

# What's Next Beyond CMOS?

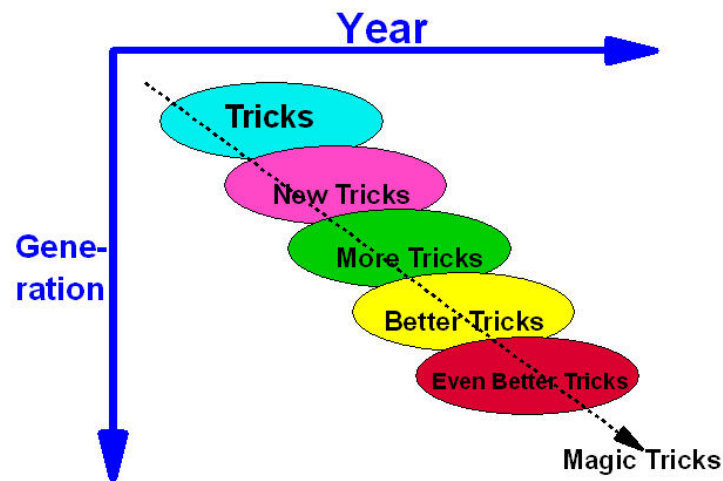
Hot Chips 19 Panel

Norm Jouppi (Chair), Mark Horowitz,  
John Kubiatowicz, Mike Mayberry,  
Ghavam Shahidi, Stan Williams

## Classic (Denard) Scaling

- Worked for ~2 orders of litho magnitude
  - Generated ~10,000X devices per chip
  - Devices were ~100X faster
  - Computational capability ~1,000,000X!
- Now scaling is up against atomic limits
  - Gate oxide thickness

# Scaling Today



- Source: Phil Emma, ISCA 2006 keynote

## So “What’s Next After CMOS?”

- CMOS
- Another technology
- Both of the above?