SWTW

IEEE SW Test Workshop
Semiconductor Wafer Test Workshop

Welcome to the 21st Annual IEEE SW Test Workshop

IEEE
Celebrating 125 Years
of Engineering the Future

CPMT
IEEE COMPONENTS, PACKAGING AND MANUFACTURING TECHNOLOGY SOCIETY

Jerry Broz, Ph.D.
SW Test General Chair

June 12 - 15, 2011
San Diego, CA USA

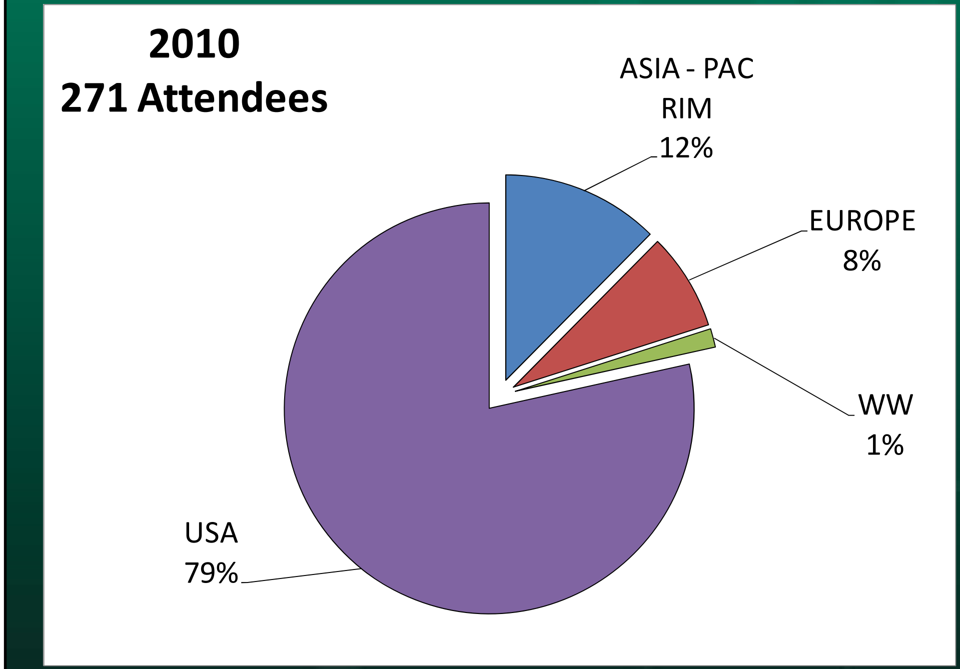
Twenty-One Years of Probe Technology

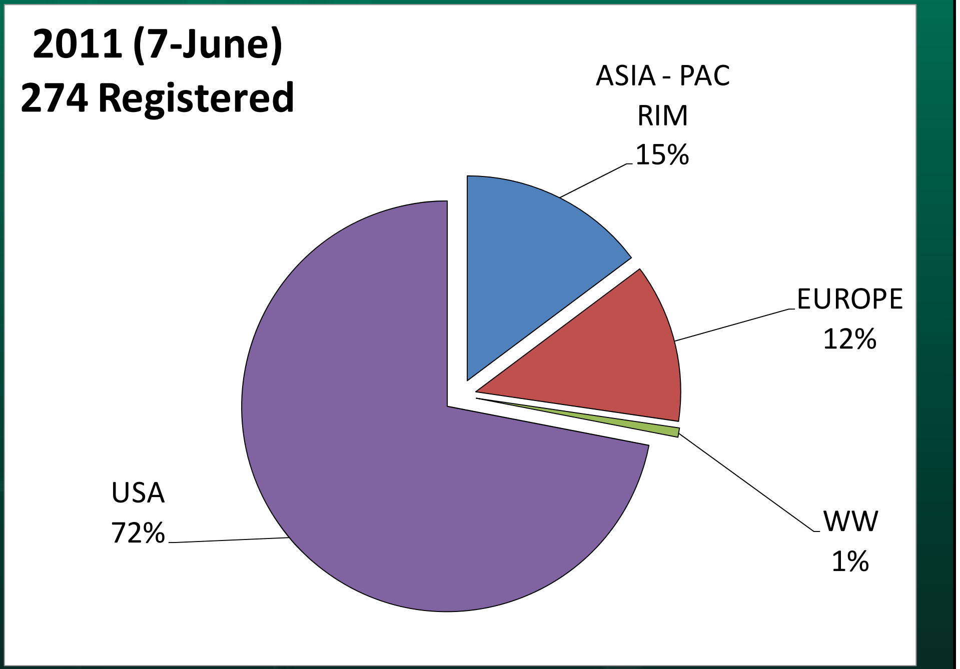
Many thanks to all of the 5000+ attendees from around the world !

IEEE SW-Test Workshop

- **SW Test IS a Probe Technology Forum …**
  - It is "***<u>THE</u>***" Conference for Wafer Test Professionals
  - Practical solutions to real problems
  - A balance mixture of semiconductor manufacturer and supplier presentations
- **Informal Conference …**
  - Great social activities and informal discussions
  - Meet new people and have a little fun !
- **Increased Attendance …**
  - Significantly increased attendance from 2010 !

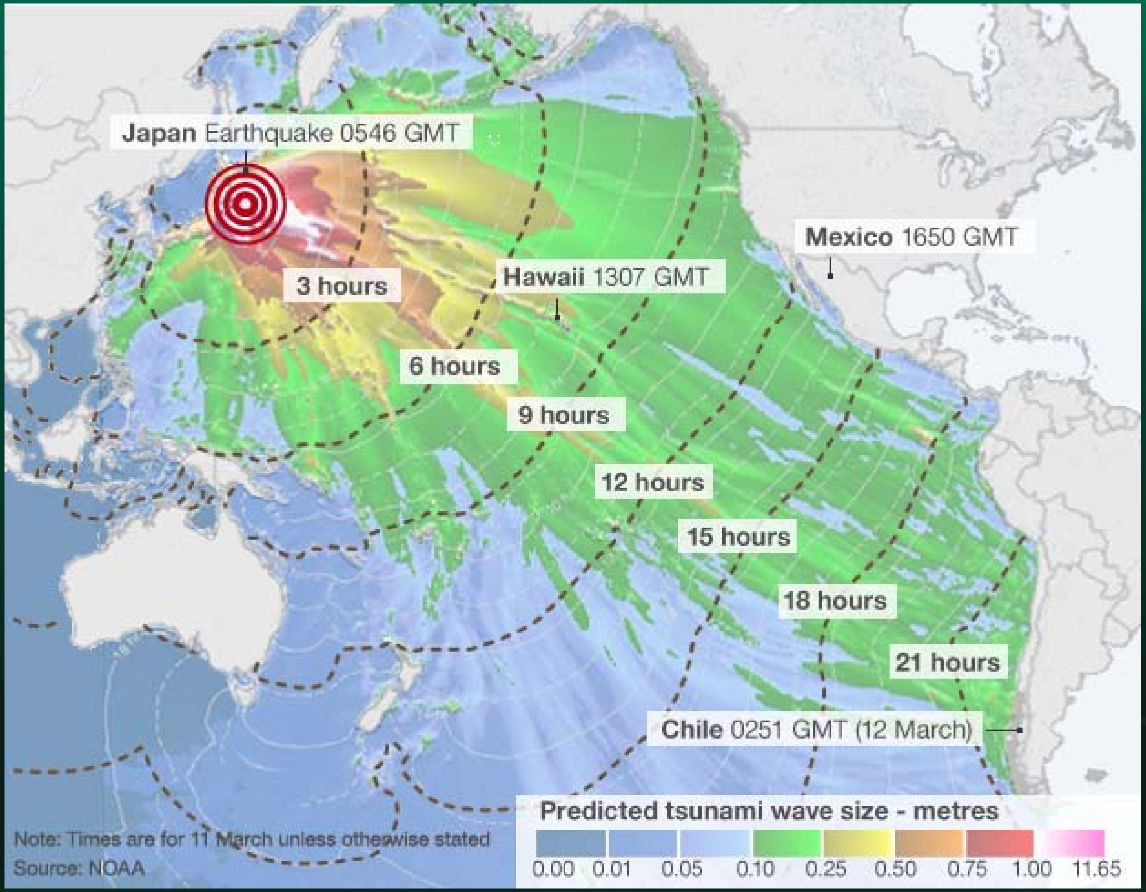
Attendance is Up !


2010
271 Attendees


2011 (7-June)
274 Registered

Many thanks to all of the attendees from around the world !

Friday, March 11, 2011 at 02:46:23 PM Magnitude 8.9 Tohoku Earthquake

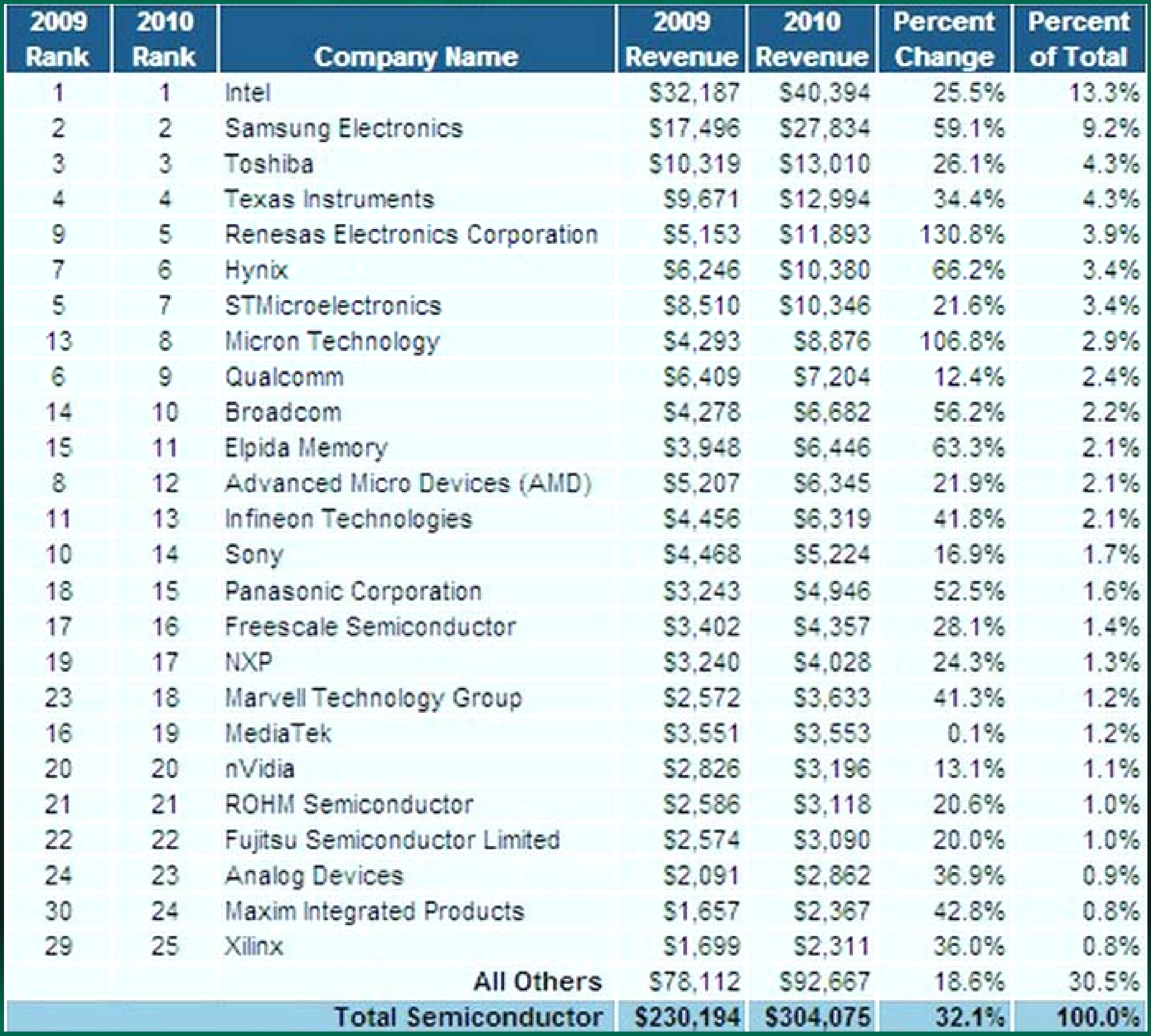


Note: Times are for 11 March unless otherwise stated

Source: NOAA

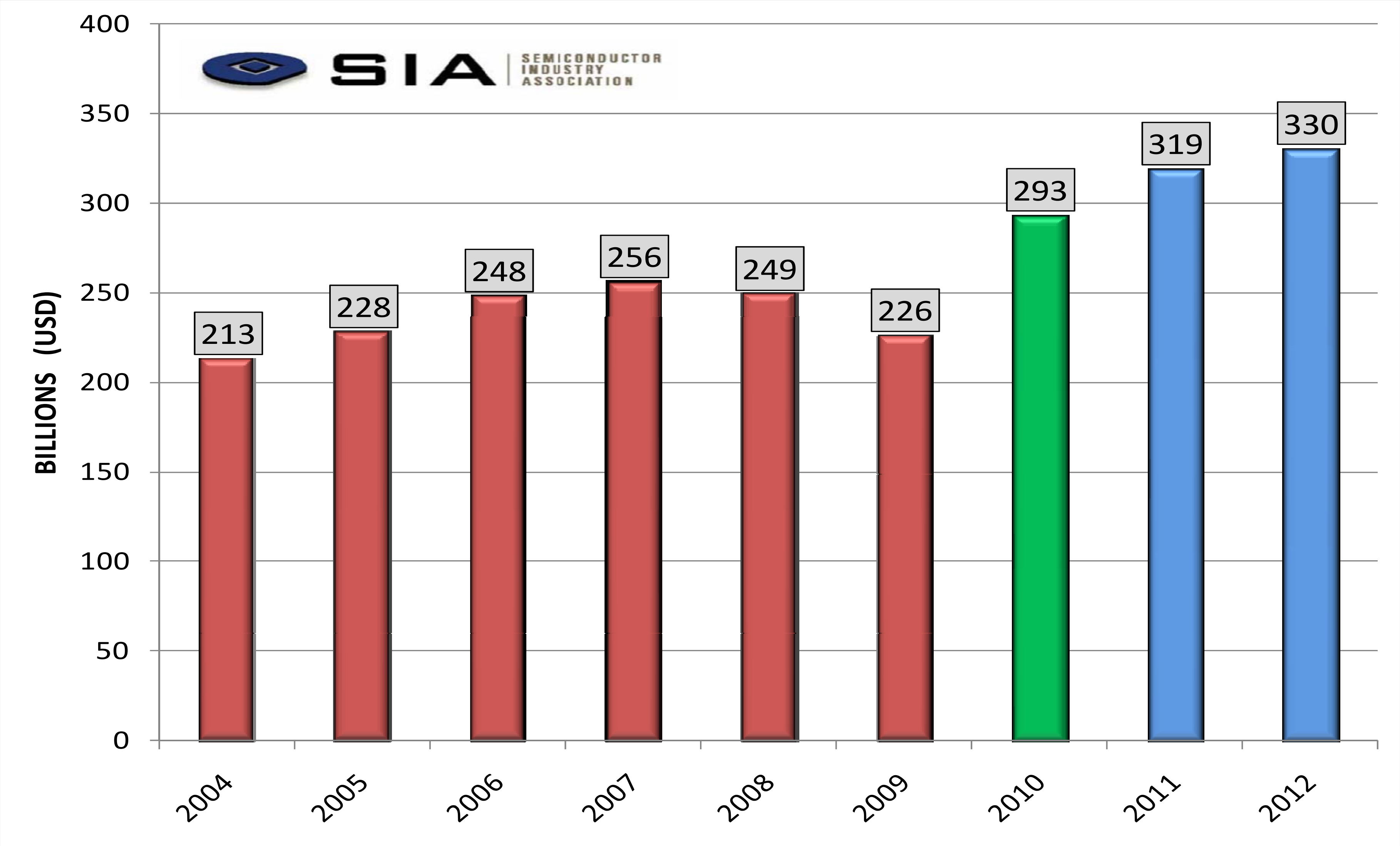
- Magnitude 8.9 unleashed a 30-foot (9 meter) tsunami
- More than 50 aftershocks greater than magnitude 6.0
- Moved the main island of Japan by 8 feet (2.4 meters)
- Shifted the planet on its axis by 4 inches (10 cm)
- Countless lives lost and property damaged
- Global economic impact

Industry in Recovery ?

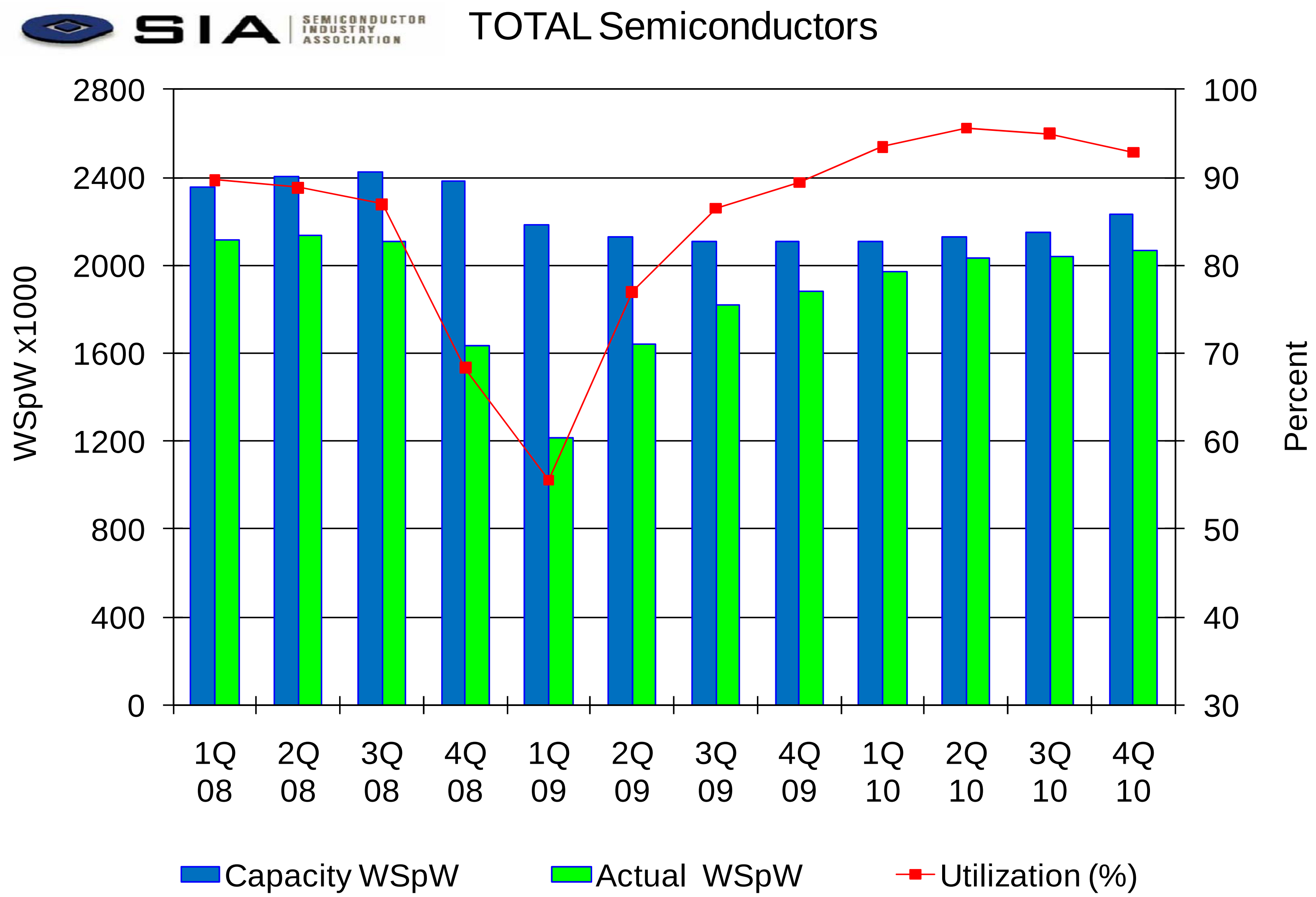


2009 Rank	2010 Rank	Company Name	2009 Revenue	2010 Revenue	Percent Change	Percent of Total
1	1	Intel	$32,187	$40,394	25.5%	13.3%
2	2	Samsung Electronics	$17,496	$27,834	59.1%	9.2%
3	3	Toshiba	$10,319	$13,010	26.1%	4.3%
4	4	Texas Instruments	$9,671	$12,994	34.4%	4.3%
9	5	Renesas Electronics Corporation	$5,153	$11,893	130.8%	3.9%
7	6	Hynix	$6,246	$10,380	66.2%	3.4%
5	7	STMicroelectronics	$8,510	$10,346	21.6%	3.4%
13	8	Micron Technology	$4,293	$8,876	106.8%	2.9%
6	9	Qualcomm	$6,409	$7,204	12.4%	2.4%
14	10	Broadcom	$4,278	$6,682	56.2%	2.2%
15	11	Elpida Memory	$3,948	$6,446	63.3%	2.1%
8	12	Advanced Micro Devices (AMD)	$5,207	$6,345	21.9%	2.1%
11	13	Infineon Technologies	$4,456	$6,319	41.8%	2.1%
10	14	Sony	$4,468	$5,224	16.9%	1.7%
18	15	Panasonic Corporation	$3,243	$4,946	52.5%	1.6%
17	16	Freescale Semiconductor	$3,402	$4,357	28.1%	1.4%
19	17	NXP	$3,240	$4,028	24.3%	1.3%
23	18	Marvell Technology Group	$2,572	$3,633	41.3%	1.2%
16	19	MediaTek	$3,551	$3,553	0.1%	1.2%
20	20	nVidia	$2,826	$3,196	13.1%	1.1%
21	21	ROHM Semiconductor	$2,586	$3,118	20.6%	1.0%
22	22	Fujitsu Semiconductor Limited	$2,574	$3,090	20.0%	1.0%
24	23	Analog Devices	$2,091	$2,862	36.9%	0.9%
30	24	Maxim Integrated Products	$1,657	$2,367	42.8%	0.8%
29	25	Xilinx	$1,699	$2,311	36.0%	0.8%
		All Others	$78,112	$92,667	18.6%	30.5%
		Total Semiconductor	**$230,194**	**$304,075**	**32.1%**	**100.0%**

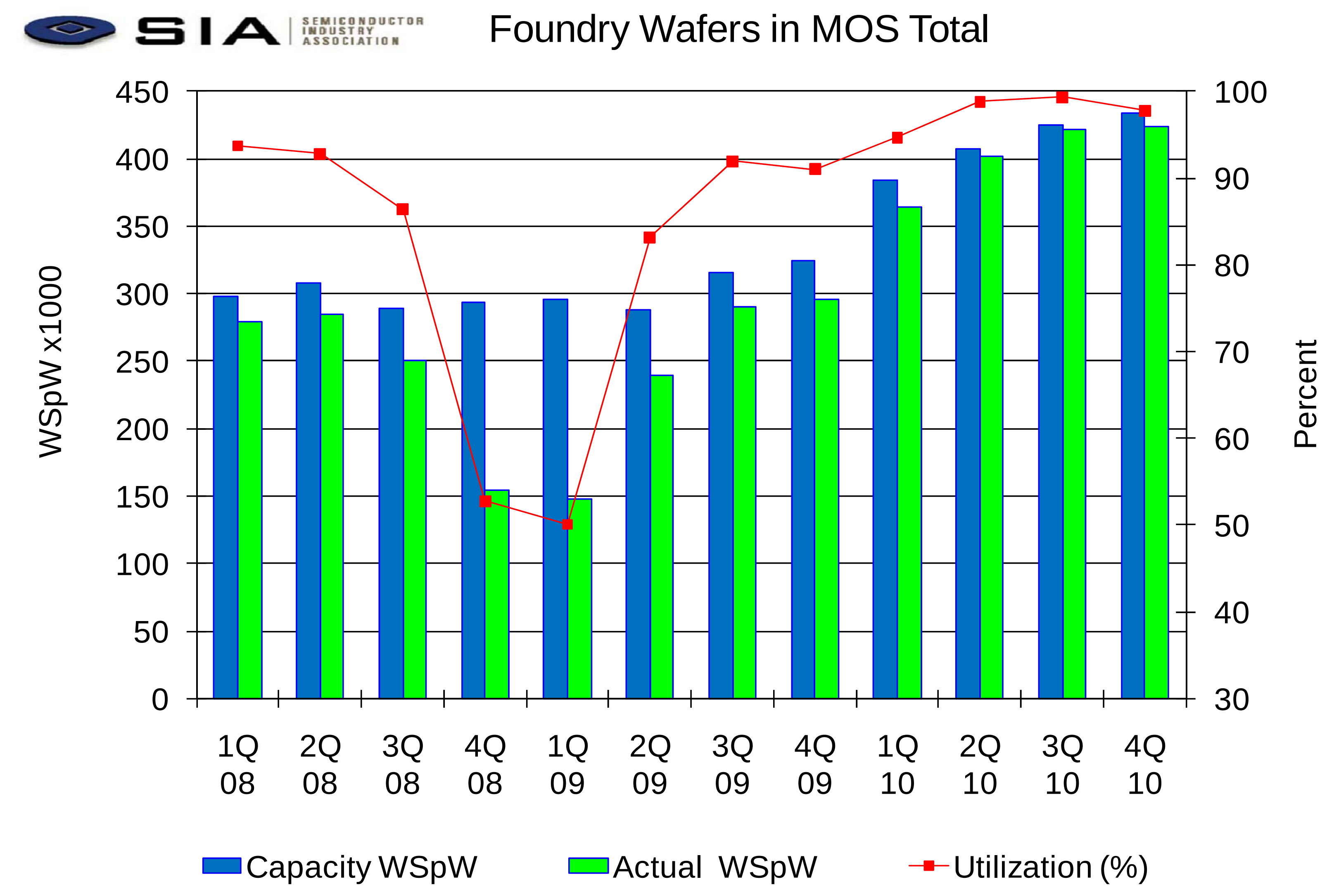
Semiconductor Revenue is Up !



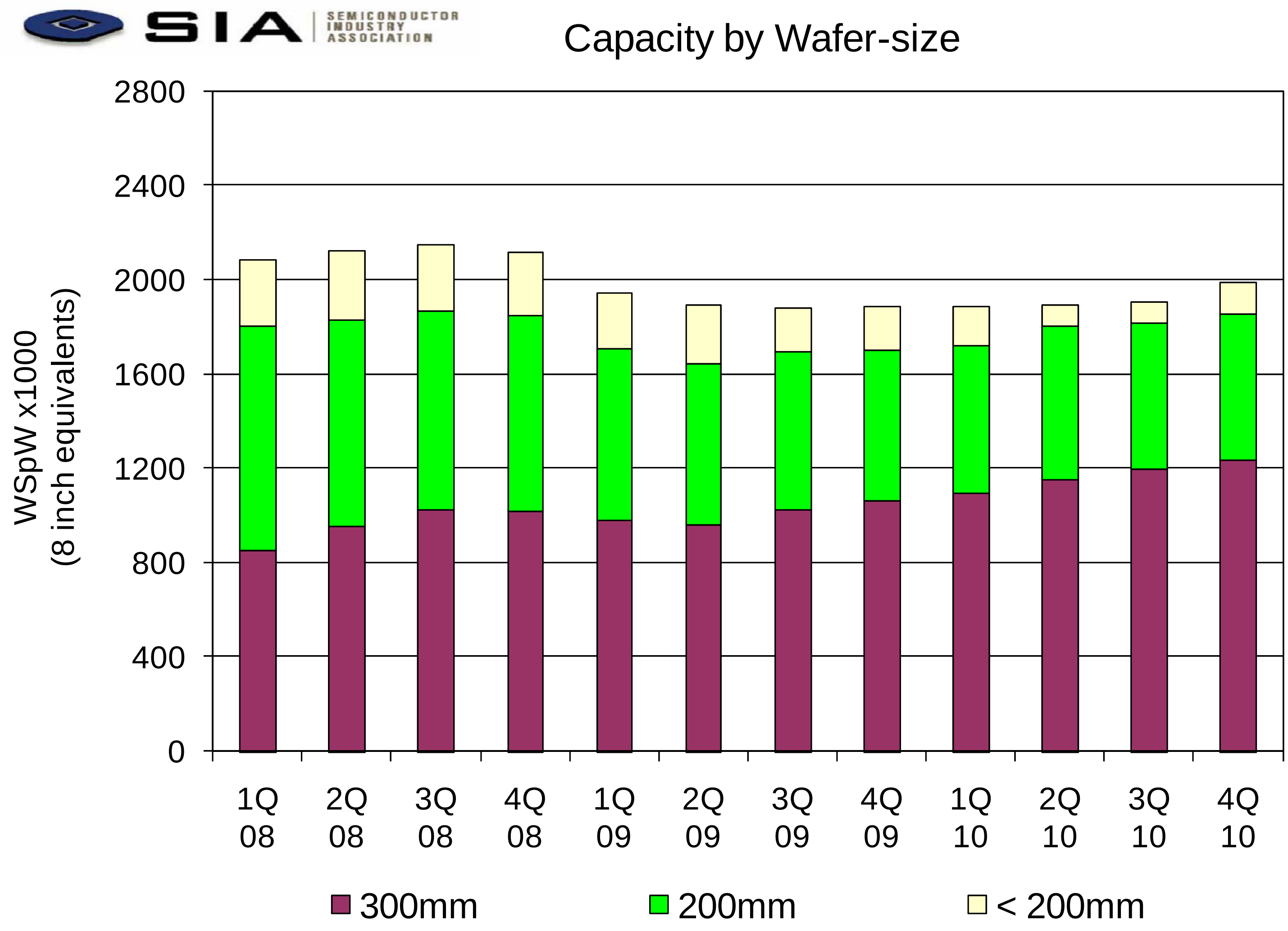
Wafer Starts Picked Up !



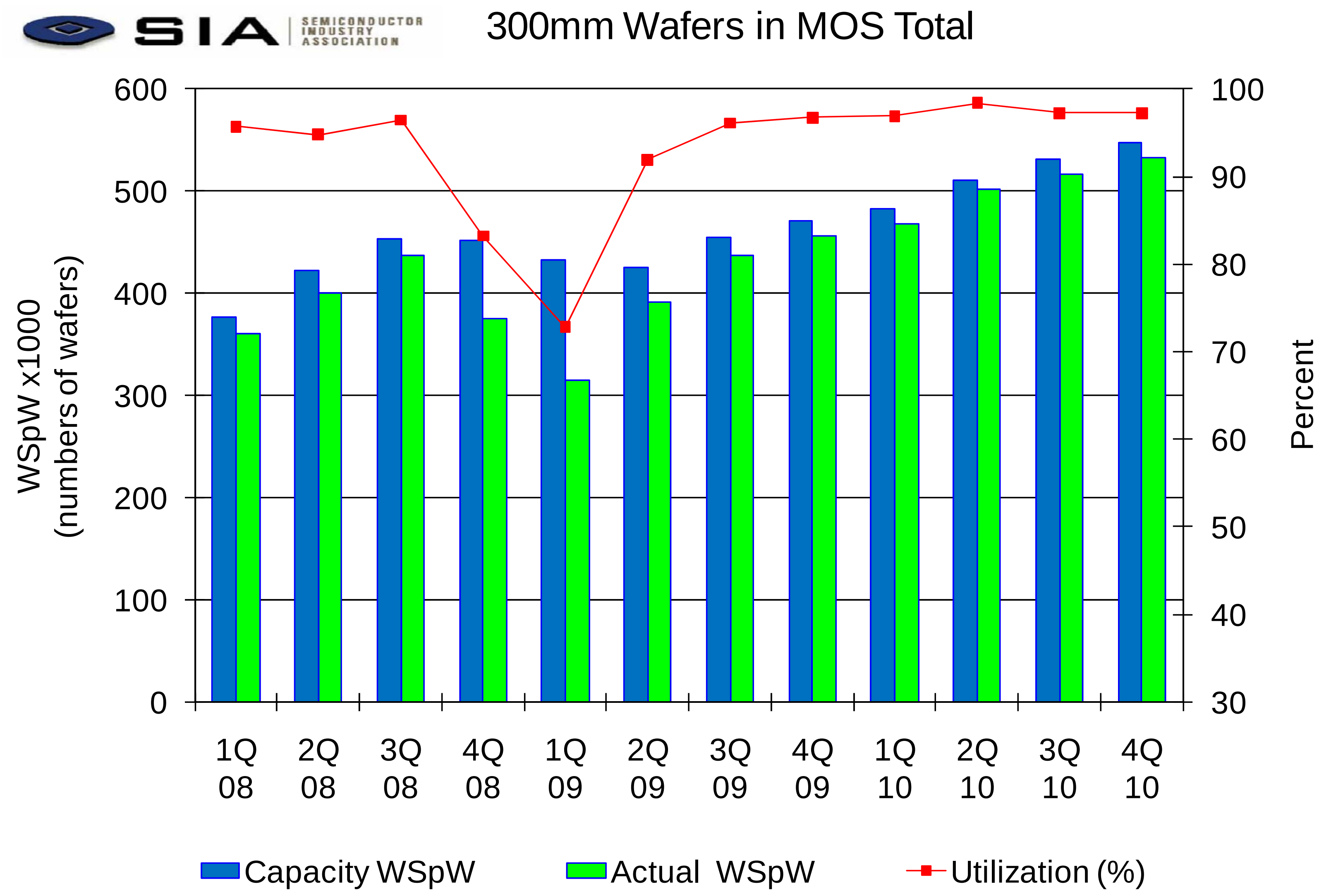
Foundry Utilization Was Up !



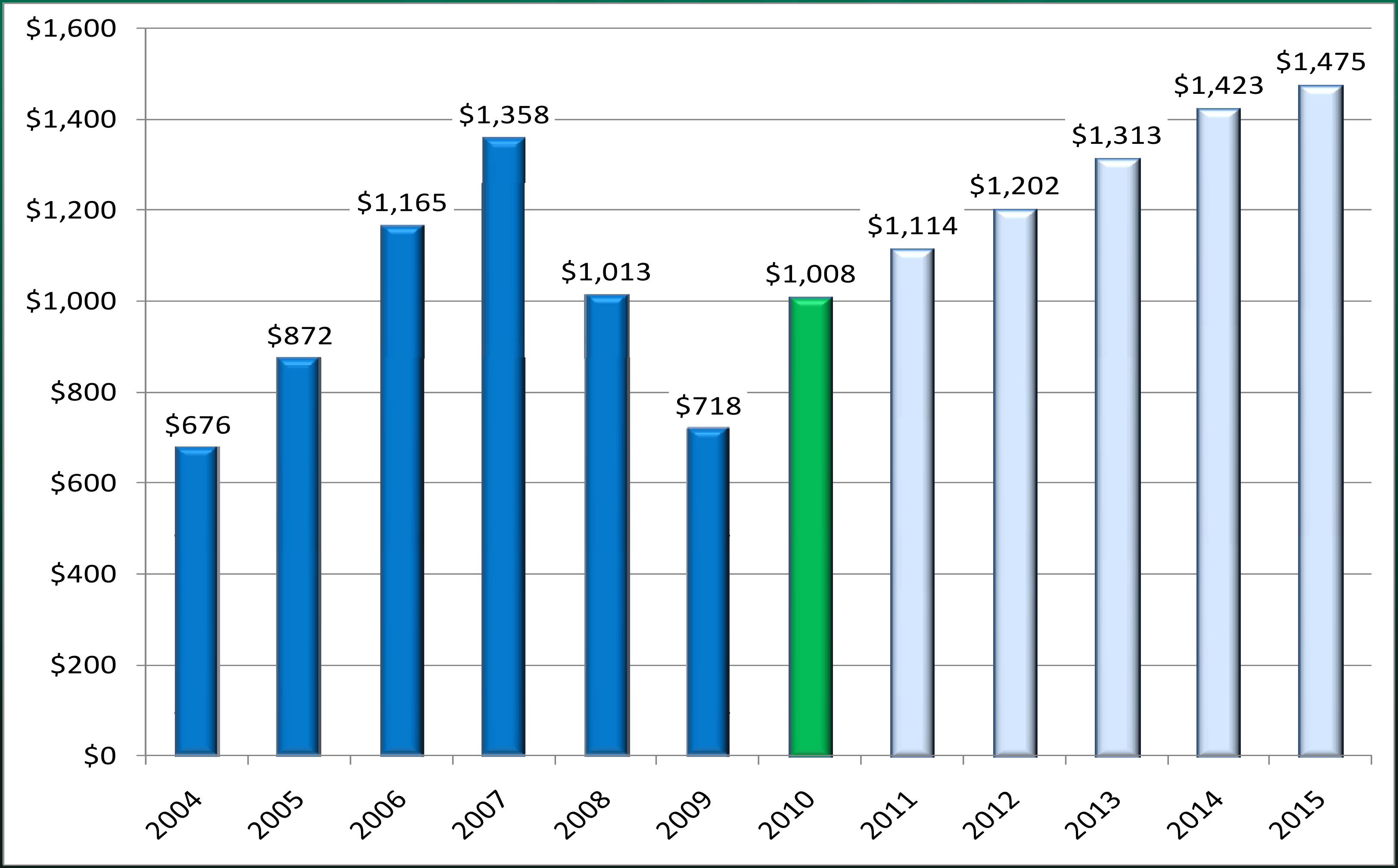
Majority of WW Capacity 300mm



300-mm Wafers Produced



Probe Card Revenue is Up !



Thanks to Risto Puhakka and John West!

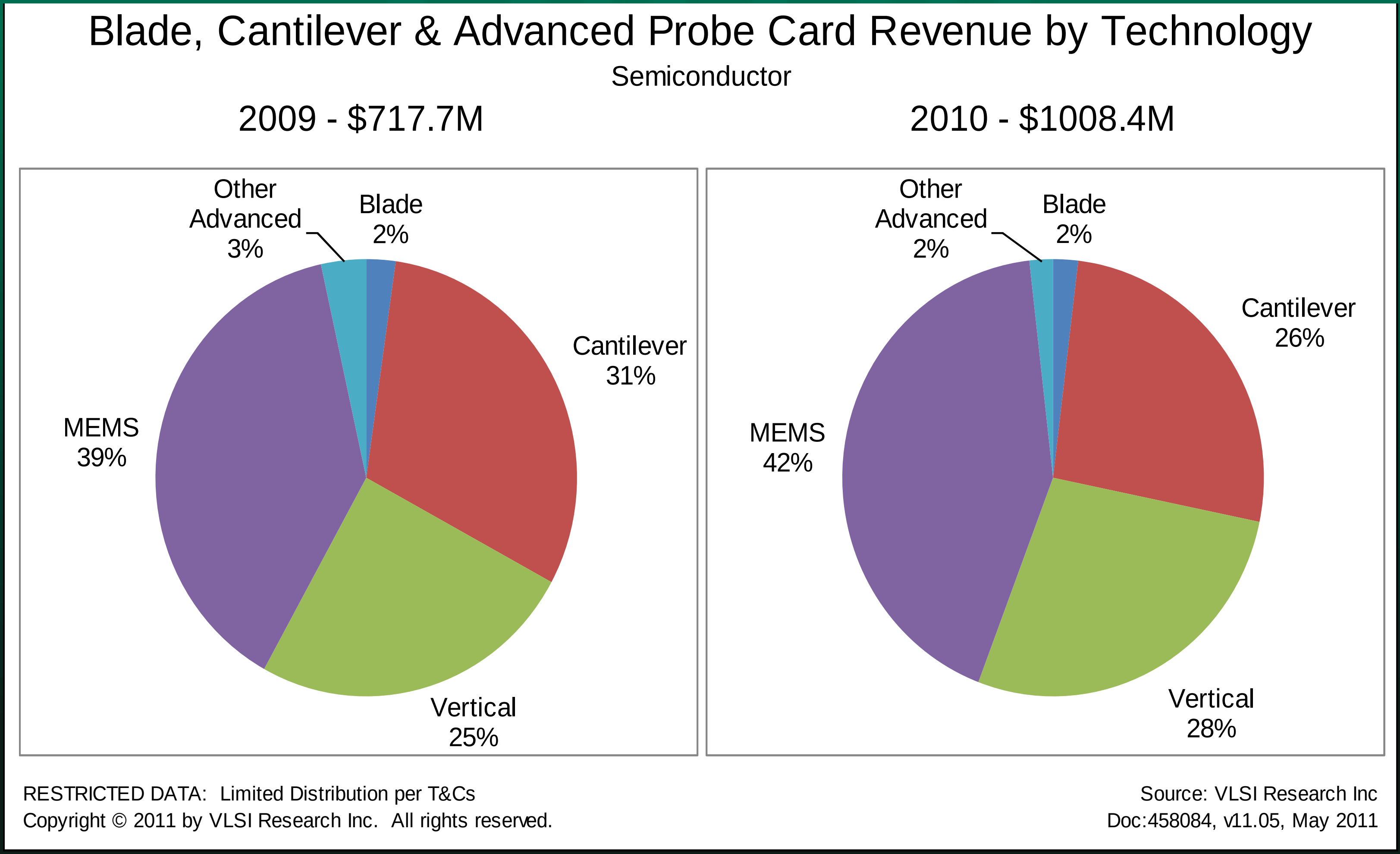
Top Probe Card Vendors

Top 10 Semiconductor Probe Card Vendors

2010	(2009)	Company	2009	2010
1	(1)	FormFactor	135.34	188.57
2	(2)	Micronics Japan Co., Ltd (MJC)	118.19	176.13
3	(3)	JEM: Japan Electronic Materials	93.64	121.39
4	(5)	Microprobe	34.55	57.30
5	(4)	Technoprobe	36.13	55.66
6	(8)	MPI	24.55	42.32
7	(6)	Tokyo Cathode Laboratories Inc	32.23	41.90
8	(7)	SV Probe Inc	28.98	40.62
9	(10)	Will Technology	22.14	33.39
10	(9)	Wentworth Laboratories	23.38	32.13
		Other	193.89	250.81
		Total Market	**743.02**	**1,040.22**

Thanks to Risto Puhakka and John West!

Revenue by Technology



Blade, Cantilever & Advanced Probe Card Revenue by Technology

Semiconductor

RESTRICTED DATA: Limited Distribution per T&Cs

Source: VLSI Research Inc
Doc:458084, v11.05, May 2011

Thanks to Risto Puhakka and John West!

21st Annual SWTW 2011

- **Technical Program**
  - Technical Tutorial on Sunday
  - Nine Focused Technical Sessions across three days
  - 31 Podium Presentations
- **Products / Services EXPO**
  - 35 full size booths … **SOLD OUT !**
  - EXPO that does not compete with Technical Program
- **Corporate Support Program … THANKS !**
  - Platinum Level … International Test Solutions, JEM, MJC
  - Gold Level … Acme Technology, T.I.P.S. Messtechnik
  - Silver Level … Advanced Probing Systems

Corporate Supporter Program

Platinum Supporters

international TEST SOLUTIONS

JEM

MJC

Corporate Supporter Program

Gold Supporter

Acme Technology, Inc.

Quality Probe Needle Solutions

T. I. P. S.

Technical Innovation - Physical Solutions

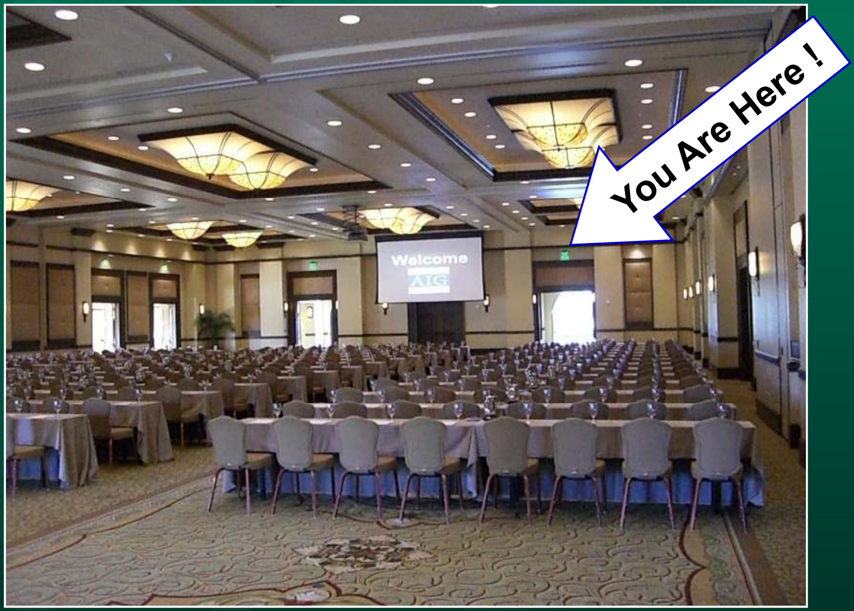
Silver Supporter

ADVANCED PROBING SYSTEMS, INC.

William R. Mann Memorial Fund

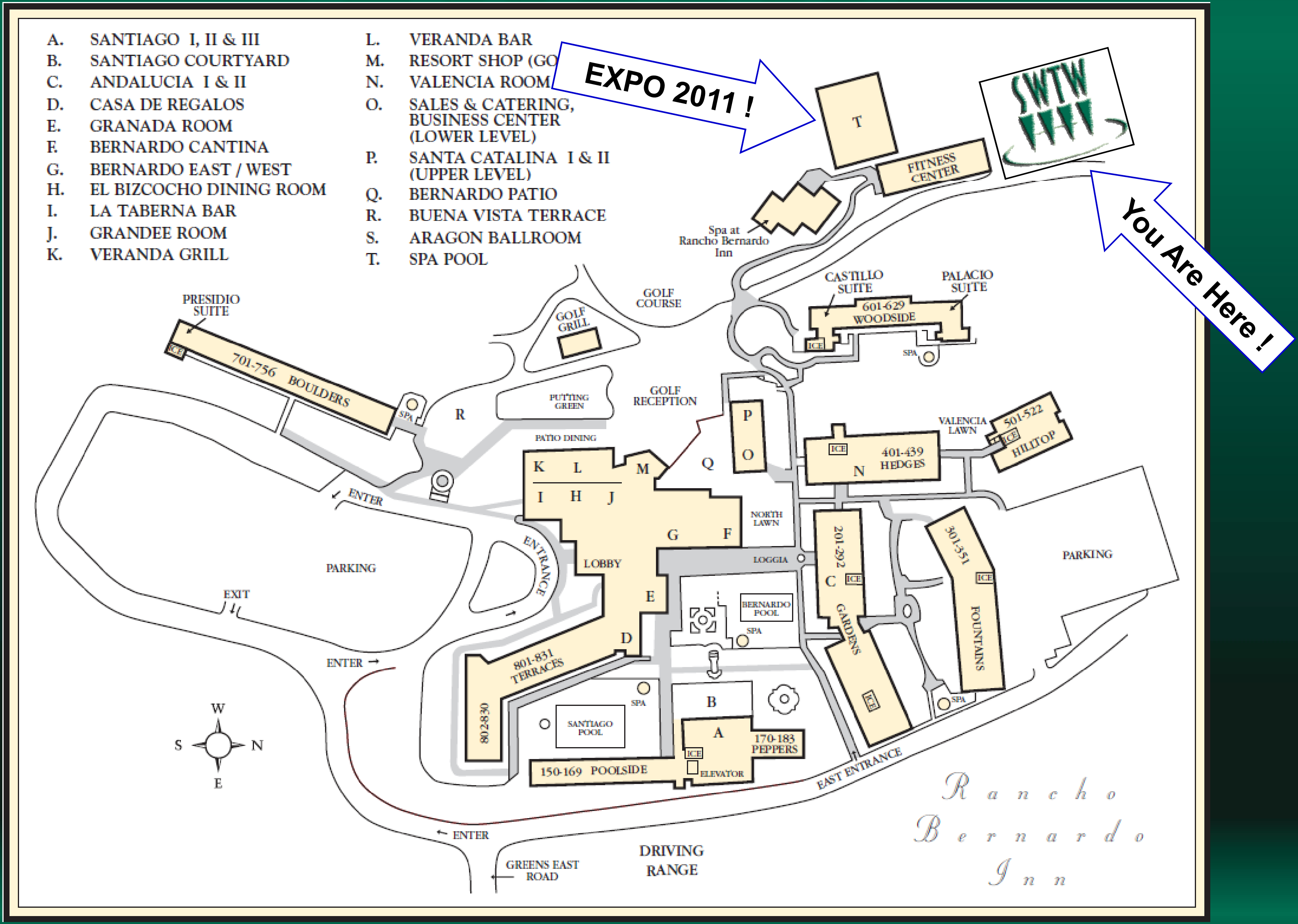
- **IEEE William R. Mann Memorial Student Grant will be awarded to either an undergraduate or graduate student attending an accredited university or college who will attend, present a paper, or participate at:**
  - IEEE International Test Conference (ITC)
  - IEEE Semiconductor Wafer Test Workshop (SW Test)
- **With Bill's spirit for education, the grant is meant to support student participation at IEEE conferences and encourage interaction between the practicing engineers and students.**

Rancho Bernardo 2011



You Are Here !

Map of the Area



A. SANTIAGO I, II & III
B. SANTIAGO COURTYARD
C. ANDALUCIA I & II
D. CASA DE REGALOS
E. GRANADA ROOM
F. BERNARDO CANTINA
G. BERNARDO EAST / WEST
H. EL BIZCOCHO DINING ROOM
I. LA TABERNA BAR
J. GRANDEE ROOM
K. VERANDA GRILL
L. VERANDA BAR
M. RESORT SHOP (GO
N. VALENCIA ROOM
O. SALES & CATERING, BUSINESS CENTER (LOWER LEVEL)
P. SANTA CATALINA I & II (UPPER LEVEL)
Q. BERNARDO PATIO
R. BUENA VISTA TERRACE
S. ARAGON BALLROOM
T. SPA POOL

EXPO 2011 !

You Are Here !

A few words about 2011 …

- **SW Test is an IEEE sponsored and 100% non-profit activity.**
- **SW Test is a "Food and Beverage Heavy" workshop held on a "resort-style" property to promote and encourage networking.**
- **Registration fee covers ONLY the food and beverages …**
  - Sunday reception and dinner
  - Daily breakfast, lunches
  - Daily AM and PM coffee breaks
  - EXPO reception, social function and dinner

- **All other costs are covered by EXPO and Corporate Support !**
- **No other IEEE conference provides this type of focused, grassroots program.**

What's the "Competition" Doing ?

- **IEEE ECTC 2011 (CPMT conference at Walt Disney World Dolphin Resort)**
  - Average registration fee $725 (advanced) and $840 (onsite) per attendee
  - Registration fee includes e-proceedings, daily lunch, and daily coffee breaks
  - All other meals (breakfast, dinner, etc.) and social events (drinks, etc.) are "ala carte" and/or individually sponsored by suppliers.
  - Room rate = $189 per night

- **IEEE Holm 2011 (CPMT conference at Crown Plaza Northstar, Minneapolis)**
  - Average registration fee $750 (advanced) and $825 (onsite) per attendee
  - Registration fee includes hardcopy proceeding, Sunday welcome reception, Monday conference banquet and Tuesday Awards Lunch.
  - All other meals (breakfast, dinner, etc.) and social events (drinks, etc.) are "ala carte" and/or individually sponsored by suppliers.
  - Room Rate = $195 per night

"We're not in it for the money …"

- **Organization and Technical Program …**
  - Jerry Broz, Ph.D., General Chair and IEEE Sr. Member
  - Rey Rincon, Freescale Semiconductor, Technical Program Chair
  - Maddie Harwood, CEM Inc, Finance Chair
  - Meredith Griffith, CEM Inc., EXPO / Registration Coordinator

“Who’s to Blame …”

- **Returning Members …**
  - Jan Martens (NXP Semiconductor) – Program Committee
  - Darren James (Rudolph Technologies) – Program Committee
  - Patrick Mui (JEM) – Program Committee
  - Fred Taber (BiTS Workshop) – Proceedings Coordinator
  - Roy Swart (Intel) – Steering Committee

- **New Members …**
  - Gunther Boehm (FeinMetall GmbH)
  - John Caldwell (Micron Technology)
  - Boyd Daniels (Texas Instruments)
  - Michael Huebner, Ph.D. (FormFactor)
  - Tatsuo Inoue (MJC)
  - Amy Leong (Microprobe)
  - Mark Ojeda (Spansion)

Technical Program / Agenda

- **Sunday, June 12, 2011**
  - Basic Statistics Tutorial
    - Lance Milner (Intel)
  - Registration and Cocktails
  - Dinner
  - Keynote Presentation …

“Backend to the Front Line”

William T. Chen, Ph.D.
ASME Fellow / ASME Fellow
Senior Technical Advisor and Fellow
ASE Group

Technical Program / Agenda

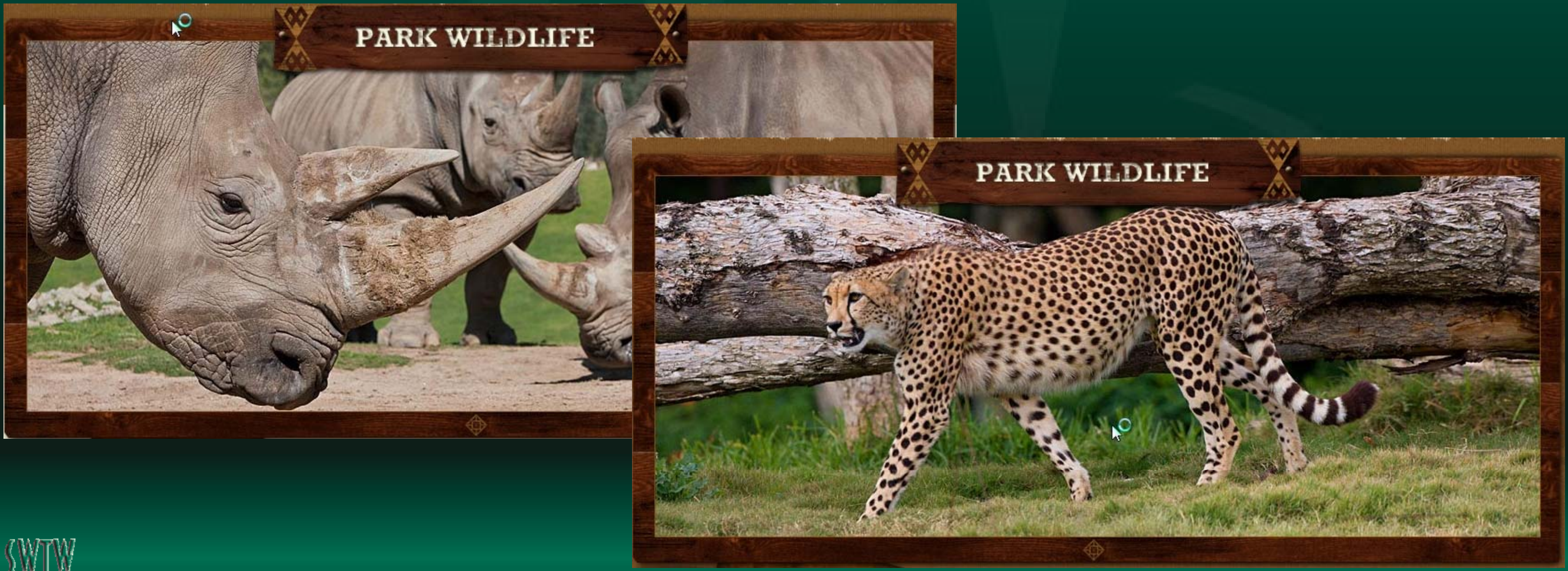
- **Monday, June 13**
  - Registration and Continental Breakfast
  - Welcome
  - Probe Challenges
  - Optimization/Process Analysis
  - Lunch on the Aragon Lawn
  - Power Probing
  - High Performance Probing
  - Reception / SW Test EXPO-2011 / Dinner
  - Networking at La Taberna Bar

Technical Program / Agenda

- **Tuesday, June 14**
  - Registration and Continental Breakfast
  - Spring Pin Probing
  - Probe Potpourri
  - BBQ Lunch on the Aragon Lawn
  - High Temp/Extreme Probing
  - SW Test EXPO-2011
  - Dinner at San Diego Zoo Safari Park
  - Networking at La Taberna Bar

Tuesday Social at
San Diego Zoo Safari Park

- Reception and Cocktails
- Safari Tour … Kids can come for FREE !
- Dinner and Relaxed Networking



Technical Program / Agenda

- **Wednesday, June 15**
  - Continental Breakfast
  - Challenges of RF Probing
  - Productivity/COO
  - Awards and Adjourn Conference
  - Lunch on the Aragon Lawn

Recognition & Awards

- Best Overall Presentation
- Best Data Presented
- Most “Inspirational” Presentation
- Best Presentation, Tutorial in Nature

- Some other “Special Awards”

SWTW-2010 Awards

Most Inspirational Presentations

"Probing Assessment on Fine Pitch Copper Pillar Solder Bumps"

Senthil Theppakuttai, Ph.D.
Bahadir Tunaboylu, Ph.D.
Jeff Hicklin
SV Probe, Inc.

"Measuring Current Carrying Capability (CCC) Of Vertical Probes"

Rehan Kazmi, Ph.D.
Habib Kilicaslan
Jeffrey Hicklin
Bahadir Tunaboylu, Ph.D.
SV Probe, Inc.

Best Presentation, Tutorial in Nature

"High Speed Control Bus for Advanced TRE™"

Michael Huebner, Ph.D.
FormFactor, Inc.

SWTW-2010 Awards

Best Data Presentation

"Contacting various metal compositions using ViProbe® Vertical Technology"

Denis Deegan	**Simon Allgaier**
Analog Devices, Inc.	**Feinmetall GmbH**

Best Overall Presentation

"Low-Force MEMS Probe Solution for Full Wafer Single Touch Test"

Matt Losey, Ph.D., Yohannes Desta, Melvin Khoo, Lakshmikanth Namburi, Georg Aigeldinger
Touchdown Technologies

That “Special” Award …

“What A Load Of Crap !”

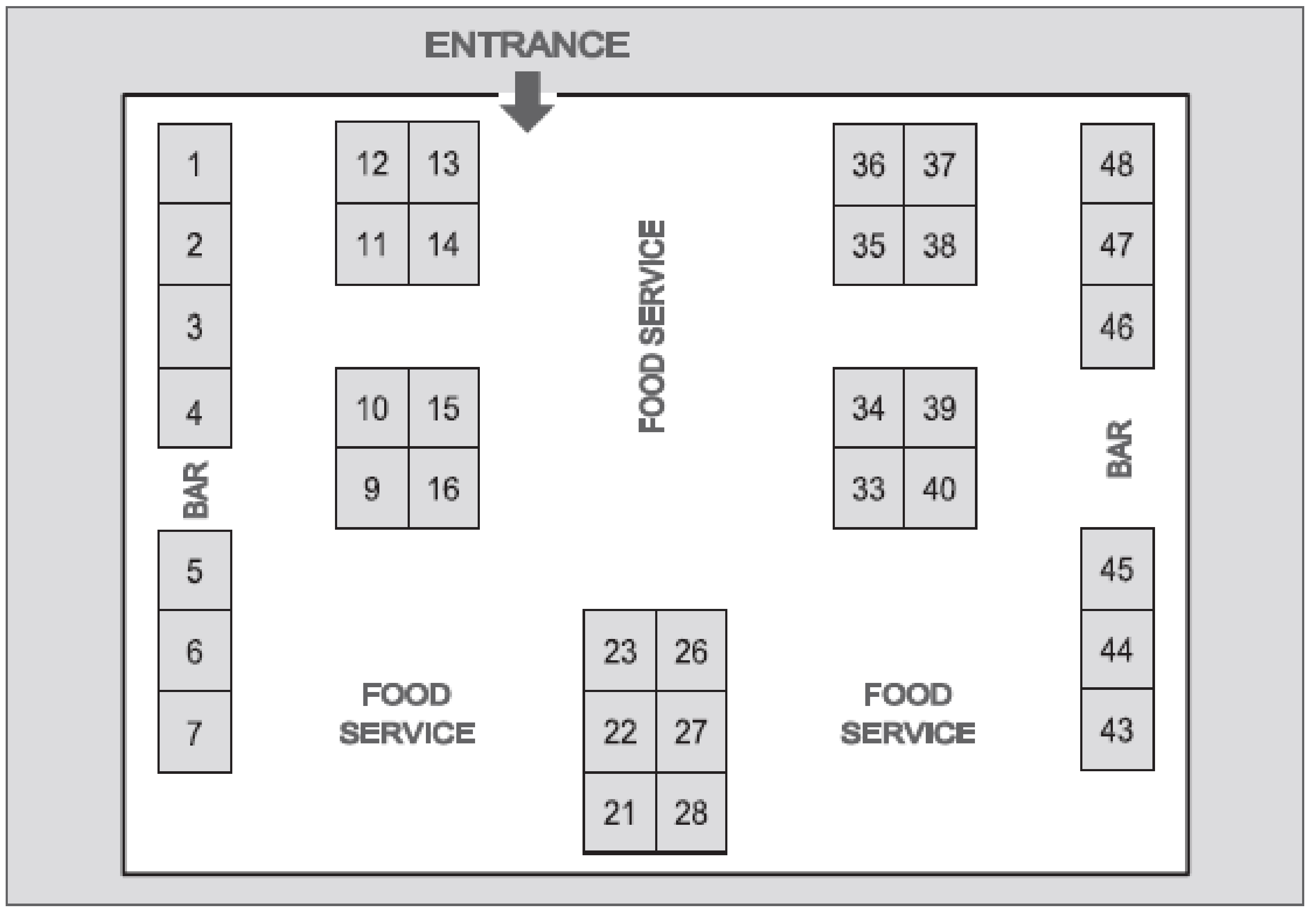
For the Poorest Disguised Sales Pitch

“What happens at SWTW stays at SWTW !”

IEEE SW Test EXPO 2011

- ☆ **Acme Technology, Inc.**
- ☆ **Advanced Probing Systems, Inc.**
- AEHR Test Systems
- ATT Systems GmbH
- Cascade Microtech, Inc.
- Complete Probe Solutions
- Feinmetall GmbH
- Ferrotec (USA) Corporation
- FormFactor
- Hitachi Chemical Co. America, Ltd.
- Integrated Test Corporation
- ☆ **International Test Solutions, Inc.**
- ☆ **JEM America Corp**
- Kanematsu
- Kyocera America, Inc.
- MarTek Inc.
- MicroProbe Inc.
- ☆ **Micronics Japan Co., Ltd.**
- Multitest
- NHK Spring Co. Ltd
- Nomura Plating Co., Ltd.
- Oxford Lasers, Inc.
- Pac Tech USA
- Plastronics/H-Pin
- Prober.com
- Qualmax America, Inc.
- Rika Denshi America Inc
- Rudolph Technologies, Inc.
- Semiconductor Consultants, LLC
- SV Probe - An Ellipsiz Company
- ☆ **T.I.P.S. Messtechnik GmbH**
- Technoprobe America Inc
- Tokyo Electron Limited (TEL)
- Unisem
- Vermont Microdrilling
- Wentworth Laboratories, Inc.
- Yamaichi Electronics USA Inc.

IEEE SW Test EXPO Floorplan



COPYRIGHT NOTICE

- The presentations included in the SWTW proceedings reflect the authors opinions and are presented without change.
- Inclusion in the proceedings does not constitute an endorsement by the SW Test Workshop Committee, IEEE CPMT Society, IEEE Computer Society, and/or the IEEE Test Technology Council.
- Papers previously copyrighted or with copyright restrictions cannot be presented. In keeping with a workshop environment and to avoid copyright issues, SWTW does not officially seek a copyright ownership / transfer from authors.
- Authors agree by submitting their work that their presentation is original work and substantially not published previously or copyrighted, may be referenced in the work of others, will be assembled / distributed in the SWTW Proceedings, and made available for download by anyone from the SWTW website.

Want to Learn More ?

- Electronic Components and Technology Conference

  2011 held at Disney Resort, Lake Buena Vista, FL
  2012 to be held in San Diego, CA on May 29 to June 1

  http://www.ectc.net

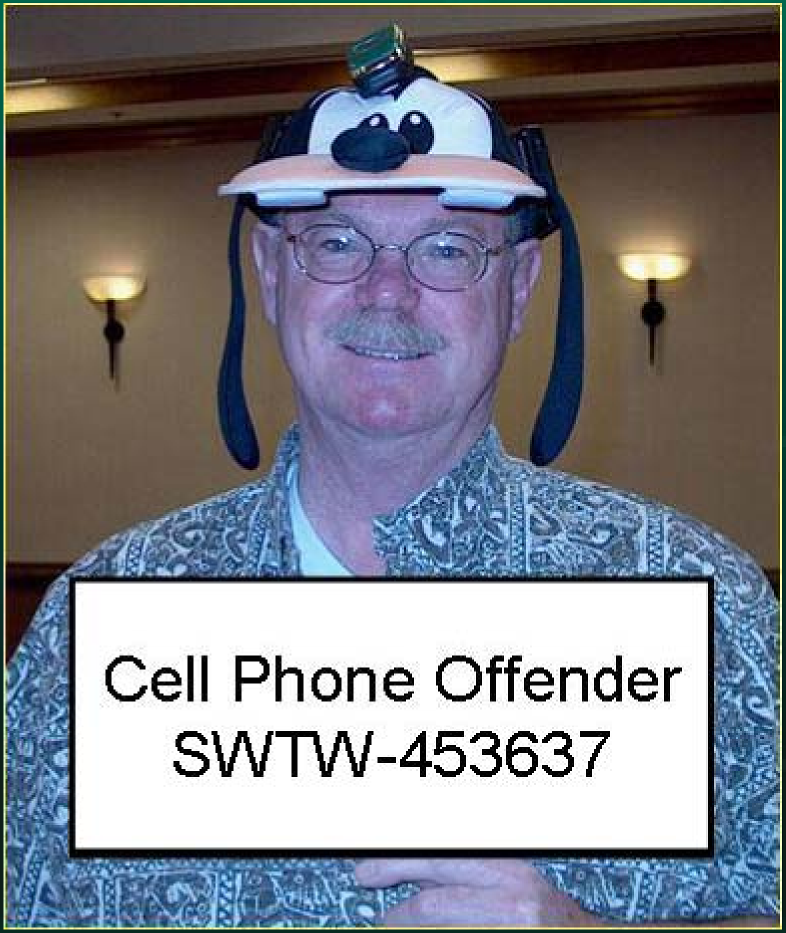
- Burn In & Test Socket Workshop

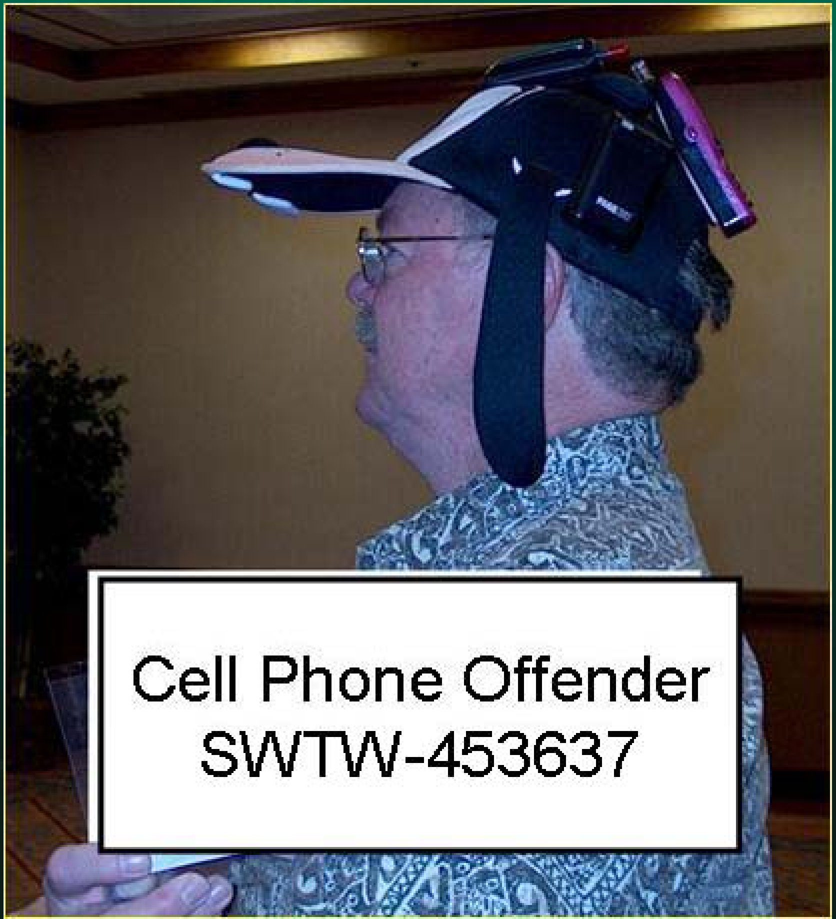
  Mesa, Arizona
  http://www.bitsworkshop.org

- IS-Test Workshop

  Freising, Germany
  http://www.is-test.com

Silence your cell phone !!!





Thanks for your Support !

- Contact the SW Test Team with any questions …

Jerry Broz, Ph.D. General Chair IEEE SW Test Workshop (303) 885-1744	**Rey Rincon** Technical Program Chair IEEE SW Test Workshop (214) 402-6248
Meredith Griffith EXPO / Registration Coordinator CEM America, Inc. (540) 905-8035	**Maddie Harwood** Finance Chair CEM America, Inc. (540) 937-5066