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**Frontiers of Extreme Computing 2007  
Zettaflops Workshop  
Enabling Technologies Group**

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Tom Zipperian**



# Industry Leads

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- **ITRS valid for everything in it**
- **There will be a zillion dollars invested without our help**
- **However, our community needs to track customer demand**
- **There will be a CMOS transistor replacement eventually, but this is basic research opportunity now. Government sector could provide more support for NRI**

This is industry's show, and the Government sector doesn't have the funds to influence things.



# Public Sector Leadership Opportunities

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- **Special Function Units**
- **Low Energy Interconnect**
- **Memory Options**



# Special function units

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- **Full commodity model: Public sector might influence design of special function units to do dual duty between a commodity use and science/public sectors**
- **Tightly coupled commodity model: Future public sector system might have a commodity components (maybe at IP level) plus a special function units or special integration technology, all to for public use**



# Low Energy Interconnect

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- **Optics**

- Probably required just to reach exascale
- Optics infuses the system from rack-to-rack then board-to-board, ... then eventually on chip
- Pace of optical development is inconsistent with ITRS electronics and not sufficient to reach exascale on expected timescales

- **Electrical**

- Evolution of LVDS



# Nano memory

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- **DRAM alone may be insufficient for balanced exascale systems, but there are no total DRAM replacements on the horizon**
  - Not dense enough, expensive, power too high
- **There are a number of future technologies**
  - Public sector needs seem technically more intense than expected commercial needs
- **Some nano-memory options might be sufficient drive informatics applications with a different architecture**



# Assessment in support of application

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- **It would be interesting to take fully-mature CMOS and plausible optical technology and estimate the performance of an exascale application on an architecture (per architecture working group)**
- **Valid exercise even if we don't change the technology (just as an observer)**

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- **25 people in outbrief room at 11:17**