



# Visionary Market Research

Identify latest trends, define system memory and storage, quantify opportunities

**Alan Niebel**  
**Web-Feet Research**

# Application-based Flash Forecast

- Demand based Usage and Complexity Flash
  - Consumer - Lowest Price, lowest functionality
  - Mobile – evolves with usage, MCP, MLC, EFD
  - Computing – highest performance, endurance, prices
- Supply Tempered Capacity Forecast
  - Competitors capacity capability: litho, multi-bit, fab lines, wafer output
- Pricing
  - Highest Price = limited supply
  - Contract Price – OEM Brand buying

# NAND & NOR Flash Forecast

Revenue	2010	2015	CAGR
▪ NAND	\$21.5B	\$38.9B	12.6%
▪ NOR	\$ 5.7B	\$ 5.5B	-1.0%
\$/GB NAND	2010	2013	
MLC	\$1.97	\$1.05	
TLC	\$1.75	\$ .83	

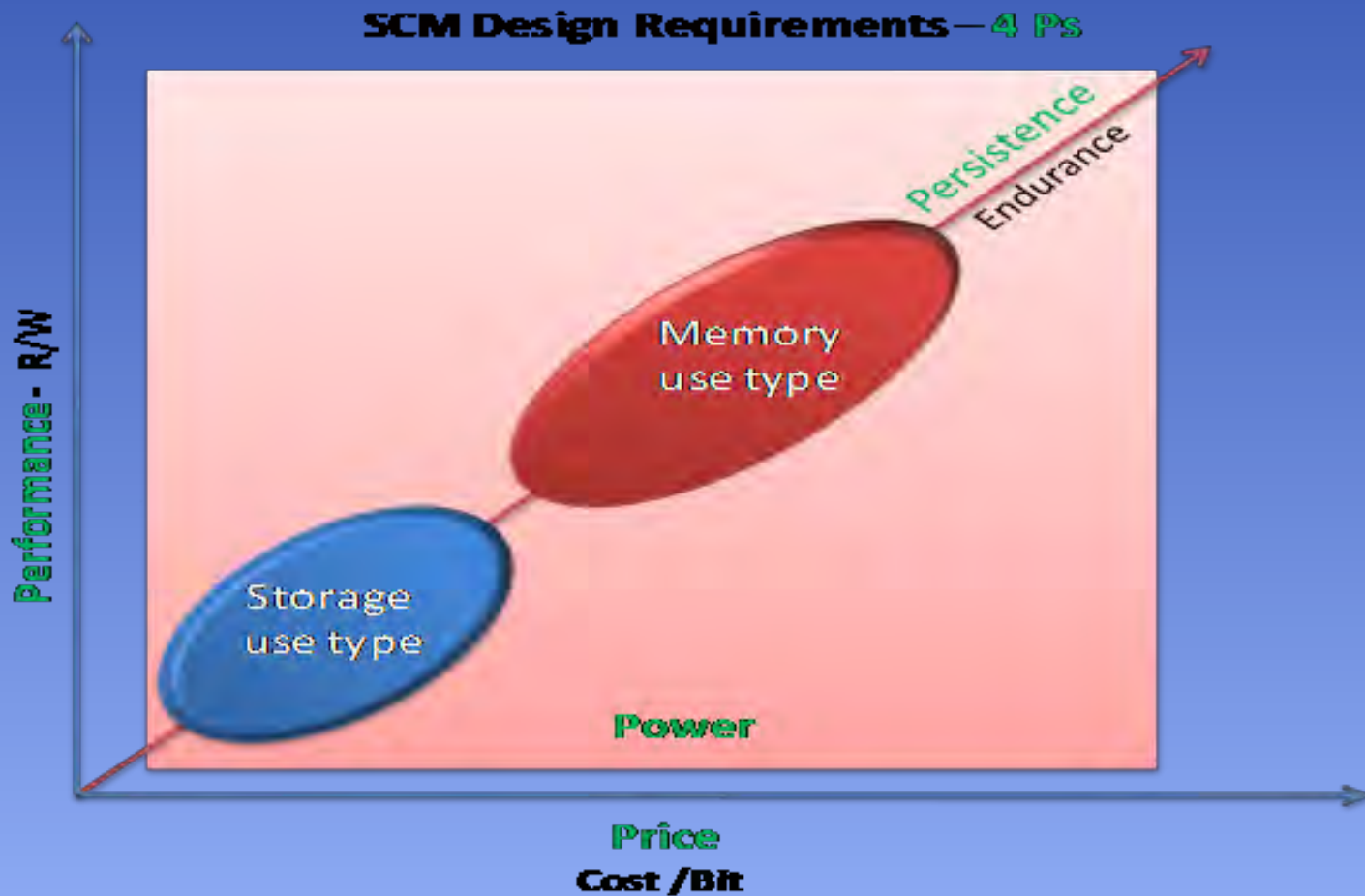
NAND – capacity constrained, ASP remain high

NOR – revenue increase \$1B, tight supply, price increase, serial NOR accelerated growth; flat market outlook

# Identify EFD from SSD – Does it Matter

- What is a SSD
  - Primary storage or cache used in computing
  - Uses standard HDD interface and future: PCIe / USB 3.0
  - Complex and high performance controller
- Embedded Flash Drive (EFD)
  - Consumer and Mobile
  - Non standard HDD interface: CE-ATA, eMMC
  - May include boot, stacked NAND and controller
  - MCP and SiP
  - iPad = EFD ; Tablet = SSD

# Storage Class Memory (SCM) 2 Types





# Web-Fee Research

**Alan Niebel** is the founder and chief executive officer for Web-Fee Research, Inc., the leading non-volatile memory and storage market research company. Under his guidance Web-Fee Research was founded in 2000 to qualify and quantify the Flash and non-volatile memory and storage markets along with the small form factor HDD markets. The company has consistently identified the emerging trends in the electronics industry and has been the first to forecast their impact in the Flash and nonvolatile memory markets. Some of WFR's firsts are: SSD, Storage Class Memories, Flash cache/Hybrid Flash, Embedded Flash Drives, Ultra Low Cost PC, Mobile storage, MP3, NAND MCP, USB Drives, Flash SIM cards, micro Flash cards, serial NOR Flash, and a quarterly SSD / controller SWOT analysis tool.

Mr. Niebel has worked in non-volatile semiconductor market research for fifteen years and has considerable experience both as a consultant and as an analyst. For the last eight years, Web-Fee Research conducts its annual Non Volatile Memory (NVM) Conference that provides a full day of in-depth analysis on the most relevant topics in the NVM industry like Storage Class Memories, SSD adoption, or Storage Evolution 2015-2020. Web-Fee Research's clients include all the current and past Flash manufacturers, test and equipment vendors, controller and SSD companies as well as many of the electronic Fortune 100 companies. Finally, Web-Fee Research looks to the future to guide the industry through insightful analyses, forecast, and business model developments.

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