

Future PC Trends & their Implications on Traditional Computing Architectures

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Evolving Traditional Computing Values

1960s-1980s

GP PERFORMANCE

1990s

PRICE • GP & MEDIA PERFORMANCE (Mhz, 000, ISA)

2000s

PRICE • GP & MEDIA PERFORMANCE • WATT (IPC% \geq WATT%)

2005

PRICE • GP & MEDIA PERFORMANCE • WATT • FF • USAGE MODEL
Single Core → Threading → Multi Core

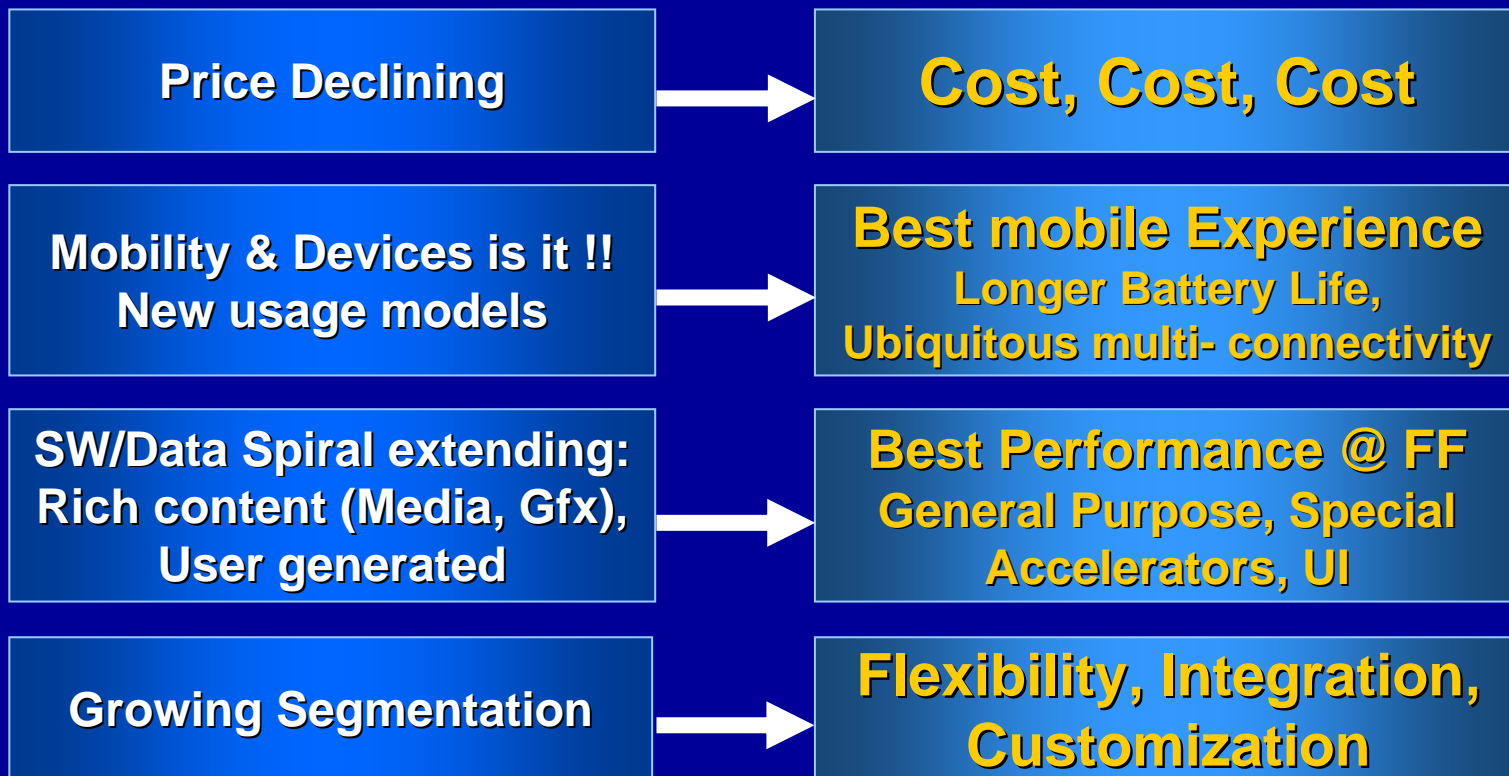
2010+ ?

PRICE • FF/STYLE • USAGE MODEL • CONNECTED • PERF • WATT
Multiple Devices – Many Mobile

Major Trends and their Implications

Trend

Implication



Core Logic ASP vs Cost Trends



Price Declining



Cost, Cost, Cost

- **Driving Moore's law is good**
 - Moore's Law DOES NOT break over the next ~10 years
 - 450mm is coming
- **Multi chip → Single chip – More integration**
- **One (big) size chip doesn't make sense**
- **Cheaper PAT** (Package, Assembly, Test)
- **Digital I/O that scales with Si process**

**Driving to advanced process
and aggressively addressing other cost factors**

**Mobility & Devices is it !!
New usage models**



**Best Mobile Experience
Longer Battery Life,
Ubiquitous multi- connectivity**

- **Always connected Broadband = Multi-Comm**
- **Always-On**
- **Integration also to achieve small form factor**
- **Outstanding power management & Cooling sharing as Integration increases**

**All PC Client Devices will become
Always on Always connected Compute + Comm capable**

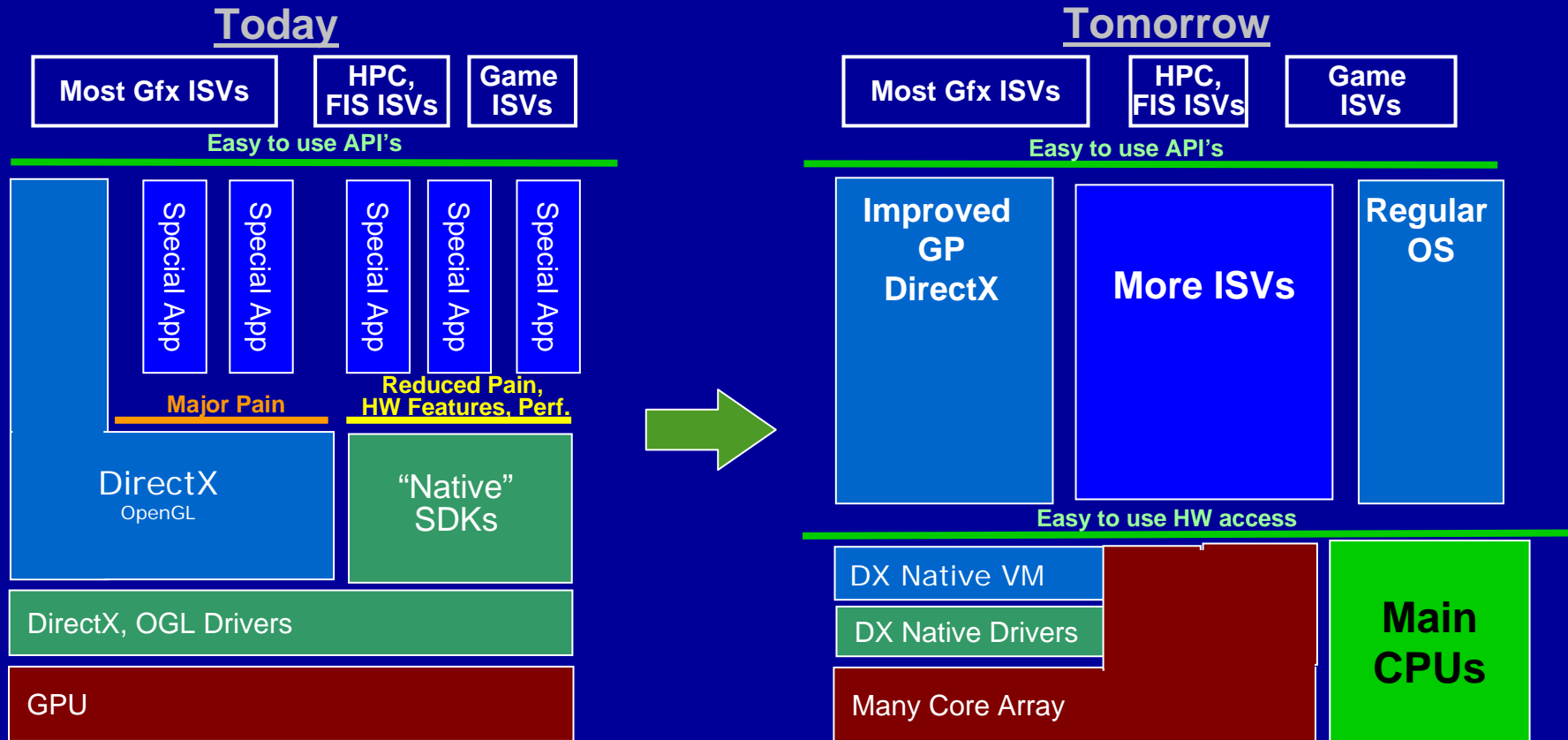
SW/Data Spiral extending:
Rich content (Media, Gfx),
User generated



Best Performance @ FF
General Purpose, Special
Accelerators, UI

- **“One internet” → One arch Top to Bottom**
- **Single Core to Multi Core Offerings**
- **More capability specific ISA/Arch extensions**
 - SIMD/Vector, Manageability, Security, Content enhancement
- **GP IA Many Core Media/Vector Acceleration**
 - Discrete and Integrated
 - Supported by new Memory Hierarchies (e-DRAM, PCM, Flash)
- **Heterogeneous Computing Model**
 - Single programming model and SW compatibility across
 - Apply the right kind of efficient performance where needed

CPUs + Many Core Arrays



- **Today:** Few ISVs doing cart-wheels for a 3-4X FP gain
- **Tomorrow:** ISVs shift to CPUs + Many Core Arrays

IA Top to Bottom + IA many core Media/Vector accelerator under one native programming model

Growing Segmentation

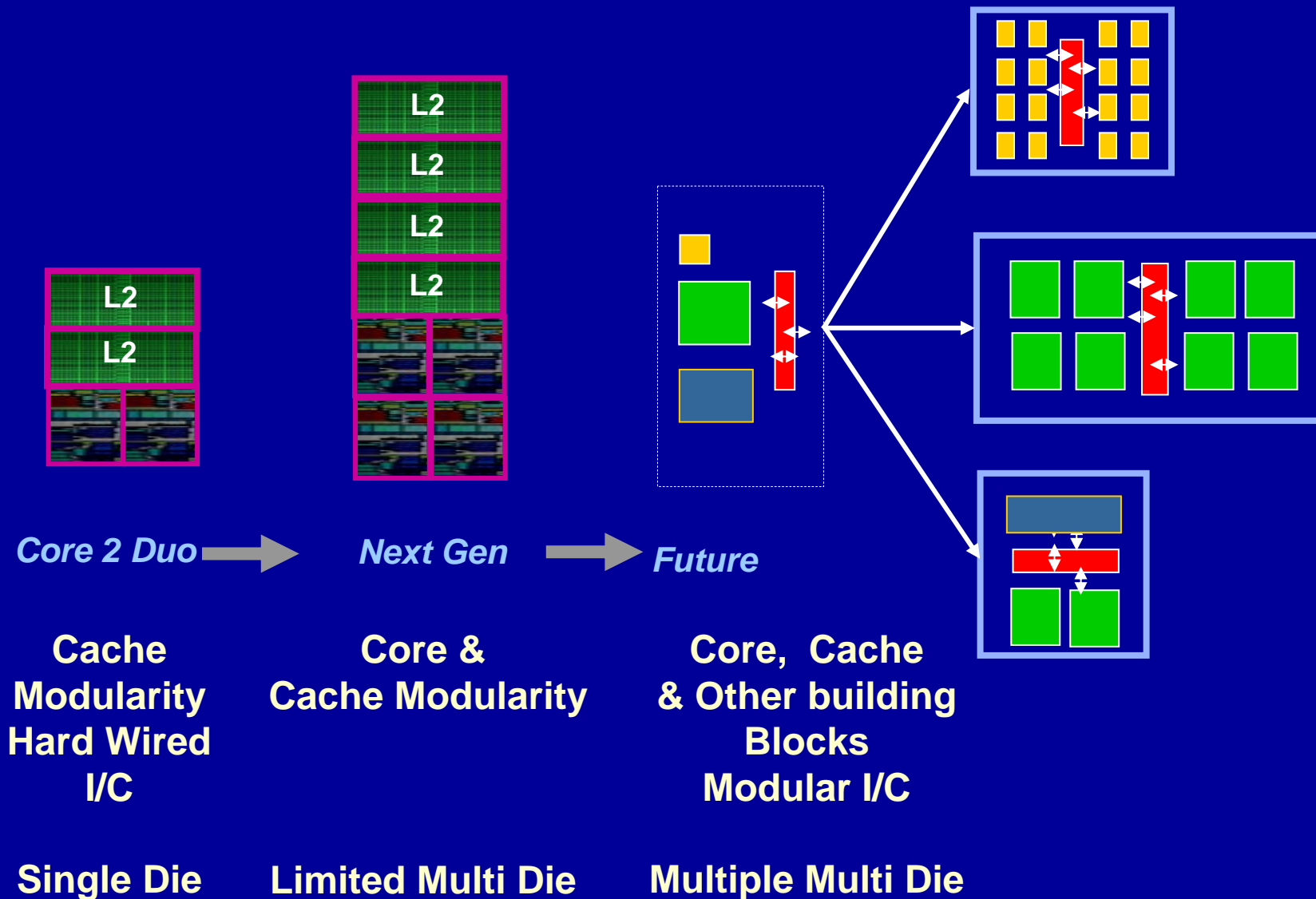


**Flexibility, Integration,
Customization**

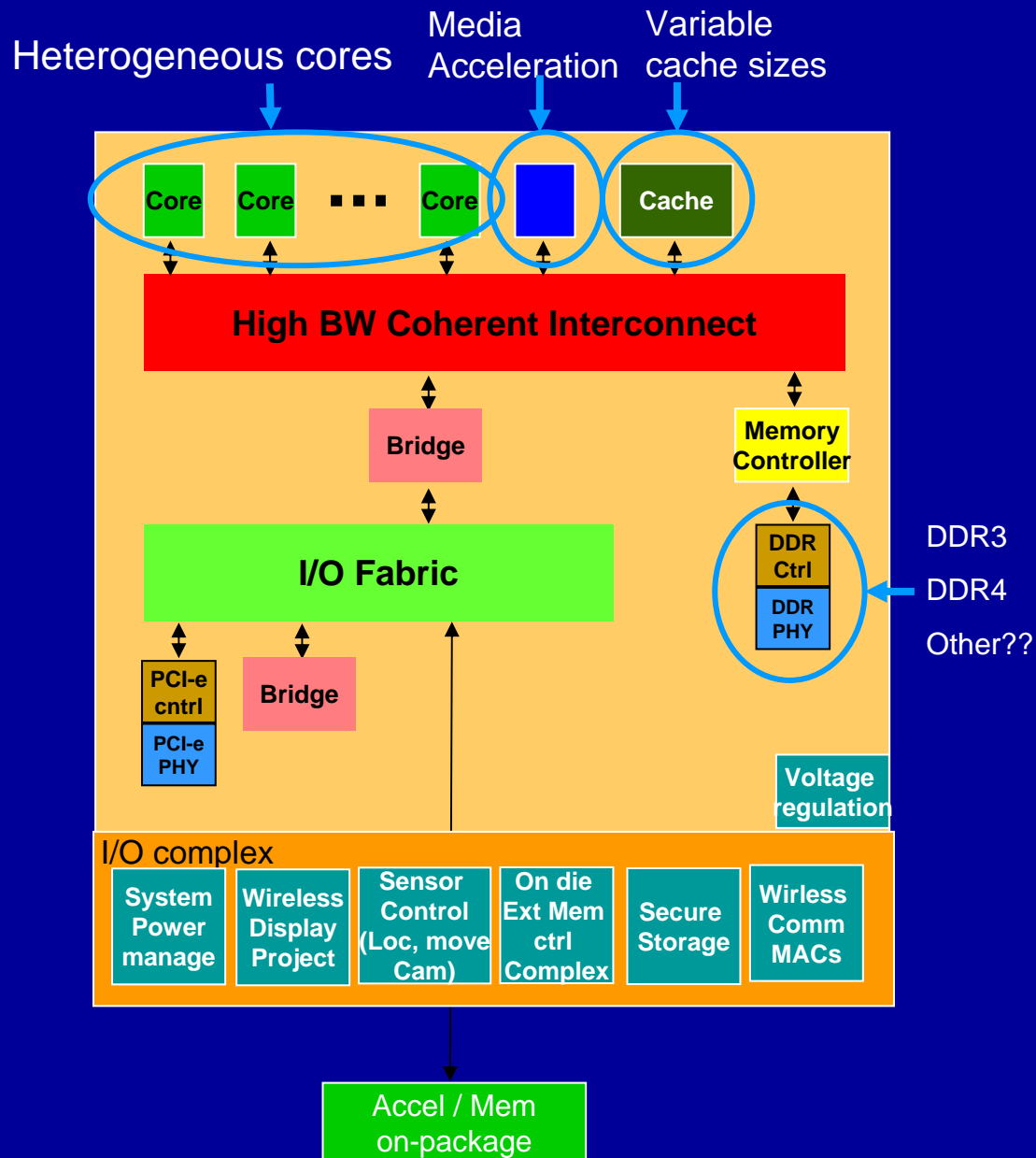
- **Highly Modular Design**
- **Architectures for IP based integration**
 - Compute, I/O, memory, communications, sensors, UI, cameras
 - “Standard” internal Interconnects
- **SOC Customization**

**Modular and Customizable “SOC”s
coming to traditional computing architectures**

Progress in Modularity



What to Expect in 2014+ ?



Trend Implications to traditional Computing Arch - Summary

- **Price** – Intel will continue drive to advanced process technology and aggressively address product cost
- **Many Mobile Devices** - All Intel Mobile Client solutions to be Compute + Comm, always on, always connected
- **SW/data spiral extending** - IA Top to Bottom + GP IA many core Media/Vector acceleration under one native programming model
- **Growing segmentation** - Modular and Customizable “SOC like” architectures across all segments