It's Time for 300mm Prime

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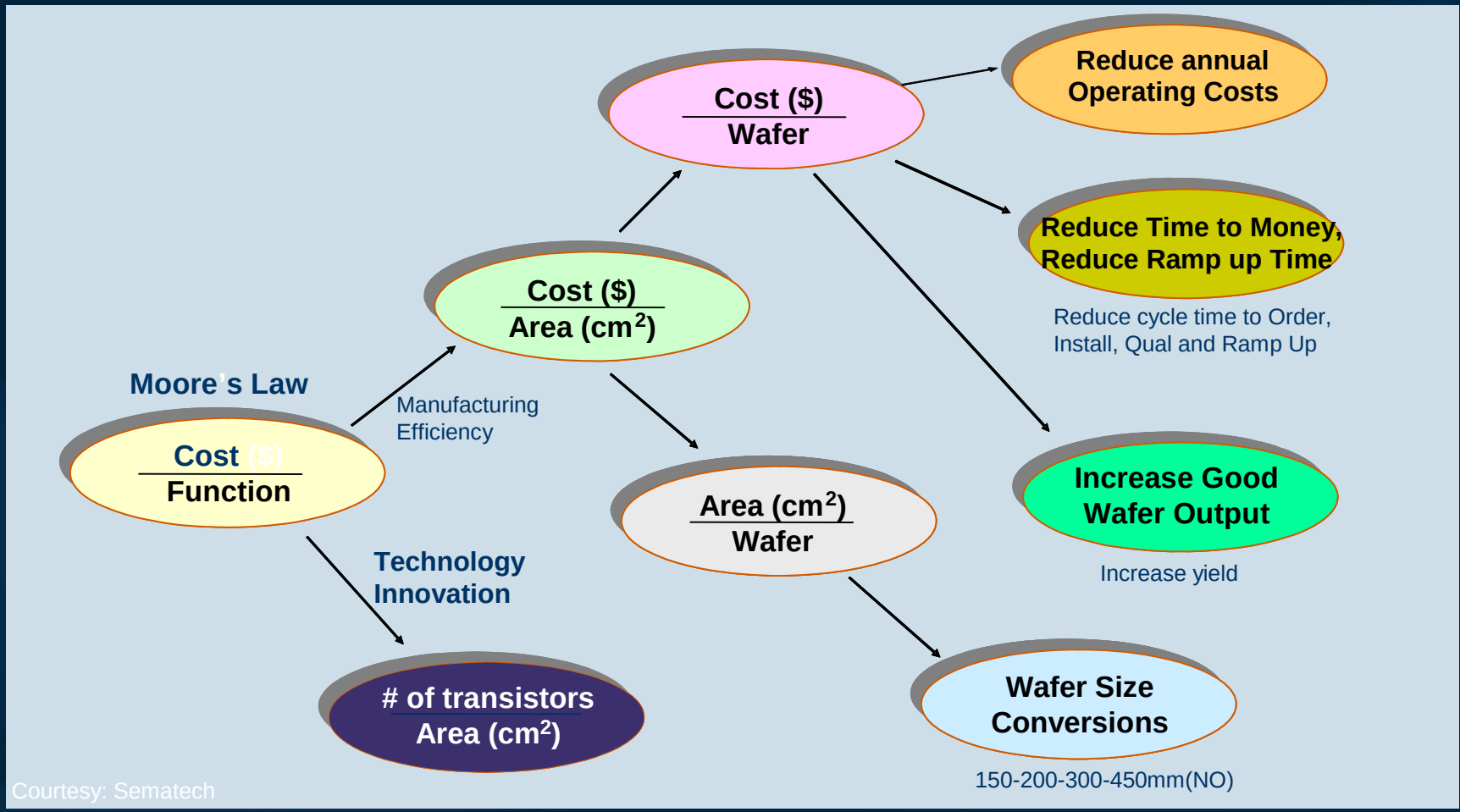
think it. apply it.™

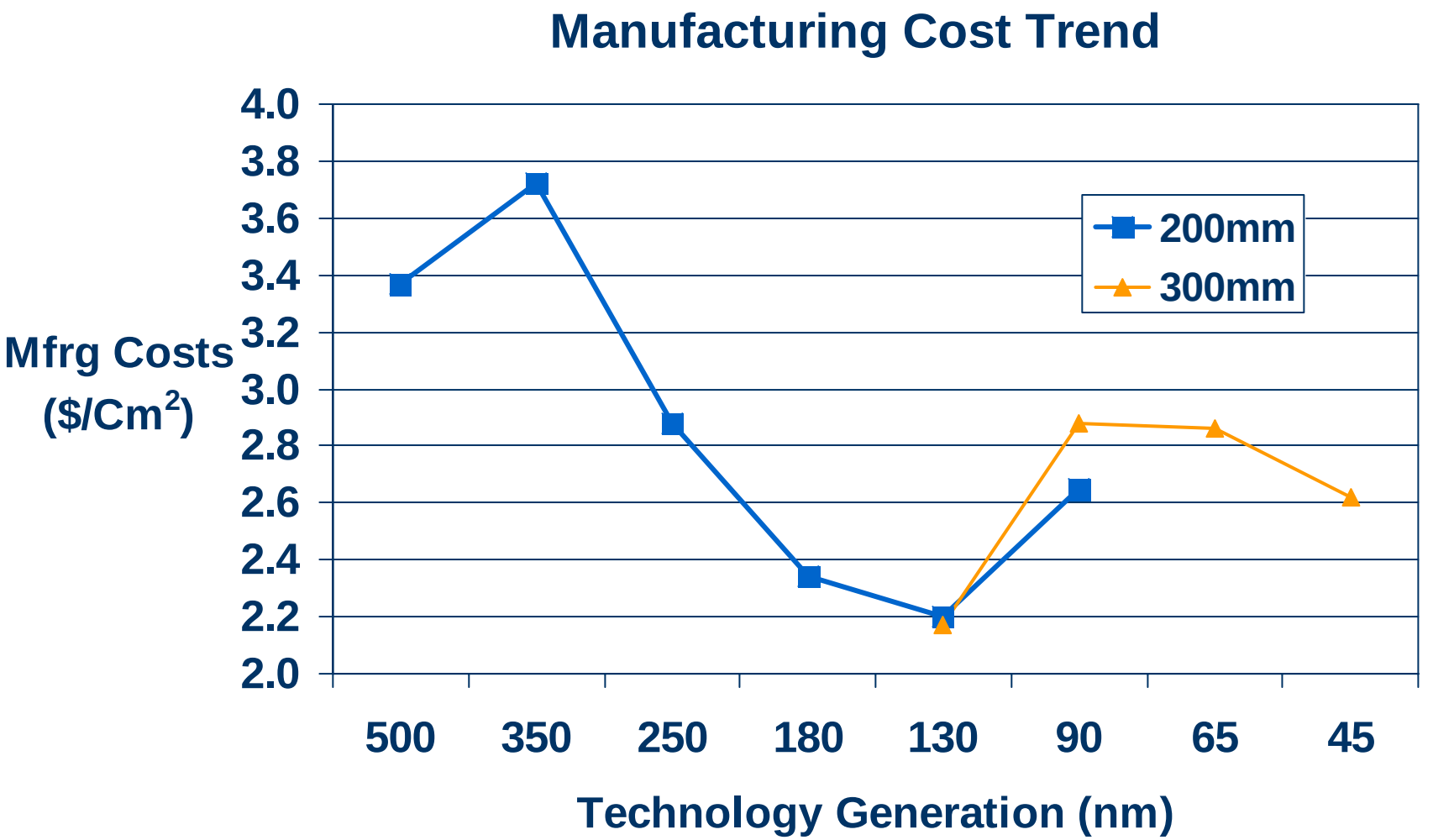
Fulfilling Moore's Law



Moore's Law Requires Continual Improvement in Cost/Function which Is Driven by Technology Innovations and Manufacturing

Ref: 2003 ITRS

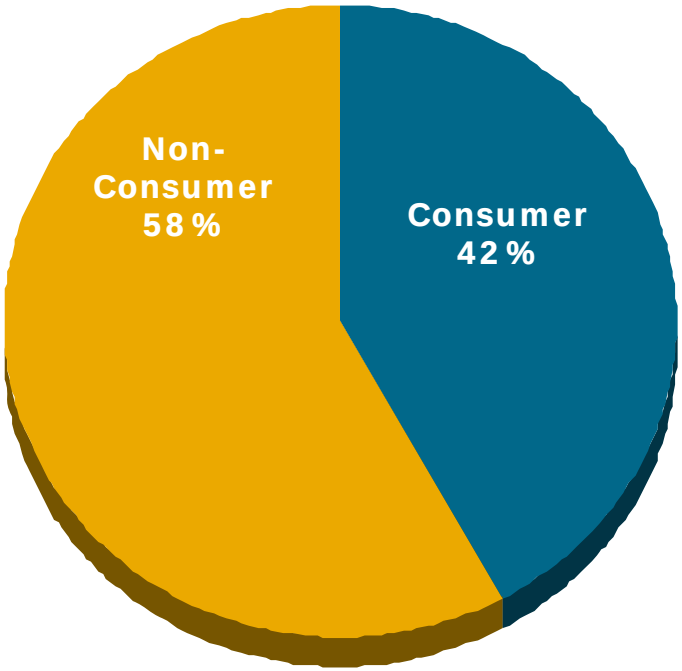
Economic Impact of Wafer Size Transition



Note: Year 3 of production, Leading Edge Memory

Source: Applied analysis of ISMI's Economic Model

Consumerization of the Industry



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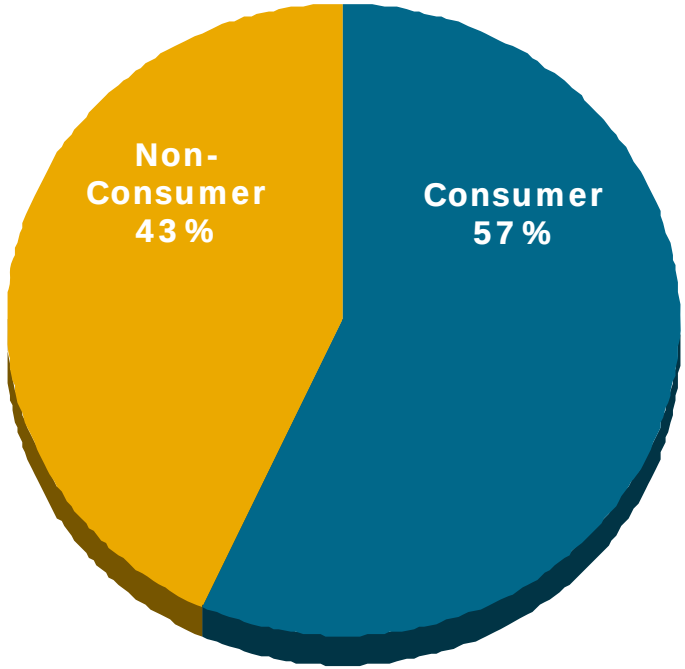

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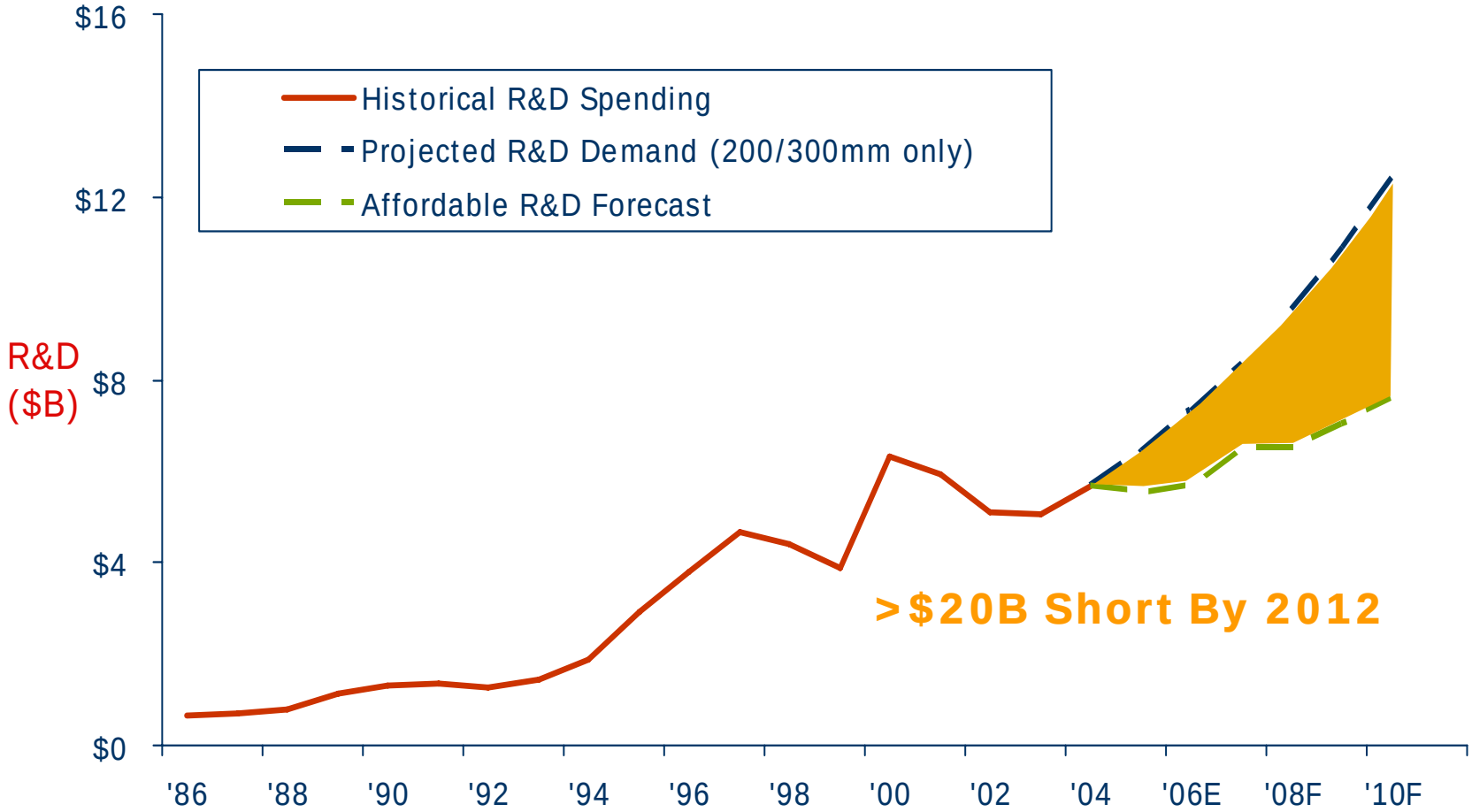
Source: Gartner Dataquest

Consumerization of the Industry Changes Everything

- "Business as Usual…"
  - Sacrificing fab agility
  - Suboptimal investment decisions
- … is NO LONGER ACCEPTABLE in the consumer era
  - Cycle time / agility requirements
  - Resource limitations
- Fabs need to match the economics of the consumer era
  - Short cycle time manufacturing and short lead time
  - Small lot size
  - Frequent recipe change

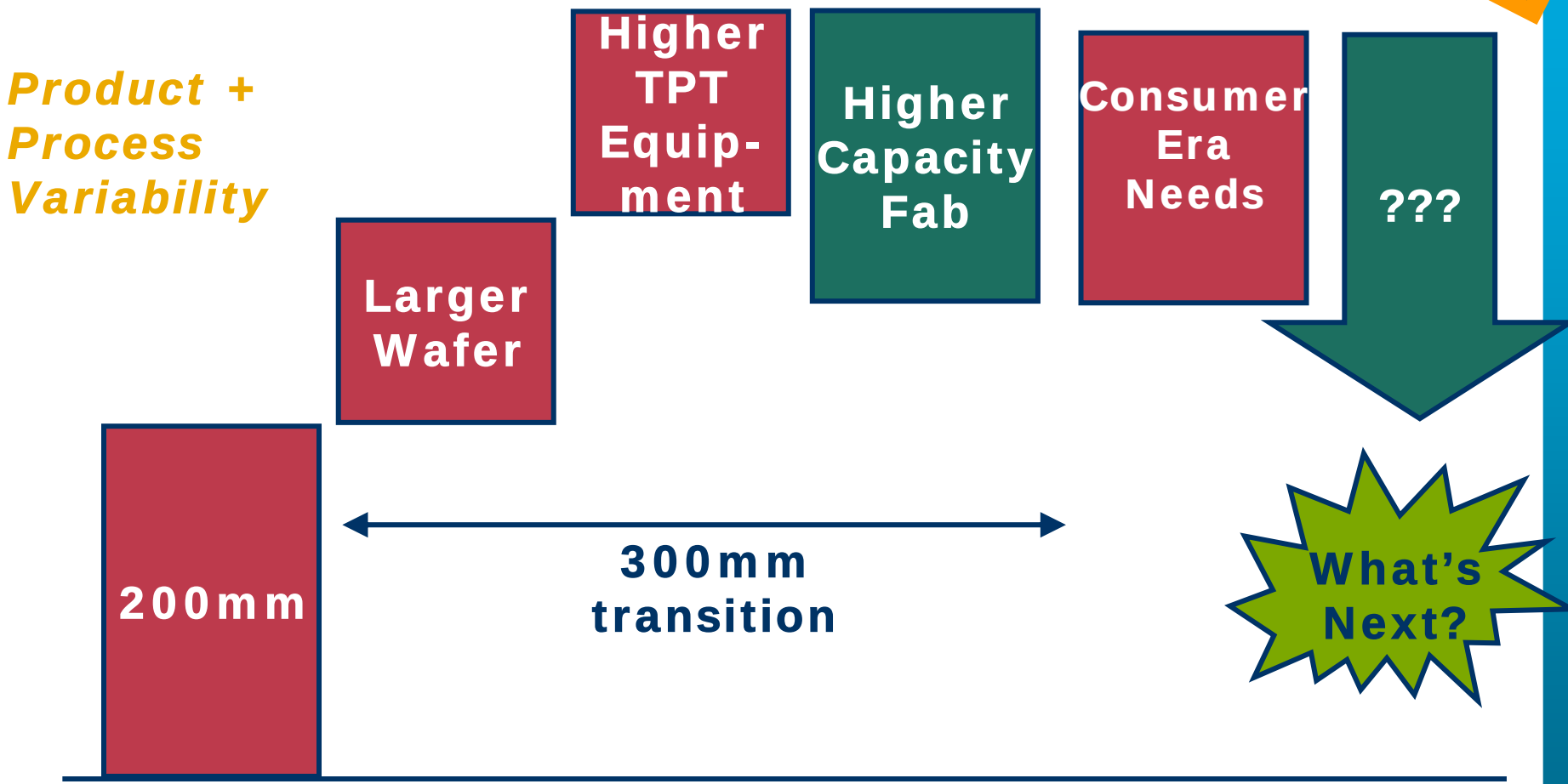
Equipment R&D Gap



Note: Affordable R/D forecast assumes 14% of equipment industry revenues
Sources: S&P, SIA, SEMI, Infrastructure Advisors

Managing Variability

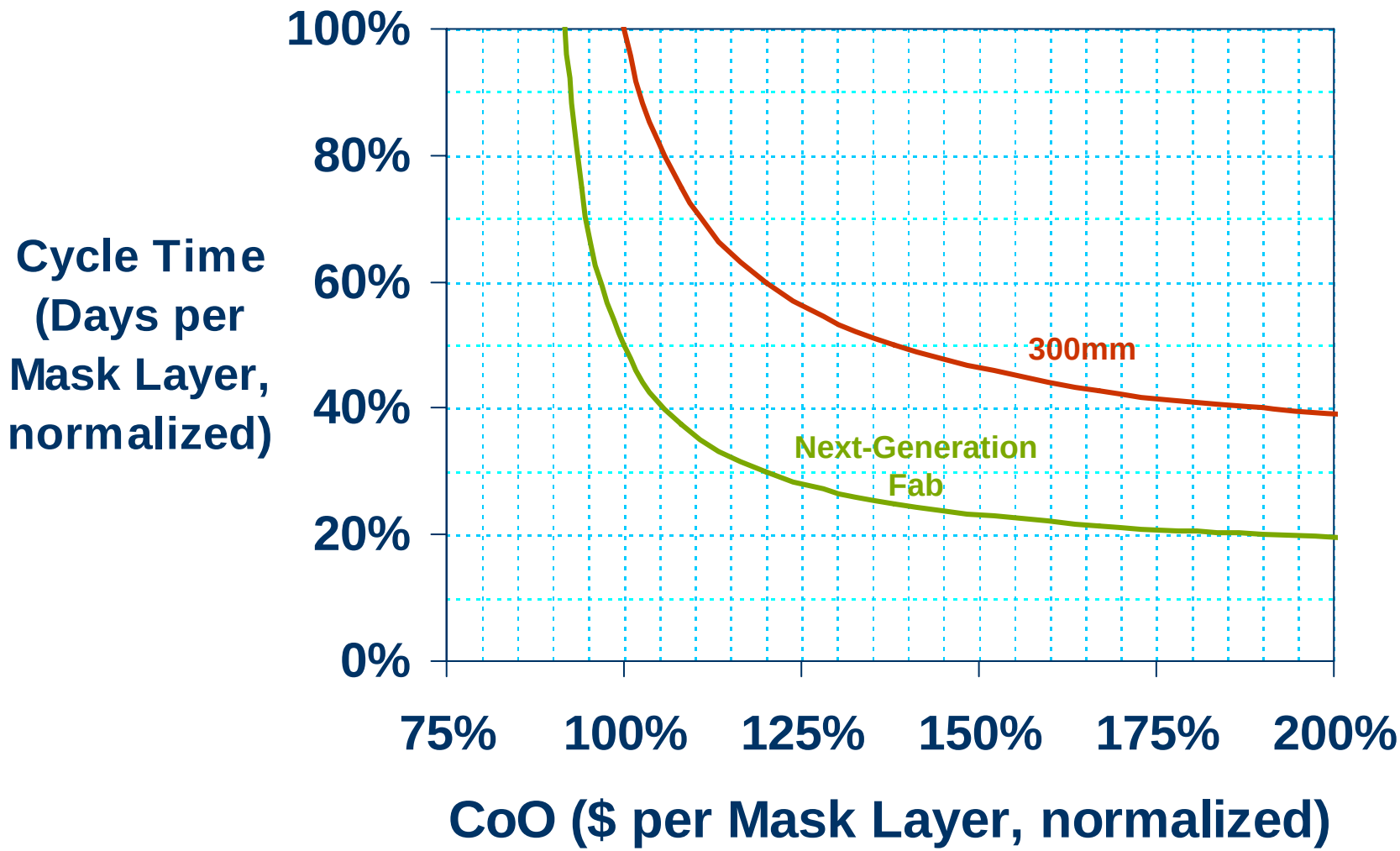
Conceptual



Cycle Time!

	Fab Economic Agenda	Role of Cycle Time
Consumer Requirements	Higher Revenue	Time to market ➔ competitiveness, share, ASP
	Higher Yields	Faster response time, control and correction cycle
	Higher Efficiency	Higher utilization at acceptable cycle time

Productivity Space



Consumerization of the Industry Changes Everything

- Push for advanced technology created fab challenges:
  - High variability in tool operational performance (defects, MTBF, MTBI, MTTR)
  - Fabs incur high costs to contain and control variability
  - Fabs sacrifice cycle time to maintain operational efficiency
- This is NO LONGER ACCEPTABLE in the consumer era:
  - Cycle time / agility requirements
  - Cost
- Consumer era also severely curtails available funding across the semiconductor food chain

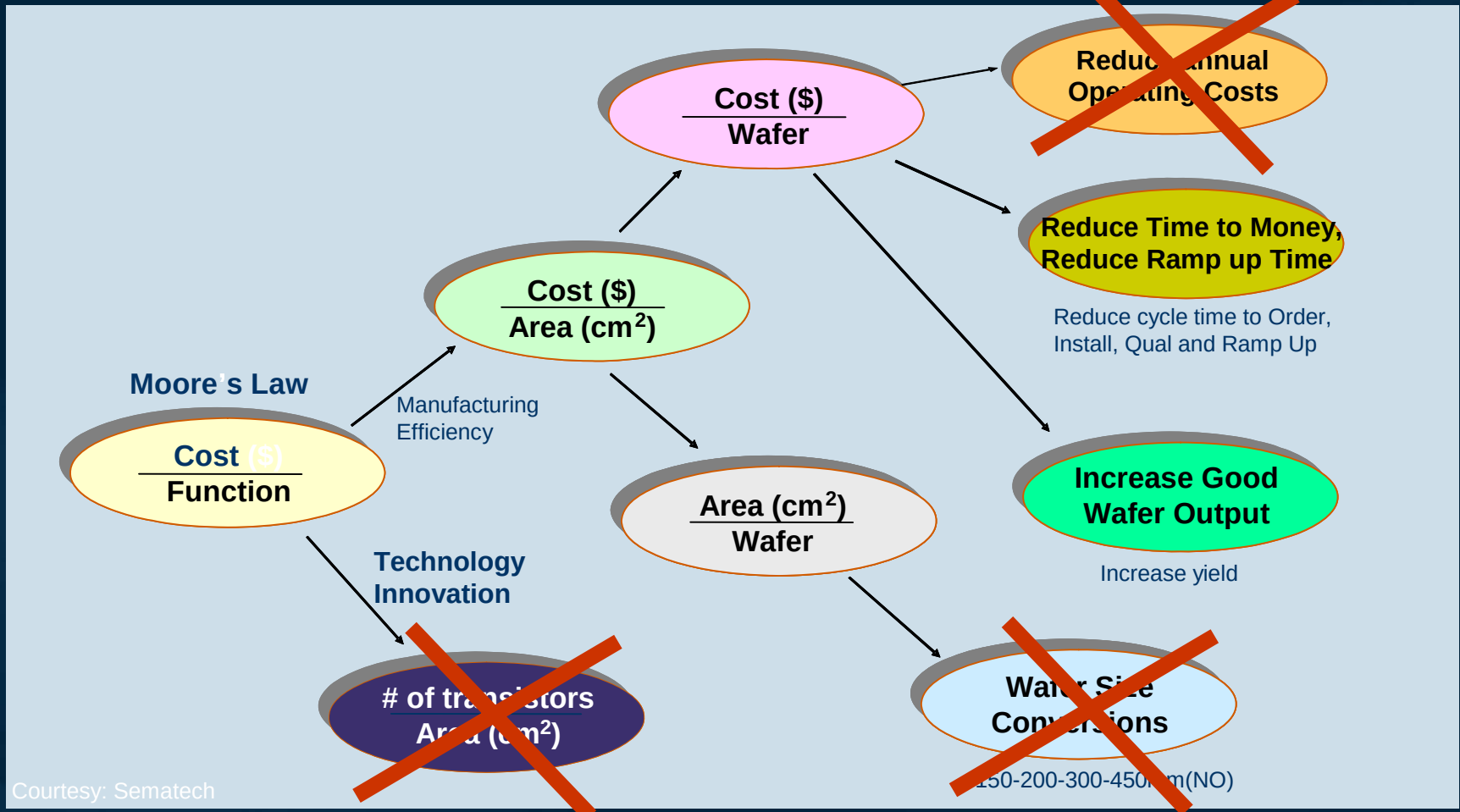
No more Business As Usual

Next Generation Factory Vision: Role of Cycle Time

- 50% reduction in cycle time:
  from 2 days per mask layer today to 0.7-1 days/layer
  - Offset continuing growth in number of mask layers
  - Reduce product delivery time to customers
- Shorter cycle time enablers:
  - More reliable process equipment
  - Eliminating of batching delays
  - Reduced lot sizes
- Several factors must come together to realize substantially shorter cycle time
  - AMHS transport performance
  - Storage strategies

Note: Based on ISMI Vision, 11/6/2006

Fulfilling Moore's Law *Role of Cycle Time*



Ref: 2003 ITRS

Maximizing the Return on Fab Investment

Optimize fab operations

Build foundation of rapid, differentiated, technology solutions

- Extend Litho
- Enable transistor performance
- Scale interconnect RC
- Scale memory density (strain)
- Resolve nano defects

300mm Prime :
Maximizing the Return on 300mm Investment

- Definition:
  - The 300 mm Prime program seeks to implement **discontinuous improvements** in fab productivity of the type historically coinciding with wafer size transitions…
  - **…** **without** incurring the costs and risks associated with a scale-up of tool sets
- Scope: primary focus will be increased fab **agility** and **reduced cycle time**, as a complement to **continuous improvements** in the productivity of the 300mm tool set

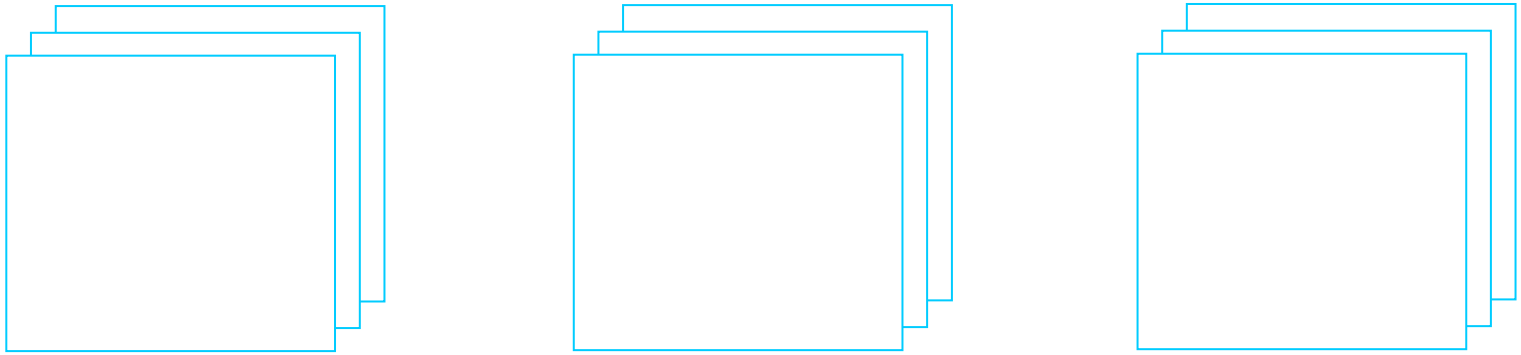
Source: Definition Used in SEMI Working Group Analysis

300mm Prime Opportunity Space

Needs/Benefits/Levers		Possible Technological Implementations (Example)			
		Small Carrier Size	Single Wafer Processing	Wafer Level Tracking	…
First Wafer Effect	Average setup time				
	time to start processing 1st wafer				
Tool Variability	% of down time that is unscheduled				
	Variability of time between down time				
	Variability of repair time				
Transport & Storage	Wafer wait time at tool inside carrier				
	Variability of carrier delivery time				
	Variability (distribution) of WIP awaiting tool				

Source: Based on Joint ISMI/SEMI Productivity Working Group Analysis

System Products ***Service Products*** ***Software Products***



300mm Prime Architecture

Processing Platforms	Automation Platforms	Software Platforms
Universal Single-Wafer Processing	*Small-Lot Handling*	*Embedded Intelligence/ Reduced Variability*

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