



REDEFINING MOBILITY



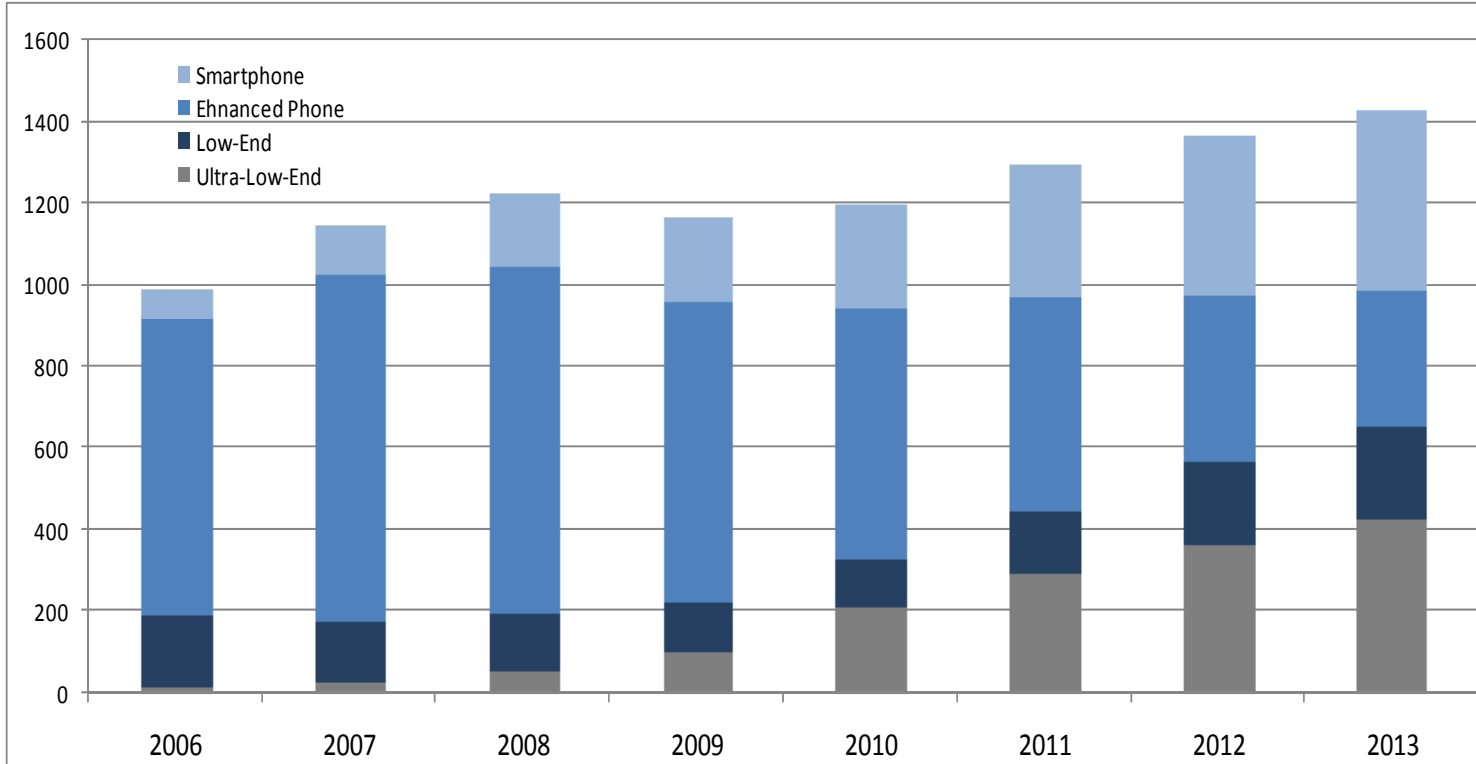
ITRS Keynote Panel:
“The Future of Innovation: Implications of Today’s Trends
on Tomorrow’s Technology”

Comments from:
Michael Campbell
Senior Vice President, Engineering
Qualcomm CDMA Technologies

Global Handset Demand Remains Strong Across Multiple Segments

New Handset Segmentation

Units/Millions



Revenue Breakdown

\$88 B

\$33 B

\$9 B

\$9 B

- **Greater demand for infotainment and other rich media services that leverage mobile broadband**
- **Rapid growth of subscriber base in emerging markets**

Source: ABI Research

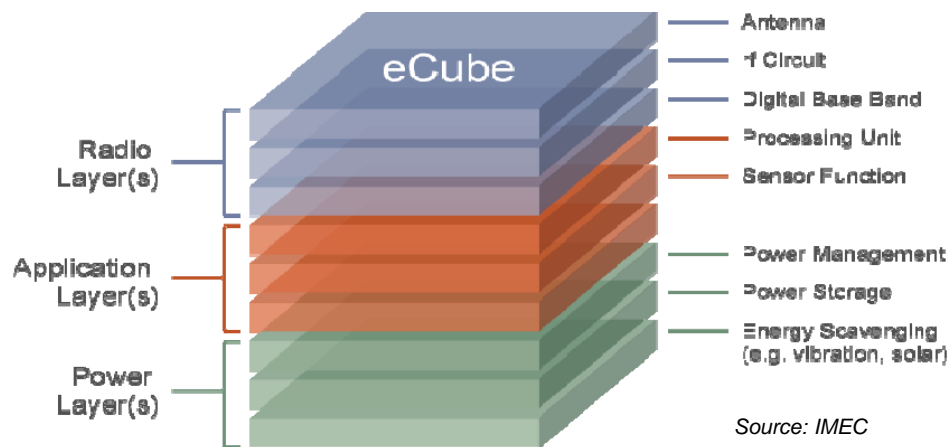
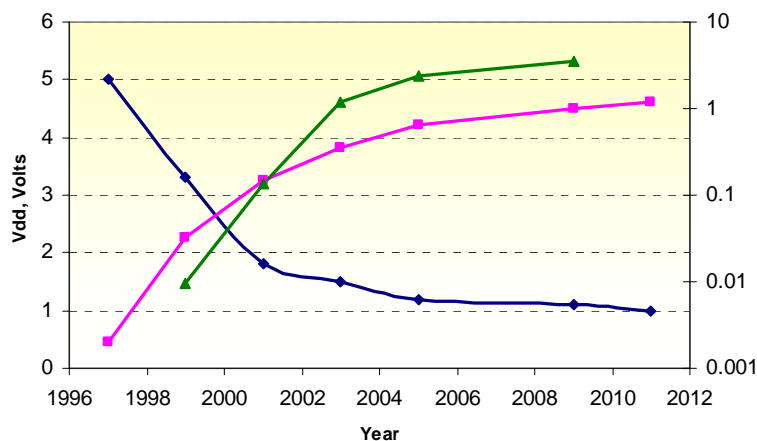
Wireless is Enabling Mobile Devices that will Transform how we relate to the World.



Technology innovations needed for: Low Cost, Low Power, small Form Factor, and high Performance

- Technology Scaling- “Moore’s”...reaching performance economic limits

- “More than Moore”...for accelerated performance and economic benefits



Source: IMEC

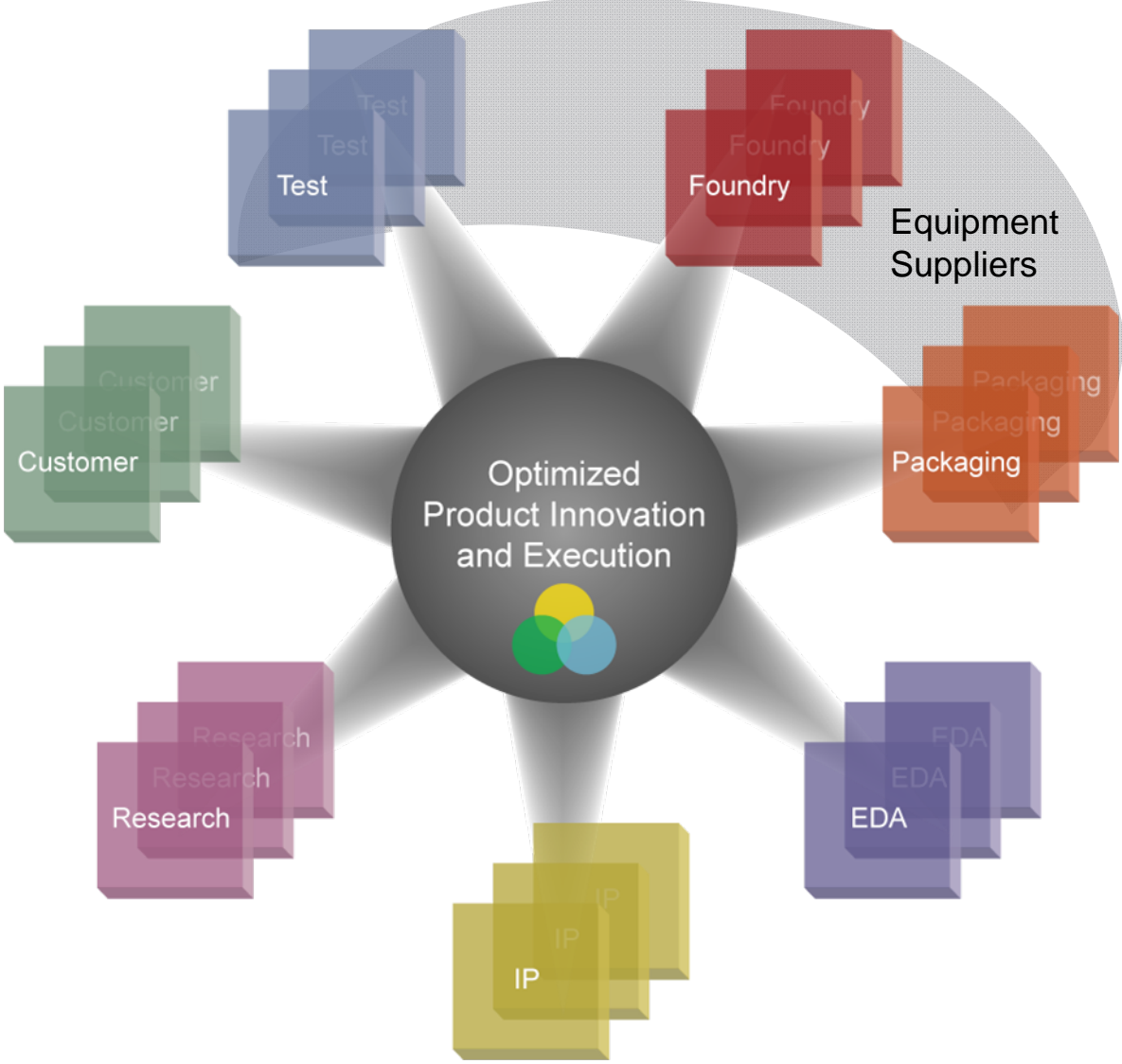
IFM (Integrated Fabless Manufacturing) can be extended for development of competitive products

Continued **Collaboration** across Value Chain

Co-design of Architecture/Design/Si/Packaging

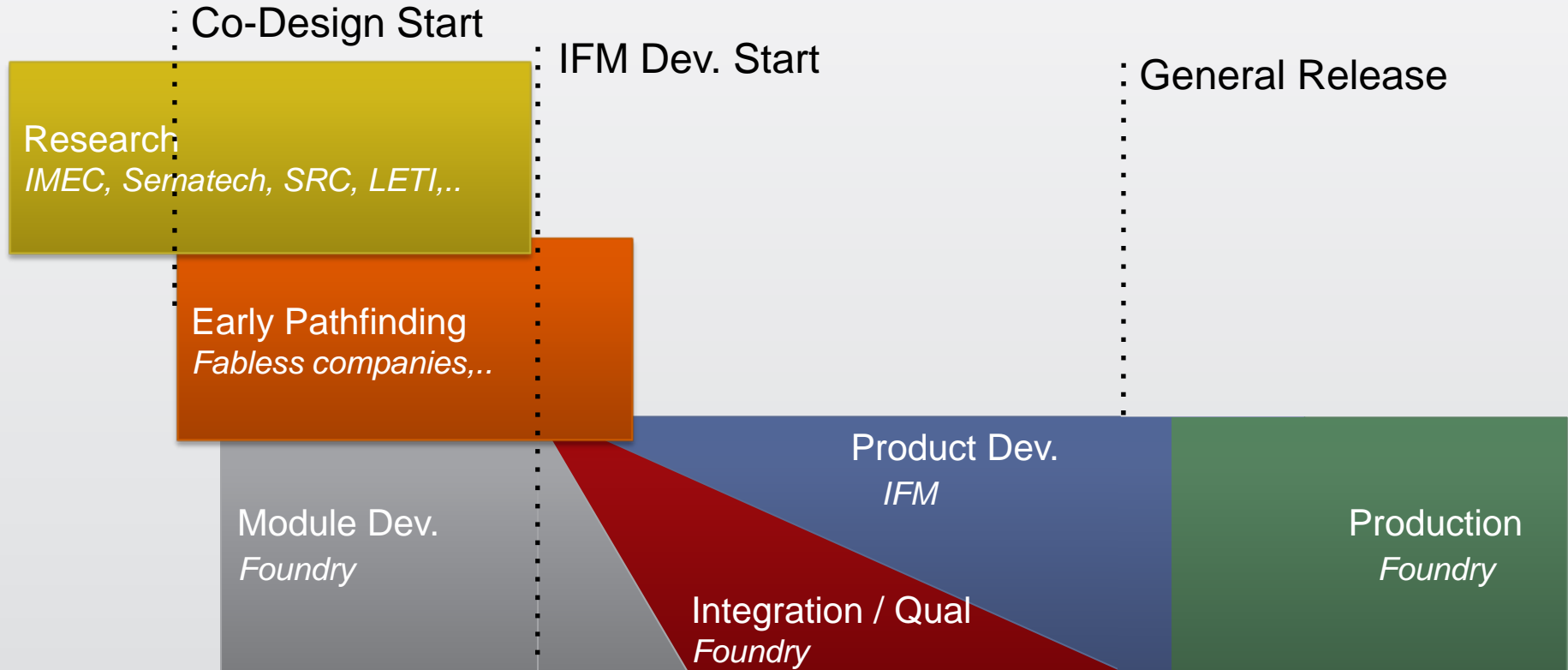
Early **Pathfinding** / pre-manufacturing partnerships

Eco-system Alignment Across Entire Value Chain is Required for Optimized Product Innovation & Execution



Superior Product Innovation Through Early Co-Design

IFM Foundry Engagement Model



IFM* enabled early Foundry process access

Pathfinding using Research organizations can enable early Co-Design

* IFM: Integrated Fabless Manufacturing

A Gap in the Supply Chain model – assembly /test historically an after thought.

IFM SATS Engagement Model

Co-Design Start

IFM Dev. Start

Research

IMEC, Sematech, SRC, LETI,..

Early Pathfinding

Foundries, Fabless companies, ..

Early Development and Prototyping/Manufacturing Gap - Assy / Test must now be part of design / development cycle

**Non – Traditional manufacturing techniques: with advanced process technology must be addressed. (TSS, MEMS, copper pillar free, High K, low k, die in substrate)
And then inspection and measurement technologies.**

Development / Integration / Qual SATS

Production SATS

- ISSUE: Historically Limited R&D Investment
- Longer lead time for development of new technologies such as 3D
 - The need for fab-like equipment and processes

* IFM: Integrated Fabless Manufacturing

Summary: It's All About Collaboration

- Consumer demand for increased features/capability in wireless applications is driving mobile wireless product demand
 - High end smart phone driving significant performance enhancements
 - Smaller, sleeker and more affordable devices
- Customer demand drives Innovative Scaling, and “More than Moore” solutions.
 - **Non-traditional manufacturing / measurement and development are required for success.**
 - Those that can innovate and collaborate will win in the high volume low cost, low power and smaller form factor systems focused products.
 - 3D TSS, Mems, embedded die in substrate, and other process /assembly techniques are driving expanded partnership and cooperation.
- **Collaboration across the entire eco-system** is required for co-design, superior product innovation and delivery to the market place (execution) in these rapidly changing times.



Thank you!