

The Dark Side of Moore's Law

Threats and Opportunities in an Era of Rapid Technology Commoditization

Presented by:

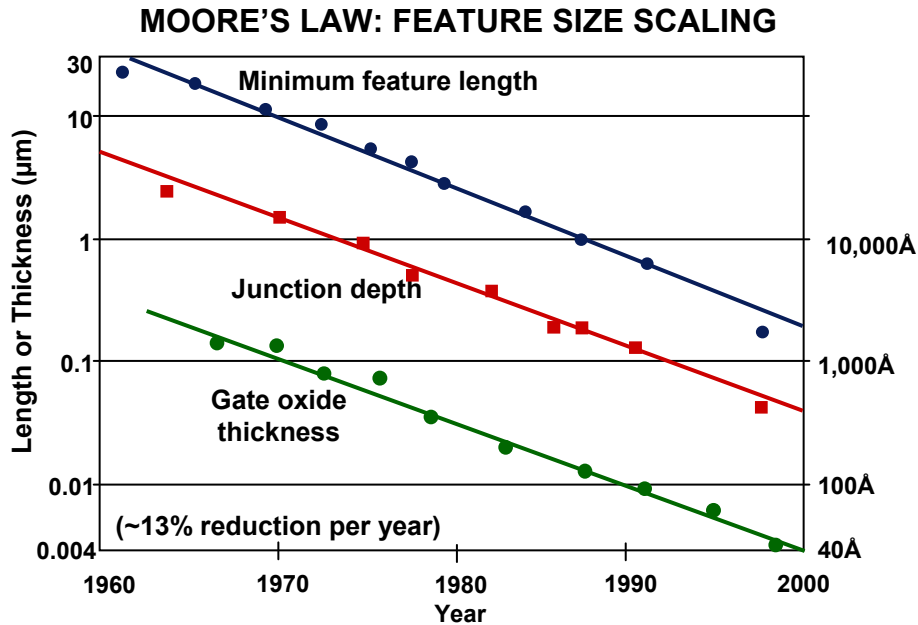
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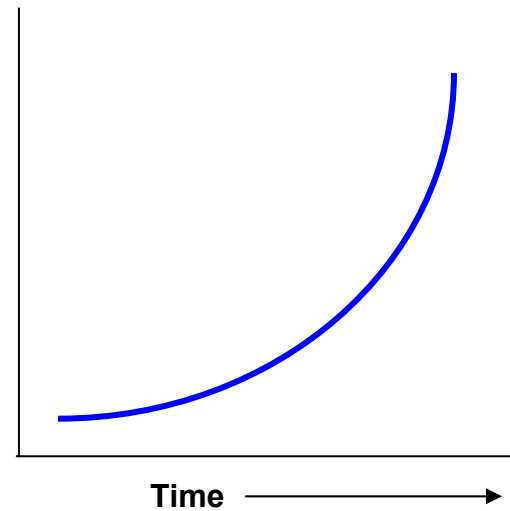
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What's All the Fuss About Moore's Law?



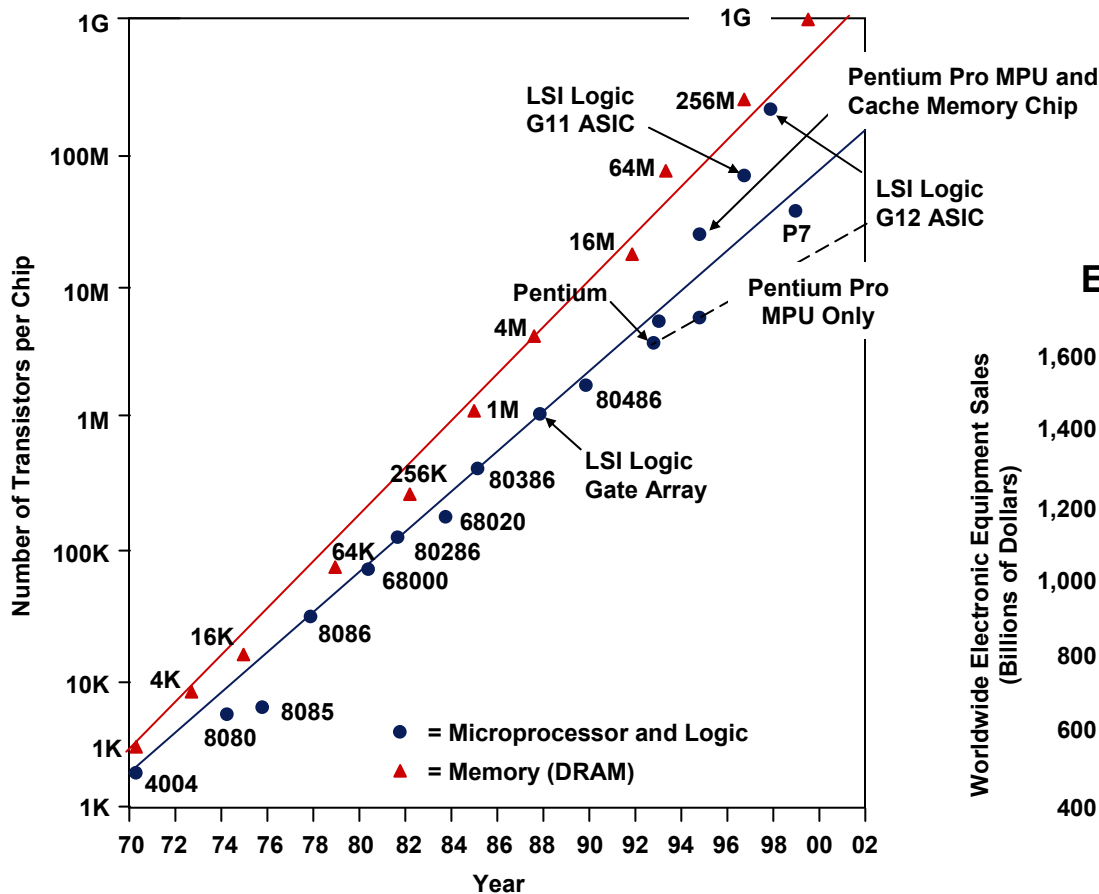
Source: Integrated Circuit Engineering Corporation

R&D and Plant Costs



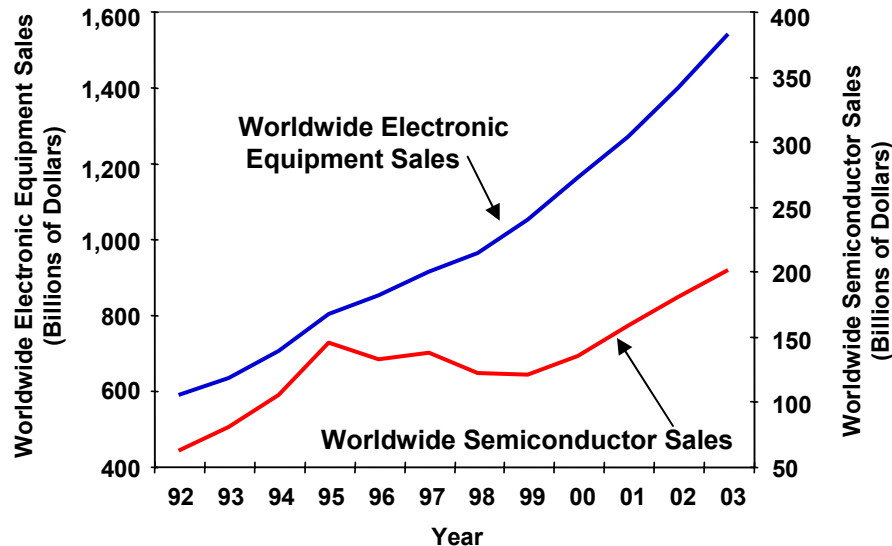
Source: SRIC-BI

Moore's Law and Electronics/Semiconductor Demand Form a Complex Feedback Loop Based on Market Pull and Technology Push



Source: Integrated Circuit Engineering Corporation

Semiconductor and Electronic Equipment Sales Trends (1992-2003)

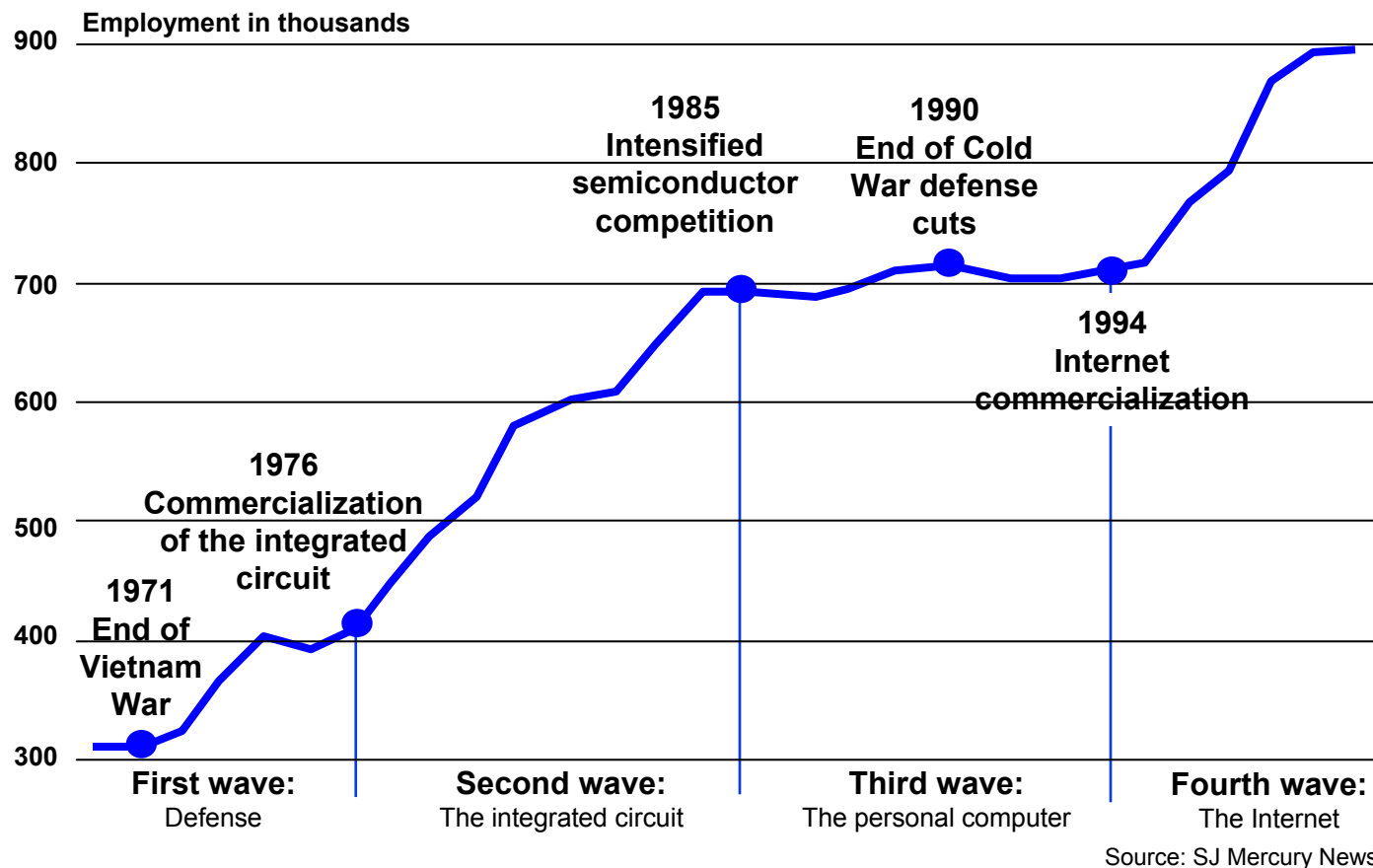


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Over Time, Semiconductor and Electronic Industry Growth has Increased as a Percentage of GDP and has had Profound Regional Effects



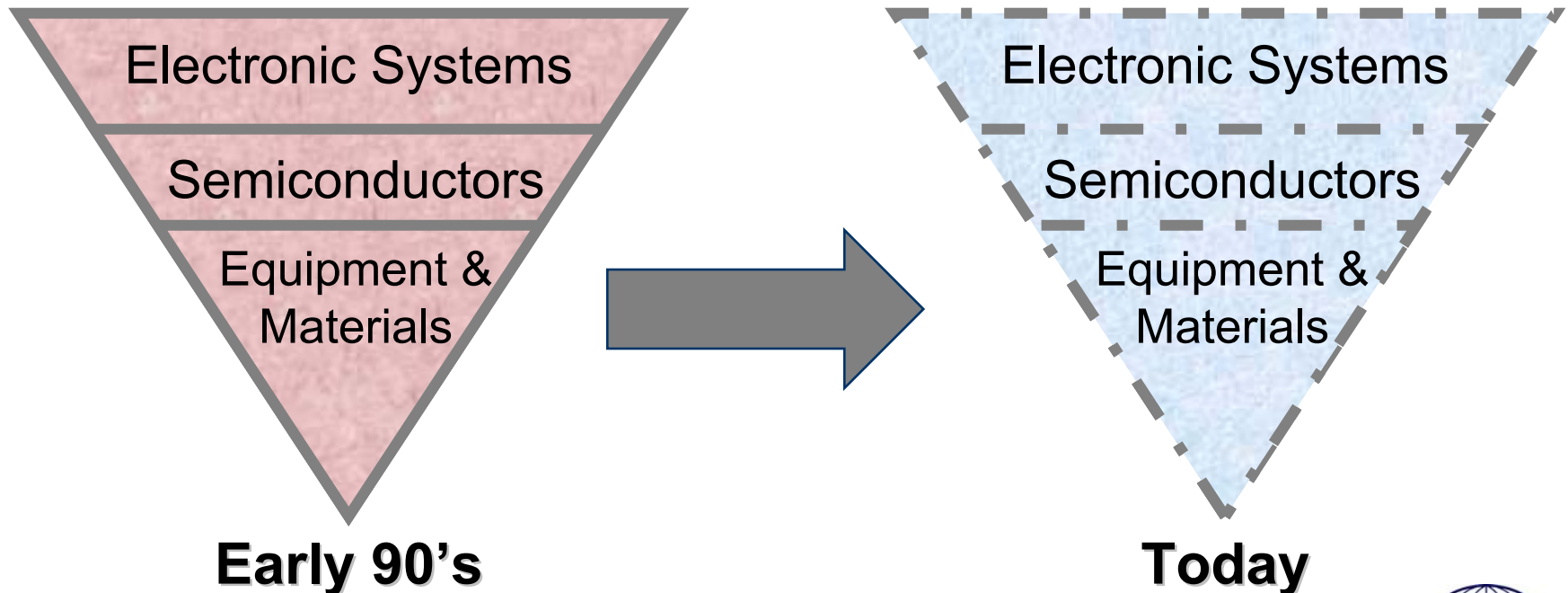
- Between 1970 and 1997, U.S. information technology industry revenue grew from \$54.6 billion to \$804.1 billion while GDP grew from \$1,015 billion to \$8,080 billion

OK, So Where's "The Dark Side"?

- **Fallout of rapid technical success coupled with high market pull**
 - **Increased competition due to increased technology availability and rush to enter perceived profitable markets**
 - **Commoditization: decreasing margins coupled with high R&D and capital costs**
- **Increased susceptibility to "boom or bust" cycles**
- **Consolidation**
- **Volatile industry structure**

Blurred Industry Structure Creates Threats and Opportunities and Makes Navigation Treacherous

- Should material/equipment suppliers own and operate fabs?
- Will systems integrators design and/or produce their own circuits?
- Will current chip producers “devolve” into design houses?



One Needs to Deal with a Multi-Faceted Situation Made More Acute by Environmental Uncertainty

- **Increasing number of potential opportunities with rapidly opening and closing “windows of opportunity”**
- **Decreasing time to inevitable commoditization**
- **No crystal ball: No single market study will have the answers**

Potential Future Semiconductor Industry Scenario

- **General purpose memories and microprocessors manufactured in 5-10 global “mega-fabs” operated by independents and/or consortia of semiconductor producers/materials and equipment suppliers**
- **Custom or ASICs increasingly designed and manufactured in-house by end-users/systems integrators**
- **Decreasing number of “pure” independent semiconductor companies: Intel, Samsung + ???**
- **Highest industry profit margins will be captured by companies that license the most novel circuit IP**
- **Biotechnology will become a major semiconductor industry driver**

Potential Future LCD Industry Scenario

- **Industry-wide consolidation results in only 2-3 producers of merchant LCDs (Samsung, Sharp + ???)**
- **Other LCD producers focus on captive use of displays to justify in-house production**
- **Markets for alternative display technologies (for example, PDP, FED) remain extremely limited**
- **LCD projection becomes dominant large-area technology**
- **Wild card: OELD**

Failure to Adjust Can be Disruptive, If Not Fatal

- **Apple Computer: How to set sales records and lose money**
 - **Reduced prices to compete with commodity suppliers such as Dell in the '90s**
 - **Price reduction increased sales, but bloated corporate R&D structure led to large losses anyway**
- **LCD Industry: Even most industry leaders are not making significant profits from merchant sales**
- **DRAM suppliers: Taking a huge beating at closely-spaced intervals**

The Need Exists to Optimize for Commoditization While Rapidly Finding and Exploiting New High-Value Opportunities

- **When dealing with commoditization, “pennies” count:**
 - Process/production efficiency
 - Lower R&D costs
 - Efficient Technology Management
 - Supply chain management, etc.
- **Exploiting new high-value opportunities:**
 - Technology monitoring
 - Opportunity searches
 - Roadmaps
 - Flexible, scenario-dependent strategic planning
 - Technology/knowledge management
 - Precise evaluation of consumer demand patterns

SRIC-BI has the Tools and Experience Needed to Assist Companies in Dealing with “The Dark Side”

- **Multiclient consulting: Demand-driven analyses**
 - **Explorer:** regularly updated evaluations of the business implications of new technology developments
 - **Business Intelligence Program:** scanning issues affecting the business environment
 - **Digital Futures:** analysis of future business prospects in an increasingly digital world
- **Single-client consulting: Unique combination of technology/industry expertise and strategic acumen**
 - **Opportunity searches:** commercialization ideas and strategies
 - **Scenario planning:** strategic planning, technology roadmapping, and/or portfolio balancing within the boundaries of uncertainty
 - **Customized business/technology research:** competitor analysis; competitive technology assessment
 - **VALS:** analysis of consumer behavior via psychographic segmentation

Summary/Conclusions

- **The combination of high technical success and high demand will accelerate the commoditization of products based on these successful technologies.**
- **Successful companies will utilize strategies both to help cope with the commoditization of existing products and rapidly to find and exploit new, high-value opportunities.**
- **These strategies require close cooperation between technology and business planners as well as the use of new methodologies and technology monitoring techniques that can deal with the rapidly changing business environment**
- **SRIC-BI has a long history of assisting companies in dealing with rapidly changing, uncertain business and technology environments.**