



Semiconductor Business Review and Outlook: View from Deep Inside the Trenches

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Interoperability – Standards – Collaborative Technology

Innovation Through Collaboration



Introduction

I am not an economist

Nor

**Do I play one on TV,
Movies or Radio,
or even in my dreams!**



About the Presenter

- **Career Details:**

- ◆ **2002 to present: Silicon Integration Initiative (Si2)**

- Role: Sr. Vice President, Engineering
- Responsible for project management for 4 coalitions driving standards, reference implementations, enabling software, training materials, etc

- ◆ **1998 – 2002: Motorola Semiconductor (now Freescale)**

- Role: Director of Design Systems
- Responsible for development of flows and tools to support design and test of uP's and SoC's

- ◆ **1969 – 1998: IBM Corporation**

- Roles: Management and Engineering positions
- Responsible for development of flows and tools to support design & test of uP's & ASIC's

- **Education:**

- ◆ PhD/CS, Syracuse University, 1977



About Si2

- **Si2 Mission**

- ◆ Improve *interoperability* and *integration* across silicon design flows
 - Advantages in cost, time to market, and IC performance
 - Includes integration with manufacturing

- **Membership**

- ◆ 91 corporate members
 - 37% user, 16% system, 47% EDA companies
- ◆ See updated list on Si2 Member List (<http://www.si2.org/?page=28>)

- **Philosophy**

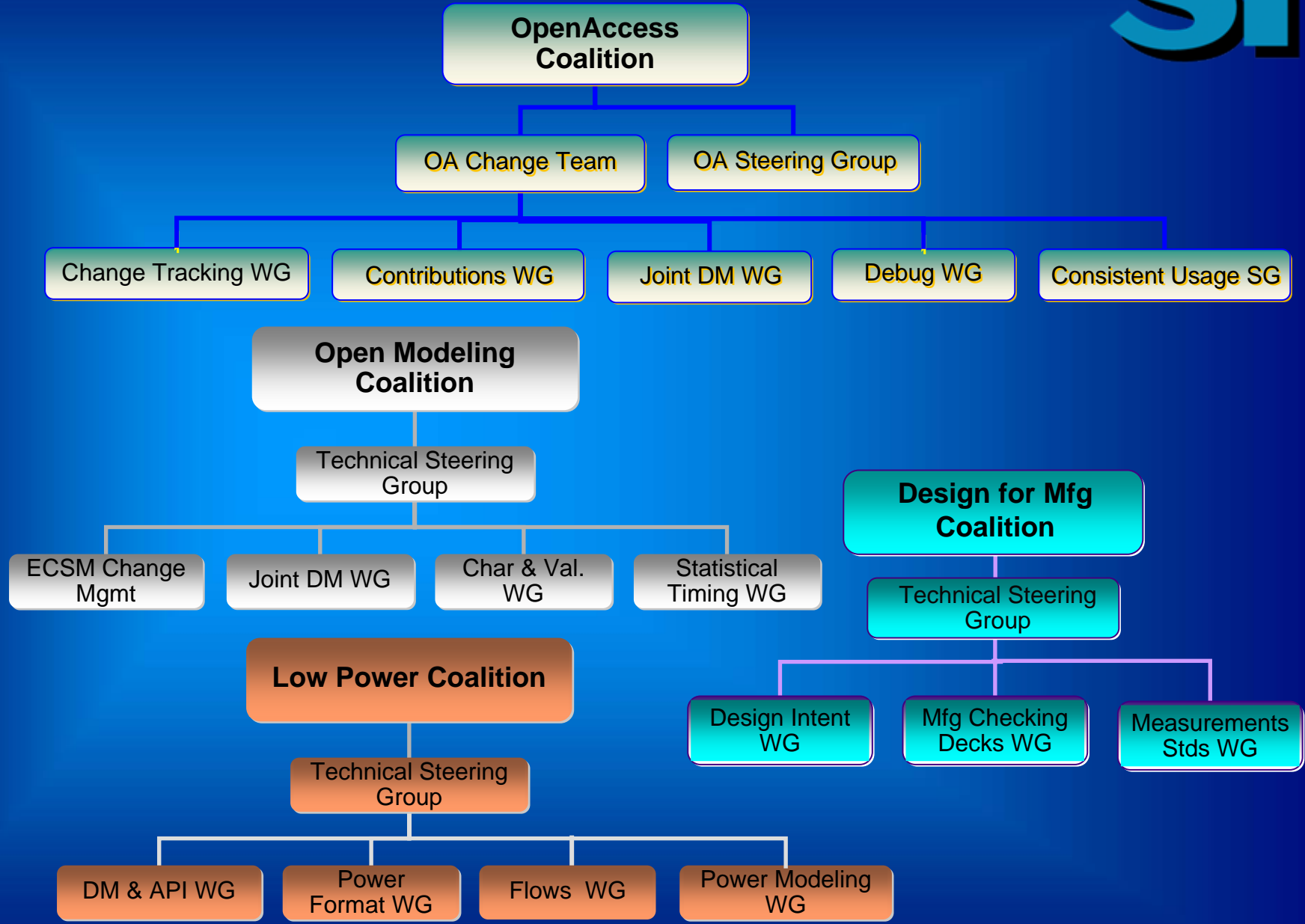
- ◆ Business focus on collaborative solutions to shared problems
- ◆ Customer-centric, but leveraging strong supplier partnerships

- **Approach**

- ◆ Dedicated technical staff and infrastructure for complex needs
- ◆ Holistic approach to market-oriented adoption success



Si2 Coalitions





About Si2 Coalitions

- **OAC Mission**

- ◆ Support development of OpenAccess as industry standard platform for EDA tool integration (incl. standard + enabling reference implementation, training materials, etc)

- **OMC Mission**

- ◆ Support development of interface standards to deliver advanced library models for design and analysis, including DFM (incl. standard + enabling software, etc)

- **LPC Mission**

- ◆ Support development of format and interface standards to support low power design (incl. standard + enabling parsers, reference flow, training materials, etc)

- **DFMC Mission**

- ◆ Support development of format and interface standards to support DFM (incl. standard + enabling reference implementation, translators, etc)

Now,... the Main Topic!



Metrics of Success in Semiconductor Industry

- **3 Key Measures of Success**

- ◆ Manufacturing line utilization
 - Success = Running near capacity (though 100% is not good)
- ◆ Inventories
 - Success = Kept at manageable levels (~50 days)
- ◆ Book-to-bill ratio
 - Success = >1.0 for growth

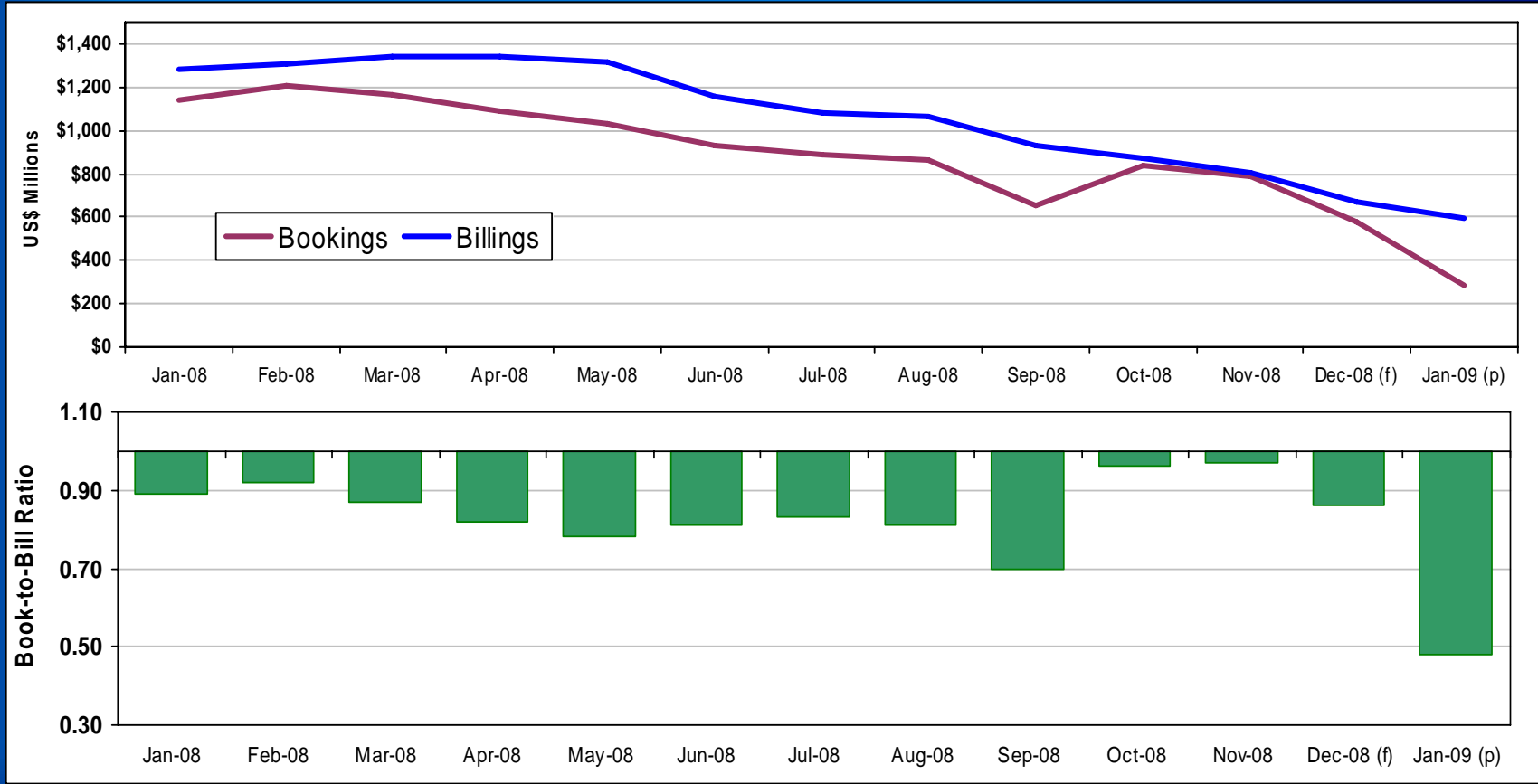
Blame Game

- **2001 IC industry bust was self-inflicted wound**
 - ◆ Dot-com business collapsed
 - ◆ PC industry stalled
 - ◆ Cell phone market tanked
 - ◆ Too many new 300mm lines created significant excess capacity
 - ◆ ... in other words, we created a “perfect storm”, a consequence of our “irrational exuberance”
- **2008... IC industry bust is like a viral infection**
 - ◆ Effects of sub-prime foreclosures spread through mortgage instruments have frozen banking industry
 - ◆ Lack of consumer demand has shrunk orders for IC's & associated software and services, increased inventories, slowed wafer processing, created layoffs
 - ◆ ... in other words, we got caught in a hurricane not of our doing, a consequence of “irrational exuberance” by others



SEMI N. America Book-to-Bill Ratio

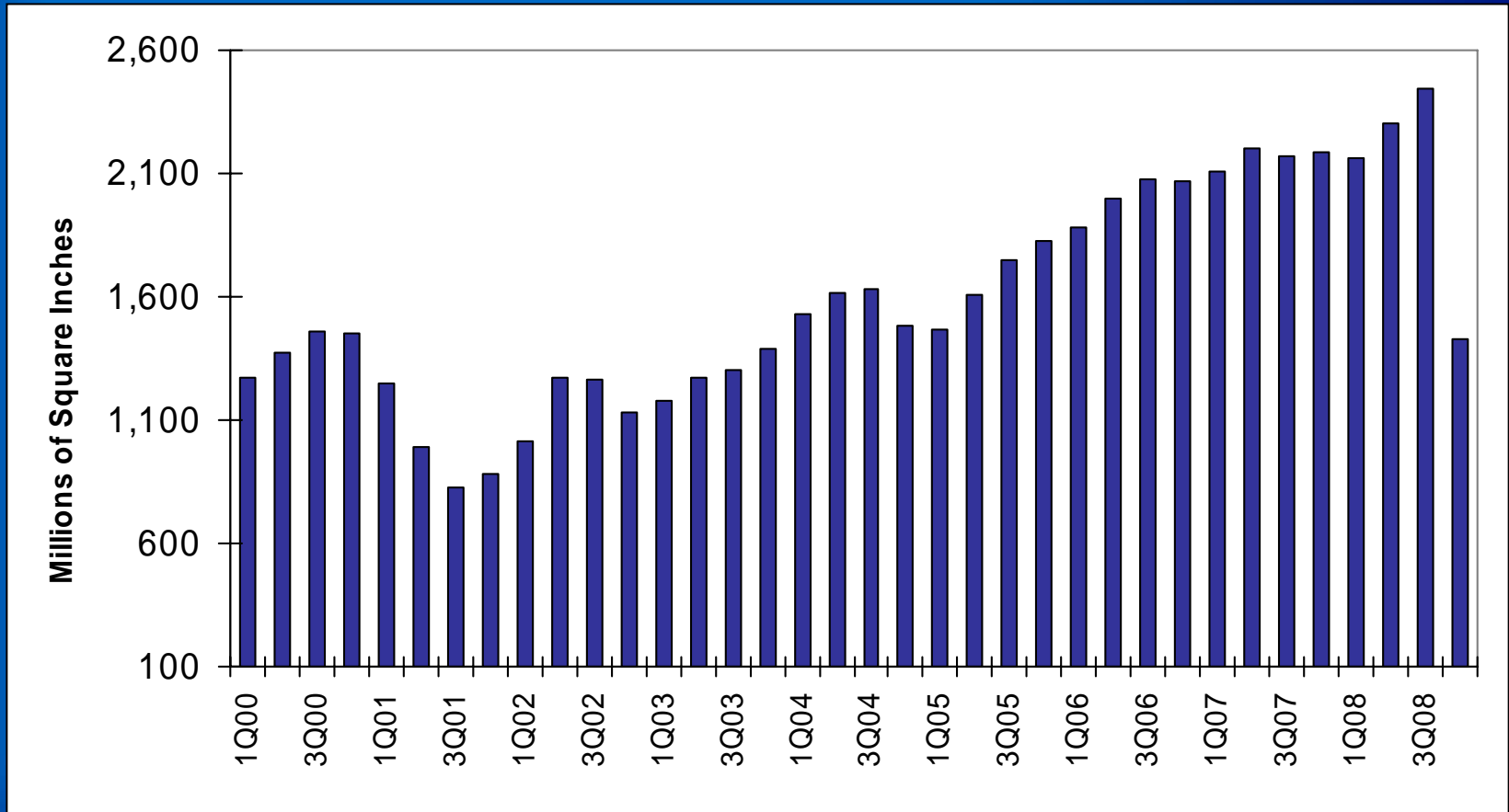
North American Headquartered Manufacturers Global Capital Equipment Book-to-Bill
(based on three month averages)



Source: SEMI Silicon Manufacturers Group, January 2009



Silicon Wafer Shipments



Source: SEMI Silicon Manufacturers Group, January 2009





Taking Stock... Airing the Bad News First!

- **Gartner Dataquest Predictions:**
 - ◆ Worldwide cap equipment expenditure
 - 2008 revenue \$30.8B, 2009 forecast \$16.9B, i.e., 45% Y-o-Y decline
 - 2010 forecast at \$20.3B, i.e., 20% Y-o-Y increase
 - ◆ Semiconductor revenue: ~\$195B in 2009, i.e., 24% Y-o-Y decline
- **IDC Report:**
 - ◆ Sharp drop (14% Y-o-Y) in 4Q'08 server revenues, total \$53.3B in 2008, i.e., -3% Y-o-Y
 - ◆ Sharpest decline since dot-com slowdown in 2001
- **iSuppli Report (PC industry):**
 - ◆ CPU shipments down 17% 4Q'08, decline projected through 1H'09, flat overall for 2009
- **2 other key barometers:**
 - ◆ Days of Inventory
 - 70-80 days versus normal of 50-55 days
 - ◆ Foundry utilization
 - Reported to be as low as 40-50% or lower
- **References:**
 - ◆ <http://www.eetimes.com/news/semi/showArticle.jhtml;jsessionid=YMNDSIZ1UXMTOQSNDLPCKH0CJUNN2JVN?articleID=215801266>
 - ◆ <http://finance.yahoo.com/news/Worldwide-Server-Market-bw-14460351.html>
 - ◆ <http://www.eetimes.com/news/latest/showArticle.jhtml;jsessionid=LQ1OP5ERKS32GQSNDLSCKHA?articleID=216401116>

Taking Stock... Mixing the Bad with the Good!

- **Let's get the bad news out of the way first**
 - ◆ Global contract IC manufacturing industry will drop >35% in 2009 revenue
 - ◆ TSMC will incur loss in 1Q2009, first time since 1999
- **And now, some good news**
 - ◆ Taiwan Economic News: "TSMC Holds Rosier Outlook for 2009"
 - Internal consensus among its executives that semiconductor industry has hit the bottom in the first quarter
 - But, there are still bad days ahead
 - Days of inventory (DOI) still high at 70-80 days, compared to normal 50-55 day range
- References:
 - ◆ http://www.cens.com/cens/html/en/news/news_inner_26372.html



Recovery,... One Company at a Time...

- **How does Intel plan to deliver?**

- ◆ Intel outlook bullish based on Netbook sales
- ◆ Intel CEO, Paul Otellini: “I'm not saying we know where the bottom is or that we've hit bottom [but] the predictability is starting to come back into the system. I think you have seen the global shock and now people are starting to figure out how to work out of it”
- ◆ Key strengths:
 - Largest semiconductor manufacturer, dominant market share in PC's
 - Intel positioning for greater growth outside the depressed PC market
 - New ATOM processor opening new opportunities in Netbooks and MID's
 - Partnership with TSMC offers new opportunities in ATOM adoption
- ◆ Key concern:
 - Success of ATOM may undercut market share / margins of higher-end processors

- **References:**

- ◆ <http://www.gulfnews.com/business/Technology/10290039.html>
- ◆ <http://www.eetimes.com/news/latest/showArticle.jhtml;jsessionid=LQ1OP5ERKS32GQSNDLSCCKHA?articleID=216401116>



Recovery,... One Company at a Time...

- **How does IBM plan to deliver?**
 - ◆ IBM positioning to lead in era that lies on other side of present crisis
 - ◆ IBM CEO Samuel J. Palmisano: “We will not simply ride out the storm, rather we will take a long-term view, and go on offense”
 - ◆ IBM reaffirms strong 2009 outlook
 - Strong double-digit growth" in long-term services signings so far this year
 - Good pipeline of software opportunities
 - On track to hit financial targets based on encouraging numbers from Jan. '09
 - ◆ Key strengths:
 - World-wide reach: 67% of revenue comes from overseas
 - Investment in cloud computing
 - Investment for a greener planet using “smart meter” technology
 - Analytical devices and software that can be used to monitor systems, from traffic management systems to food traceability products, etc
- References:
 - ◆ http://money.cnn.com/news/newsfeeds/articles/djf500/200903091159DOWJONESDJONLINE000366_FORTUNE5.htm

Recovery,... One Company at a Time...

- **How does Ericsson plan to deliver?**
 - ◆ Ericsson soared in 2008, but can it win in 2009?
 - 2008 revenues rose 11%
 - Cash & short-term investments soared by 30%
 - ◆ Industry analysts see Ericsson performing strongly in 2009
 - ◆ Key strengths:
 - Lots of cash in bank, healthy line of credit
 - Strong sales growth carried over from 2008
 - Attractive and extensive product lines
 - Wide geographical customer base
 - ◆ Key concern:
 - ST-Ericsson joint venture will require significant short-term cash outlays

- References:
 - ◆ <http://www.eetimes.com/news/latest/showArticle.jhtml;jsessionid=WT2JJMSU1FE1MQSNDLSCCKHA?articleID=215801552>

Recovery,... 2009 Outlook

- **Gartner Dataquest Top-5 Predictions**
 - ◆ Virtualization, Cloud Computing, Servers Beyond Blades, Web-Oriented Architectures, Enterprise Mash-ups
- **Outsourcing will grow through downturn of 2009**
 - ◆ Balancing act between outsourcing costs versus cost optimization
- **Key observations to pay attention to during recovery**
 - ◆ Technology will continue to advance at rapid pace, but global economic conditions will significantly impact business uptake in 2009
 - ◆ Technologies like virtualization and emerging trends like cloud computing offer new efficiencies and reduce the need for capital expenditure
- **References:**
 - ◆ <http://blog.gogrid.com/2008/10/16/analysis-of-gartners-top-10-strategic-technologies-for-2009/>
 - ◆ <http://www.customercommunicationscommunity.com/2009/01/20/gartner-says-outsourcing-will-continue-to-grow-in-2009-despite-economic-slowdown/>
 - ◆ http://www.searchstorageasia.com/content/gartner-predicts-2009-innovation-despite-economic-downturn?src=top_view

Recovery,... Key Focus Areas

- **Business focus for recovery**
 - ◆ The world after the downturn (2010...) will be different from the world before the downturn (2008),... lesson from all previous downturns
 - ◆ Enterprises that do not use this downturn to reduce or eliminate inefficiencies & prepare for new opportunities will find themselves at considerable disadvantage,... another lesson from past
- **Technology focus for recovery**
 - ◆ Enterprises that postpone essential technology deployments do so at their own peril
 - ◆ Technologies like virtualization and emerging trends like cloud computing offer new efficiencies and reduce need for capital expenditure



Recovery,... A Plug for Standards Orgs!

- **Avoid throwing the baby out with the bath water**
 - ◆ Discretionary spending is first target of any downturn-driven cost reduction
 - ◆ Funding work at standards organizations is always part of discretionary spending
 - ◆ Yet, when money is tight, “innovation through collaboration” in standards organizations provides significant ROI
 - Cost sharing offers “1/N” leverage
 - Standards can enable new growth
 - No one has monopoly on good ideas
 - Partner with leaders in supply chain
- **Key message for troubled times**
 - ◆ When you cut costs, know what to cut and what to keep!

Recovery,... Hopeful Signs

- **Now some good news from TSMC**
 - ◆ TSMC seeing backlog for orders in 04/2009
 - ◆ Price upturn of flat display panels in 01/2009 a good harbinger
- **News from Semico Research Corp.**
 - ◆ Less bearish outlook, semiconductor revenue will decline by ~15%
 - ◆ More bullish about receding inventories creating demand to improve outlook and output
- **And the best news is...**
 - ◆ All reports point to end of trough in 2H'09 and start of growth cycle in 4Q'09 – 1Q'10
 - ◆ There are already hopeful signs that companies are lining up to lead the pack
- **References:**
 - ◆ http://www.cens.com/cens/html/en/news/news_inner_26372.html
 - ◆ <http://www.eetimes.com/showArticle.jhtml?articleID=215801395>