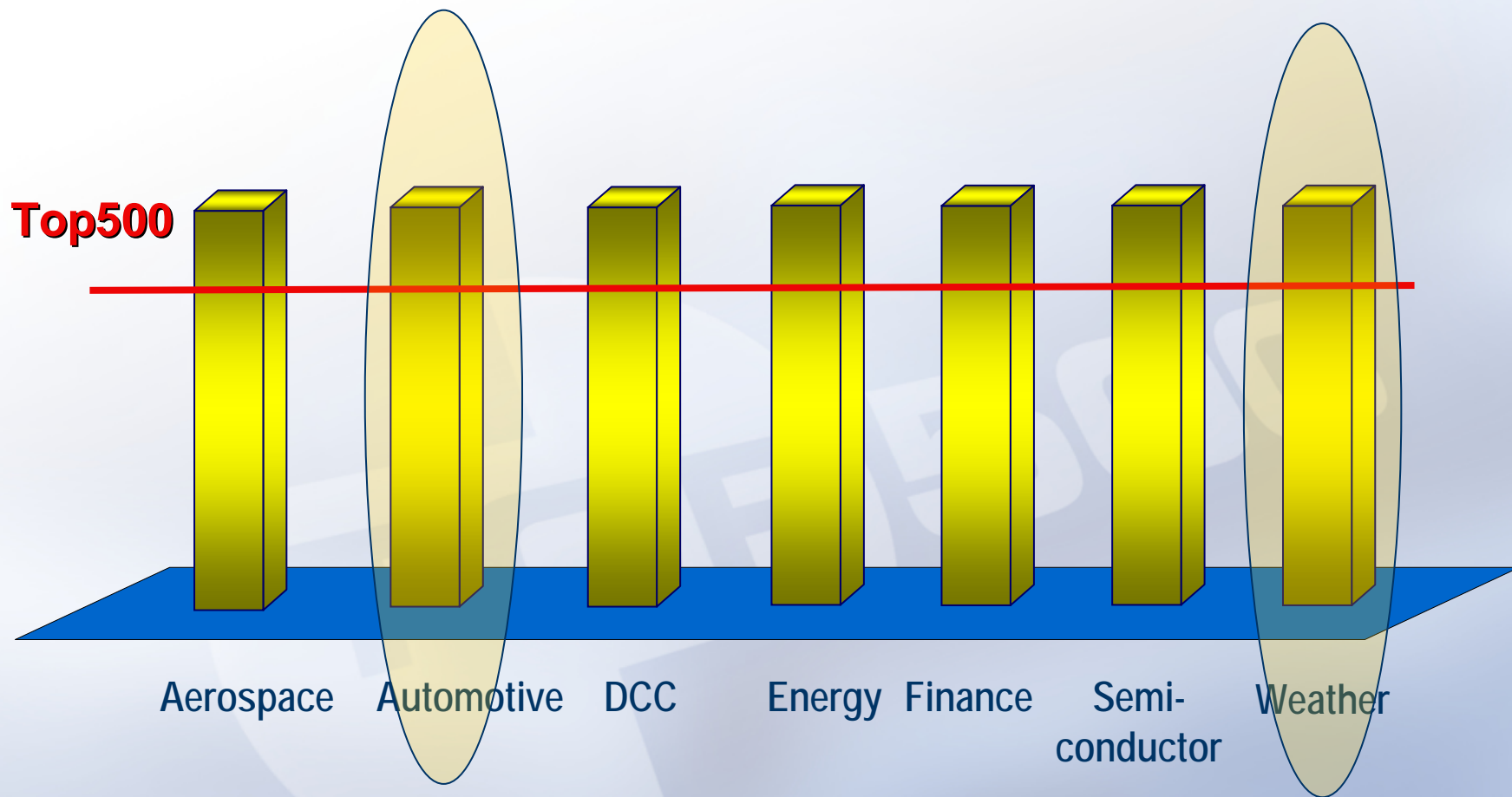




*Top20Auto
Survey of HPC Installations
in the Automotive Industry*

Christian Tanasescu
SGI Inc.



Top20Auto

Study introduced at SC'03 in Phoenix

Automotive Segment in Top500 Processor Architectures

-Top Automotive site, Opel, with IBM p5 575, 4.3 TFlops, is #72 in the Top500 list,

-Automotive installations
1% from the sites in Top500
0.6% from performance

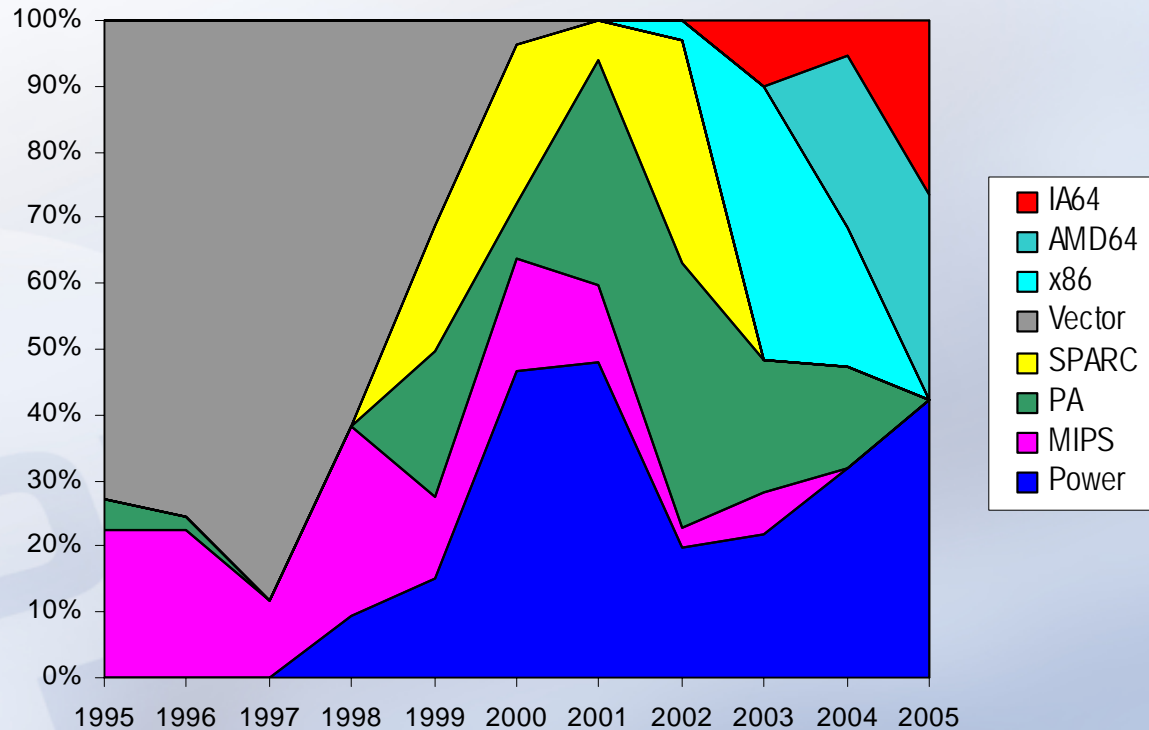
- Only 3 processors in the in the Top500 list

-Power (42%)

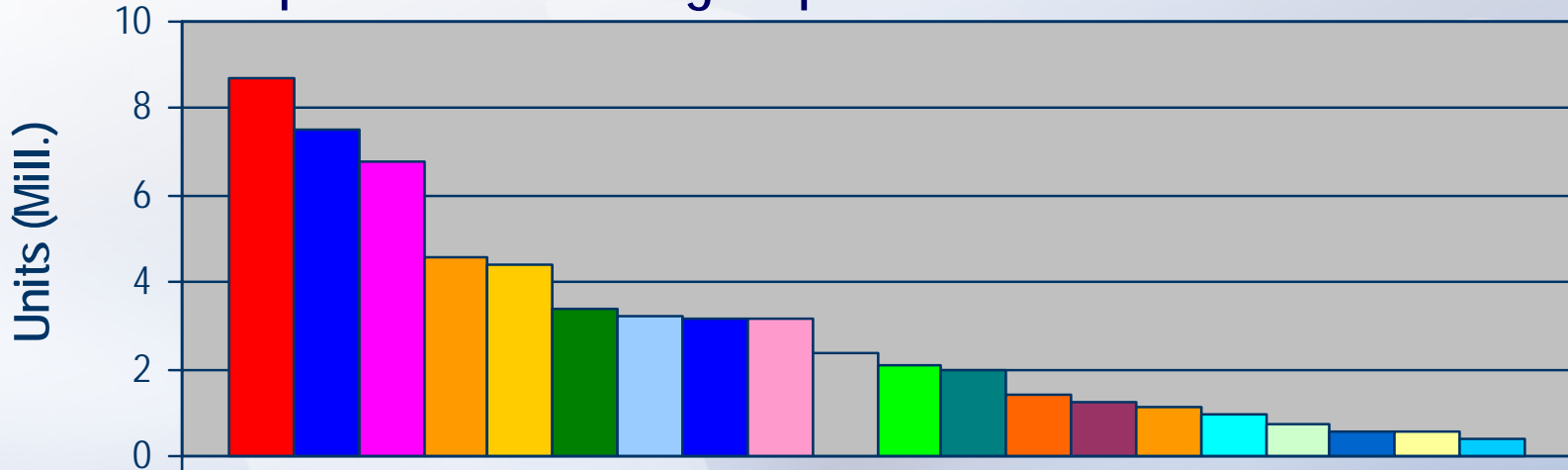
-AMD64 (32%)

-IA64 (26%)

- Not relevant to understand the entire HPC Automotive sector



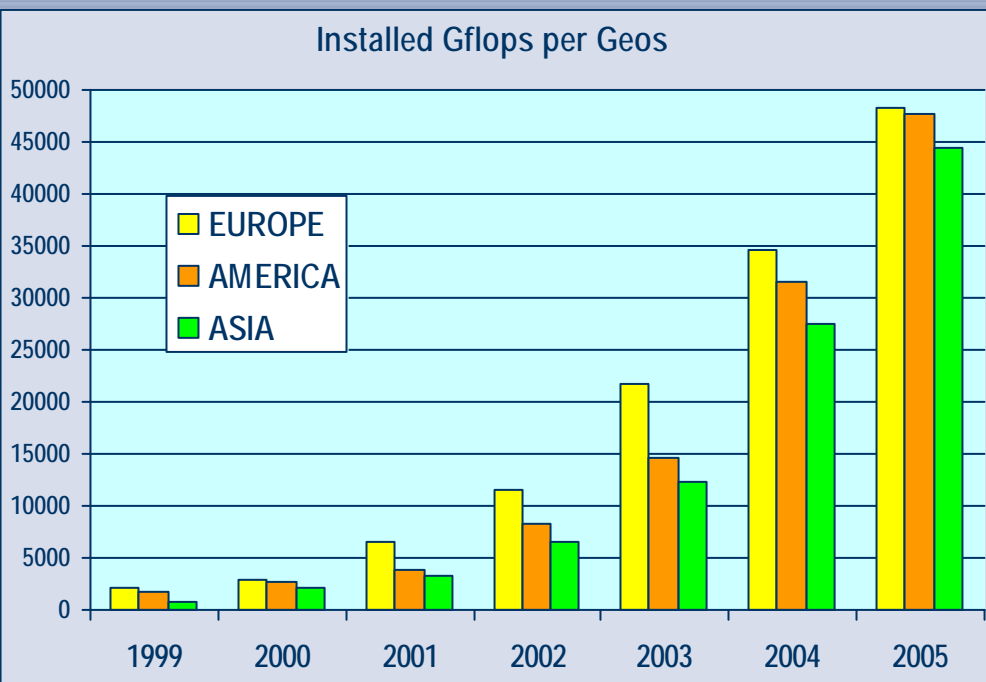
- Survey of HPC Installations in the Automotive Industry
- Understand the structure and dynamic of the HPC market in Automotive and detect technology trends
- Track down only **server** installations for **CAE** in the top 20 automotive OEM's
- Metric is performance in Gigaflops



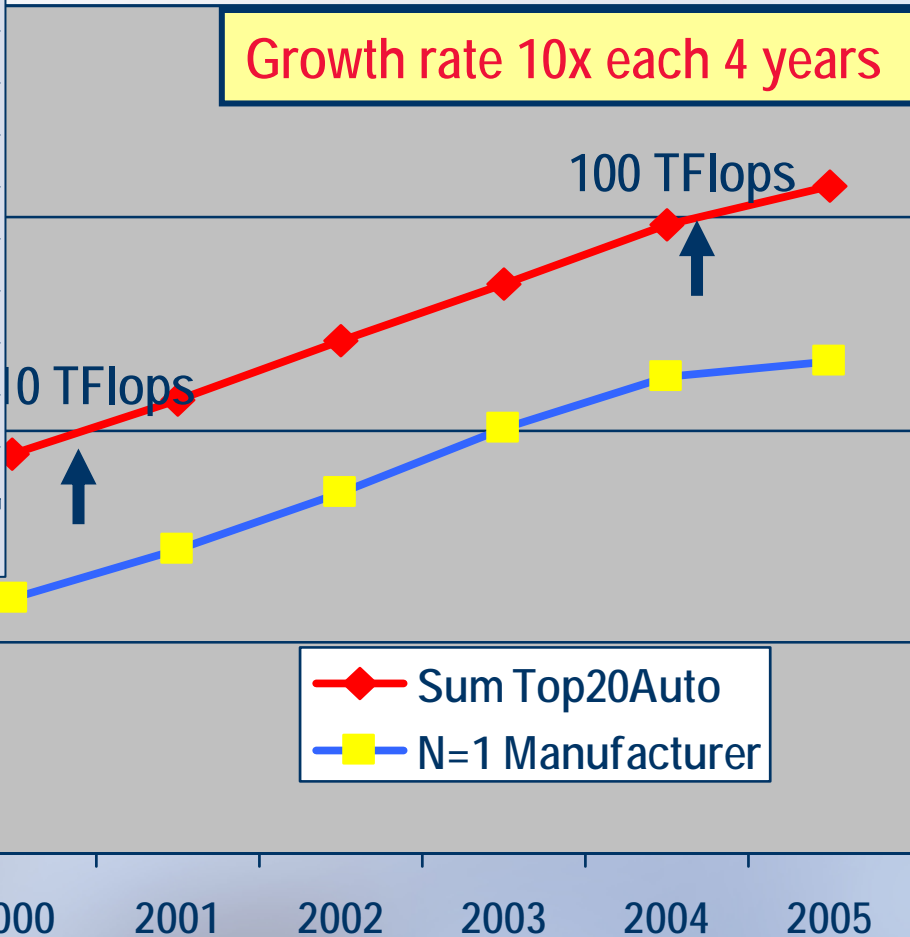
Automotive Manufacturers ranked by production in 2004



Source Automotive News, May 2005



Growth rate 10x each 4 years



N=1

Ford

Ford

Ford

Daimler Chrysler

Daimler Chrysler

Daimler Chrysler

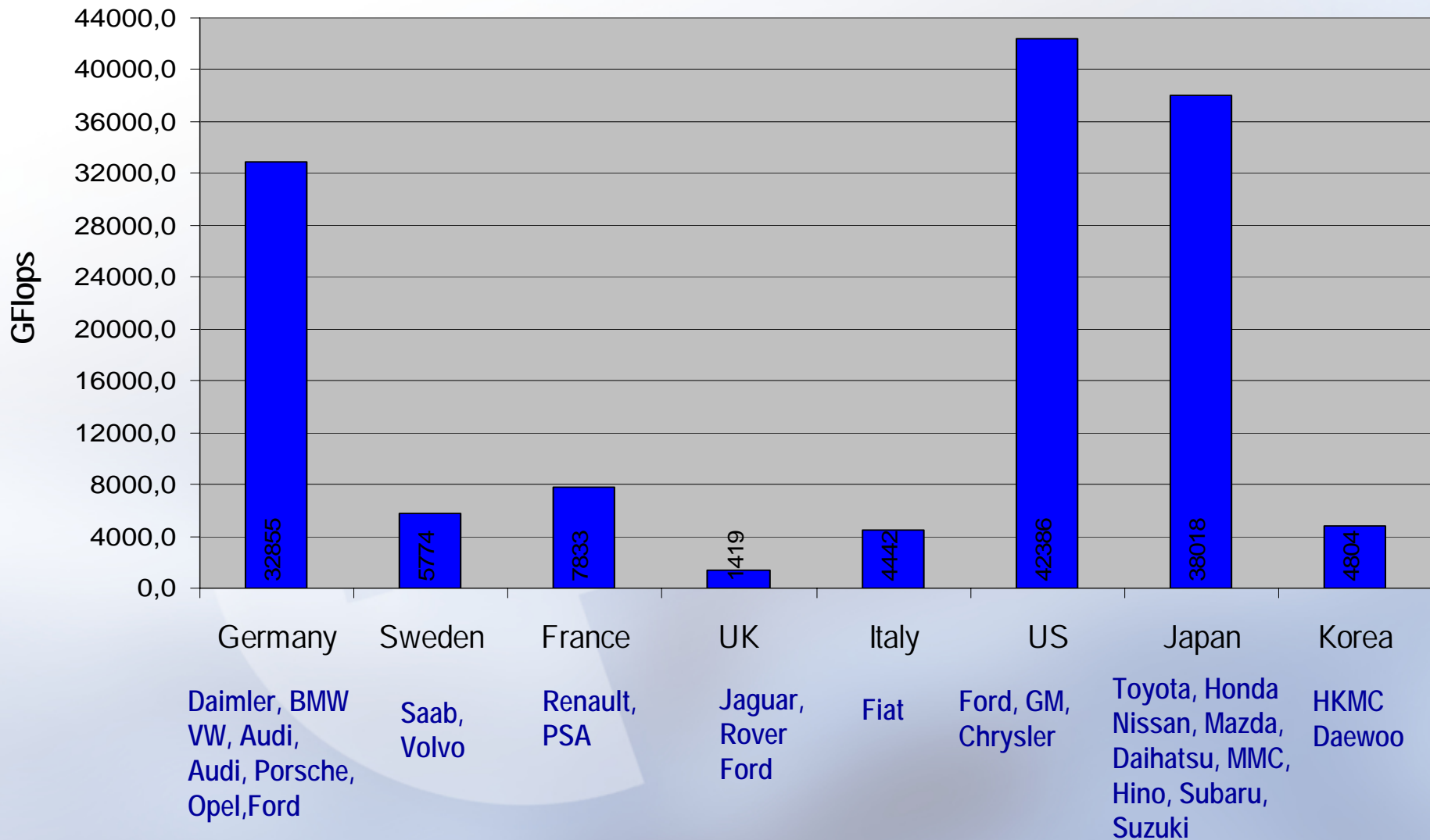
Daimler Chrysler

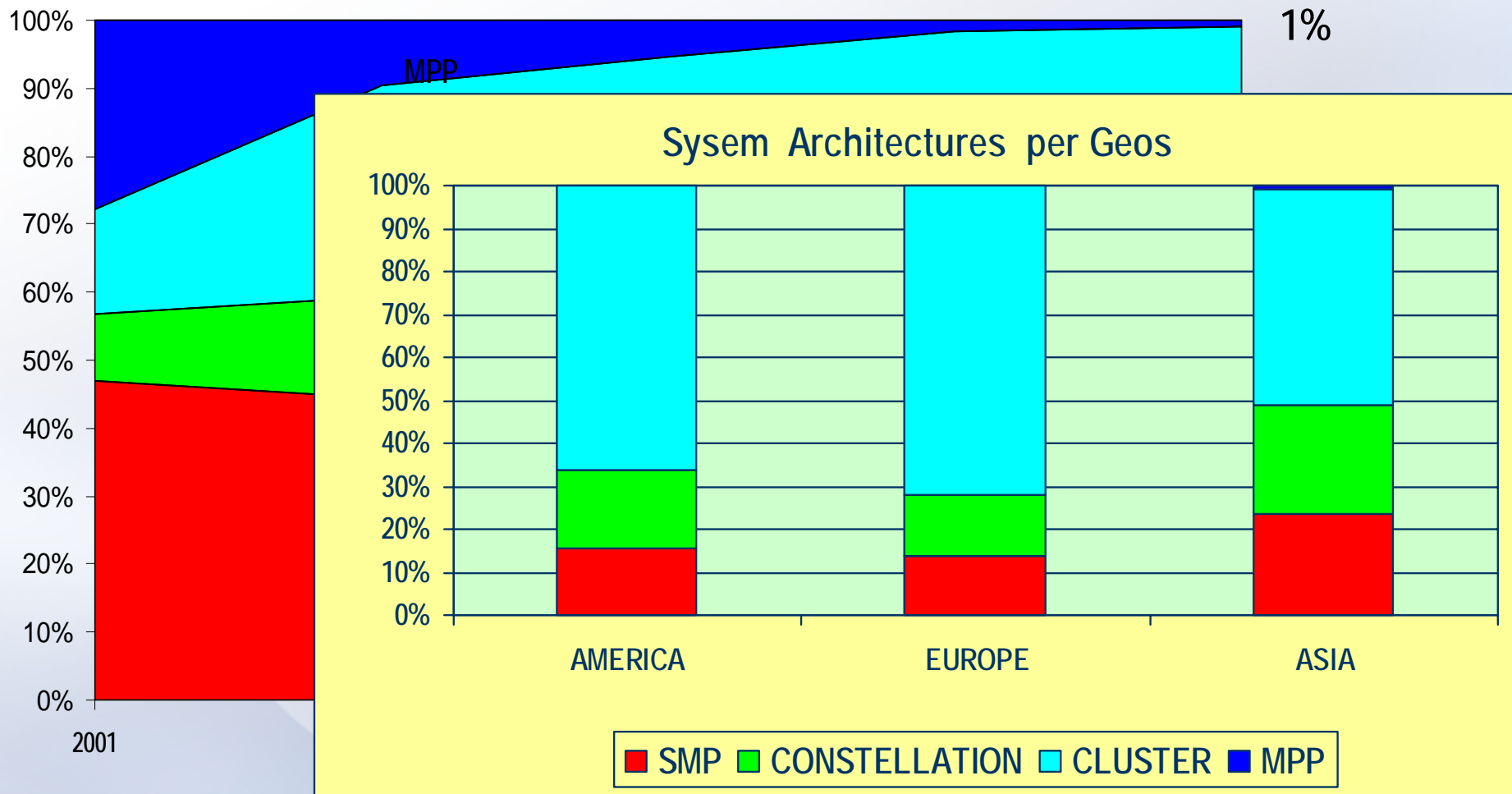
Daimler Chrysler

GM

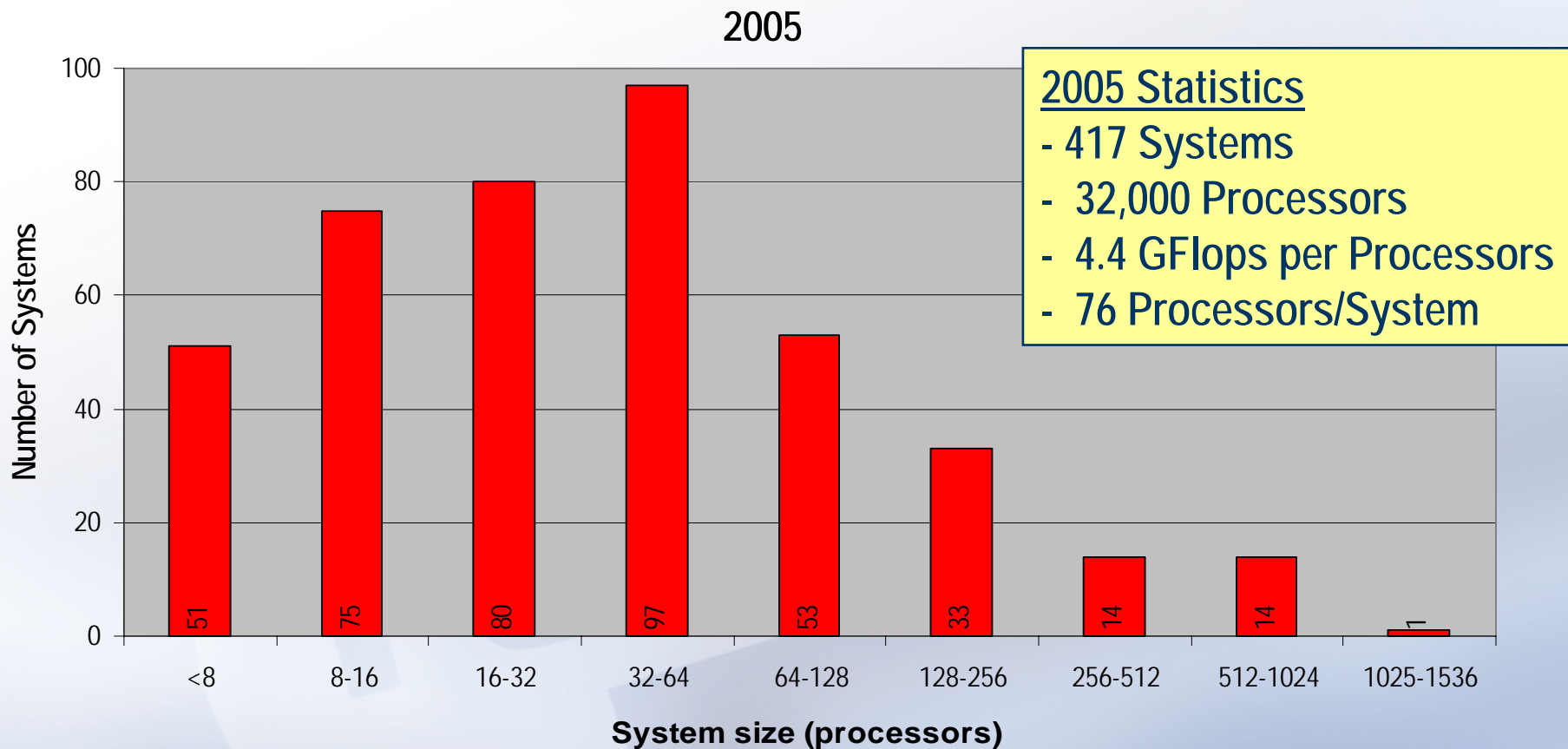
Toyota

HPC in Automotive by Country - 2005





System Size Distribution - 2005



Asia: low granularity, 64% of the systems have less than 32p
 US: high granularity, 60% of the systems between 32p-128p
 Europe: medium granularity, 64% of systems between 8p-64p

-Classify microprocessor architectures at instruction set level

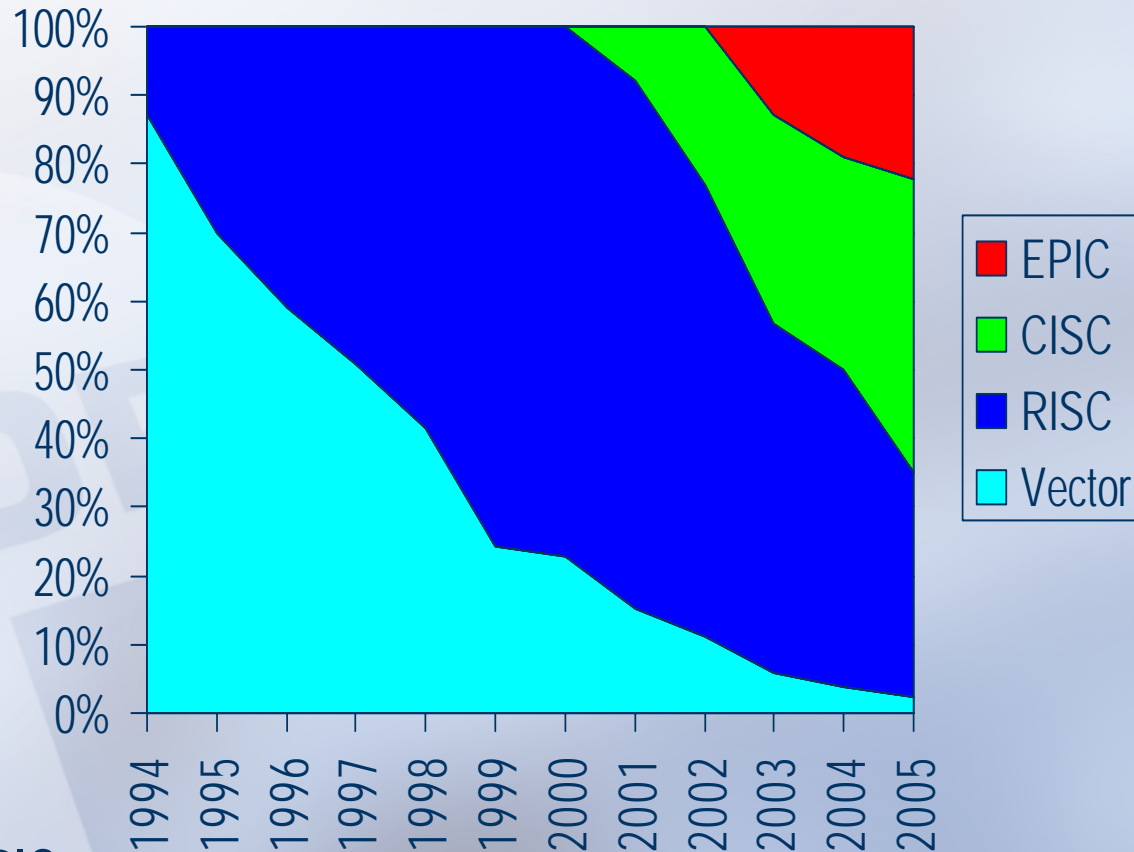
- RISC** Power, SPARC, PA, MIPS, ALPHA
- CISC** x86, x86-64, AMD32, AMD64
- EPIC** Itanium2
- Vector** Cray, NEC

3 platform migrations:

Vector -> RISC

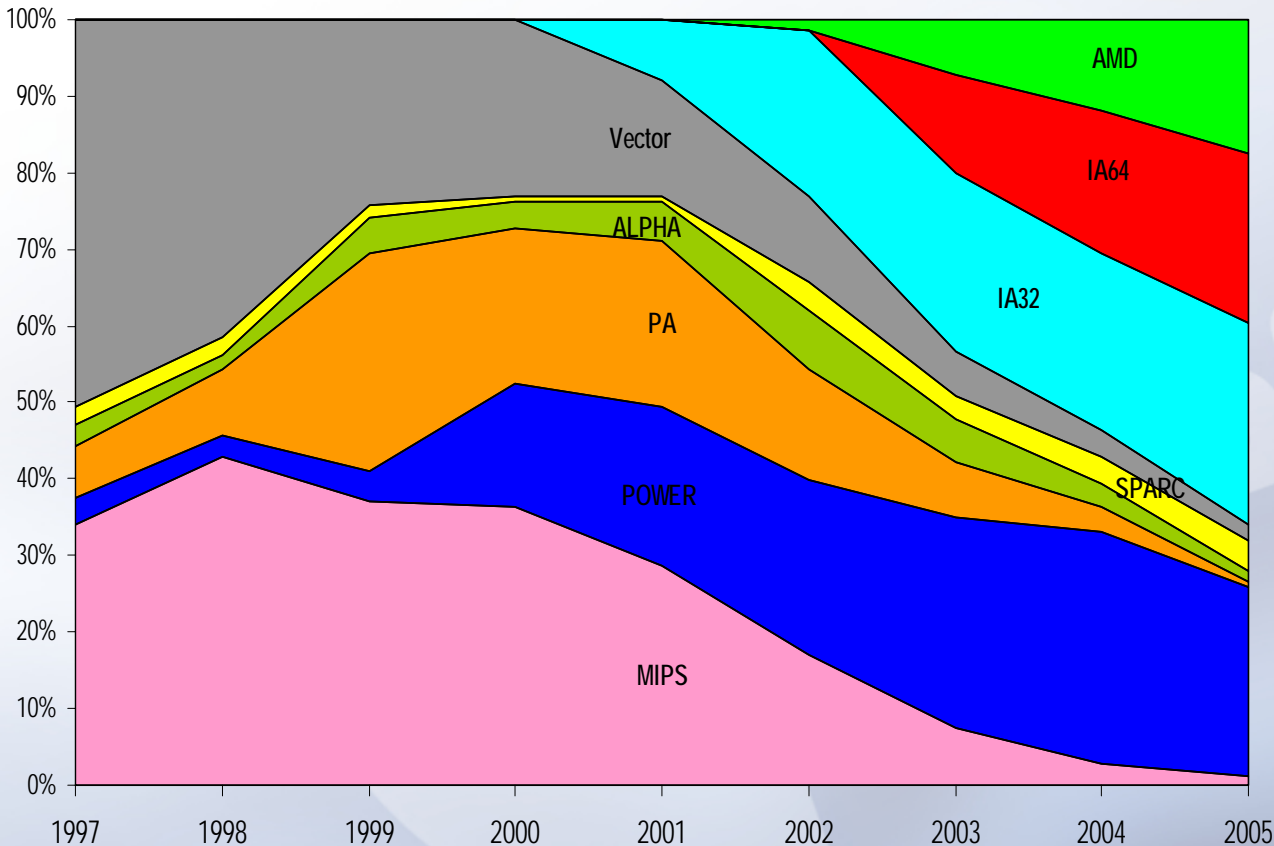
RISC -> CISC

RISC -> CISC and EPIC



-Co-existence of RISC, CISC and EPIC will continue in the next years

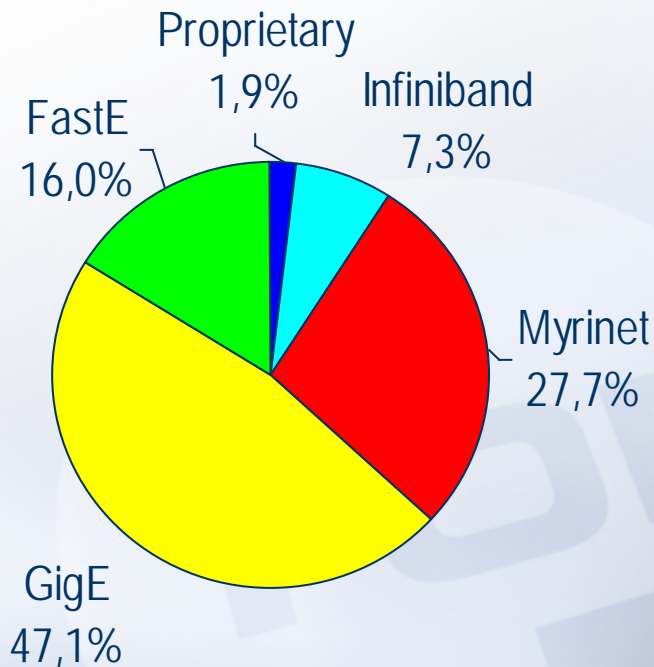
Processor Family Market Shares for HPC in Automotive



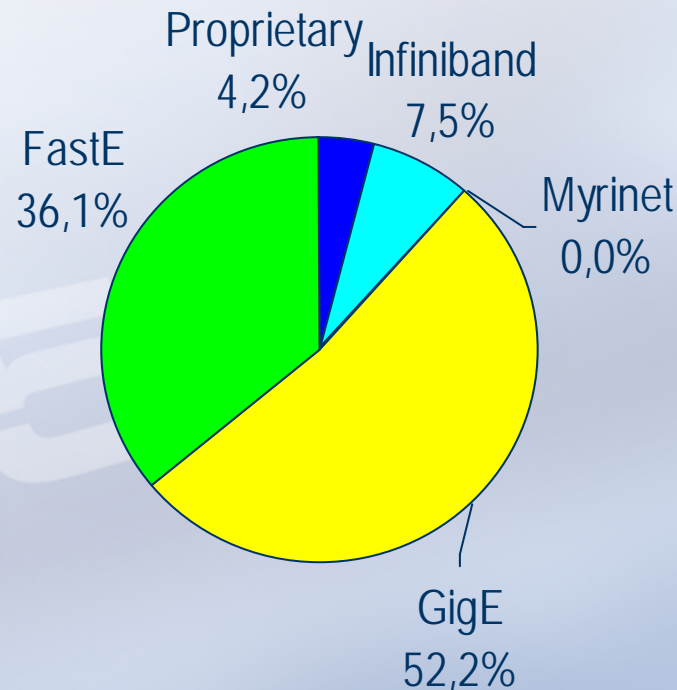
-IA32 is the leading processor architecture with 26%, followed by POWER 25%, IA64 22% and AMD 18%

-Vector architecture represents 2.2% and continues to lose market shares, as well as the other RISC platforms

Clusters

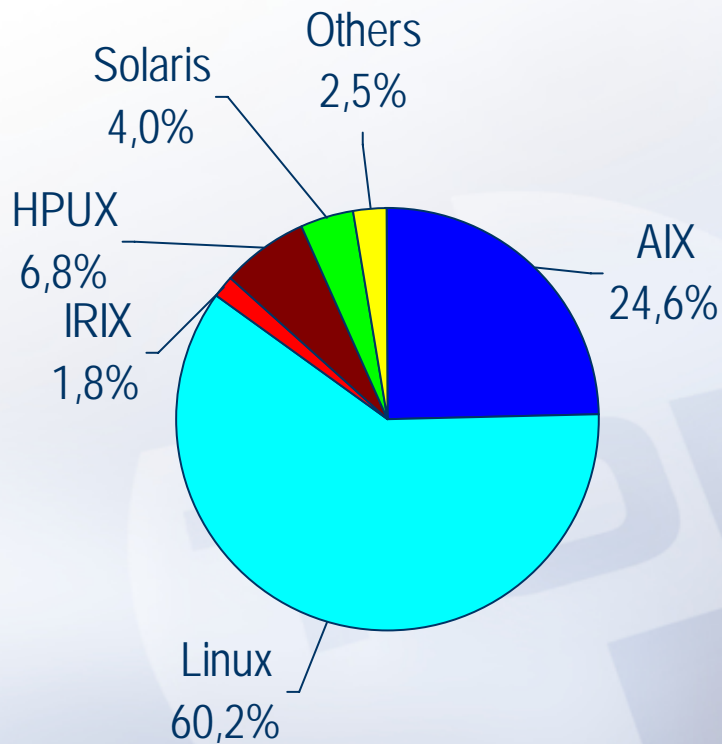


Constellations

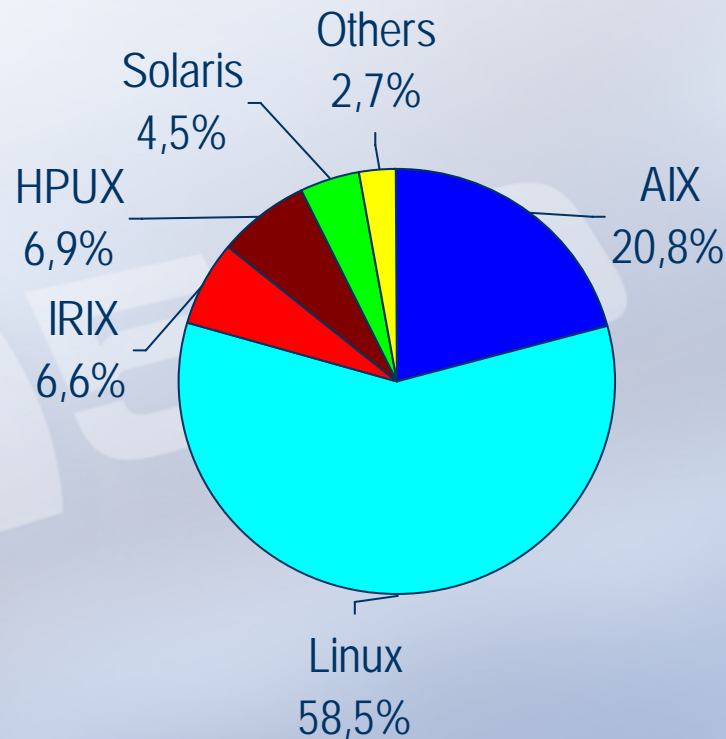


Constellations are a form of server virtualization for capacity environments through a batch queuing system. Apps don't span the boundary of node, hence a low BW interconnect is good enough.

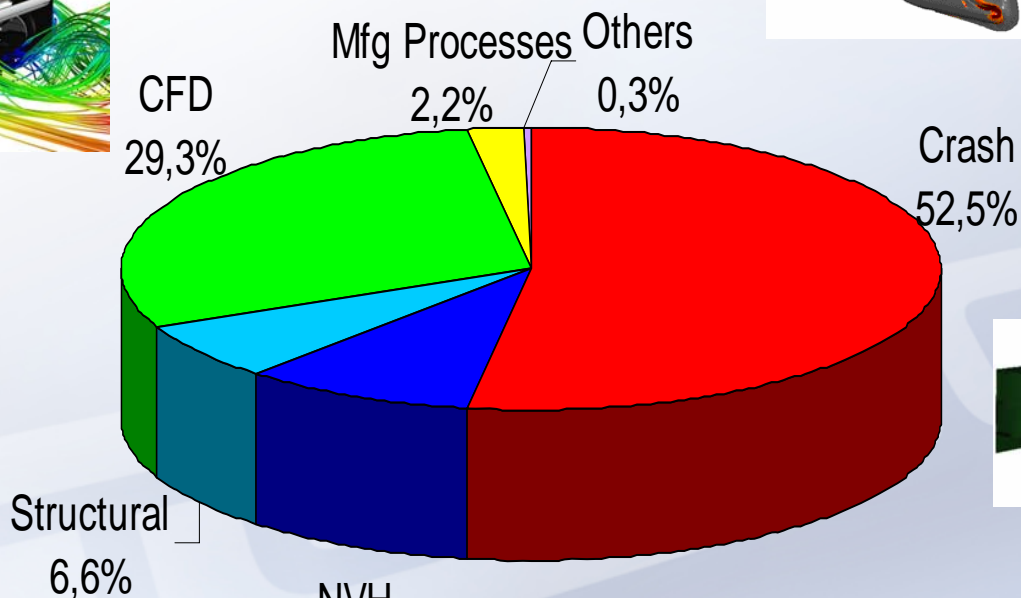
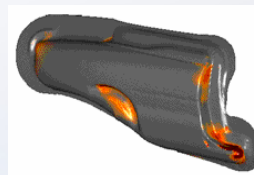
Performance (GFlops)



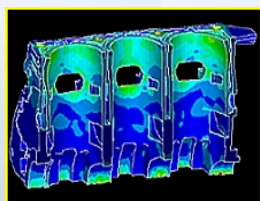
Capacity (Processors)



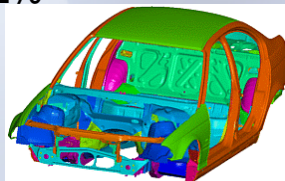
Linux is the leading Operating System, 28% yty growth.
In Europe Linux has 70% market shares.



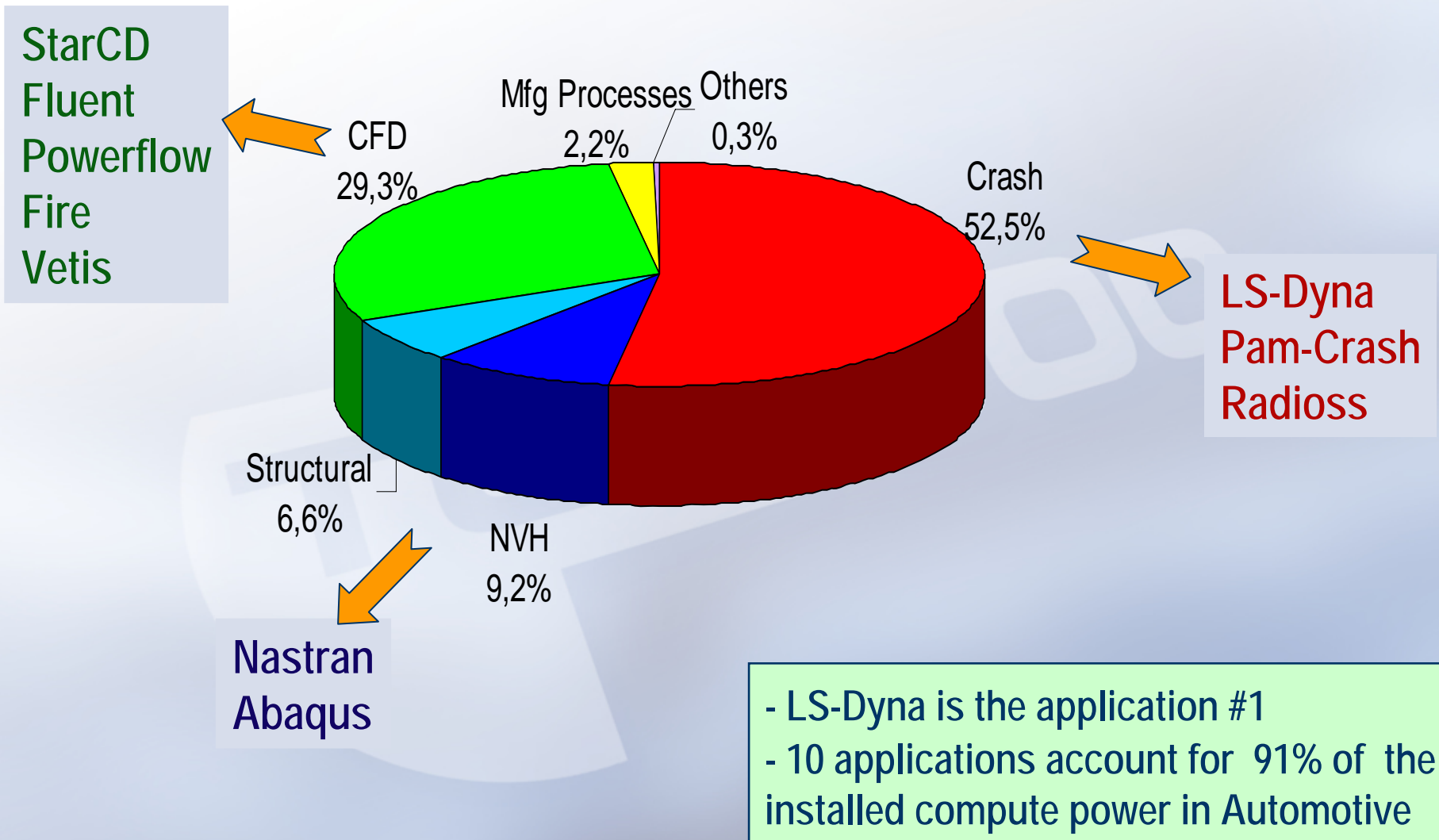
Crash
52,5%



NVH
9,2%

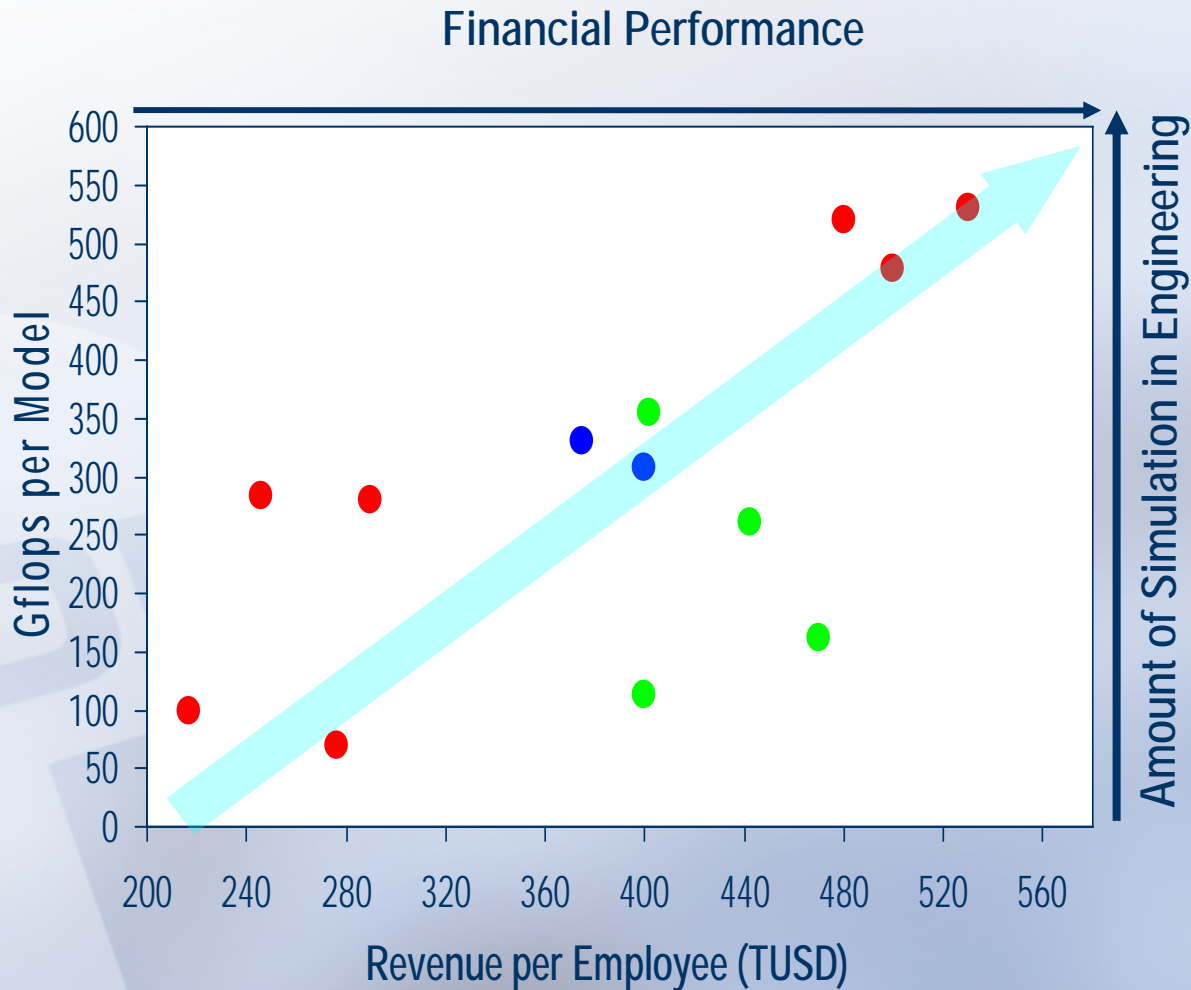


- **Crash** is the application segment #1
- **CFD** is the fastest growing application segments (5% yty])
- **NVH** the most demanding in terms of memory and IO bandwidth.



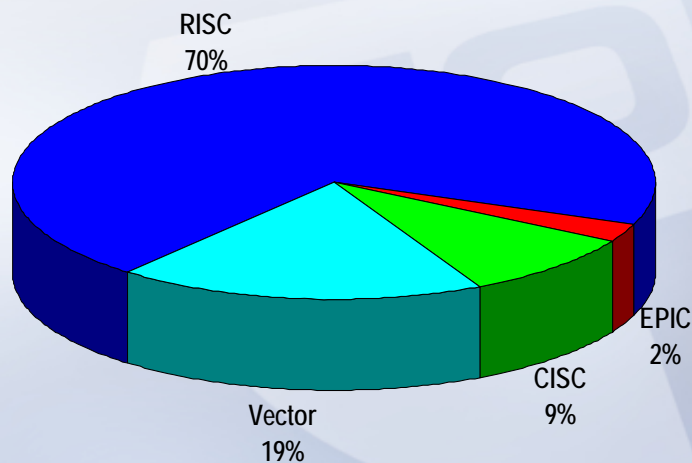
- US Automotive OEMs
- EU Automotive OEMs,
- Asian Automotive OEMs

Good correlation between Rev/Employee and Gflops/Model for US and European companies. For Japanese companies profitability comes primarily from efficient manufacturing processes. Nissan plant is rated number #1 in the productivity index list (Automotive News, Dec 16, 2002)



- Extend the methodology to other Industry Segments
- Operational Weather Forecast market study at SC'06

Processor Family



System Architecture

