Best Ways to Use Billions of Devices on a Chip

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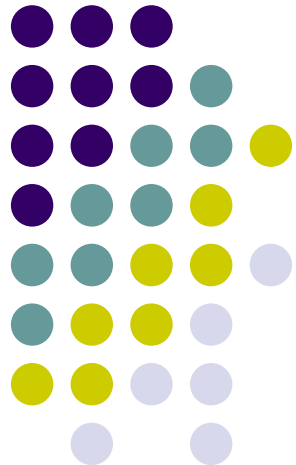
ASP-DAC 2008 Designers' Forum Panel

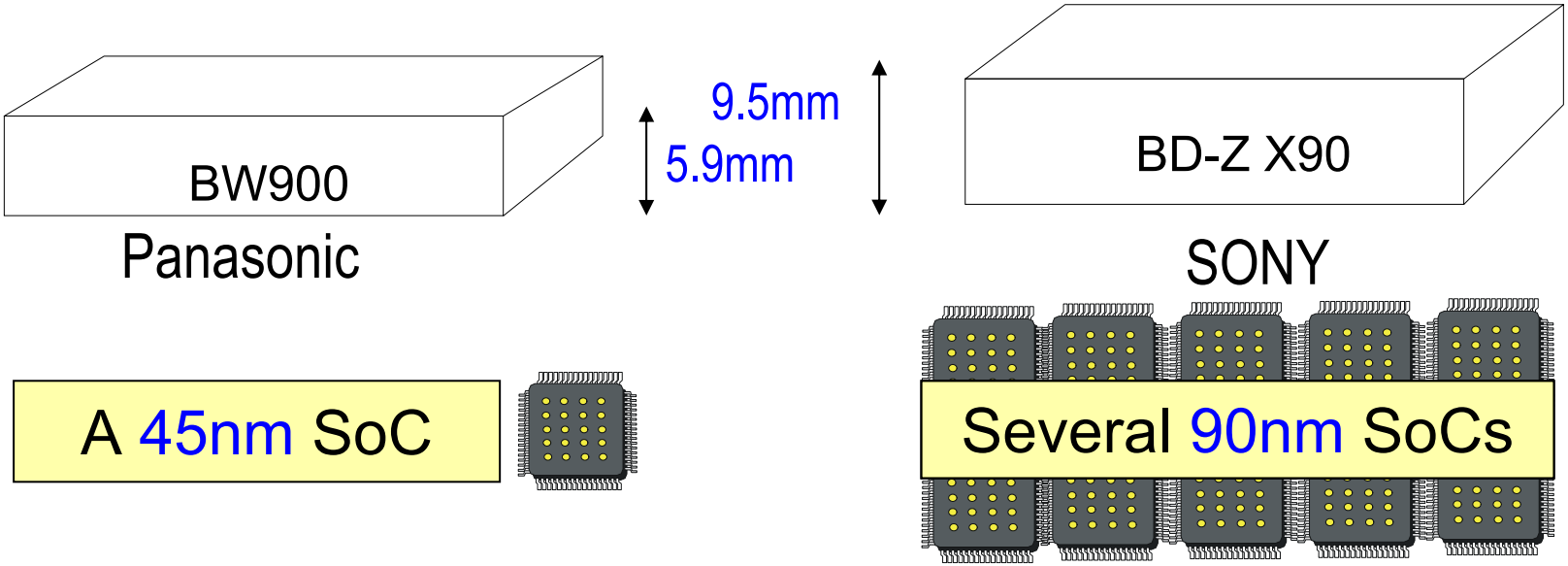


Two Possible Ways

1. Utilize billions of Trs for Superior Capabilities
   - Make consumer products more appealing
2. Utilize them to enhance Reliability and Availability
   - Make the SoCs more reliable

Superior Capabilities with Billions of Trs

Blu-ray Recorders for HD Digital TVs



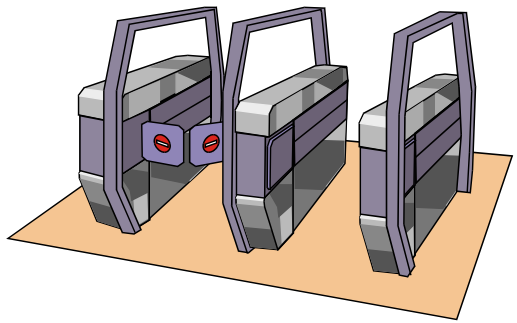
0.8W Stand-by Power 3.0W

Full HD (1920x1080)
MPEG4 AVC Encoder

Full HD (1440x1080)
MPEG4 AVC Encoder

Reliability and Availability

- Our daily life highly relies on computer systems



Transportation

Banking

- Troubles freeze our daily life

May, 2007
Airline reservation system trouble

Affects 70,000 people

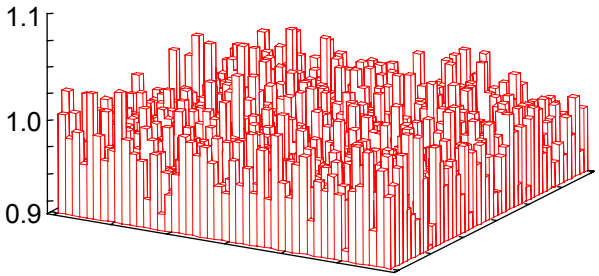
Dec., 2007
IC ticket gate in train stations trouble

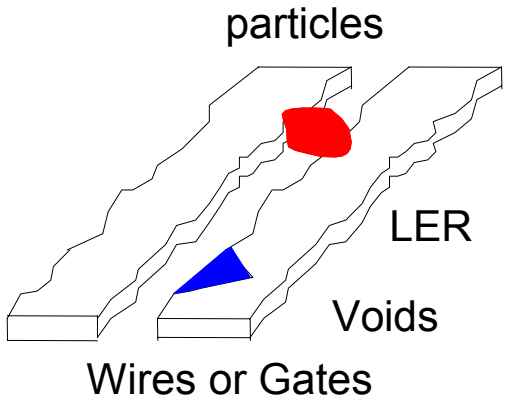
Affects 2million people

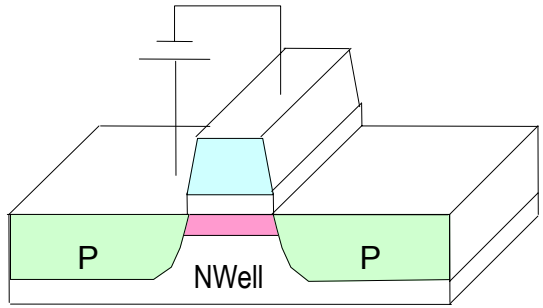
Less Reliability and Availability on Billions of Trs

- It is impossible to guarantee perfect functionality of billions of Trs on a chip

Device Variation	Defects	Age Degradation

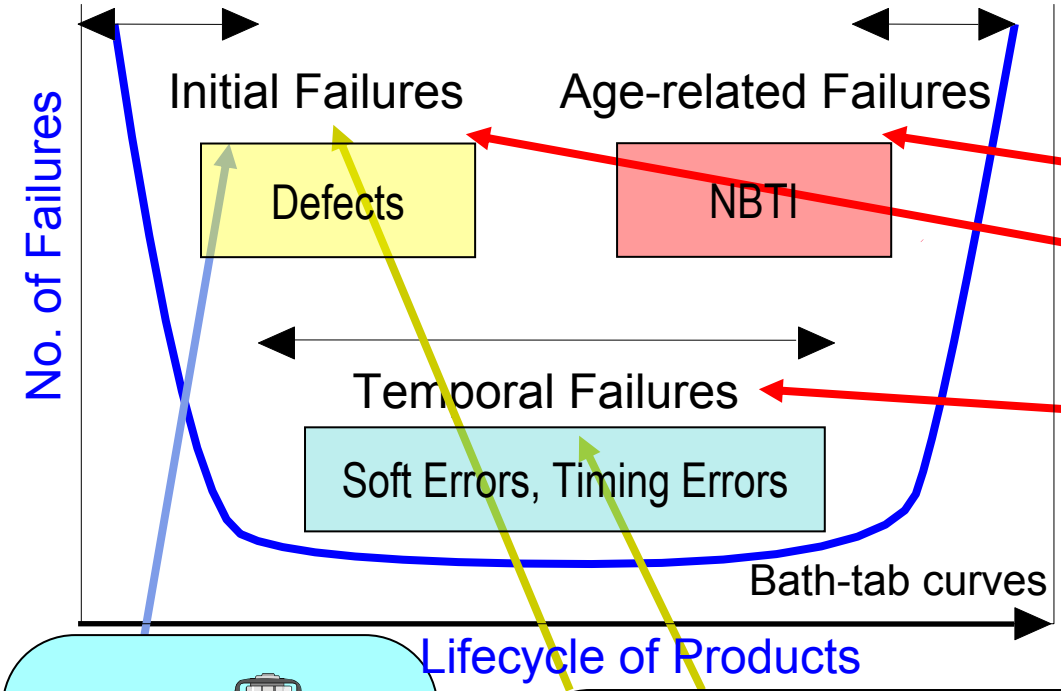


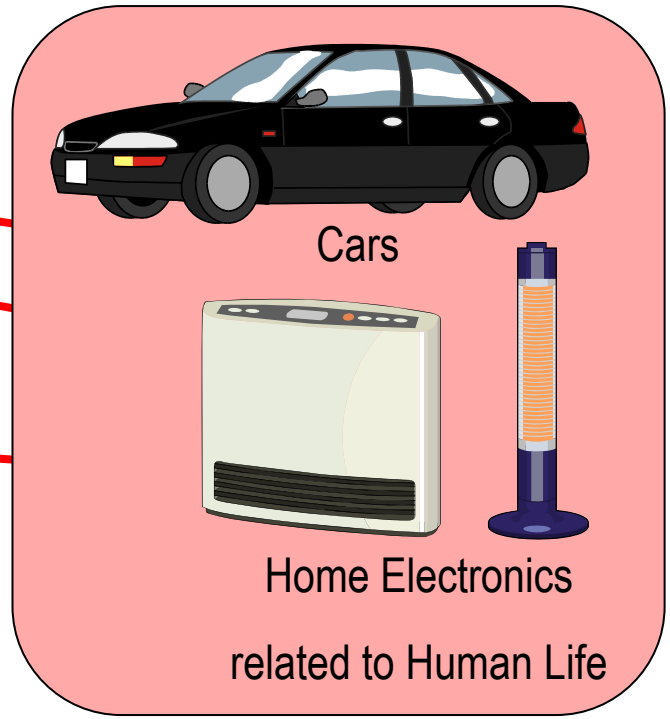


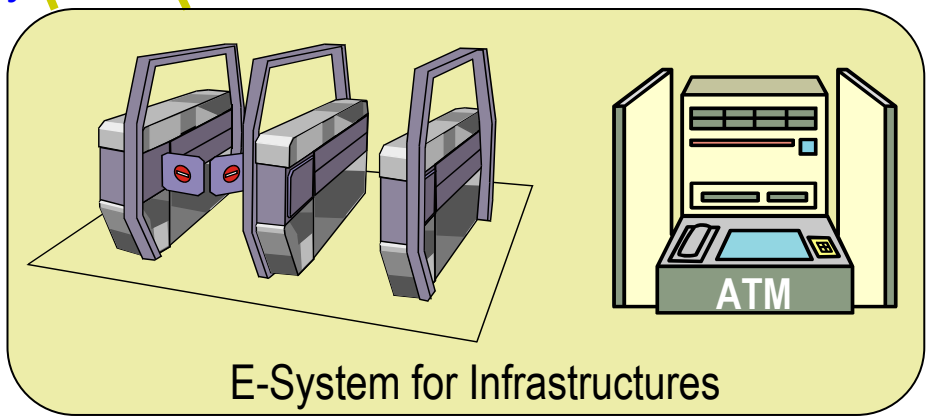


NBTI

Various Requirement for Robustness



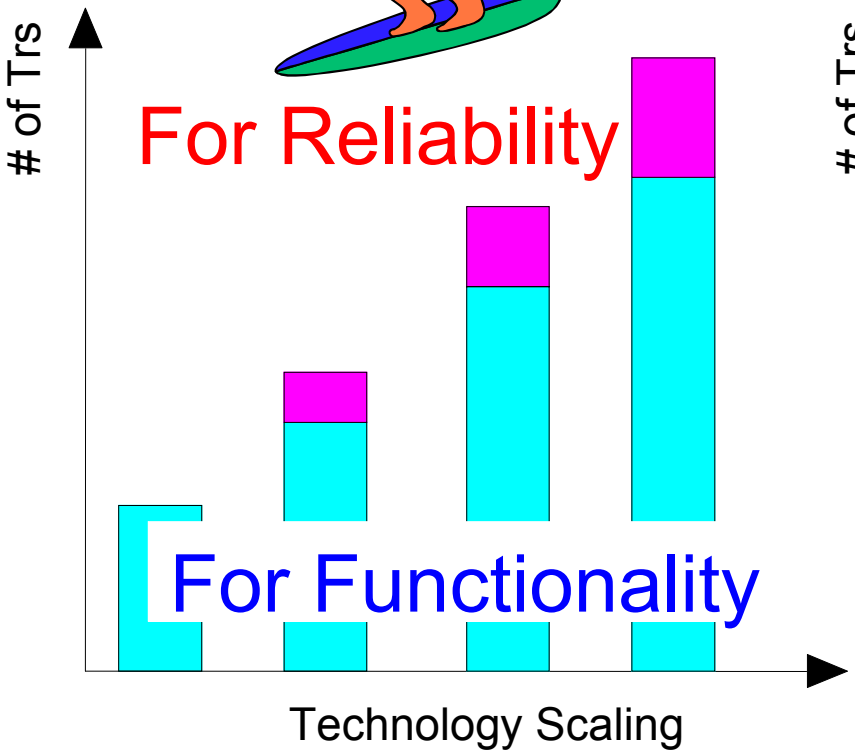


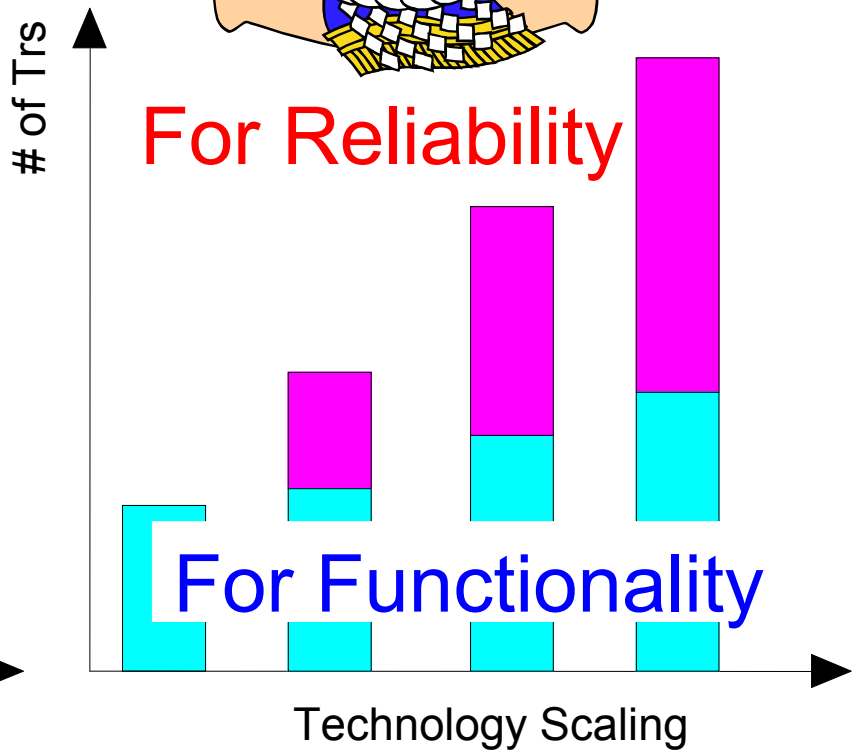


Conclusions and Discussions

- For more functionality
  - Final products have superior capabilities
  - Can you find good applications?
    - Digital TVs, Cell phones, Digital Cameras, Robots
  - Will consumers choose such products?
    - Nintendo Wii vs SONY PlayStation3
- For Reliability and Availability
  - Some amount of Trs to enhance Reliability
  - Tradeoffs between Cost and Benefit
    - Who can pay the cost?
    - Do you pay the additional cost for reliability?

Best Way / Worst Way





Best Way vs. Worst Way

Thank You