



***Test Research, Inc.***

***www.tri.com.tw***

# Test Research, Inc.



- **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)

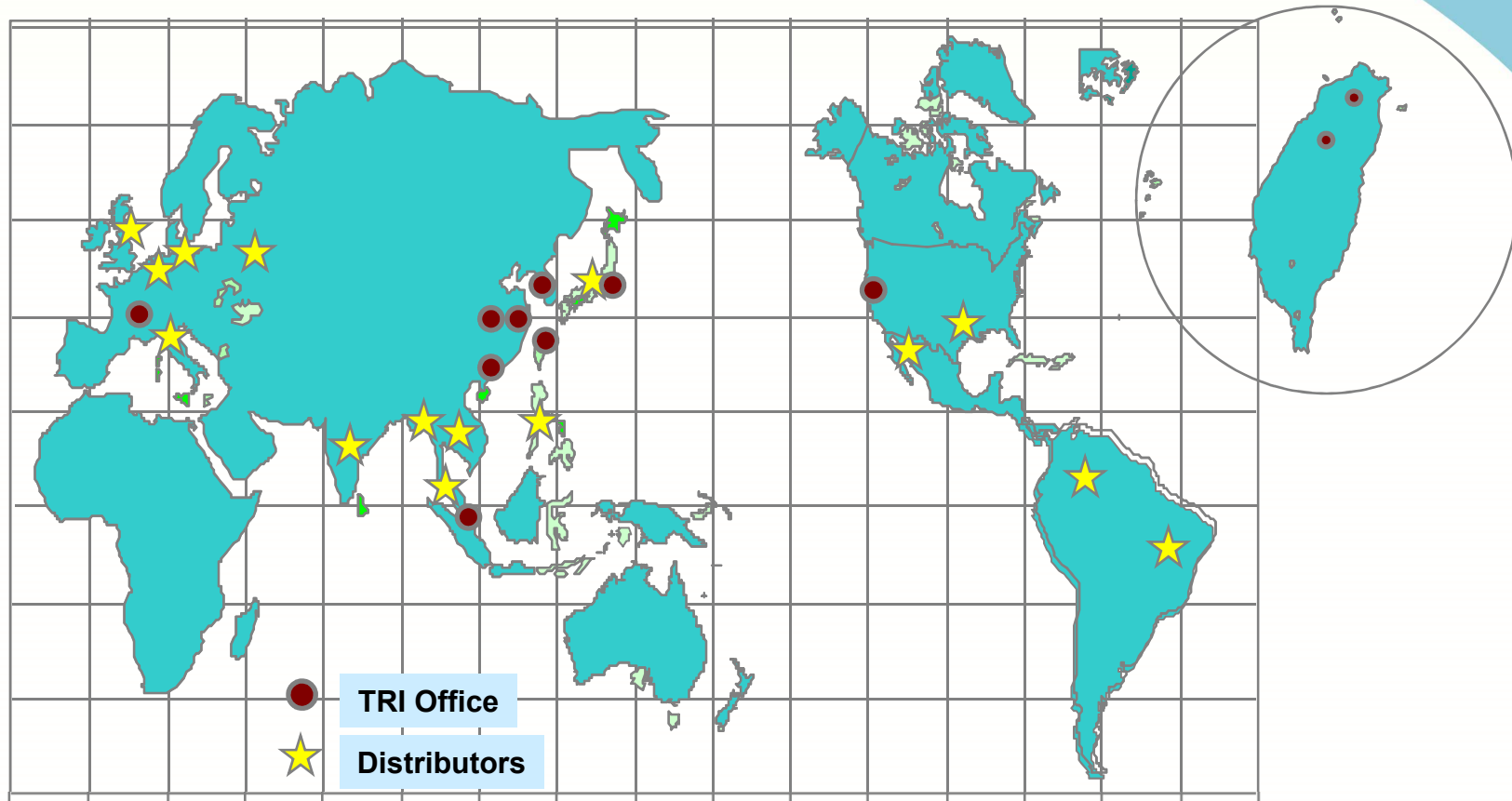
## ★ In-Circuit Board Tester

- ★ MDA
- ★ ICT

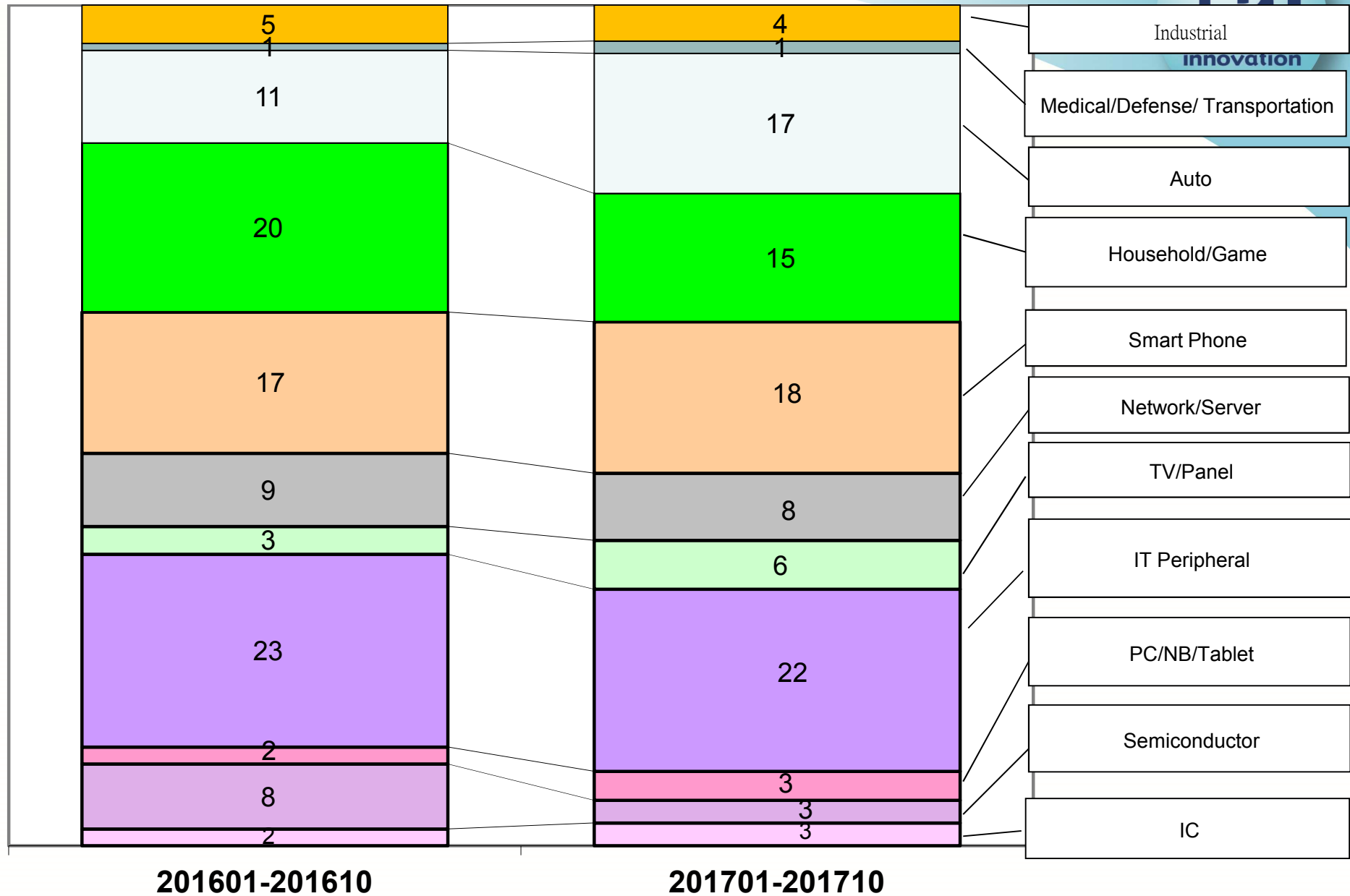
# One Stop Solution Provider in PCBA Production



# Global Service Network



# Electronic Industry/Revenue Movement



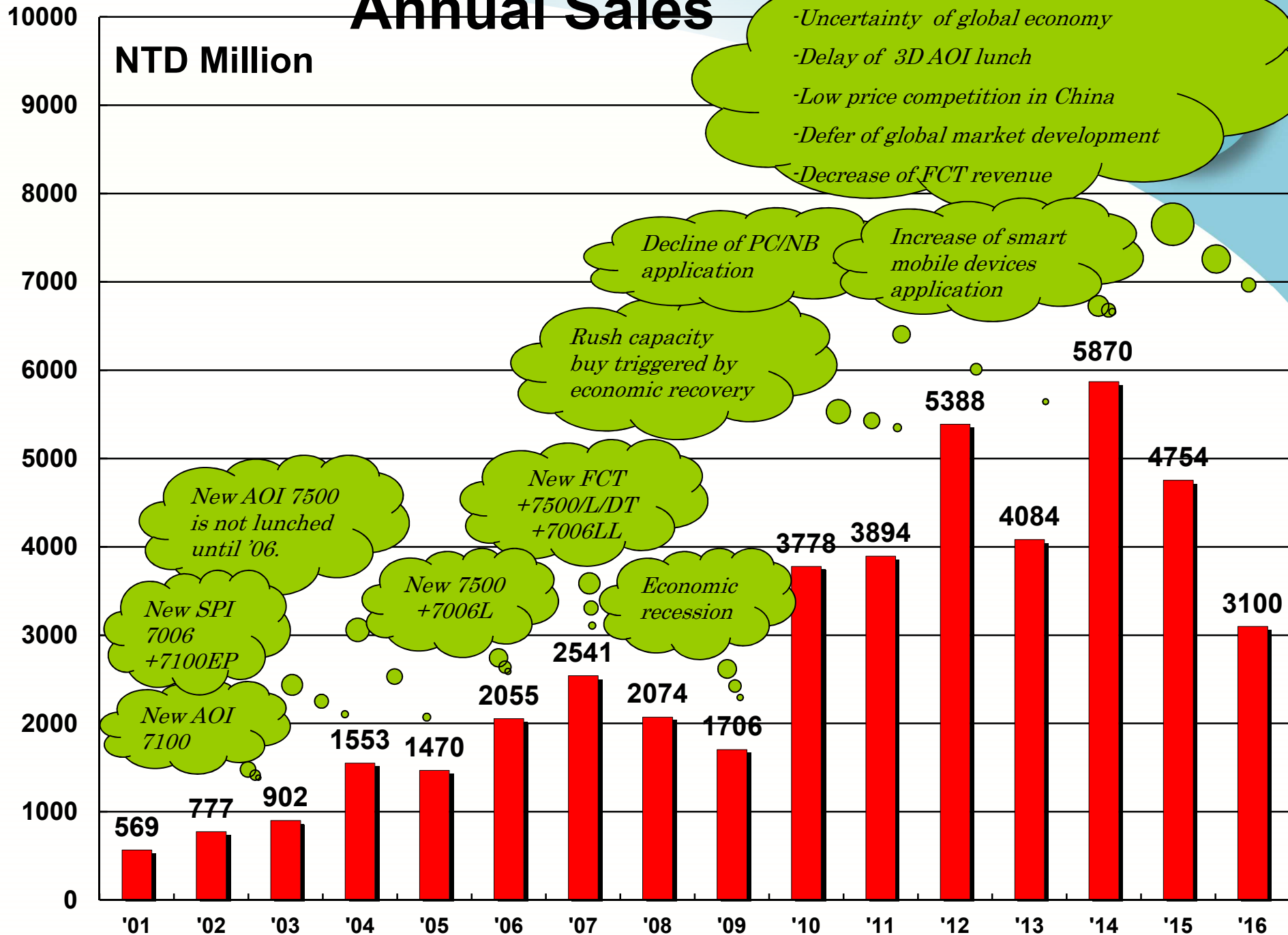
# Major Competitors



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

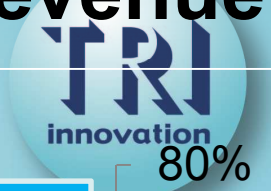
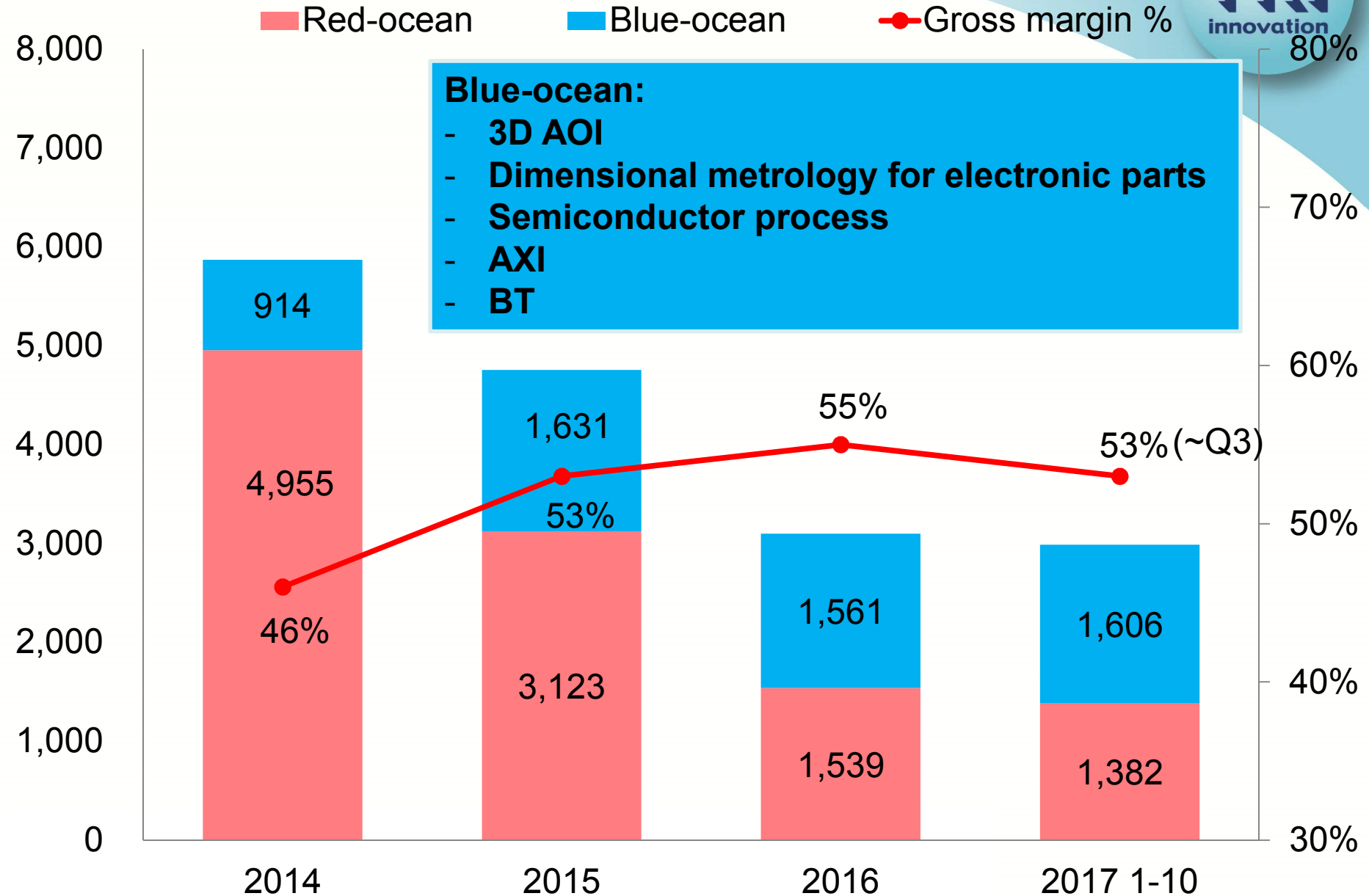
# Annual Sales

NTD Million



# Red & Blue-ocean Market Movement in Revenue

NTD Million



# 3D AOI with 2D+Side view

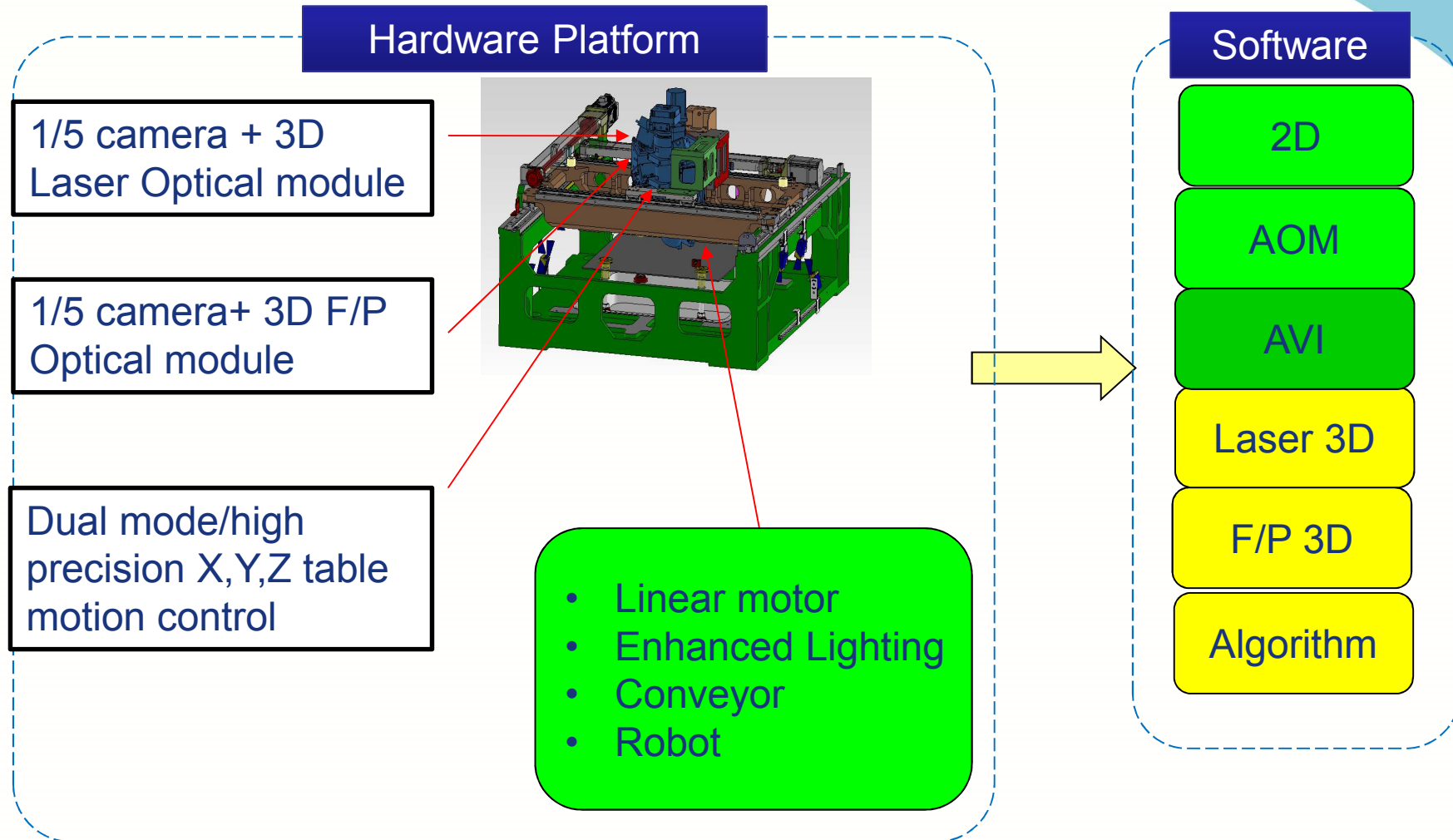


	2D AOI	3D AOI	2D+3D AOI	Side View
Missing/Extra comp.	Good	Good	Good	
Shift	Good	Partial	Good	
Polarity mark	Good	N/A	Good	
OCV/OCR/Bar code	Good	N/A	Good	
Bridging	Good	Partial	Good	
Lifted comp.	Partial	Good	Good	Good
Height measurement	N/A	Good	Good	
Fine short close to comp.	Partial	Partial	Partial	Good



**Zero escape**

# Integration of Vision Technologies for the Demands of Dimensional Metrology for Electronic Parts & Semiconductor Process



# 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.



**TR7600LL 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



**TR7600F3D**

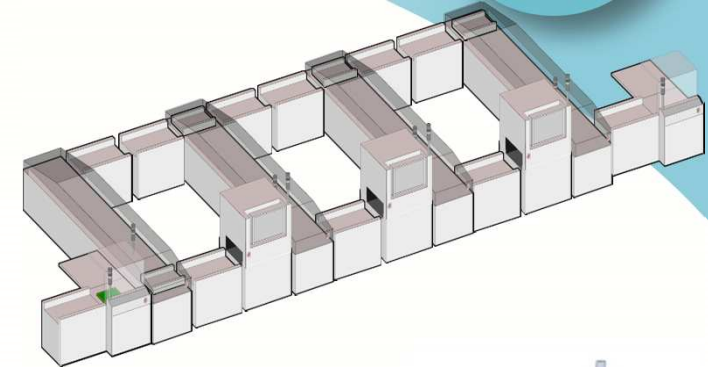
highest image quality maximize production yields on any production line

# Board Test Opportunity



- **Automation**

For Industry 4.0 , Unmanned Factory



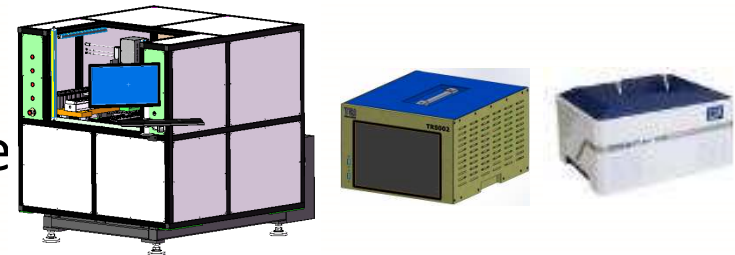
- **Functional Test**

For Automobile Electronics, Air Condition, TV, Smart Phone, Pad



- **FlexPCB Open/Leak Test:**

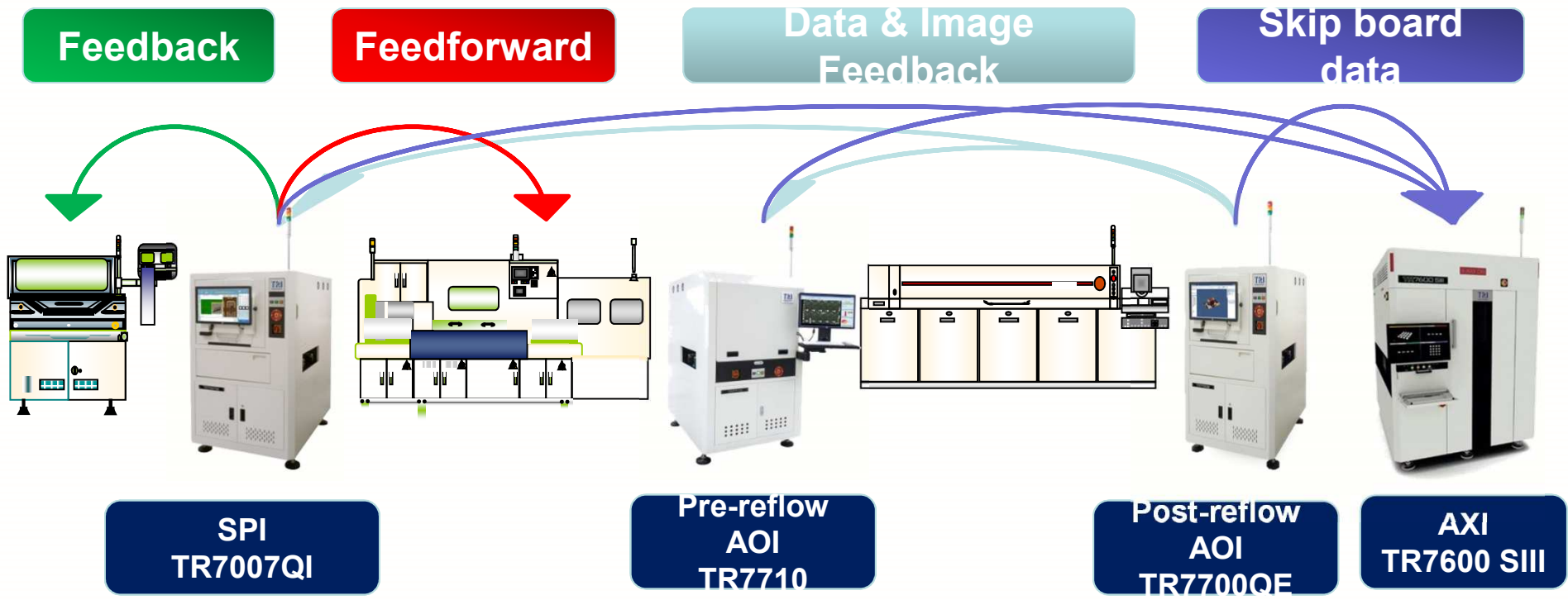
For Smart Phone, Pad, Handheld device



# TRI Support Closed Loop Solutions



## TRI SPI, AOI, AXI Inspection Integration

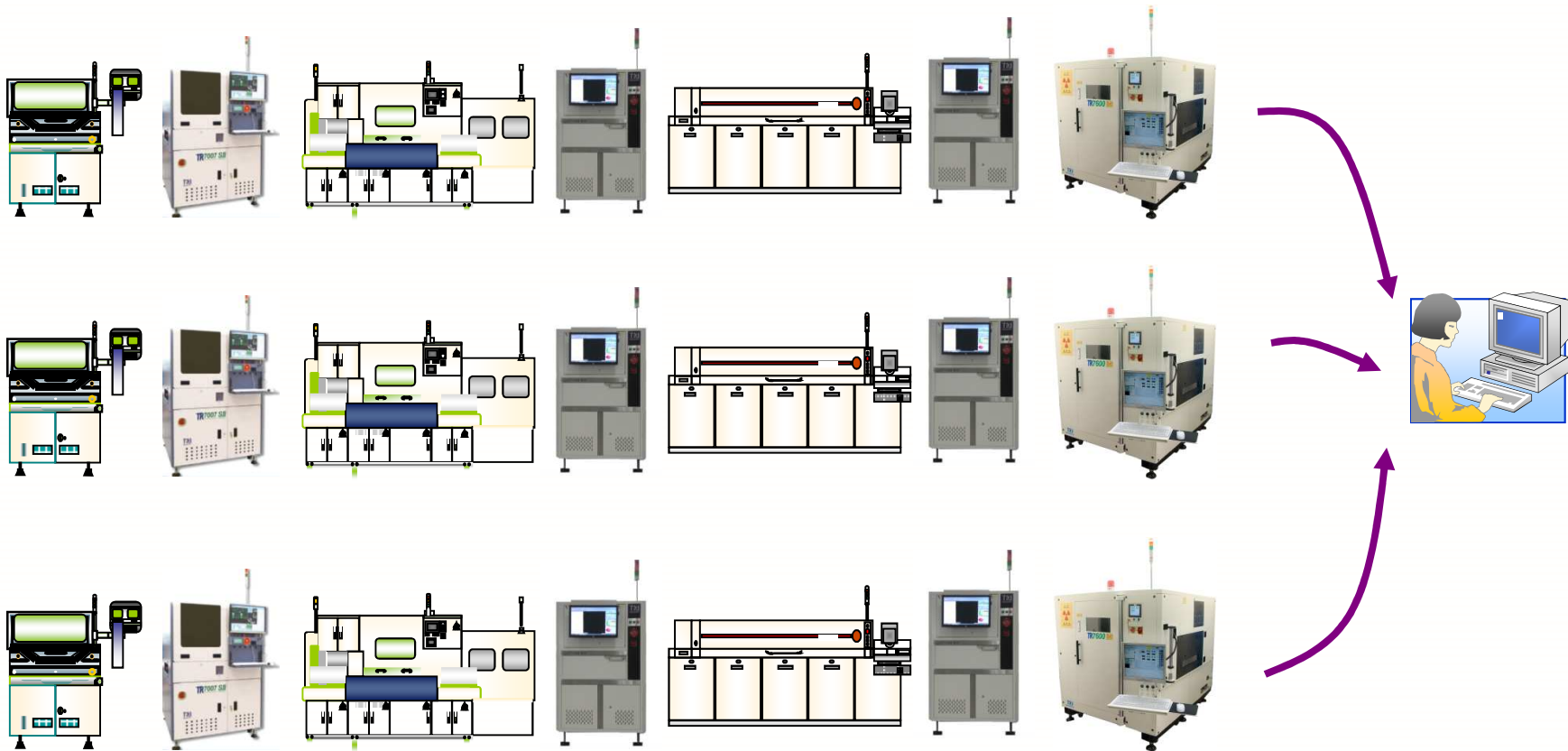


# YMS 4.0 Support Industry 4.0

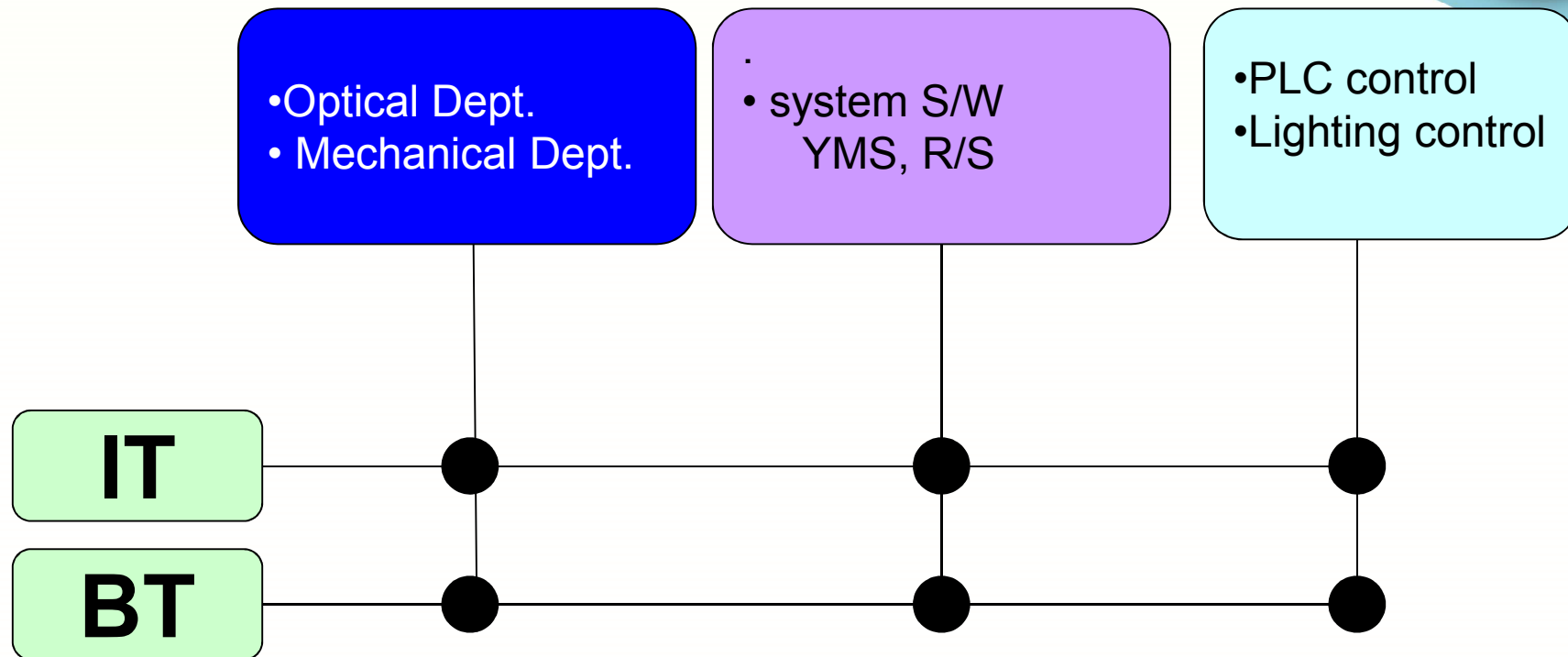


TRI combines SPI, AOI & AXI Data to Improve Yields with Yield Management System (YMS) by:

- Overall Image and Data Integration
- SPC Trend Monitoring
- Drill Down Root Cause Analysis



# In-house RD Team



130+ RD ( 2017 )  
5 PhD

# Outside Support



**Department of Computer science, National Taiwan Univ.**  
**- Image processing / Understanding**

**Department of Mechanical Engineering, National Taiwan Univ.**  
**- Structure Analysis / machine error compensation**

**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 and traceability**

# Recent Milestones



- 2014 Best Supplier Award
- 2014 Asia Innovation Award
- 2015 EM Asia Innovation Award
- 2015 Global Technology Award
- 2016 EM Asia Best Supplier Award
- 2016 Global Technology Award
- 2017 EM Asia Innovation Award
- 2017 Circuits Assembly NPI Award

# Consolidated Income Statement



(NTD M)	17/1-9 (A)	16/1-9 (B)	Diff. (C=A-B)	% C/B	Remark
Revenue	2,746	2,448	298	12%	The increase of market demand & product competition capability
Operating margin	1,444	1,347	97	7%	17~Q3: 53% vs. 16~Q3: 55%
Operating expenses	839	874	-35	-4%	The decrease of RD material
Operating profit	605	473	132	28%	
Non-operating income & expenses	-36	-37	1	-2%	
Profit before income tax	569	436	133	30%	
Income tax expense	91	80	11	14%	
Profit	478	356	122	35%	
EPS	2.03	1.50	0.53	35%	

# Consolidated Balance Sheets



(NTD M)	2017/9	2016/9	Diff.	Remark
Cash	1,273	1,435	-162	The decrease of cash generated from operations
NR & AR	1,665	1,449	225	The increase of revenue
Inventory	728	613	115	The increase of revenue
Other current Assets	61	57	4	
Fixed assets	2,168	2,194	-26	
Other non-current Assets	65	66	-1	

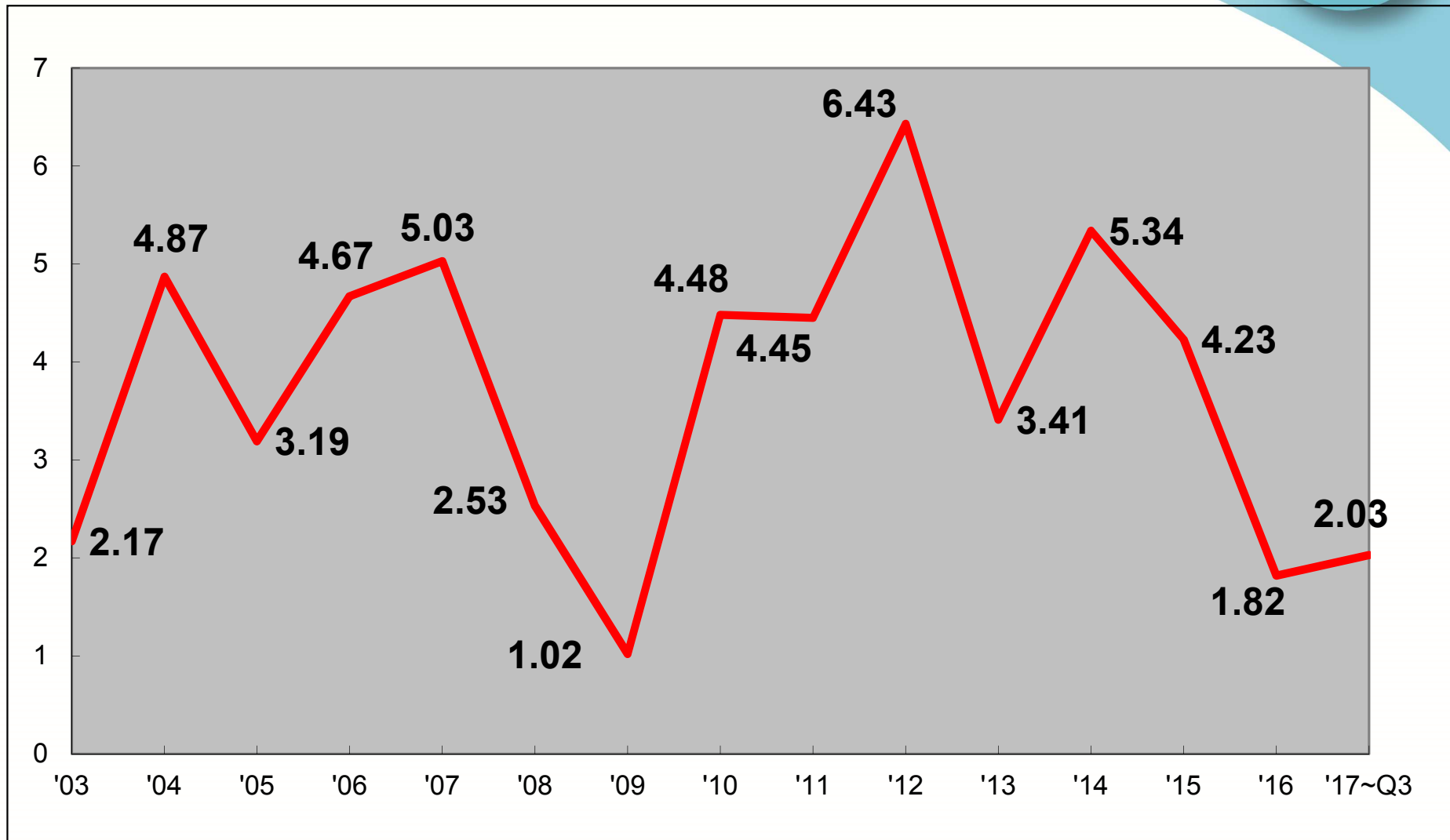
(NTD M)	2017/9	2016/9	Diff.	Remark
NP & AP	682	438	244	The increase of revenue
Income tax payable	48	5	43	The increase of income
Expense payable	190	180	10	
Other current liabilities	32	18	14	
Non-current liabilities	113	111	2	

# Consolidated Finance Ratio



	'13	'14	'15	'16	'17H1	'17~Q3
Gross Margin %	50	46	53	55	<b>52</b>	<b>53</b>
Operating Income %	22	23	24	18	<b>19</b>	<b>22</b>
Net Income %	20	22	21	14	<b>14</b>	<b>17</b>
ROE	15	23	18	8	<b>5</b>	<b>10</b>
Accounts Receivable Days	117	68	101	160	<b>148</b>	<b>145</b>
Inventory Days	149	92	131	173	<b>159</b>	<b>153</b>
Liability Ratio(D/A)	16	16	14	11	<b>26</b>	<b>18</b>
Current Ratio	457	476	528	659	<b>261</b>	<b>391</b>

# EPS



# 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](http://www.tri.com.tw)**

