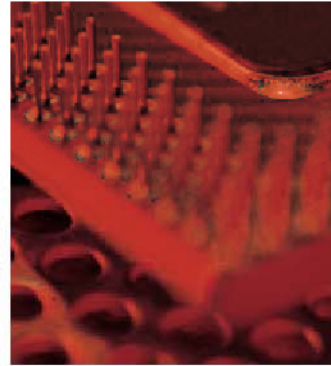




Global Semiconductor Alliance



N.A. MEMS Working Group Formation Committee Meeting

Louis Ross, President & CEO, Virtus Advanced Sensors
December 8, 2010



Agenda

- Overview of Semiconductor/MEMS Industry
- What is the goal of the GSA MEMS Working Group?
- How will the Group achieve this goal?
- Identify priorities
- Determine the meeting strategy moving forward
- Determine what other companies should be invited to join the Working Group





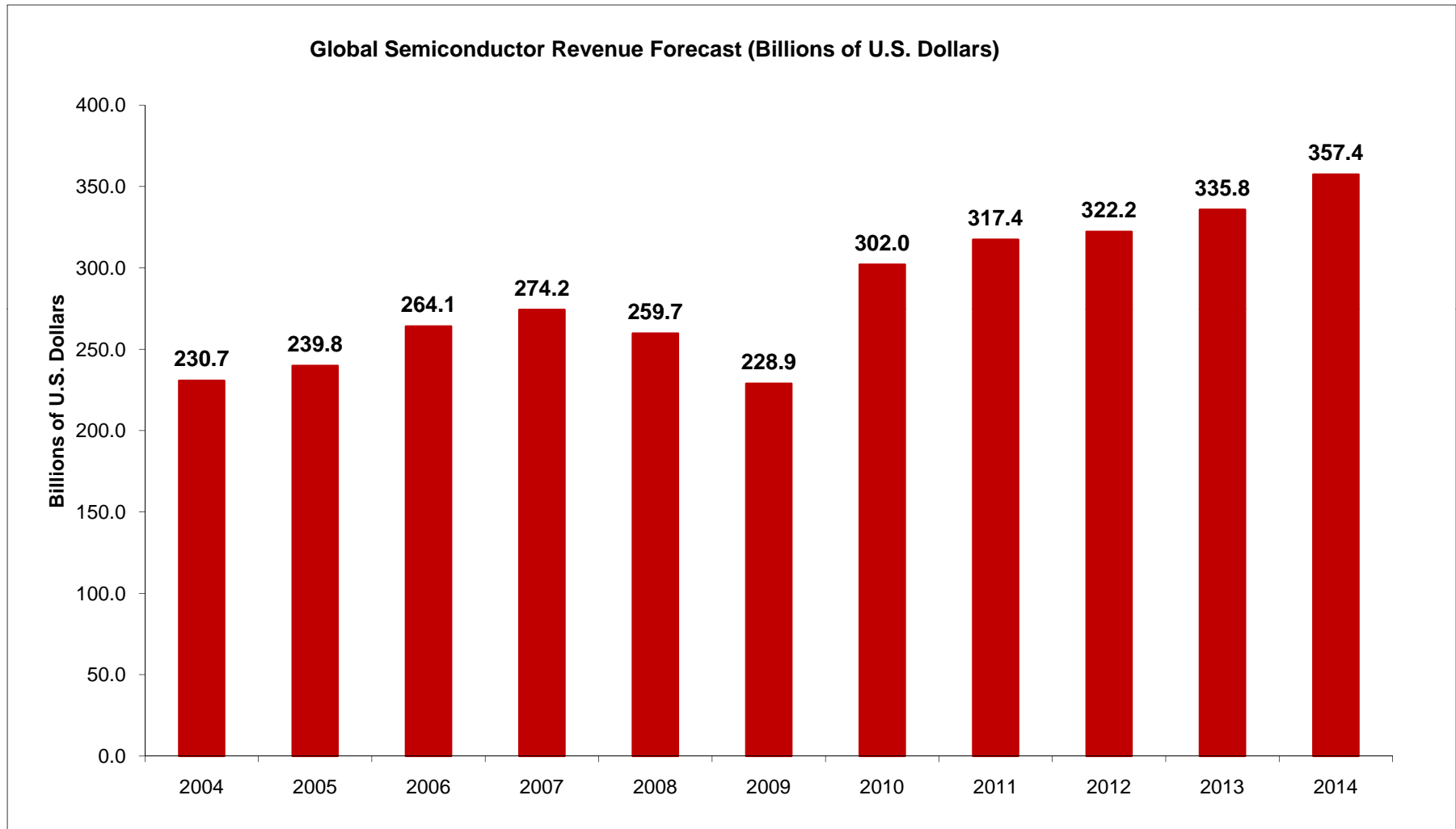
Overview of Semiconductor Industry

- Reported sixth straight quarter of growth in Q3 2010
- All of the top 20 semiconductor suppliers have for one—Sony Corp.—are expected to register **strong double digit growth rates in 2010**, according to IC Insights Inc.'s preliminary ranking of the top 20 chip suppliers this year.
- Most analysts predict the industry to grow over 30% this year, placing it in second place after 1984's 50% growth according to IC Insights.
- In the last few weeks, analysts have begun to project double-digit growth for 2011 after months of forecasting single-digit growth.



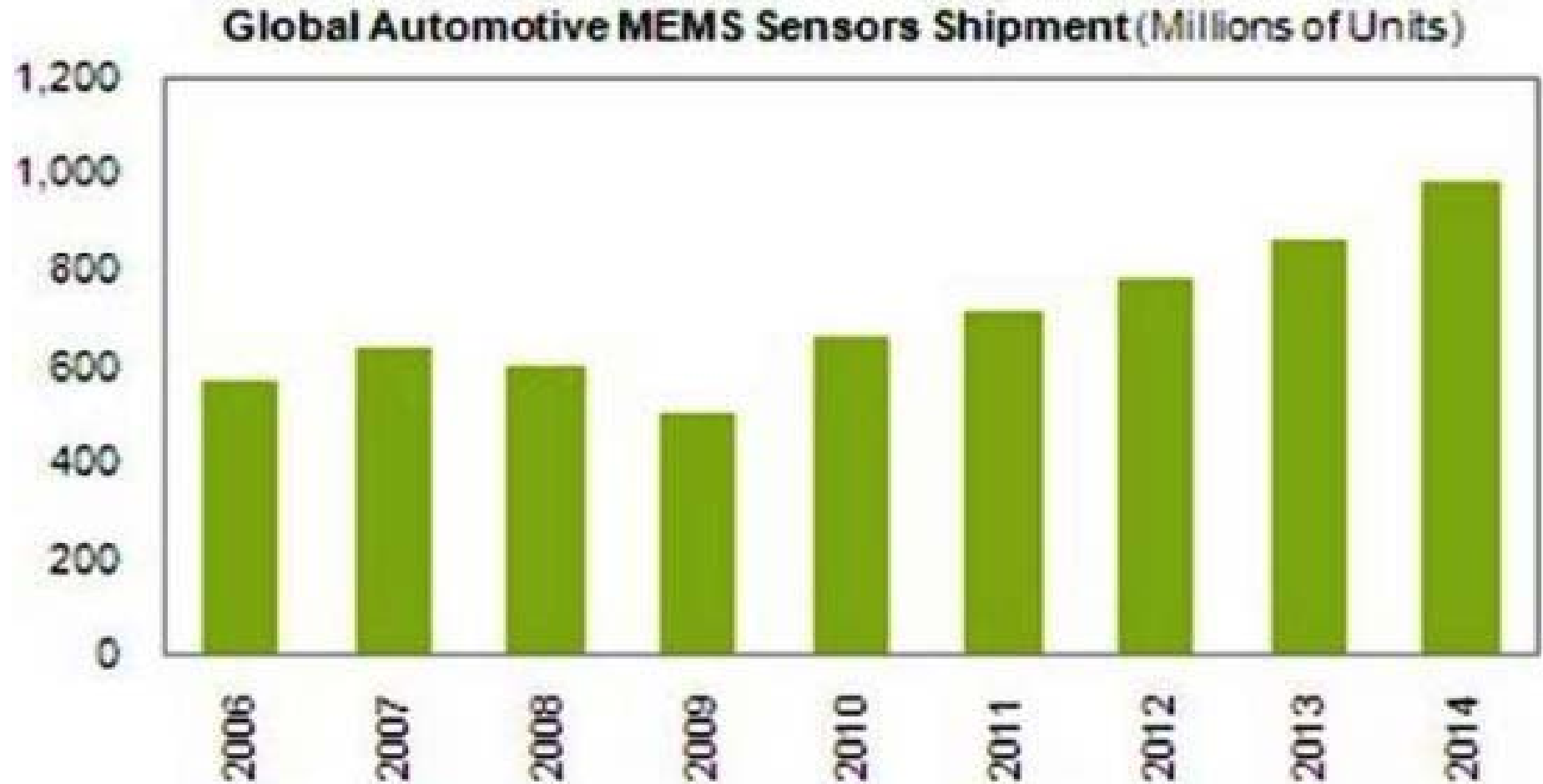


Overview of Semiconductor Industry

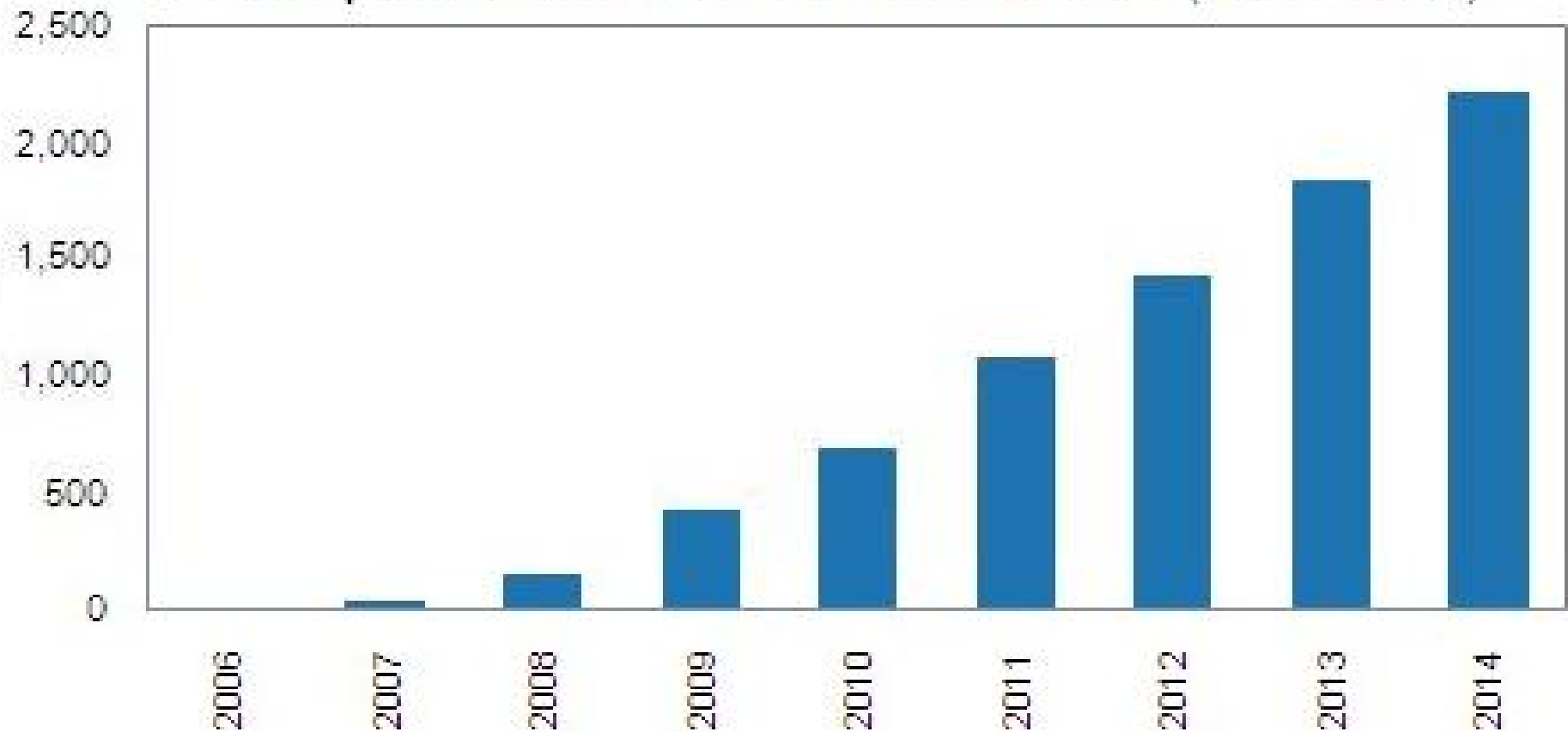


iSuppli, Oct 2010



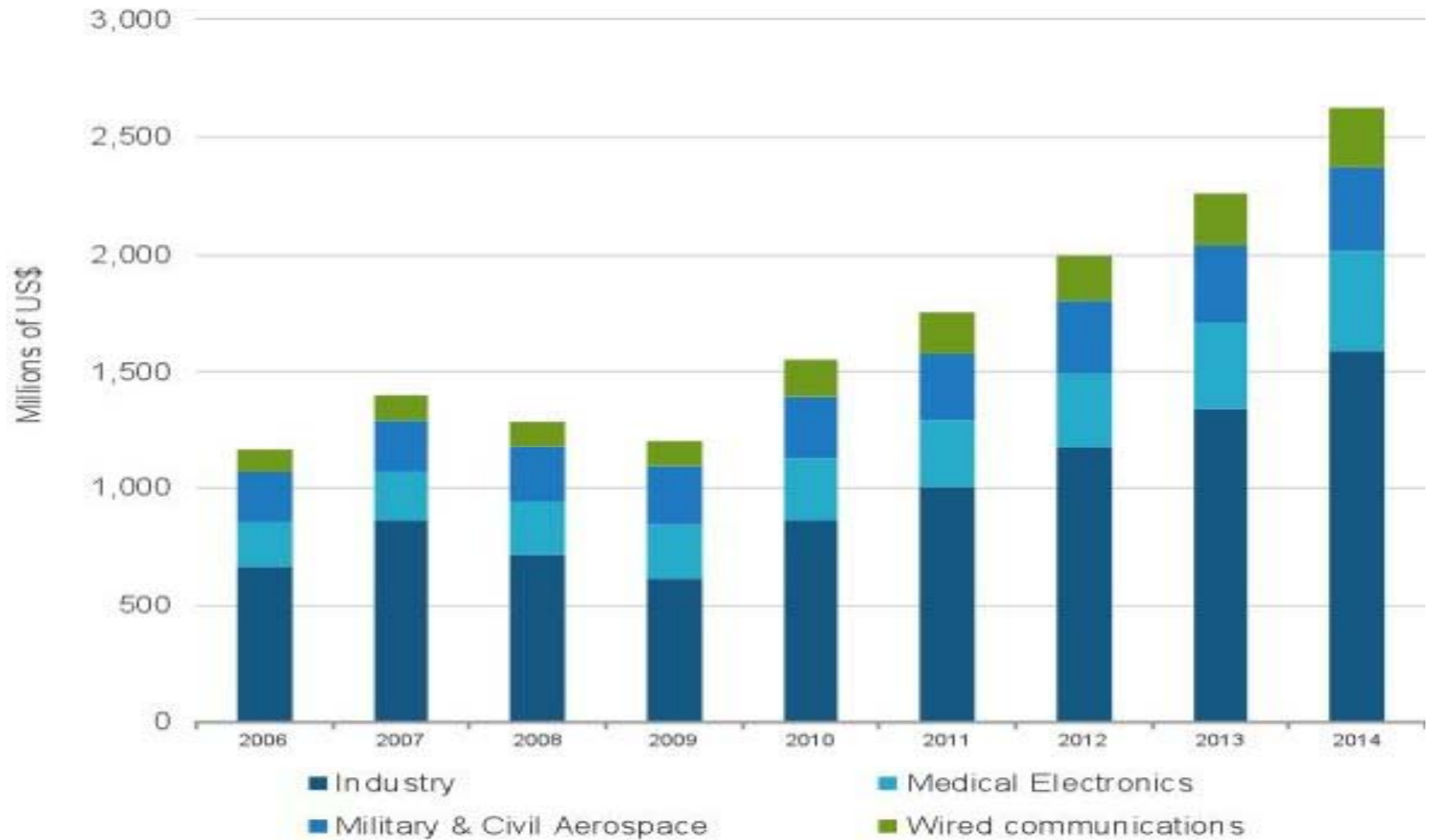


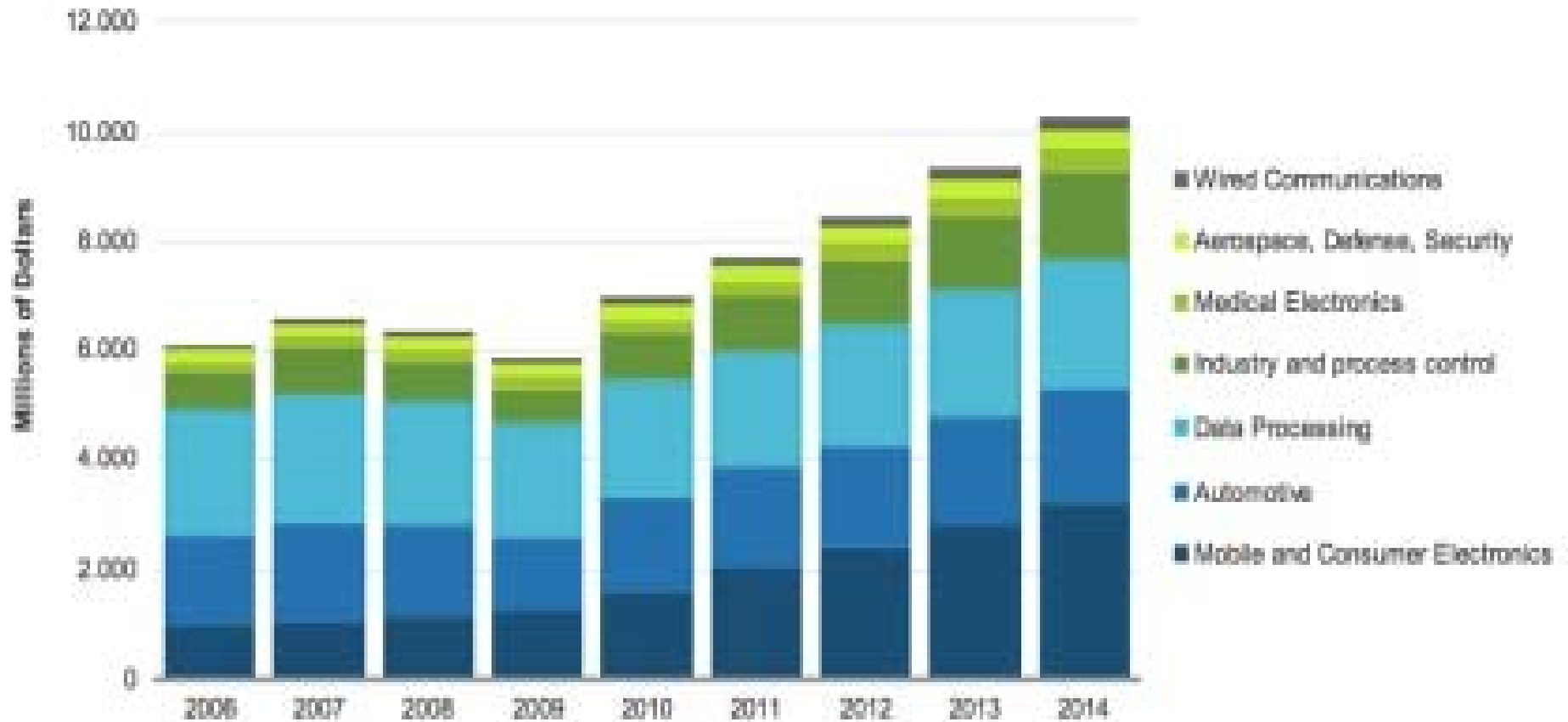
Global Shipments of Motion Sensors in Mobile Handsets (Millions of Units)





Increasing Diversity in Technologies, Products and Services





MEMS markets will experience double-digit growth, from about \$7 billion in 2010 to over \$12 billion by 2014 - iSuppli





Investment in MEMS

- Semiconductor/MEMS industry has been about 5-6% of total VC investment (\$/deal), which places it at #6 of 17 measured industries.
- 5 markets ahead of it comprise over 70% of total VC investment (Software, Biotechnology, Med Devices and Equipment, IT Services, Industrial/Energy). MEMS is an enabling factor in all of these markets and considered a type of “semiconductor investment”
- Many MEMS plays will incorporate a software/internet components; sensors
- VCs are funding a high amount of later stage semiconductor/MEMS firms
- Over 90 different firms put money in the Semiconductor/MEMS industry over the past two quarters.
- Sources of funding proliferating; angel, large company strategic, public, overseas.... Source: PWC MoneyTree





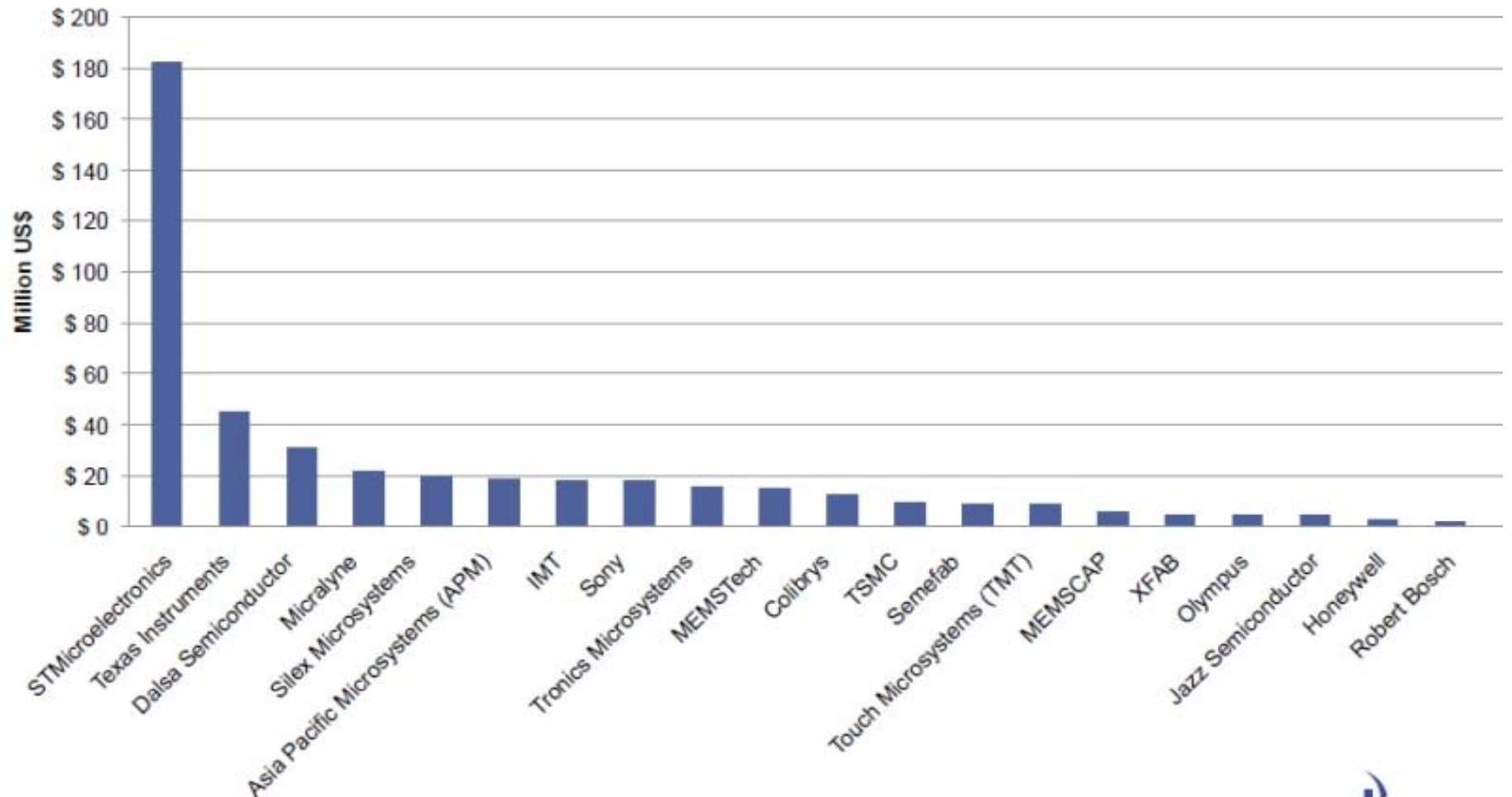
MEMS and the Semiconductor Industry

- The future of the MEMS space is tied to the diversification and growth of the of the semiconductor industry
- MEMS is a key enabling technology to mature before NEMS and Nanotechnology
- Leading semiconductor foundries began to actively build their MEMS capabilities only recently; Growth of capacity of captive and independent (“boutique”) MEMS foundries
- Successful introduction and growth of new low-cost, mass produced MEMS devices helped to create more opportunities for standards development, etc.
 - microphones, inertial sensors, timing chips, etc.
- However, MEMS is still very fragmented and more new, novel applications will ensure this is the case for some time to come...



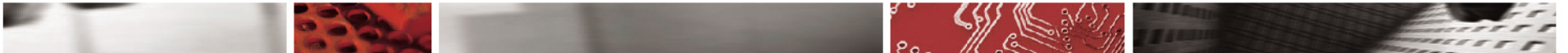
TOP 20 MEMS Foundries - 2009 revenues

(Yole Développement Estimates - US\$ Million - April 2010)





MEMS WORKING GROUP





Goal of MEMS Working Group

- To establish an efficient and integrated ecosystem for the MEMS supply chain by bringing together fabless, equipment, designers, suppliers, applications, and end use customers to address the challenges to collaboration in an effort to scale and drive costs down to increase the opportunities to expand the MEMS market.
- Fabless design companies and start ups have increasingly been successful at introducing new products into the MEMS space
- Huge growth expected for applications companies that utilize MEMS components to build systems
 - sensors, mics, clocks.....
- Customers of devices broadening and interest by “non-traditional” customers increasing (i.e. more and more industries discovery MEMS as a key enabler or potentially disruptive technology for their business...)





How Will the Group Achieve this Goal?

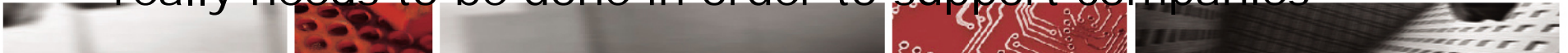
- GSA has set up two working groups representing:
 - **North America and Asia** – Headed by Louis Ross, President & CEO, Chairman, Virtus Advanced Sensors, and operated out of North America and Japan, Asia
 - EMEA** – Headed by Maarten Willems, CMORE Business Director, IMEC, and operated out of Europe
- We are beginning with a **MEMS Working Group Formation Committee**. This Committee will be asked to help us identify the priorities to address the timing and tools to address them.
- Draft of yearly agenda (deliverables, seminars, conferences); select “point people” for various topics (i.e., organizer of activities related to test, foundries, start up companies, individual applications/sectors, etc.)





Identify Key Priorities

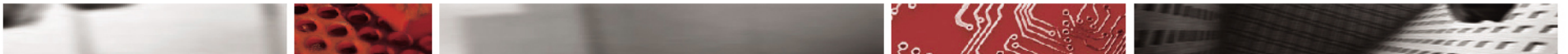
- Standard process flows
- Packaging and test challenges
- Foundry evaluation and selection
- Supply chain issues
- Alignment with customers
- Issues for start-up companies; enhancing interfacing between start ups and large strategic partners
 - larger companies have built ecosystems but things are still in flux; start up growth is key to build industry
- Emerging technologies for MEMS
- University/industry collaboration and R&D
- Research institute activities (IMEC, etc.)
- Government programs supporting MEMS R&D and commercialization
- Utilize existing market knowledge to determine what really needs to be done in order to support companies





Tools for Addressing Priorities

- Designing a **2011 Global MEMS Supply Chain Collaboration Conference** to bring together key MEMS players and will include expert presentations and panels. The location of this event will be determined by the Working Groups. Additionally, the working groups may identify the need to host smaller sessions in different regions to address topics.
- A general **MEMS White Paper** that includes a MEMS history, current state, challenges and opportunities moving forward. Topical white papers may be useful as well.
- Creating a **MEMS White Paper** on "The Future of MEMS and the Challenges that Must Be Addressed". This paper will be the basis for our work in the MEMS area.
- Determination of topics for relevant **Surveys** to better understand areas of interest to be dispatched.





- Collaborate internally (GSA's 3D IC Working Group); joint seminar/symposia, etc.
- Identify data aggregator/analyst/consulting company partnerships (MEPTEC, Semi mag, iSuppli, etc.)
 - determine limits to such cooperation in consideration of company needs/wishes
 - align with other industry associations to hold joint seminars/symposia (CEA, etc.....beyond "food chain industries" reaching into applications oriented...)
 - interaction with IEEE committees, publications, conf. (IEEE MEMS, IEEE NEMS, etc.)
- Strong interest in the MEMS community in integration and development of systems
 - Stage 1- proliferation of **components**
 - Stage 2- proliferation of **systems**





Assorted Goals

- Become the key conduit of MEMS market knowledge to industry and sector analysts
- Introduce MEMS as a growing and potentially disruptive component of the semiconductor industry
- Develop “application watcher” to loosely follow new developments in the applications area...which fuels volume for device manufacturers, etc.
- Industries of interest to MEMS: consumer electronics, industrial, automotive, healthcare/medical, sports, defense.
 - what can we use in terms of existing GSA knowledge/data?
 - opportunities to collaborative on events/white papers; example- MEMS section in consumer electronics oriented publication.

Help companies to follow the “lineage of demand”.....





Goals....

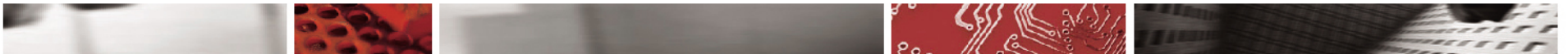
- Determination of types of useful databases for companies
 - vendors, suppliers, etc.
- Development of special effort for start up company support (legal, accounting, funding, etc.)
- ?
- ?
- ?





Companies that should be invited to join

- Large companies and start ups
- Information/service providers, consultants, existing
- MEMS groups (opinions?)
- Priority should be with companies engaged in the MEMS, semi and related businesses.
- Cultivate relations with leading academics/advisors to industries; new tech canvassing, joint projects, recruiting
- Develop strong ties to key actors in the government sector
 - Government provides R&D funding and helps direct industry; white papers to educate key politicians





MEMS is Way Beyond MEMS

- Consumer electronics- cell phones, digital video, still cameras, toys, ebooks, etc.
- Industry- semi manufacturing, building automation, test and measurement, energy and power, manufacturing automation, agriculture and construction, marine, etc.
- Defense/Aerospace- civilian, military aircraft, munitions aerospace electronics, etc.
- Life Sciences- patient monitoring, diagnostics, drug delivery, drug discovery, etc.

As a key enabling technology, MEMS footprint, in reality is extremely broad and expands as existing and potential users become updated and educated on the space.....that should be a key function of the MWG....

