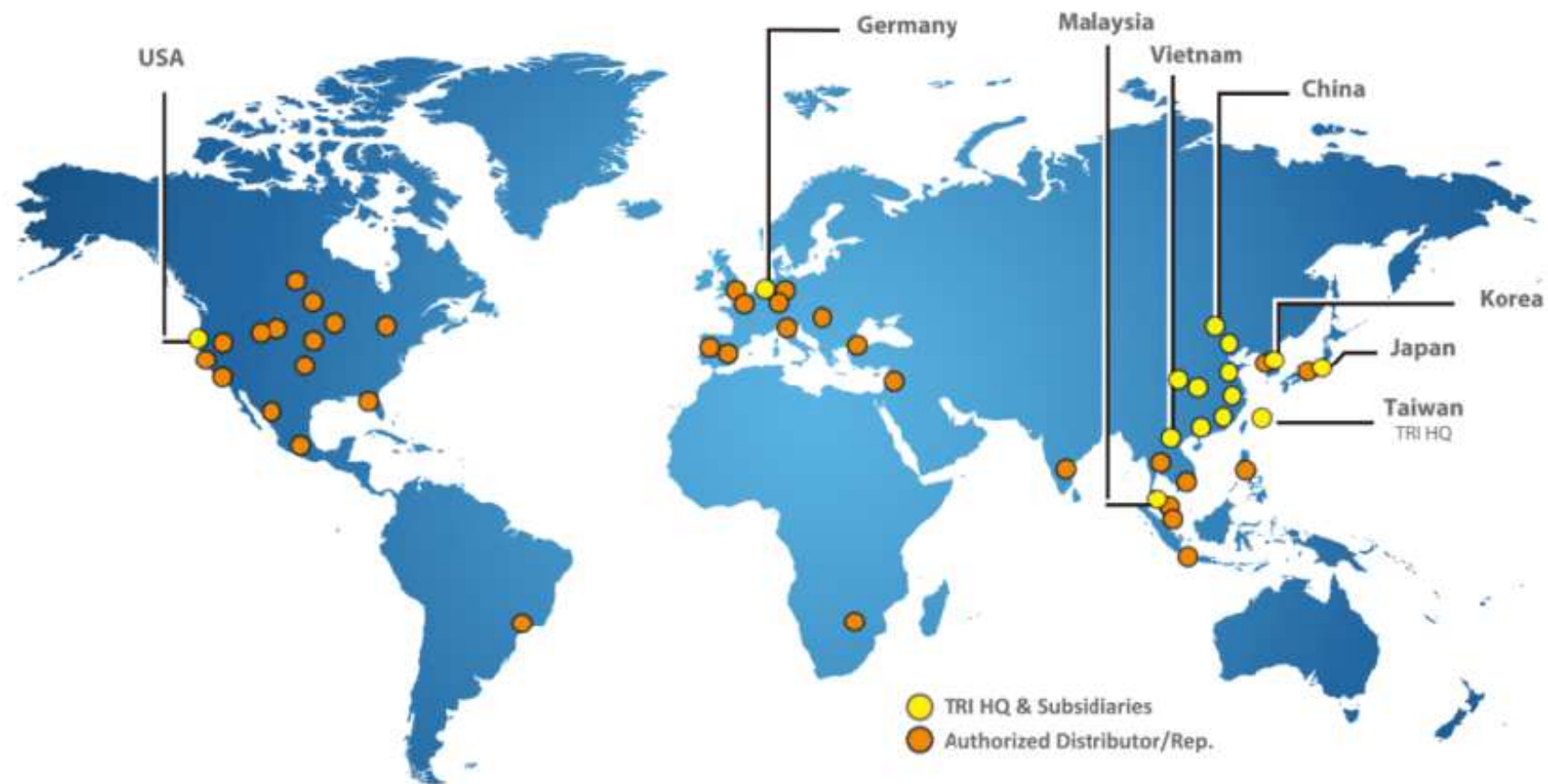
- Dimensional Metrology for Electronic Parts
- Semiconductor Manufacturing/Packaging Process



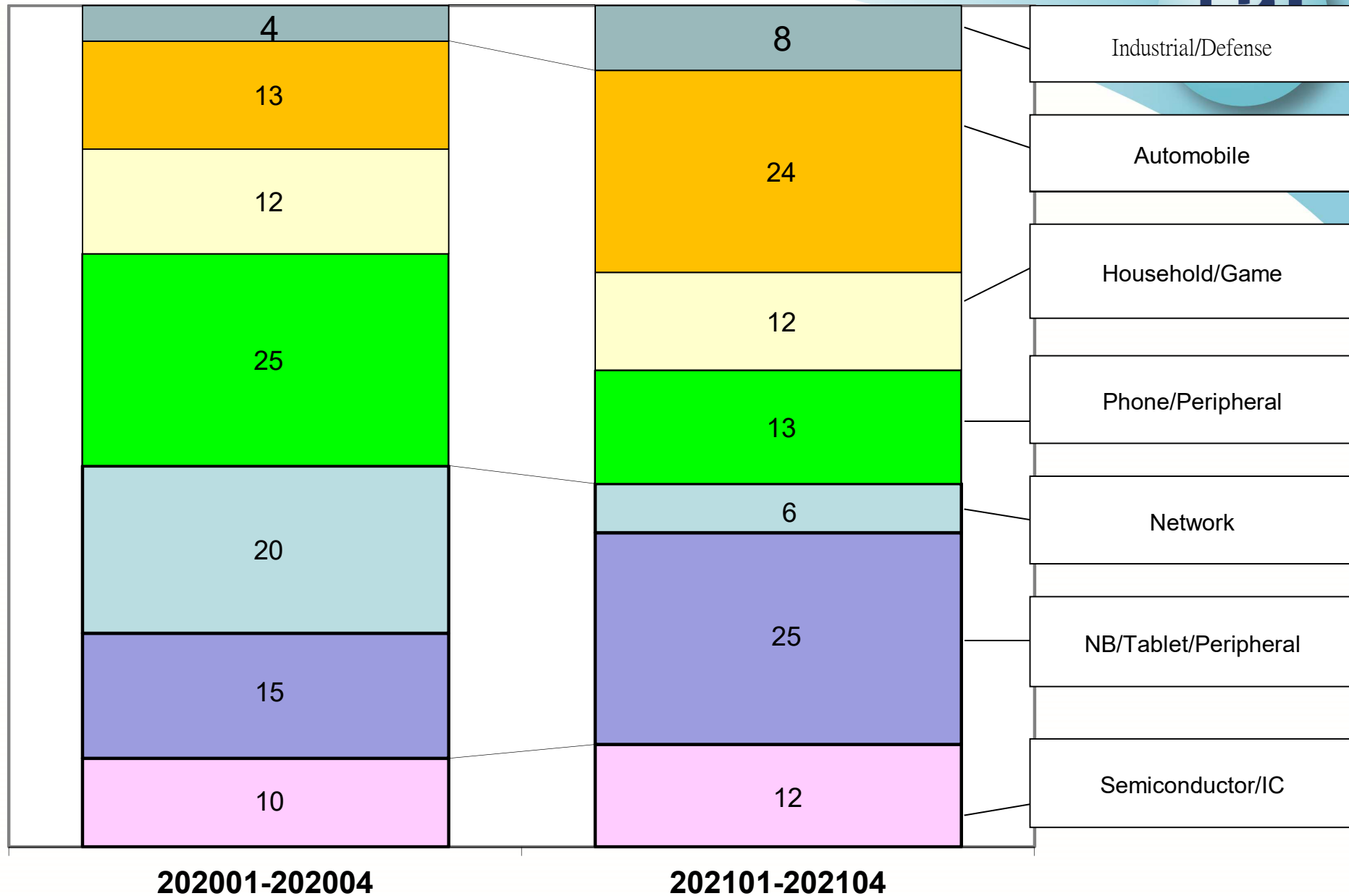
Global Service Network



More than 3000 customers have been serviced through worldwide partners
More than 50 distributors and Rep. worldwide.



Electronic Industry/Revenue Movement

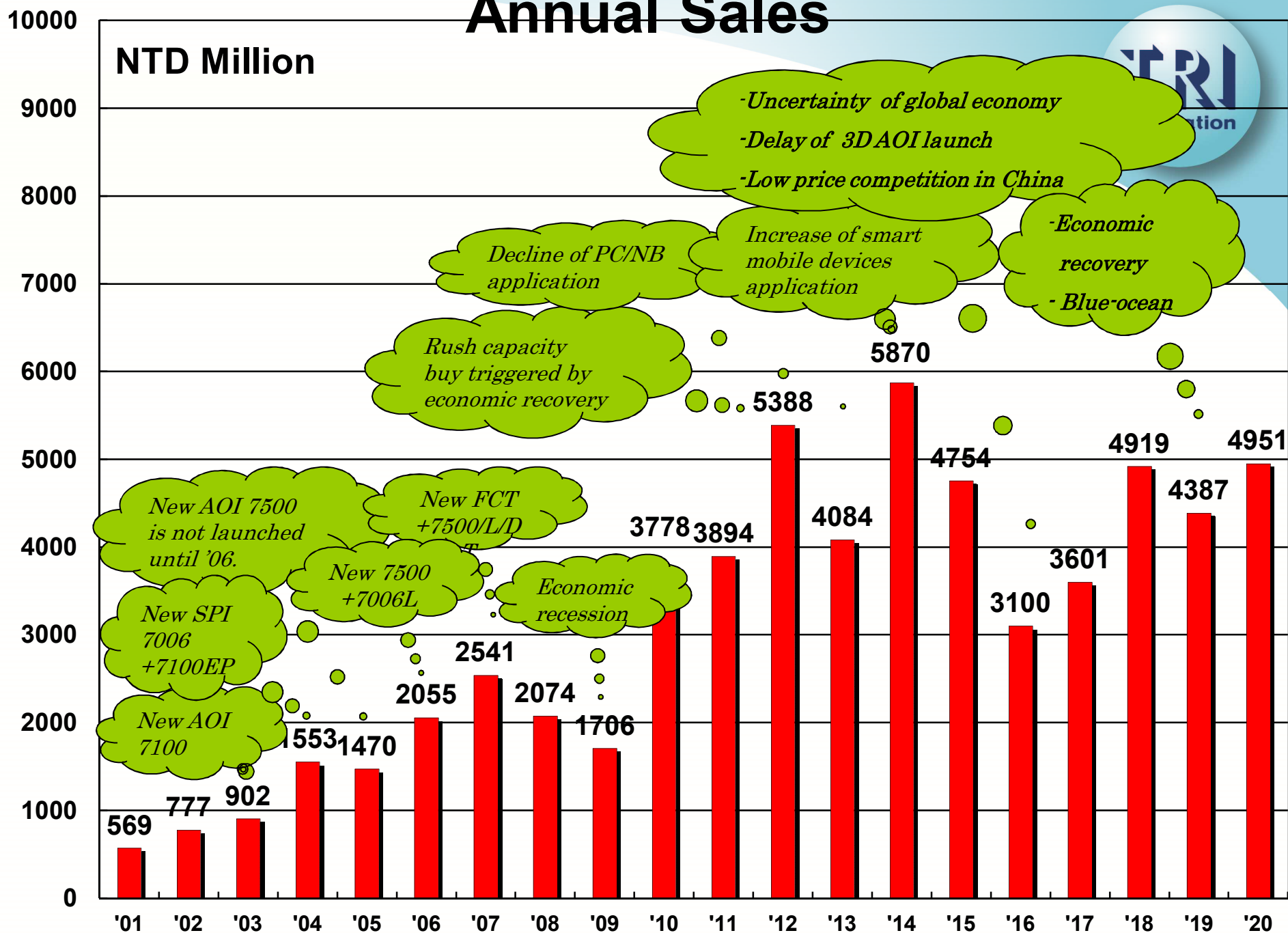


Major Competitors

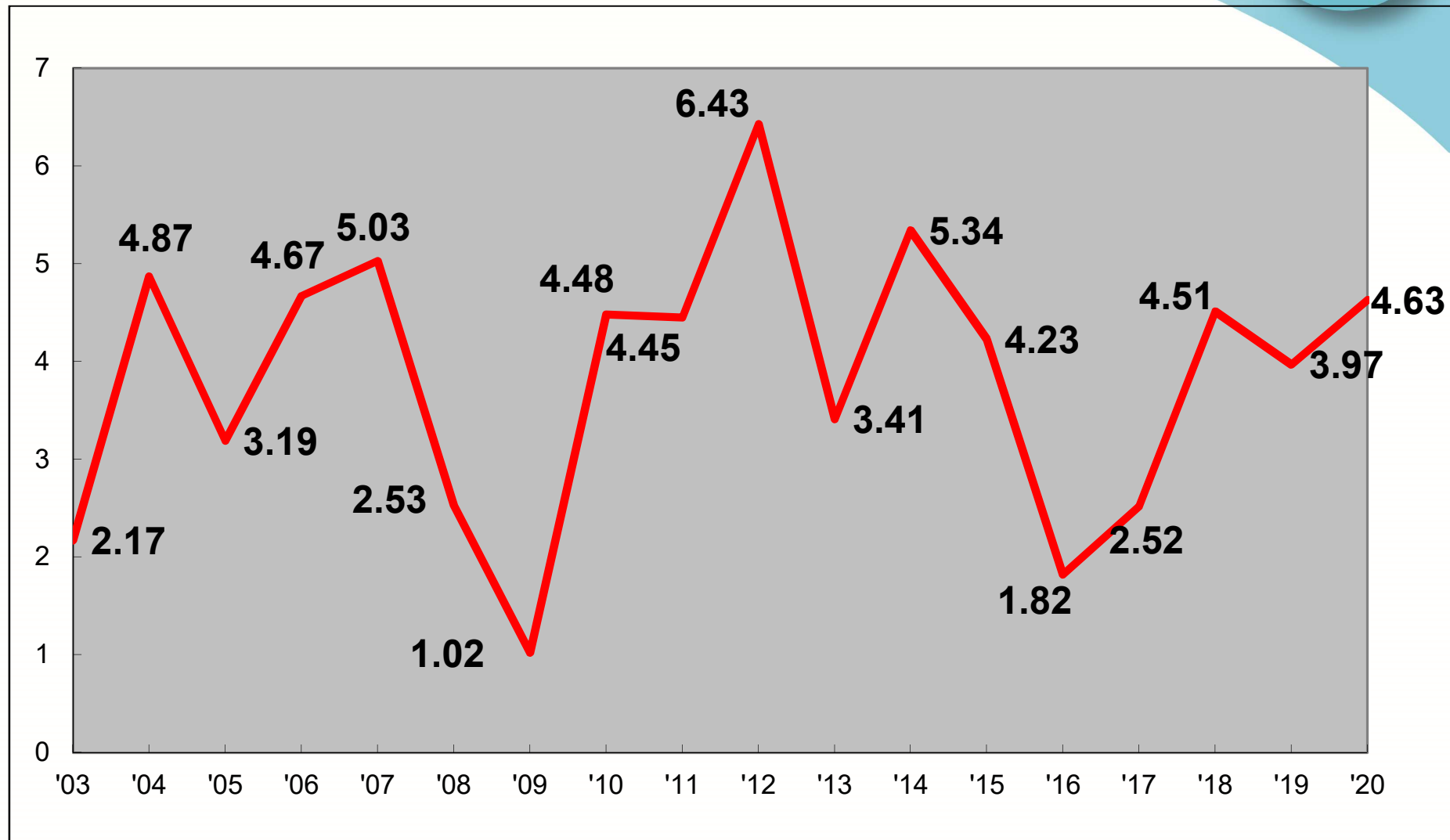


- Korea: Koh Young
- Japan: Omron
- China: Jutze/Sinic-Tek/Holly
- Malaysia: Vitrox
- USA: Keysight/Teradyne
- Europe: Viscom/SPEA

Annual Sales



EPS



Red & Blue-ocean Market Movement in Revenue

NTD Million

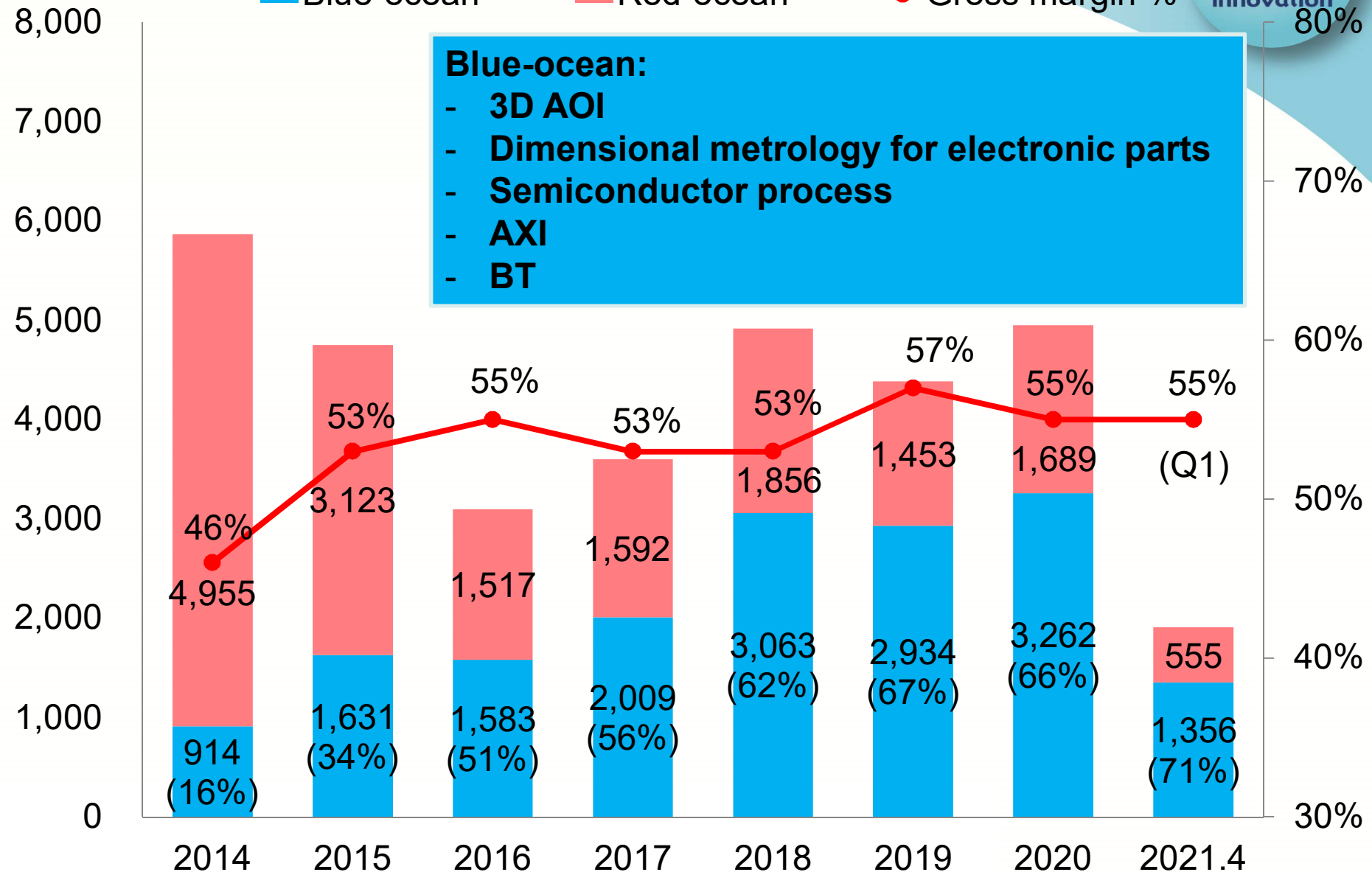
Blue-ocean

Red-ocean

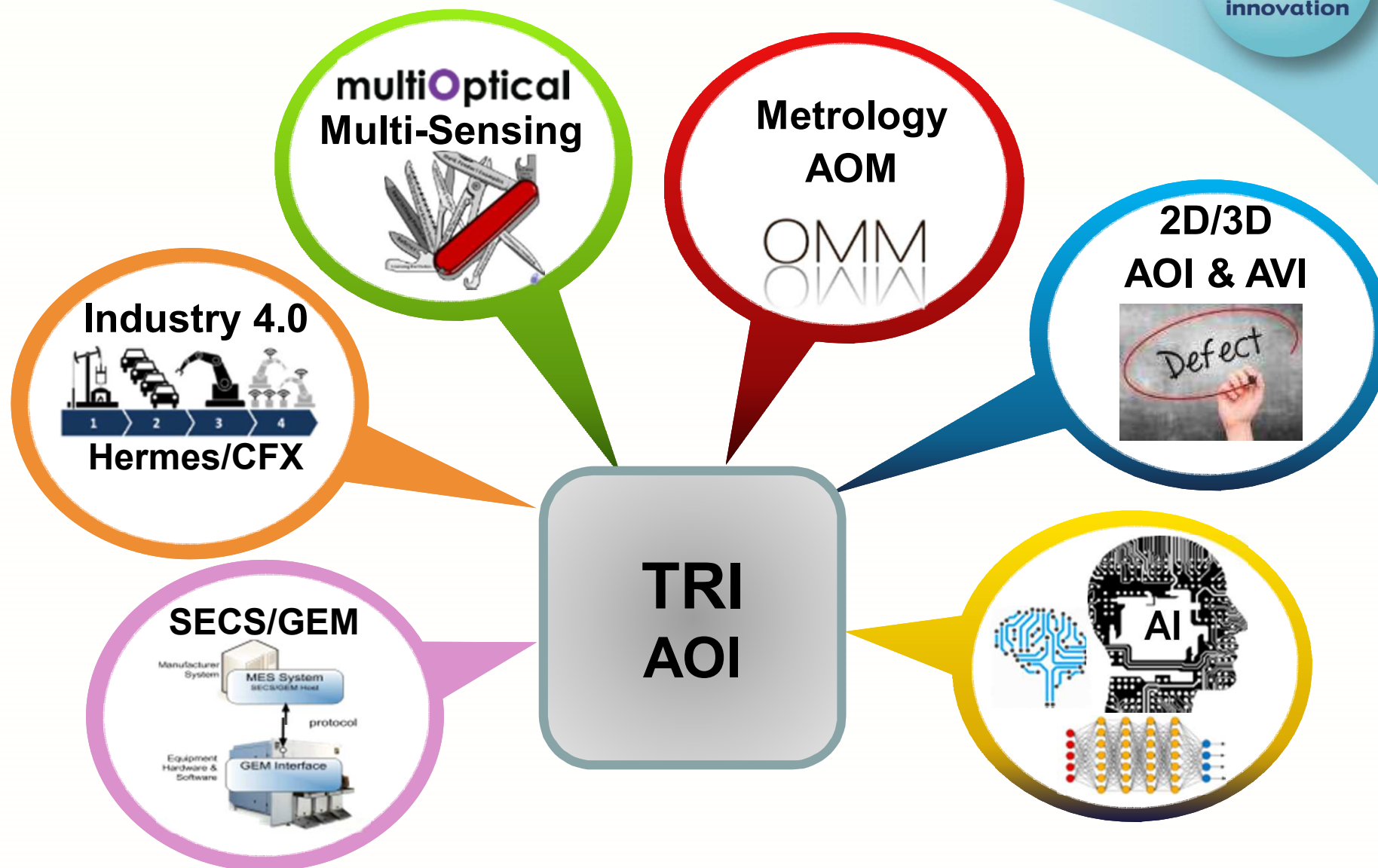
Gross margin %

Blue-ocean:

- 3D AOI
- Dimensional metrology for electronic parts
- Semiconductor process
- AXI
- BT



TRI Integrated Total Solution



Upgrade DFF 3D Technology

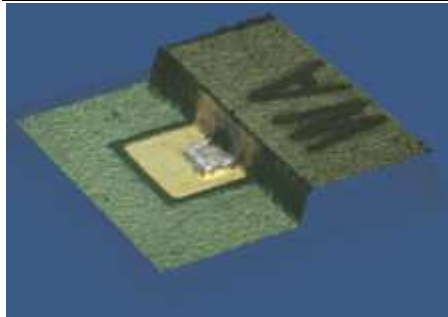


0.5 μ m

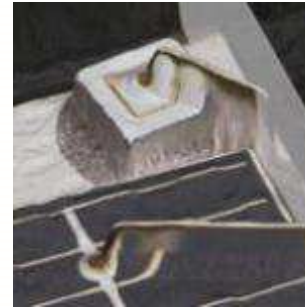
1 μ m

Ultra High Resolution

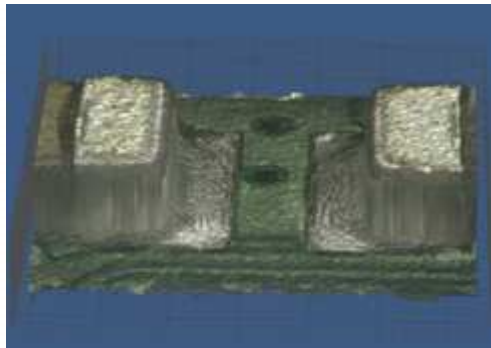
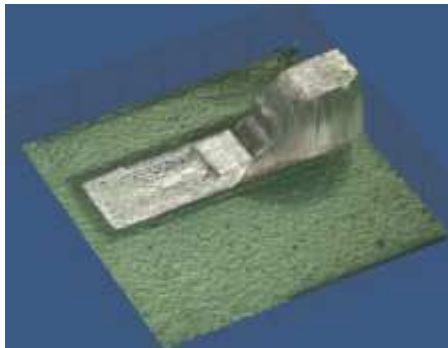
- Optimal **focus** position
- **Clearer** 2D Images
- **Sharper** images
- **Shadow-free** 3D Image



SMT
–Solder joint



Semiconductor
-Wire bond



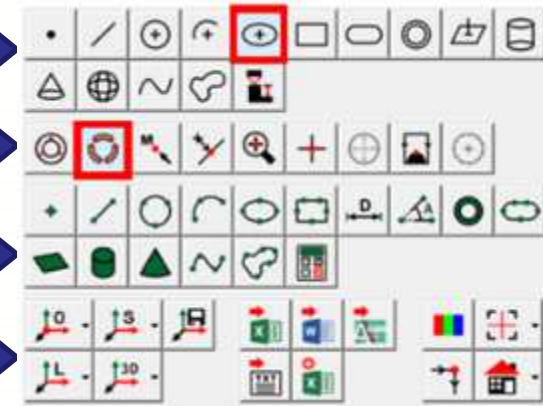
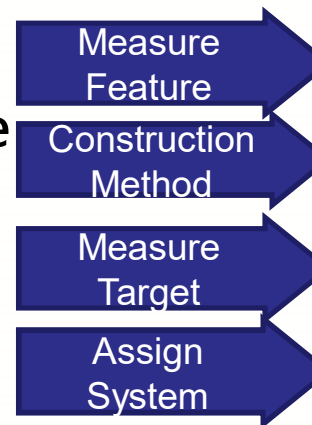
TRI New TRI Measurement Functions (AOM)



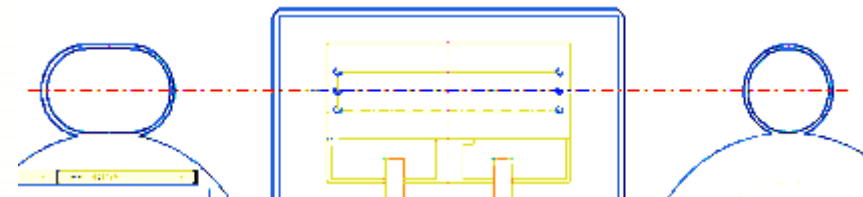
- ❖ UI: New designed and friendly user interface



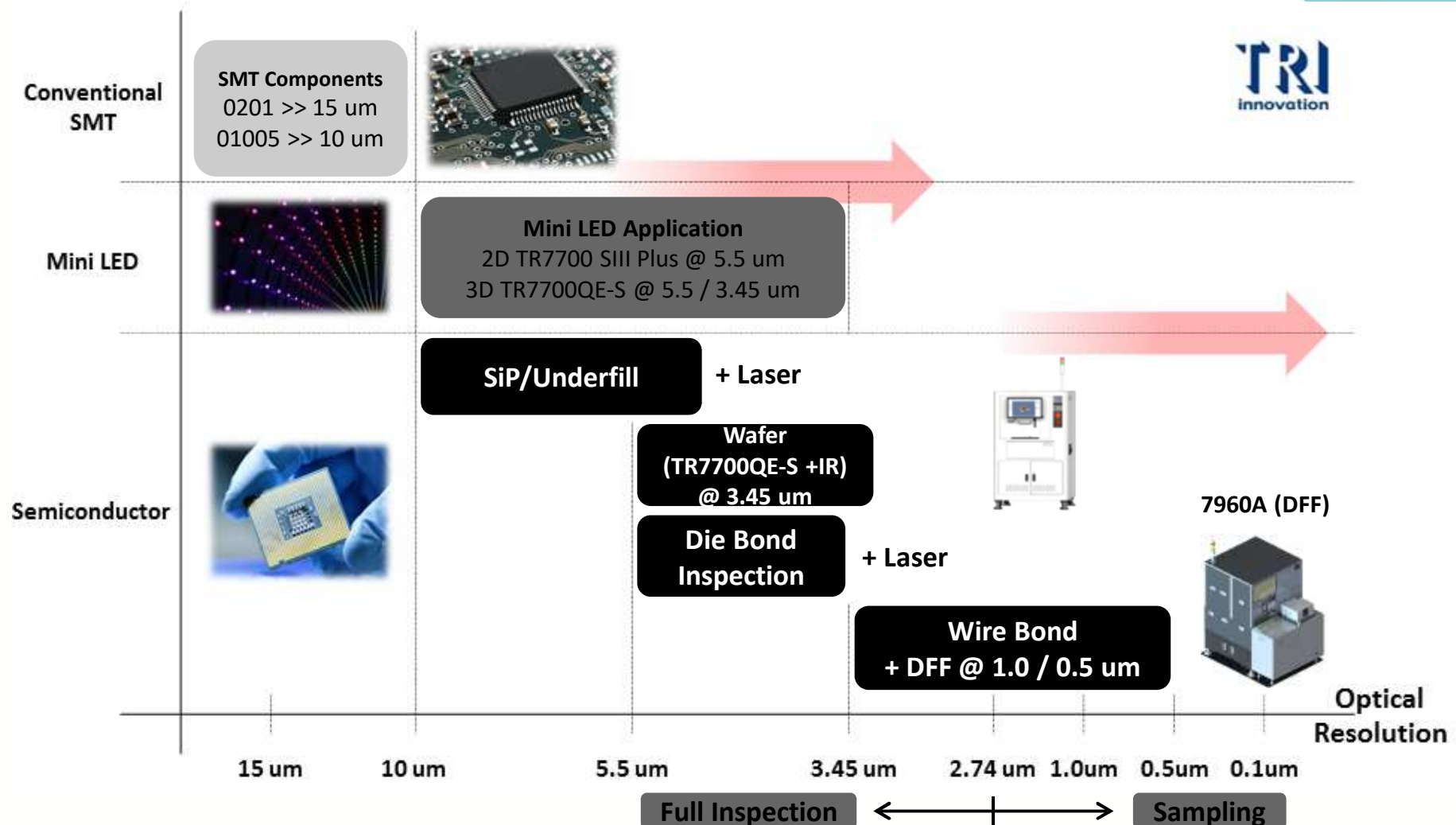
- ❖ Features: More complete measurement functions will be available



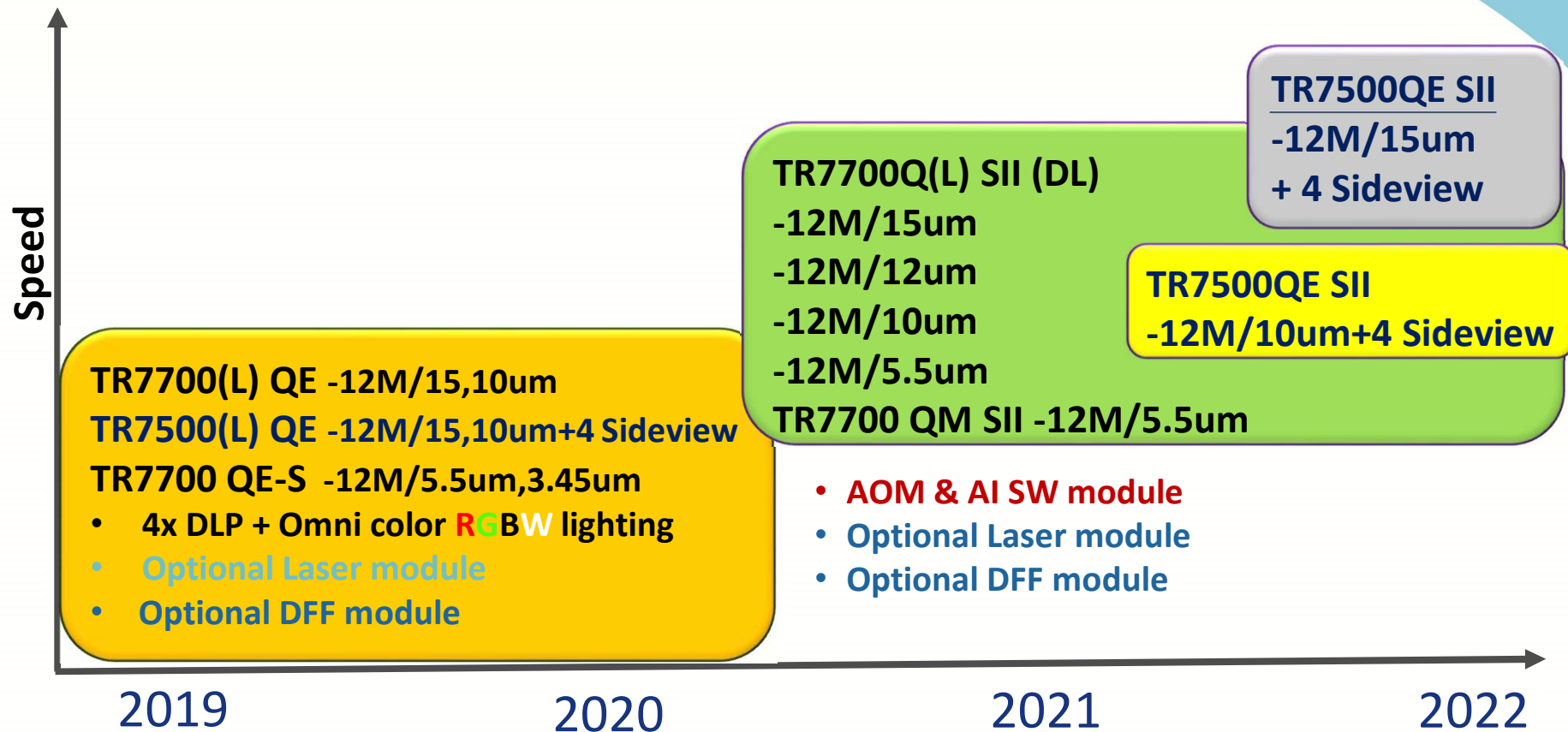
- ❖ High Flexibility: Multi-Layer measurements



TRI 3D AOI Product Roadmap



TRI 3D AOI Product Roadmap



NEW

TR7700Q SII 3D AOI Highlight

TRI
innovation



**Industry-Leading Inspection
Speed up to 57 cm²/sec**



**Ease of Programming with
TRI's Smart Library**



**Multiple 3D Technologies:
Zero-escapes Inspection**



TR7700QE-S 3D AOI Highlight



NEW



**Supports 3.45 / 5.5um
Ultra High Resolution**

**Inspection Solutions for
Semiconductor Packaging Level:**

SMD

Bump

Die / Wire Bonding

Underfill



TRI's SPI Innovations



Fast Inspection Speed



Large FOV

CoaXpress Technology

Dynamic Imaging

Stop & Go Imaging

Precision Inspection

5.5 μm

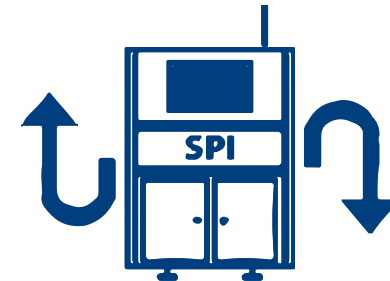
High Resolution

Shadow Free

Smart Warpage Technology

High Inspection Range

Smart Factory



Closed Loop

IPC-CFX

Smart Library

YMS 4.0

A Full Line of 3D In-Line AXI



TR7600 SIII

A new generation of TRI's hallmark inline PCBA inspection solutions. Designed for 100% inspection coverage at production line speed, industry's fastest high resolution imaging speed with greatly improved image quality in the industry's most advanced automatic X-ray inspection.

NEW



TR7600TL SIII

High performance and high speed 3D AXI for the largest server, networking and power PCBs. TRI's Planar CT technology brings true 3D solder joint review for maximum inspection accuracy.

NEW

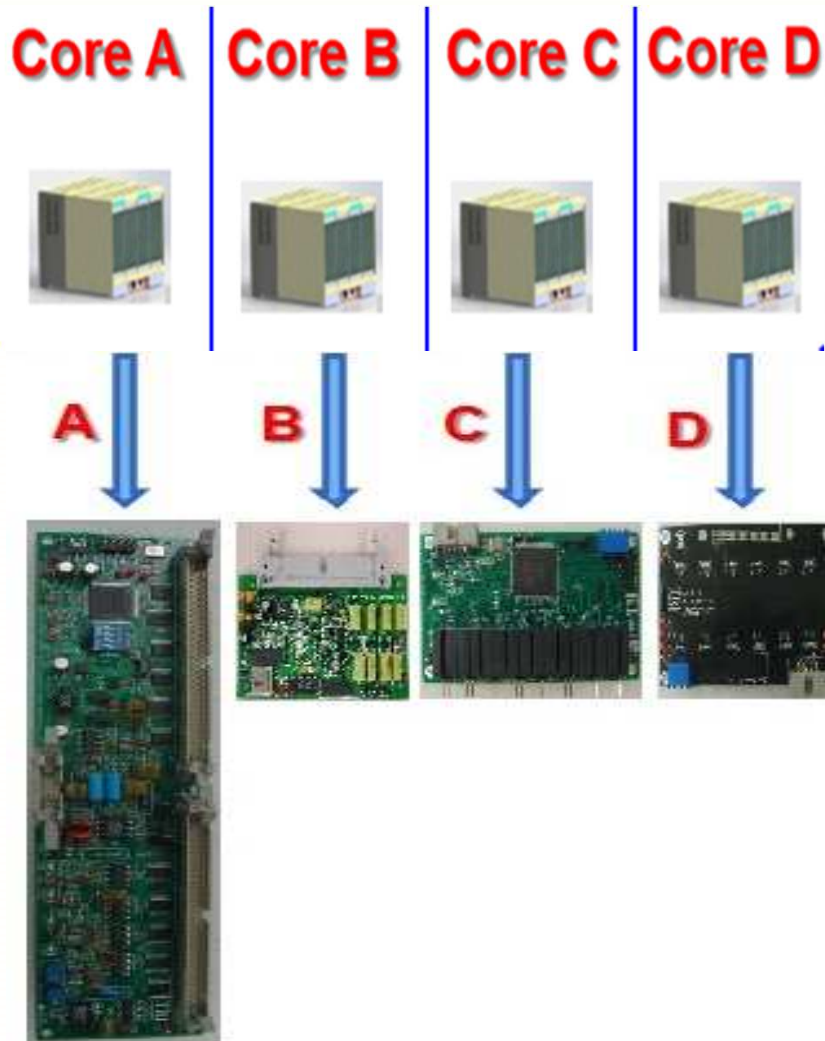


TR7600F3D SII

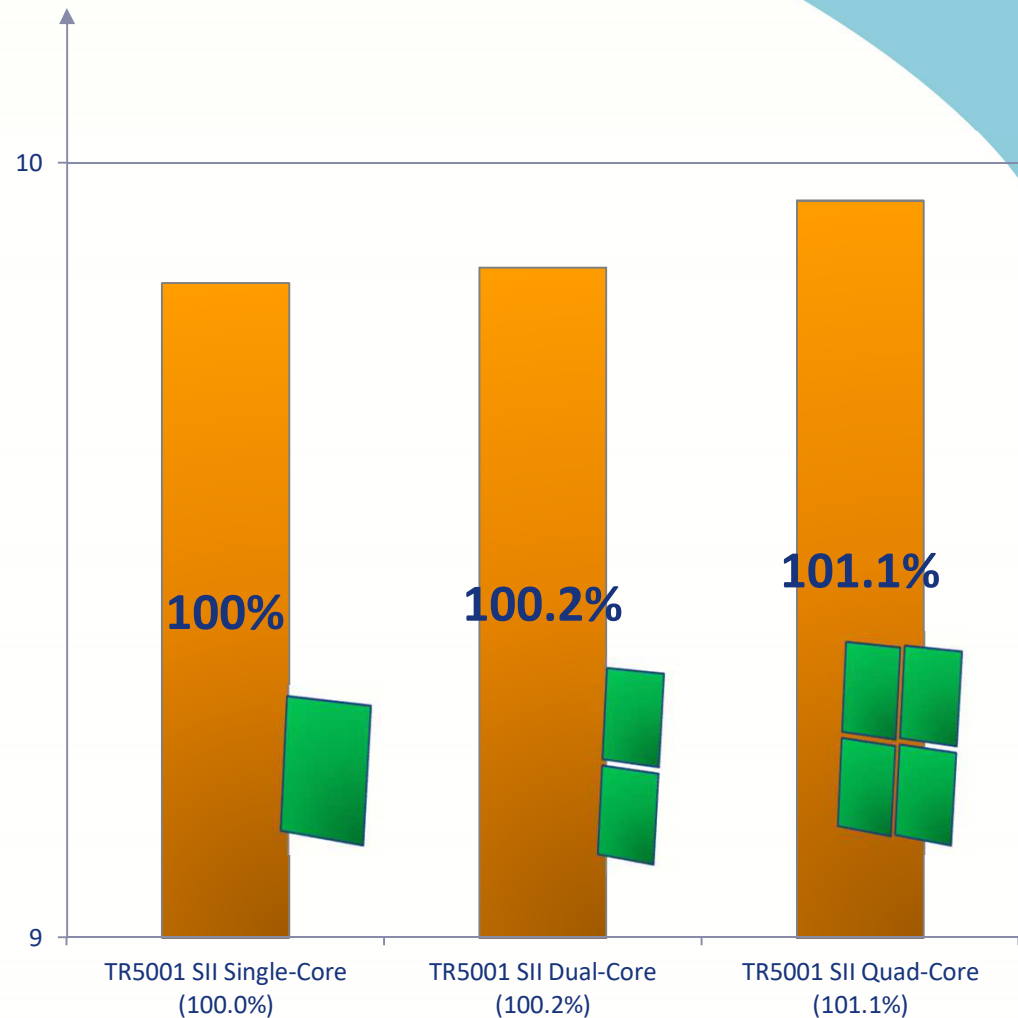
Faster inspection speed, ultra high resolution 3D CT X-ray inspection, highest image quality maximize production yields on any production line.

BT Parallel Test for Different DUTs (Multi-Program)

TR5001 SII Quad-code System



Testing Time Comparision



High Density Pin Count ICT TR8100H SII / TR8100HL SII



NEW

Original Model	Test Points.	New SII Model
TR8100LV	3584 pins	7056 pins
TR8100LLV	5632 pins	11088 pins



The Benefits of AI



Combines traditional
Image process data
and AI technology

Integrates different TRI
models to enhance the
production process

Reduces the labor cost
of the production line

TRI's AI Application

Can be divided in Two Phases



Inspection Phase

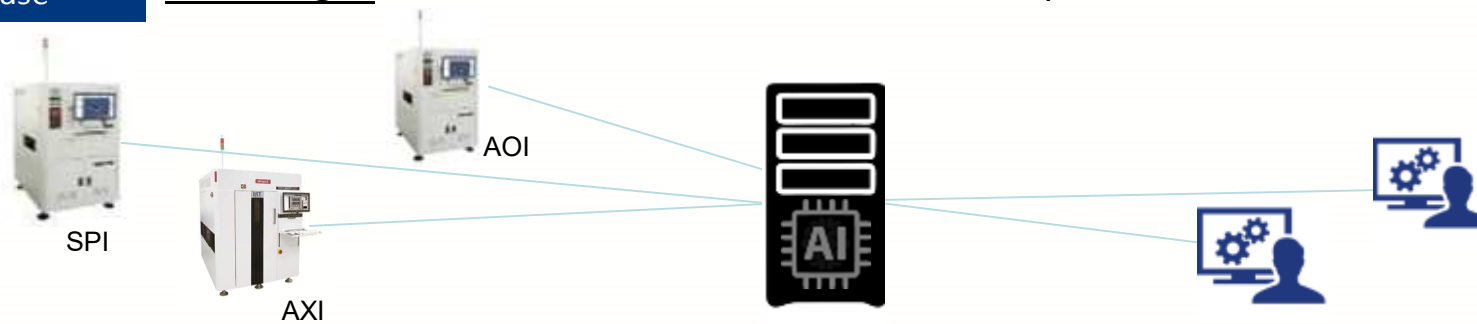
Defect Detection / Character Recognition / Visual Inspection / Measurement assistance

Advantage: Improve Inspection Quality and Reduce False Calls

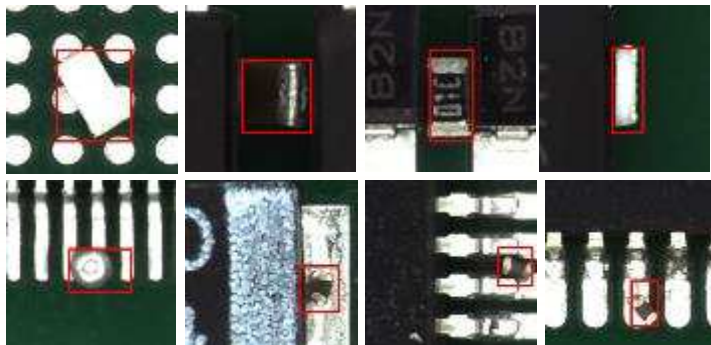
RS Phase

Repair Station Defect Classification and Re-Inspection

Advantage: Reduce the workload of manual Re-Inspection



TRI Inspection Solutions



TRI AI Station

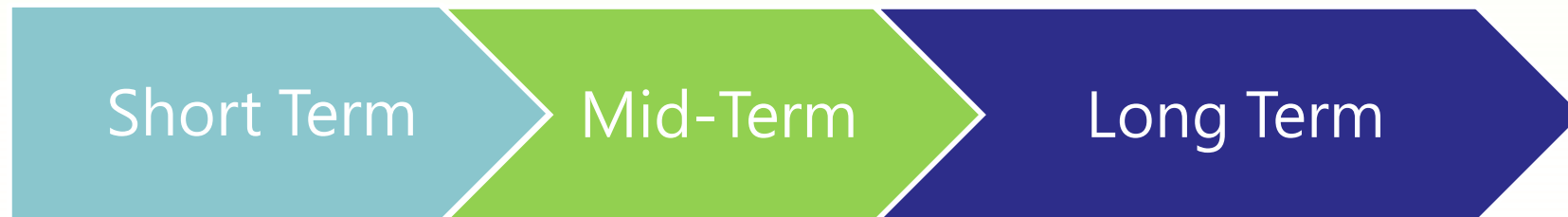
Std-Img	Insp-Img	Gray-Img	Edge	Line	Original Type	Result Type
					Missing Parts	Tombstone
					Billboard	Missing Parts
					Billboard	Missing Parts
					Billboard	Billboard

Repair Station(s)

TRI's AI Development Roadmap



AI Road Map:



❖ Fast development

- ❖ Commercial Library
- ❖ Cooperation

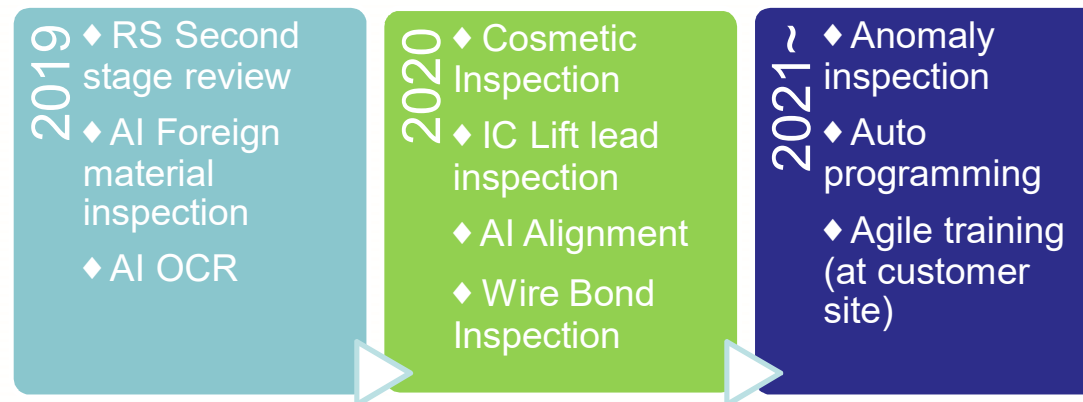
❖ Technical cultivation

- ❖ Open-source Solution
- ❖ Inference/Training Server
- ❖ Faster and more accurate

❖ Unmanned AOI

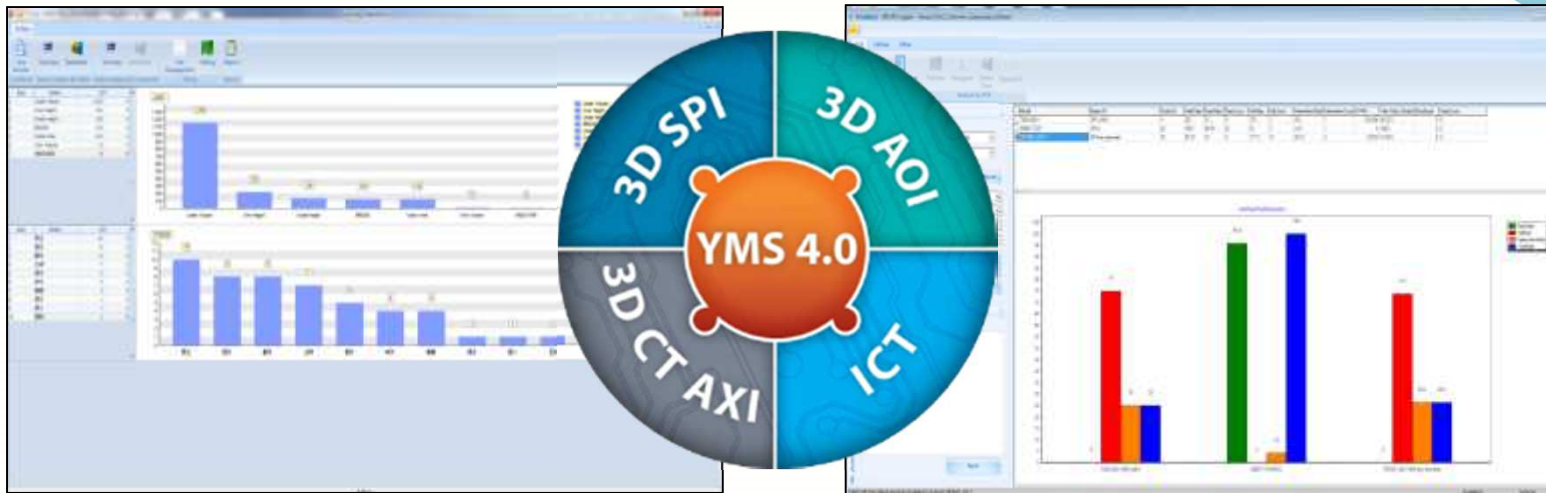
- ❖ Zero escape and false call
- ❖ TRI Standard Spec

AI applications:



YMS 4.0

Yield Management System



- Improvement Monitoring
- Support Quality Improvement
- Output Reports to MES/SFCS
- PDCA improvement cycle
- Real-Time Inspection Status
- SPC and Productivity Monitoring
- Top 5 or 10 defects & Images
- Issue Drill Down line, station or process

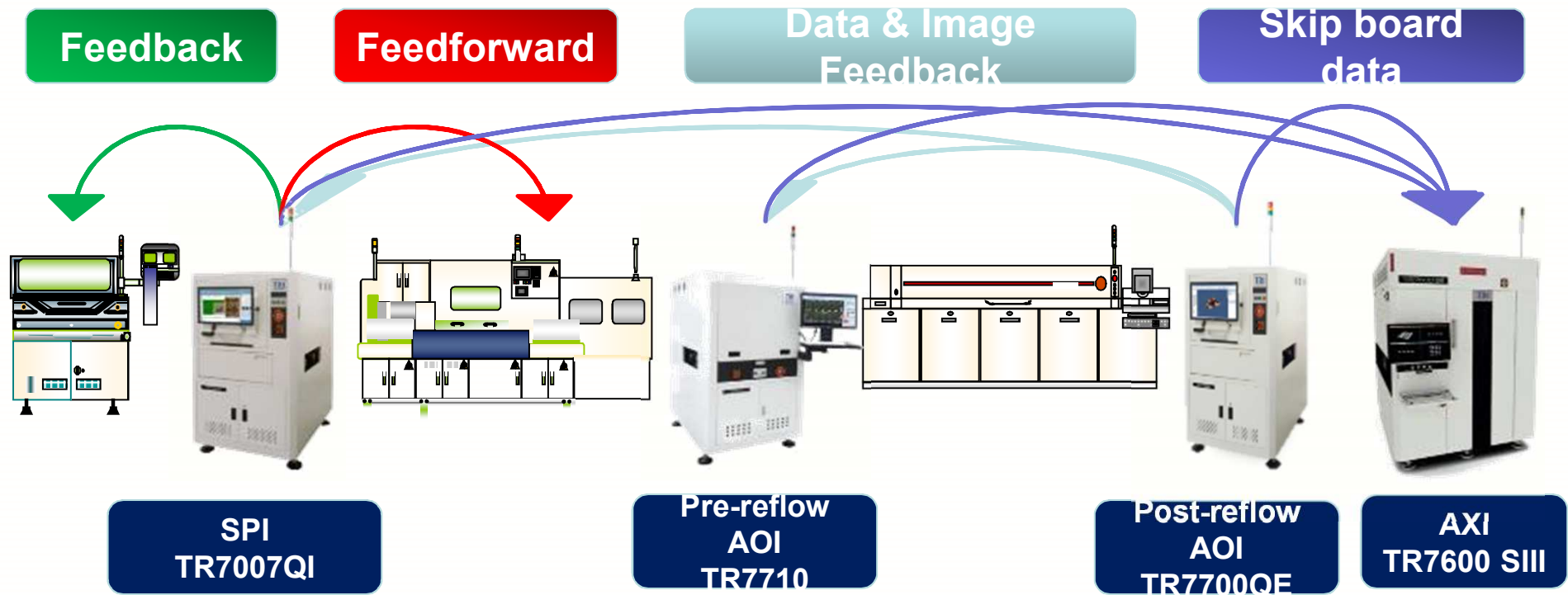
Industry 4.0 Solution



TRI Support Closed Loop Solutions



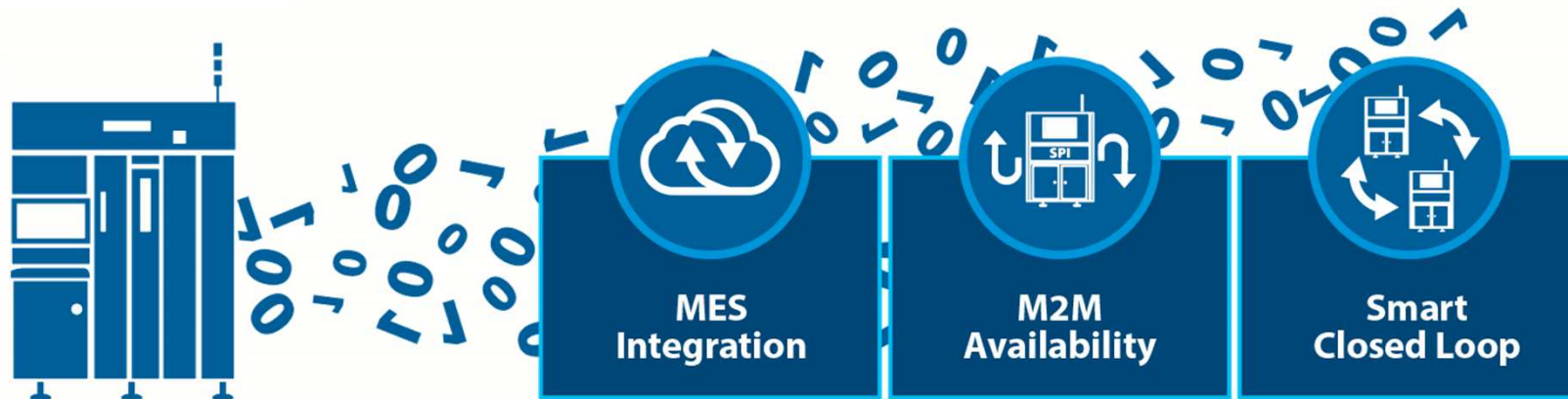
TRI SPI, AOI, AXI Inspection Integration CFX(data)/HERMES(M2M)



Smart Factory Solutions



Big Data Ready



Smart Monitoring



In-house RD Team



- Optical Dept.
- Mechanical Dept.

- system S/W
YMS, R/S

- PLC control
- Lighting control

IT

BT

180+ RD

Outside Support

Department of Computer science, National Taiwan Univ.

- Image processing / Understanding

Department of Power Mechanical, Tsing Hua Univ., Taiwan

- X-ray 3D Reconstruction/Digital Tomosynthesis Algorithm/ CT algorithm

Center of Measurement Standards, Industrial Technology Research
Institute Taiwan

-- Length/ Camera / Color calibration

Recent Awards



- 2016 Global Technology Award
- 2017 Circuits Assembly NPI Award
- 2017 EM Asia Innovation Award
- 2018 Circuits Assembly NPI Award
- 2018 EM Asia Best Supplier Award
- 2019 Global Technology Award
- 2019 EM Asia Outstanding Product Award
- 2020 Global Technology Award
- 2021 EM Asia Innovation Award

* TRI's Company Milestones:

<https://www.tri.com.tw/tw/about/about-21-1-2.html>

Safe Harbor Notice



TRI's statements of its current expectations are forward looking statements subject to significant risks and uncertainties and actual results may differ materially from those contained in the forward-looking statements. Except as required by law, we undertake no obligation to update any forward-looking statement, whether as a result of new information, future events, or otherwise.

Better Testing Better Quality



THANK YOU!

***For more information about
Test Research, Inc.***



Please visit:

www.tri.com.tw

