Department of the Navy Perspective on Obsolescence Management

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2006 DMSMS Conference

Outline

I The Case for Managing Diminishing Manufacturing Sources and Material Shortages (DMSMS)

II DoN Status - Past/Present/Future

III Microelectronics Market

IV Technology Considerations

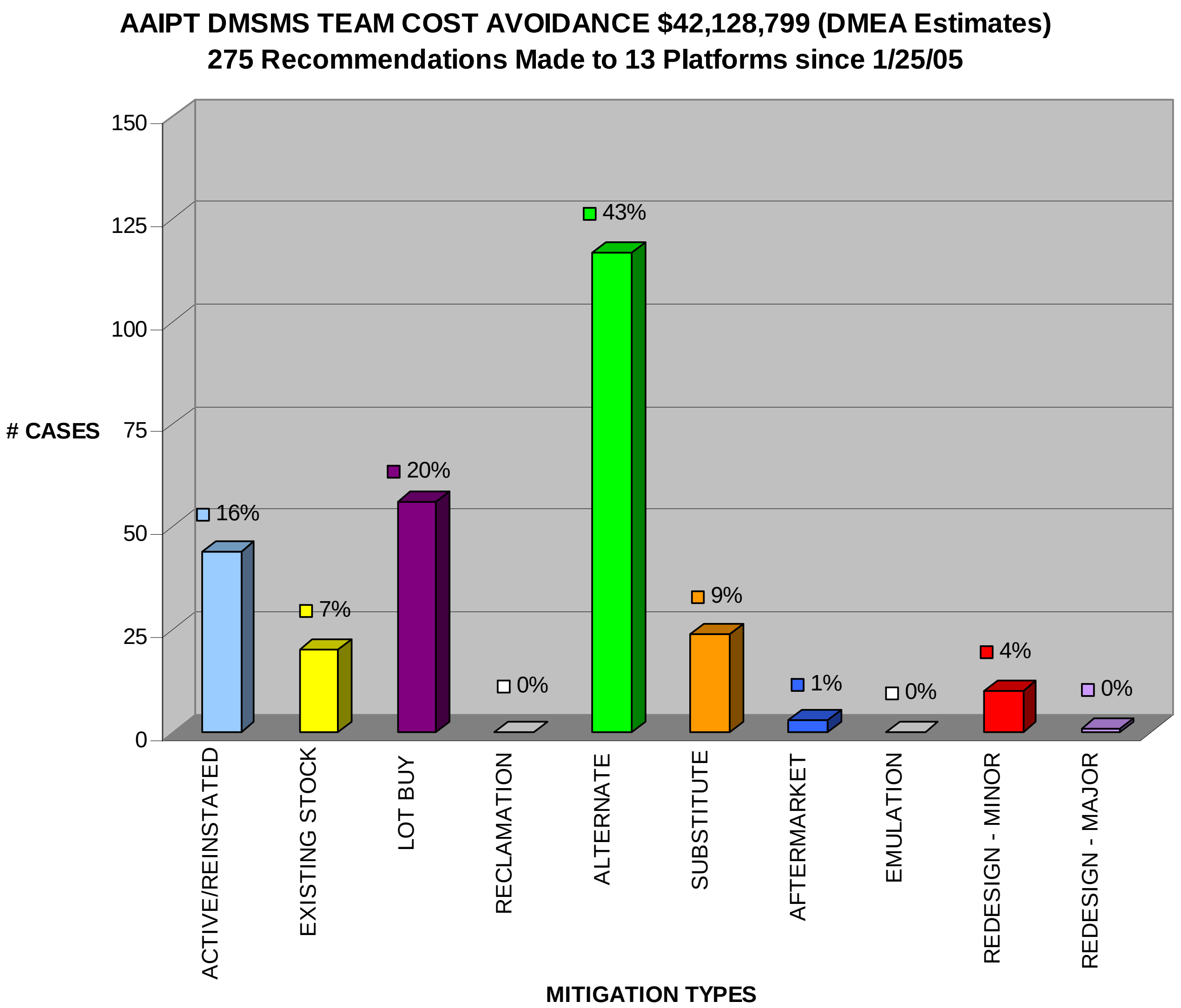
V Performance Based Logistics (PBL) and DMSMS

The Case for Managing DMSMS
A Government Perspective

The Case for Managing DMSMS

- Why manage DMSMS proactively?
  - Significant costs to redesign, test, qualify, certify and integrate replacement sub systems and components
  - Schedule volatility prior to introduction to the fleet
  - For deployed product, associated readiness degradation
- DOD cost estimates for DMSMS impacts on deployed systems range upward of $15 Billion
  - DoN share is significant
- A January 06 review of DoN programs showed a healthy Return on Investment for managing DMSMS

The Case for Managing DMSMS



The Case for Managing DMSMS

DoN case management data from SSB, Horizon, and OMIS

Jun 06	Customers	# of Platforms	# of Systems	# COTS LRUs	# Custom LRUs	Est. Cost Avoidance
	• 18 NAVSEA • 4 SPAWAR • 16 NAVAIR • 3 USMC • NAVICP-Phil • I Coast Gaurd; 1 Army; 1 AF • 6 Private Party (EDO; Raytheon; Boeing, Northrop Grumman)	**52**	**429**	**6,637**	**8,718**	**$135.4 M**

Jan 05	Customers:	# of Platforms	# of Systems	# COTS LRUs	# Custom LRUs	Est. Cost Avoidance
	• 15 NAVSEA • 1 SPAWAR • 8 NAVAIR • 2 USMC • 1 NAVICP-Phil • Private Party: EDO.	**41**	**265**	**5,038**	**5,627**	**$94.2 M**

II. DoN Status – Past/Present/Future

Past

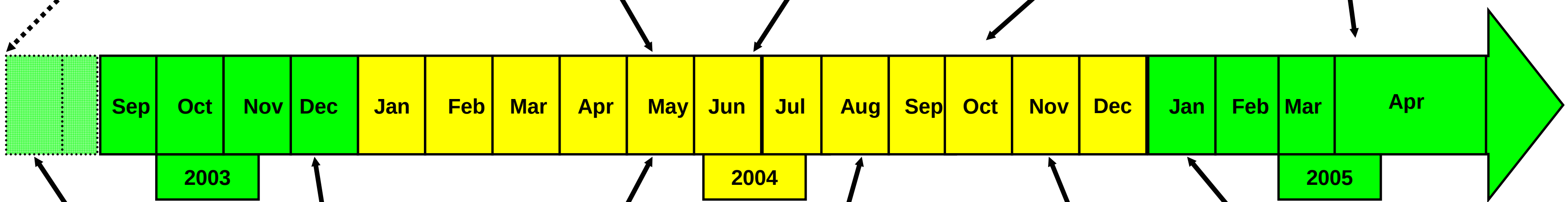
DoD 4140.1-R
Supply Chain
Regulation
DMS Policy
23 May 03

DASN(L)
DMSMS Survey
9 May 04

DoN
DMSMS
EXCOMM
28 June 04

DMSMS
ESG & IPT
Established
18 October 04

DMSMS PM
Plans & Metrics
12 April 05



DASN(L) In-place
ASN(RD&A)
directed to address
DMSMS issue
July 03

NAVSO P-3692
ILA Handbook
30 Dec 2003

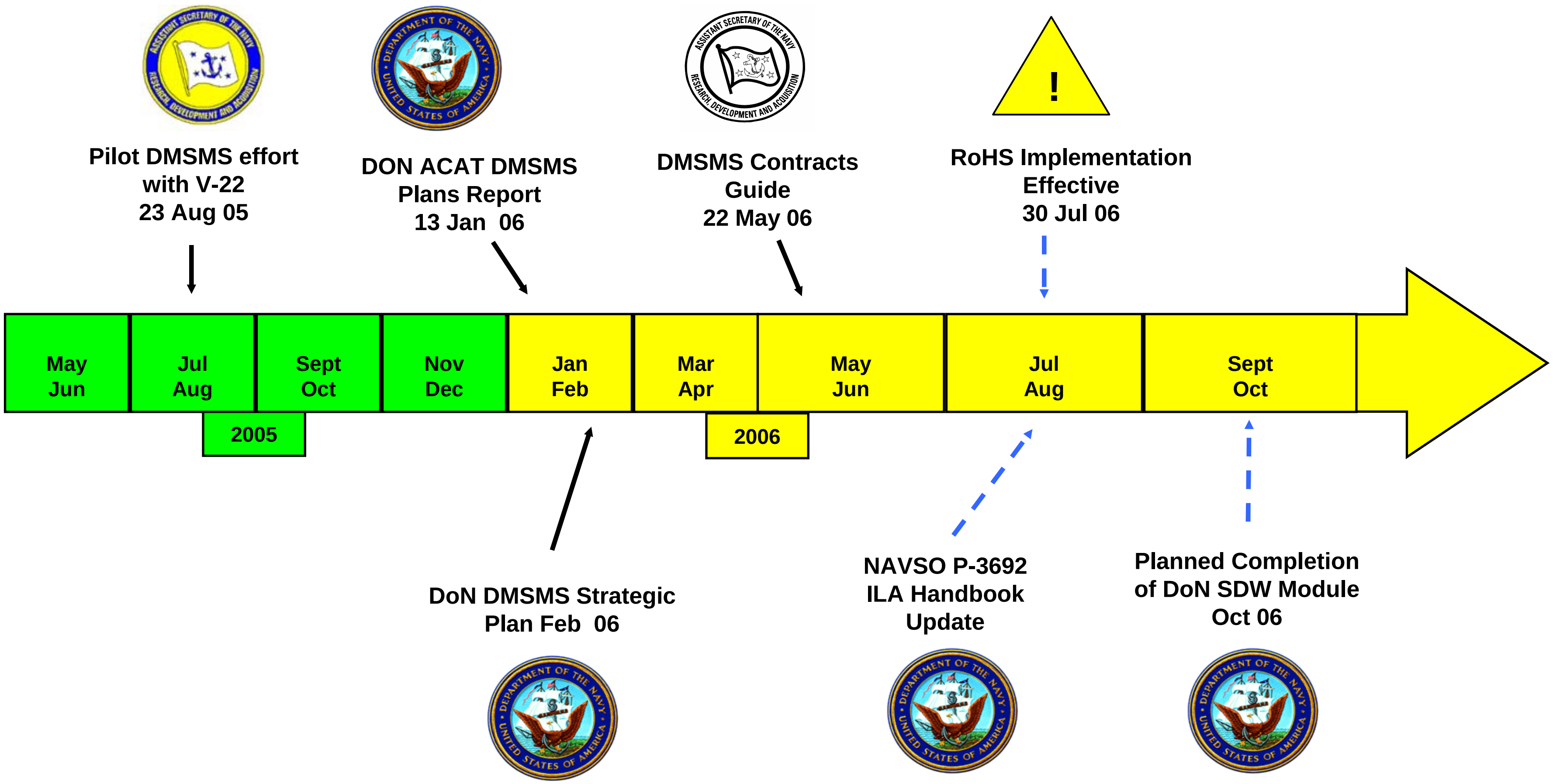
DASN(L)
DMSMS Memo
10 May 04

DASN(L)
Evaluation Criteria
for DMSMS
20 August 04

SECNAVINST
5000.2C
19 Nov 04

ASN(RD&A)
DMSMS Management
Guidance
27 January 05

Present/Future



Documents available at
http://www.acquisition.navy.mil/

Present/Future

DoN DMSMS Contracts Guidance

- Applicable to PBL and Traditional Contracts
- Provides considerations for:
  - DMSMS Management;
  - Parts Management;
  - Configuration Control;
  - Supplier/Subcontractor Management;
  - Bills of Material (BOM);
  - DMSMS Forecasting and Notification;
  - Open Systems Architecture for Software; and
  - Incentives & Exit Clauses.

Draft ILA Handbook (NAVSO P-3692)

- Incorporates and updates DMSMS criteria from the 20 Aug 04 DMSMS supplement
- Incorporates information from the published ASN(RDA)/ DASN(LOG) DMSMS memos and guidance documents
- Emphasis placed on implementation (# BOM loaded, metrics collection, management practices, etc.)

III. Microelectronics Market

Problem & Challenge

Problem

Microelectronics are increasingly manufactured off-shore, and most OEMs don't know the pedigree or location of manufacture of their microelectronics

Challenge

Do you know where the microelectronics in your systems are manufactured?

Do you understand the risks associated with not knowing?

Do you know how to mitigate the risks?

Process

Sand to Silicone – Eleven Steps

1. **Obtain Silicone (Sand)**
2. **Silicon Crystal** (Ingot) 99.99999% Pure Si
3. **Polished Wafer** – Mirror-like surface, credit card thin 100 – 300 MM diameter
4. **Dielectric Deposition** (SiO2) – a non-conductive layer
5. **Photo Lithography** – Photo resist builds up a pattern of hardened material
6. **Etching** – Strips away hardened patterns to leave a pattern of dielectric
7. **Doping** – Implants various conductive materials
8. **Metalization** – Deposits the final layers of metal (copper) that provide the network of interconnects
9. **Testing** – **Die Level** via wafer probes
10. **Packaging** – Wire bonding and lead frame attachment
11. **Testing** – **Package Level** – via In-circuit or other test methods

Process

Critical Manufacturing Flow (Example)

– Integrated Circuit (IC)

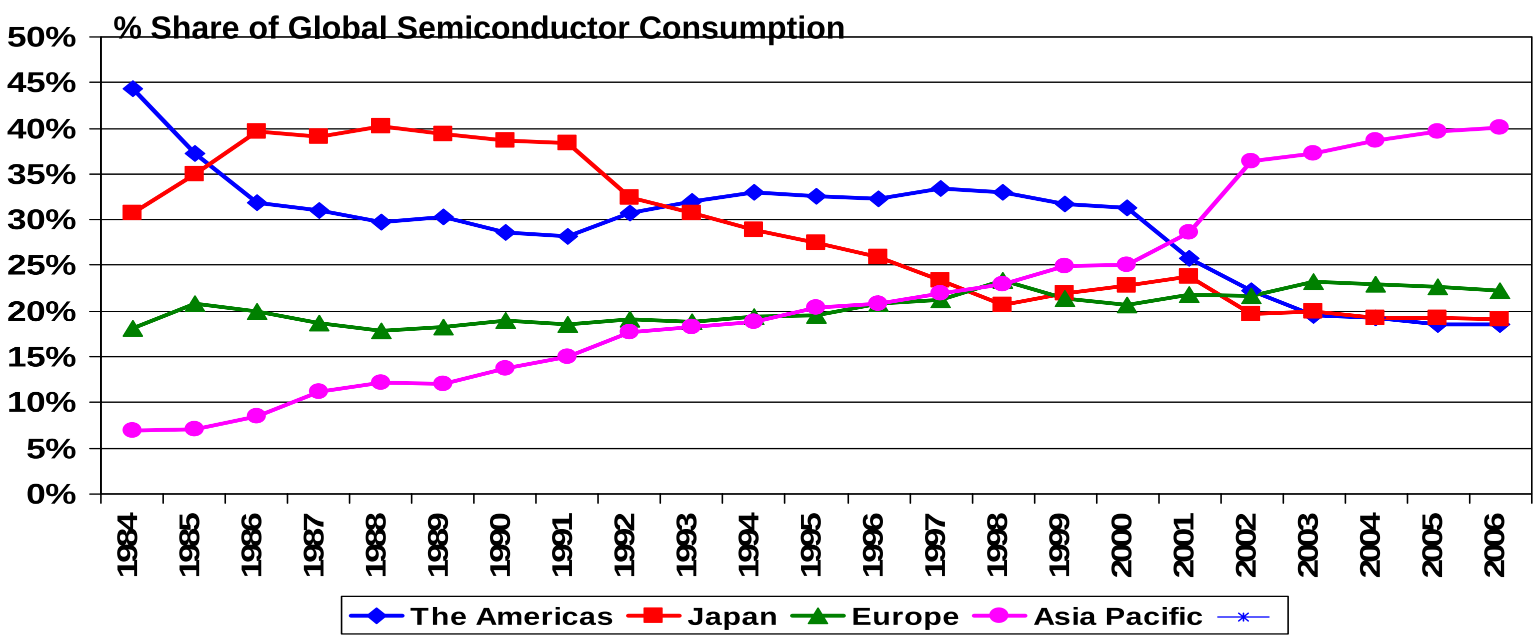
- Silicon (Sand) — Norway/Brazil
- Silicon Ingots — Netherlands
- Wafer Slice / Polishing — USA
- Foundry — Current → China
- Testing — Malaysia
- Packaging — Thailand
- Final Test — USA
- IC Distribution — USA / Asia / Europe
- EMS — Mexico / China
- Final Assy & Test — USA
- Customer — USA/DoD

Source: ARROW/ZEUS Electronics

Semiconductor Market

Semiconductor Sales in Millions/$:

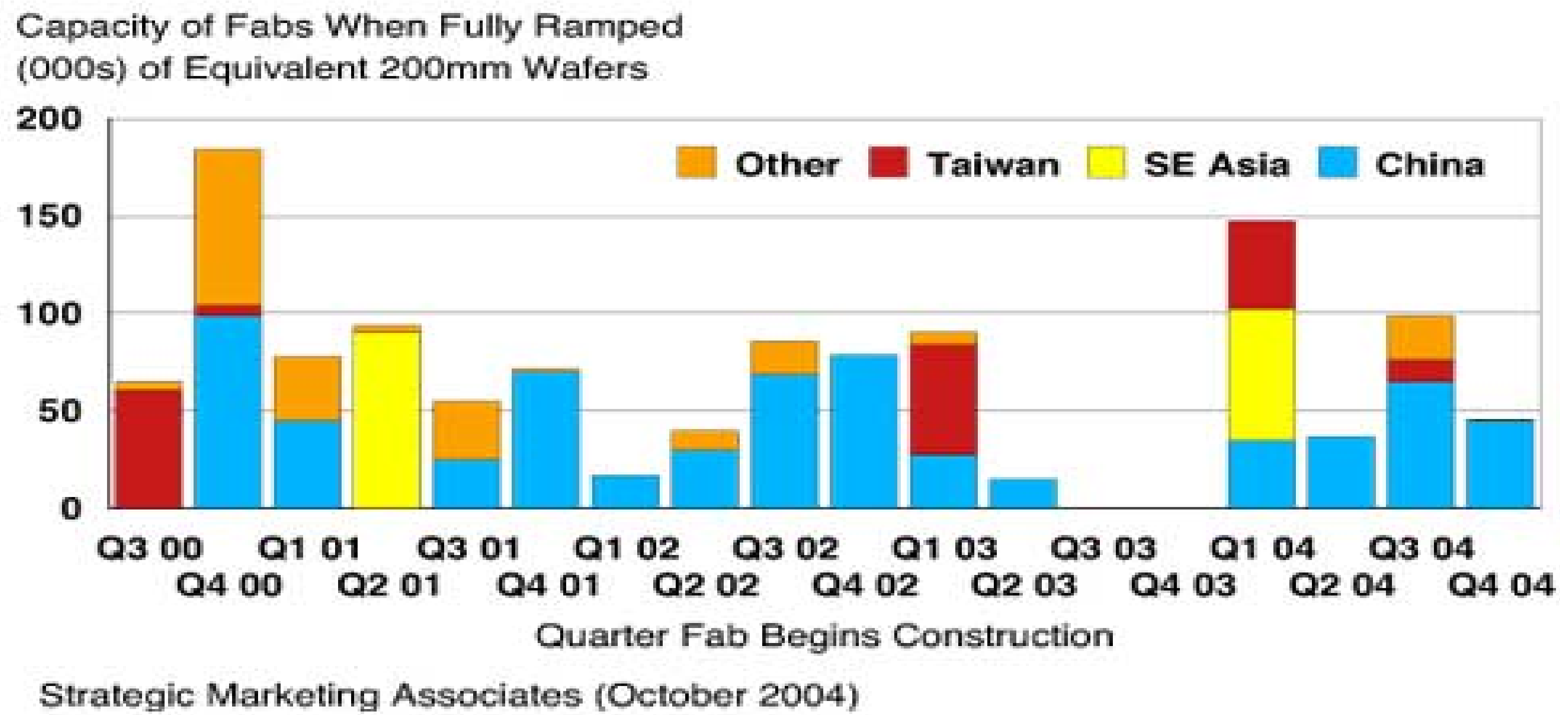
Year	1995	2005
• US	46,998 (33%)	40,736 (18%)
• EUR	28,199 (20%)	39,275 (17%)
• Japan	39,667 (27%)	44,082 (19%)
• ASIA/Pacific	29,540 (20%)	103,391 (46%)



Source: SIA

Foundry Locations

More Than One-Half of the Foundry Capacity That Has Started Construction Since 2000 is in China

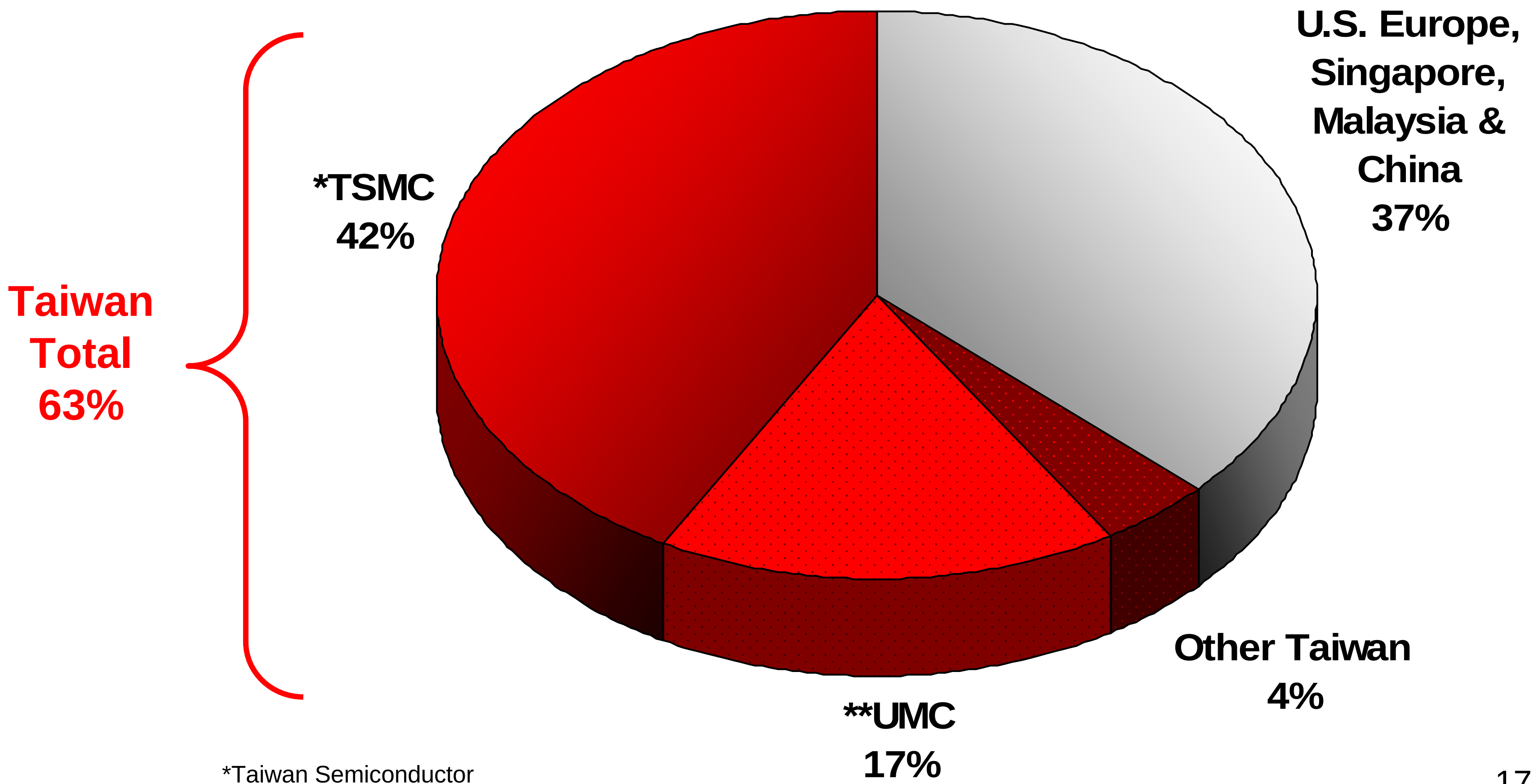


Source: Strategic Marketing Associates (2004)

Foundry Locations

World-wide Foundry distribution:

2002 Foundry Shares



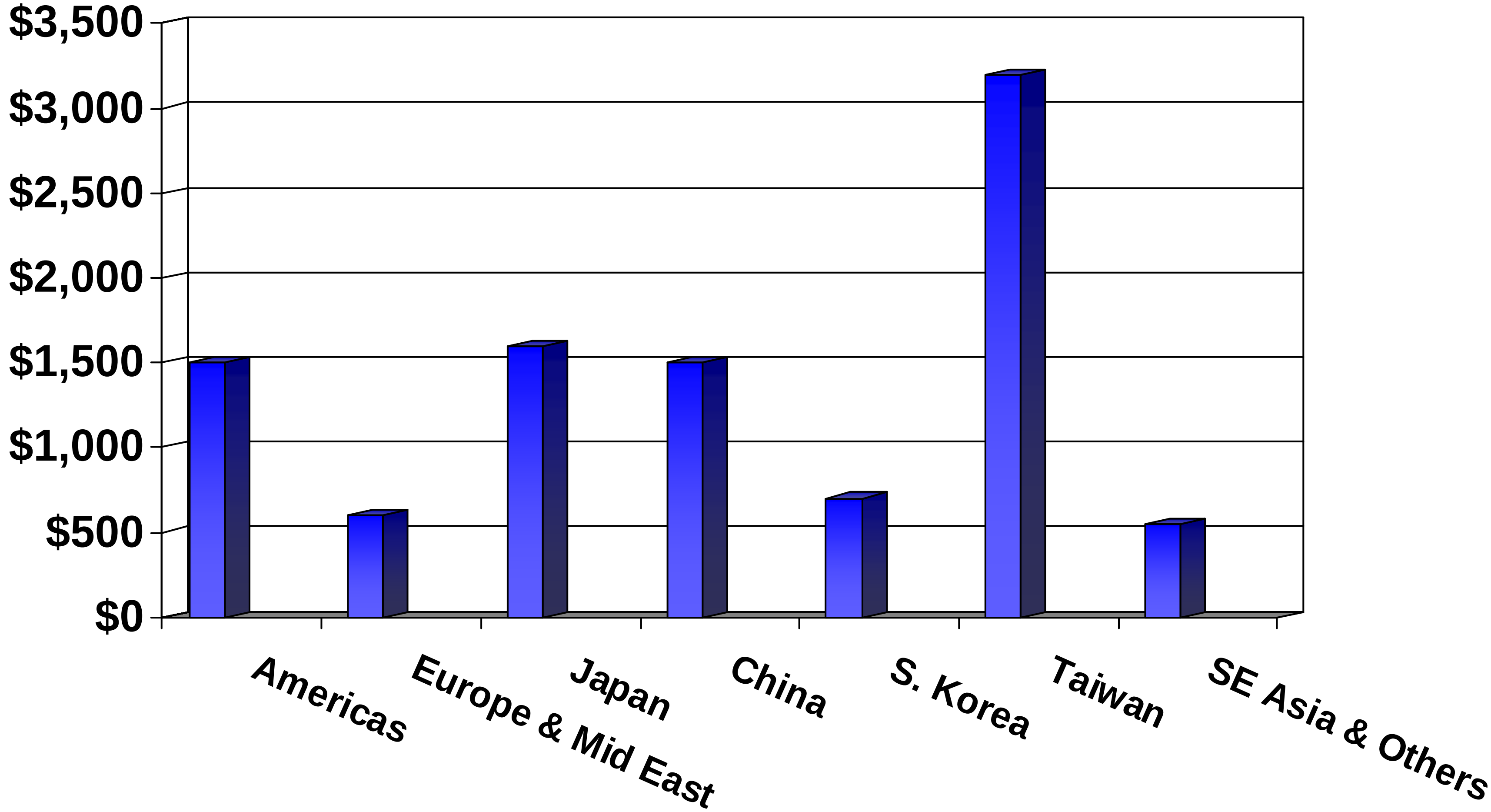
Source: iSuppli

*Taiwan Semiconductor Microelectronics Corp (TSMC)

**United Microelectronics Corp (UMC)

Foundry Locations

Construction Spending by Region (Millions of Dollars)



Source: Semiconductor Equipment and Materials International (SEMI®)/FabFutures Oct 2005.

Risks and Unknowns

- Even if you get the BOM, you still may not know the following:
  - Pedigree of the part or process;
  - Possibility of Hostile Code;
  - Reliability / Quality;
  - Lead Frame Material Coating Content;
  - Date Code; and
  - Fabrication Process (Die Shrinks).
- Assess the criticality of the item to determine the level of data required

IV. Technology Considerations

Technology Considerations

Support Characteristics

Component Type	Supply Base	Standardization	Rate of Tech Change
Passives	Broad	High	Slow
Discretes	Broad	High	Slow
Digital Logic	Moderate	Moderate	Fast
Linear and Analog	Moderate	Low	Fast
Programmable Logic	Limited	Low	Fast
Memory – Volatile	Moderate	High	Fast
Memory – Non Volatile	Broad	High	Moderate
Processors and Controllers	Limited	Low	Moderate
Application Specific IC	Limited	Low	Slow
Switches, Relays, Displays	Limited	Low	Slow

Source: ARROW/ZEUS Electronics

Technology Considerations

Support characteristics compounded by temperature, packaging, factors, etc.

Component Type	Supply Base	Standardization	Rate of Tech Change
Passives	Limited	High / Drawing Controlled	Slow
Discretes	Limited	High	Slow
Digital Logic	Limited	Low	Moderate
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Programmable Logic	Limited	Low	Moderate
Memory – Volatile	Moderate	High	Moderate
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Source: ARROW/ZEUS Electronics

Technology Considerations

Product Life Cycle Information is a Subjective Measure

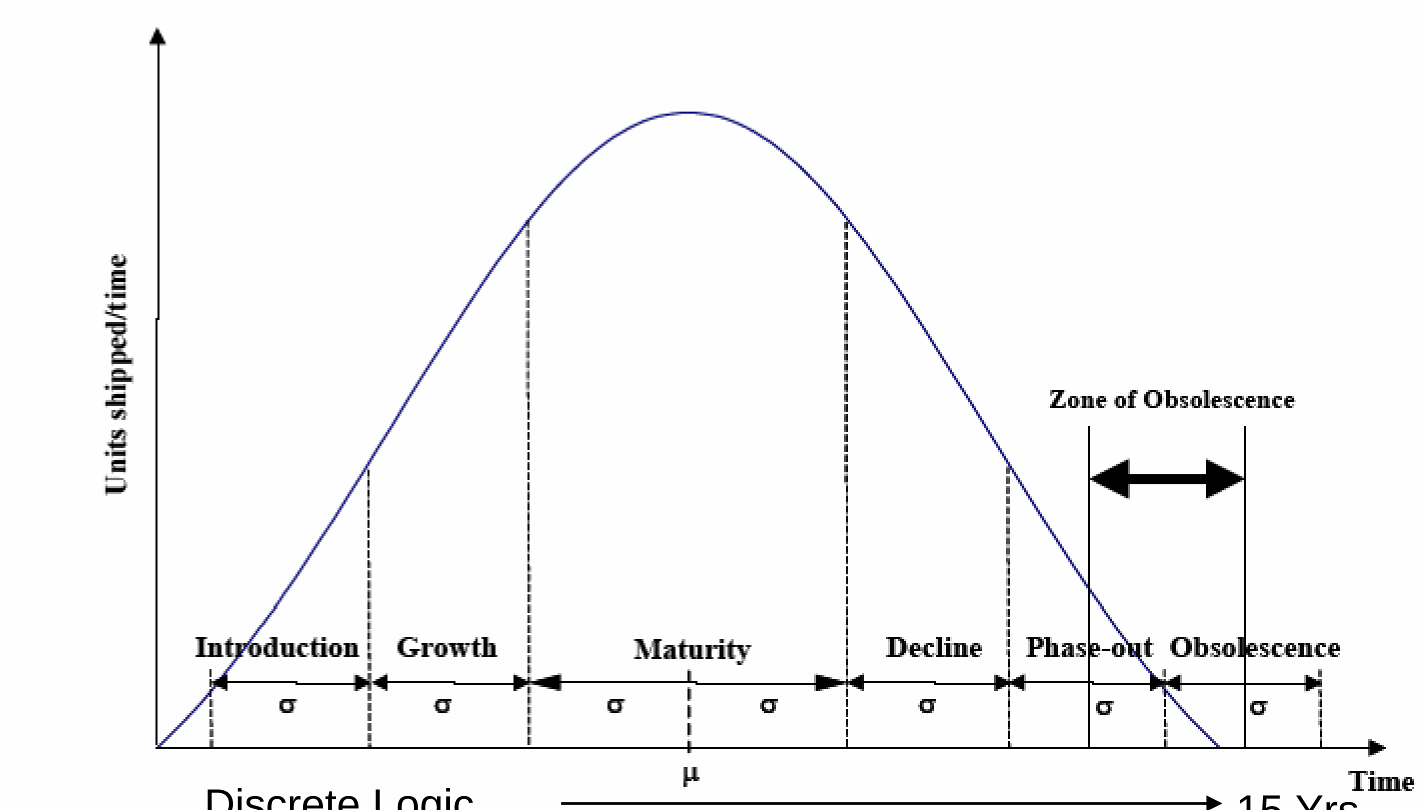
Typical life cycle characteristics for the six generic stages of a part life cycle

Characteristic	Introduction	Growth	Maturity	Decline	Phase-out	Obsolescence
Sales	Slow but increasing	Increasing rapidly	High	Decreasing	Lifetime buys may be offered	Sales only from aftermarket sources, if at all
Price	Highest	Declining	Low	Lowest	Low	Not applicable or very high of available from aftermarket sources
Usage	Low	Increasing	High	Decreasing	Decreasing	Low
Part Modification	Periodic die shrinks, and possible mask changes	Periodic die shrinks	Periodic die shrinks	Few or none	None	None
Competitors	Few	High	High	Declining	Declining	Few
Manufacturer Profit	Low	Increasing	High	Decreasing	Decreasing	Decreasing

Source: ARROW/ZEUS Electronics

Technology Considerations

Time to process through the entire cycle varies for different components and technologies



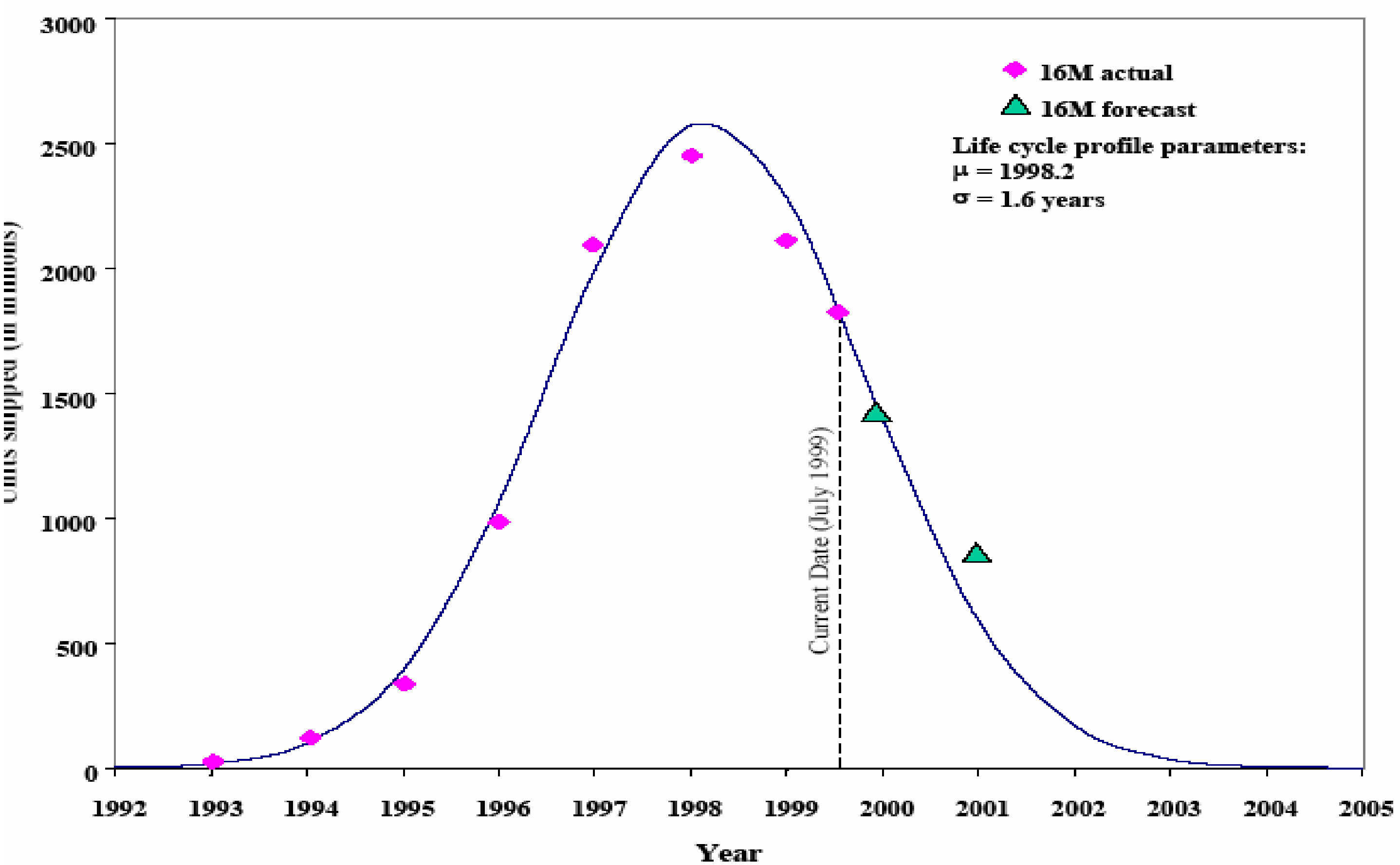
Discrete Logic → 15 Yrs

High Performance Interface Logic → 3 Yrs

Source: ARROW/ZEUS Electronics

Technology Considerations

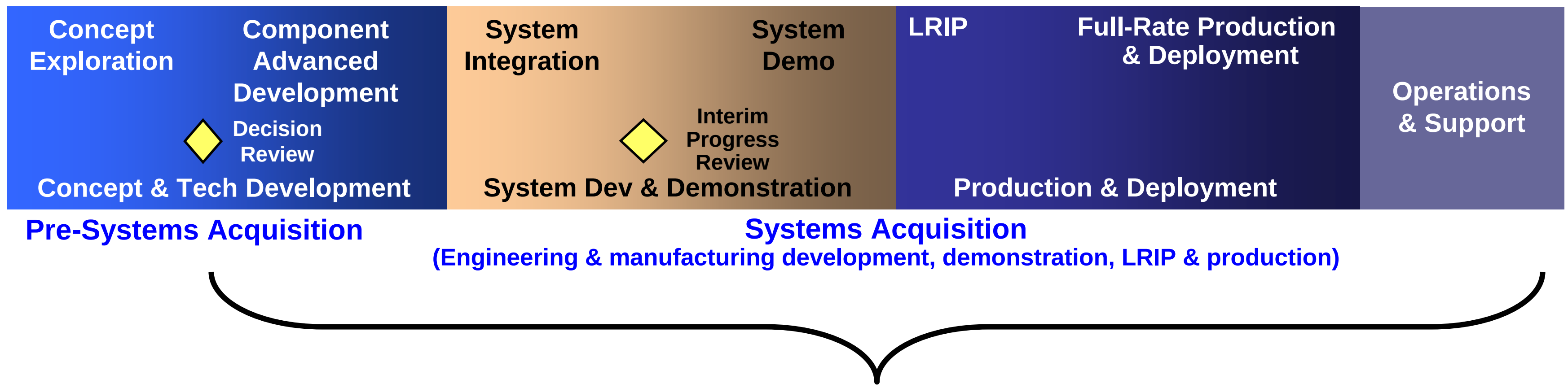
Time to process through the entire cycle varies for different components and technologies.



Source: ARROW/ZEUS Electronics

Typical consumer Electronics Component Life Cycle

Mitigation and Management



Understand the Industry Technology Roadmap and Pedigree of Critical Integrated Circuits/Technologies

- Obtain BOM (or preliminary parts lists during design)
- Map those Roadmaps to the system's Technology Roadmap and address Gaps
- Forecast for Obsolescence, Manage, Mitigate, Track
- Collect Metrics (Use ASN(RD&A) published metrics guidance)

V. PBL and DMSMS

PBL and DMSMS

PBL does not mean that you abdicate responsibility for DMSMS. You should:

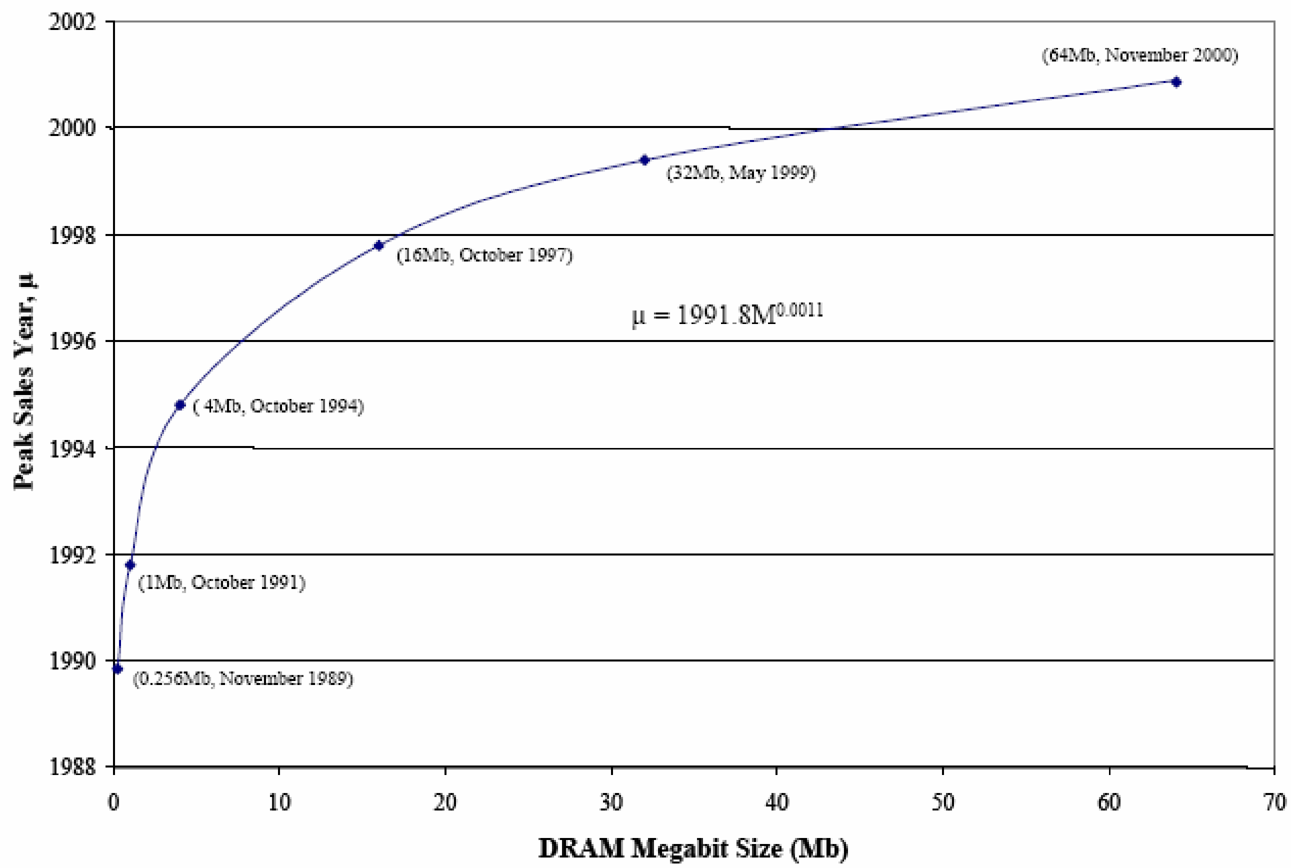
- Require Incremental delivery of the BOM;
- Manage Configuration of the BOM at the piece part level;
- Require Continuous monitoring of the BOM…with periodic feedback;
- Require continuous proactive DMSMS management…employing technology roadmaps;
- Continually identify, track and manage DMSMS cases;
- Ensure cost effective solutions…"Hierarchy of Cost Avoidance Methodology";
- Require Reporting and tracking of performance and cost metrics;
- Maintain Insight into prime contractors management of subcontractors (e.g., design for obsolescence); and
- Utilize Exit clauses that includes delivery of the above as required.

The DoN DMSMS Contractual Guide, May 2006 provides details, available at http://www.acquisition.navy.mil/

Questions/Discussion

Technology Considerations

Moore's Law pushes Critical Characteristics Forward.



Source: ARROW/ZEUS Electronics