Key Factors for a Successful Transition to 450mm Platform

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Why 450mm?
Demand for devices expected to increase exponentially
Silicon Demand expected to increase substantially

- **50B** connected devices by 2020
- **6B** cell phone contracts in 2012

Source: Gartner
Silicon Demand driven by

**Low Cost**

- **TRANSISTORS per $**
- **1960 to 2020**

**Low Power**

- **WATTS per MIPS**
- **1960 to 2020**

enabling the Mobility Age
Ramp of Complexity in the next 5 years

EUV, E-Beam Inspection, III-V Materials
3-D NAND, Integrated Processing,
Material Modifications
Conformal Films, Hi-K ALD

PVD → Metal CVD, Flowable Films
Quad patterning, High Aspect Ratio Tech
Sacrificial Films, Complementary patterning
Lamp Based Processing, TSV

R&D of 450mm needed in parallel to all 300mm technology inflections
Silicon Demand by Wafer Size

WW Silicon demand by wafer size

- 75mm
- 100mm
- 125mm
- 150mm
- 200mm
- 300mm
- 450mm

Year:
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015
- 2020
- 2025
- 2030

Silicon demand (%)
- 0%
- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%
- 80%
- 90%
- 100%
The Supplier Industry Dilemma

how does industry...

KEEP MOORE’S LAW PACE

ADDRESS INCREASING COMPLEXITY

AND REALIZE 450mm
The Key Factors
Key Factor # 1: Synchronized Timelines

Synchronized Timelines lowers the overall cost of Transition

Signals
1) Litho Timelines Published
2) Consortia/Semi Activities
3) Customer Announcements
Key Factor #2 : Efficient R&D

Parallel development drives need for efficient R&D
Key Factor #3: Collaboration

Chip Makers & Equipment Suppliers need to collaborate early and intimately.

Open Dialog between IC Makers, Equipment Suppliers and Materials Suppliers

1. Joint R&D
2. Tool Design
3. Fab Layout
4. Technology Requirements

Strong Collaboration ensures no ‘Wasted’ R&D Money
Key Factor #4: Standardization

Standardization on non-competitive parts eliminates redundant R&D
Key Factor # 5: Innovation

Innovative Tool Design for Performance and Productivity

Innovative Funding, Pricing and Time to Manufacturing Concepts

Innovative low cost factory layout schemes

Innovative Business Models

Use Innovative Strategies to overcome Transition Hurdles
Key Factor #6: Supply-Chain Readiness

- **Partnership**
  - Strong supply-chain partnership essential in early stages for successful transition
  - Expect continued consolidation

- **Technology**
  - Larger wafer size drives new technology investment and Innovation to meet 7-10 nm IC requirements

- **Costs**
  - Must deliver Cost Effective Solutions for larger scale

- **Efficiency**
  - Standards and collaboration on common components.
  - Supply Chain Efficiency needs revolutionary improvement

Existing Supply-Chain needs to be revamped & ready
Summary

Key Factors for a Successful Transition

1) Synchronized Timelines
2) Efficient R&D
3) Collaborations
4) Standardization
5) Innovation
6) Supply Chain Efficiency
Create a Sustainable Vibrant Semiconductor Industry