



# 多媒體處理器 之技術趨勢與應用

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# Overview



## ◆ Technical Story

- Why is HD video so hard?
- Which Architecture?
  - Hardwired, Simple Processor, SIMD, VLIW, Co-Processor
- What Applications?
  - Broadcasting, Hybrid DV/DSC, IP CAM

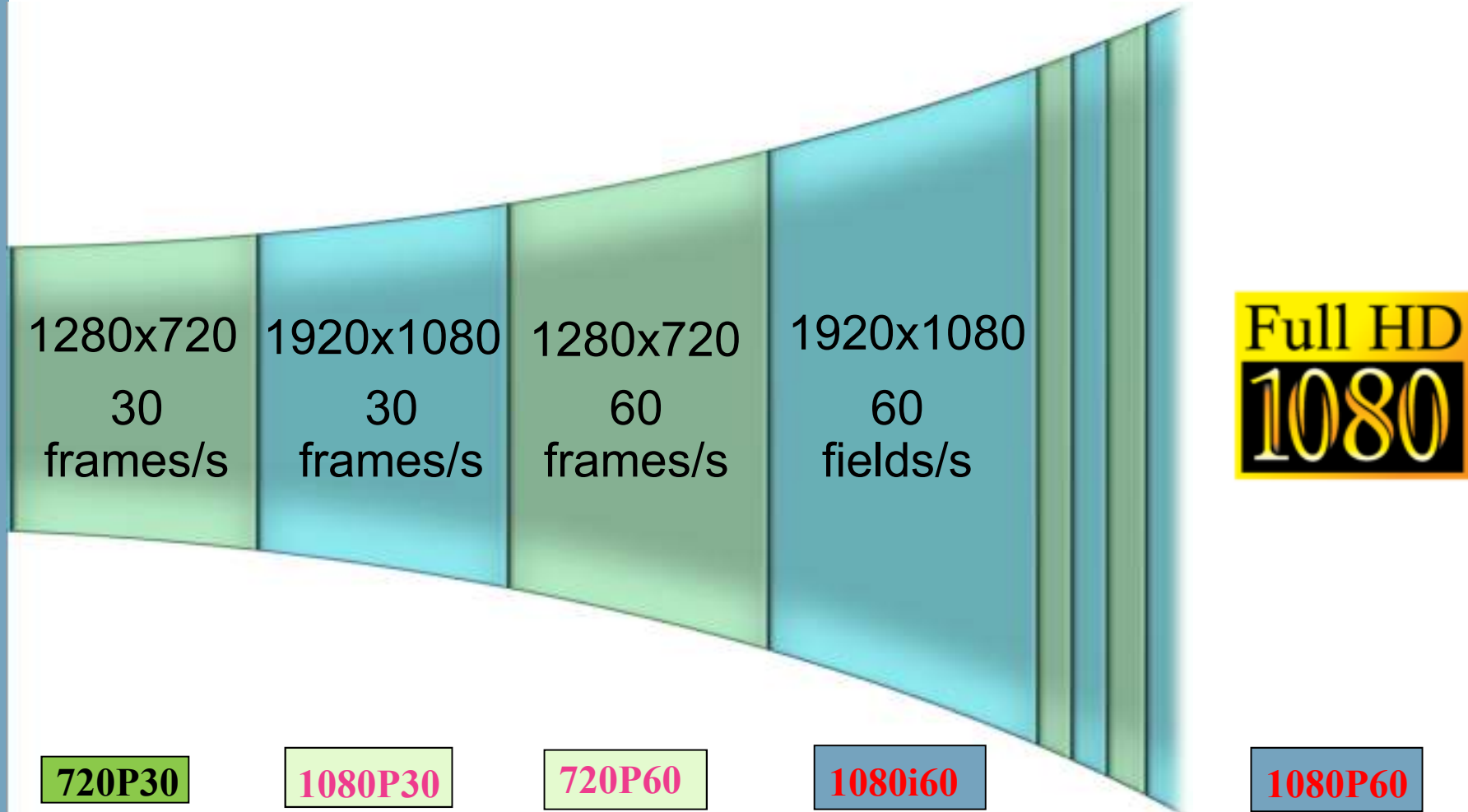
## ◆ A few fatherly advice

- Icons of our time

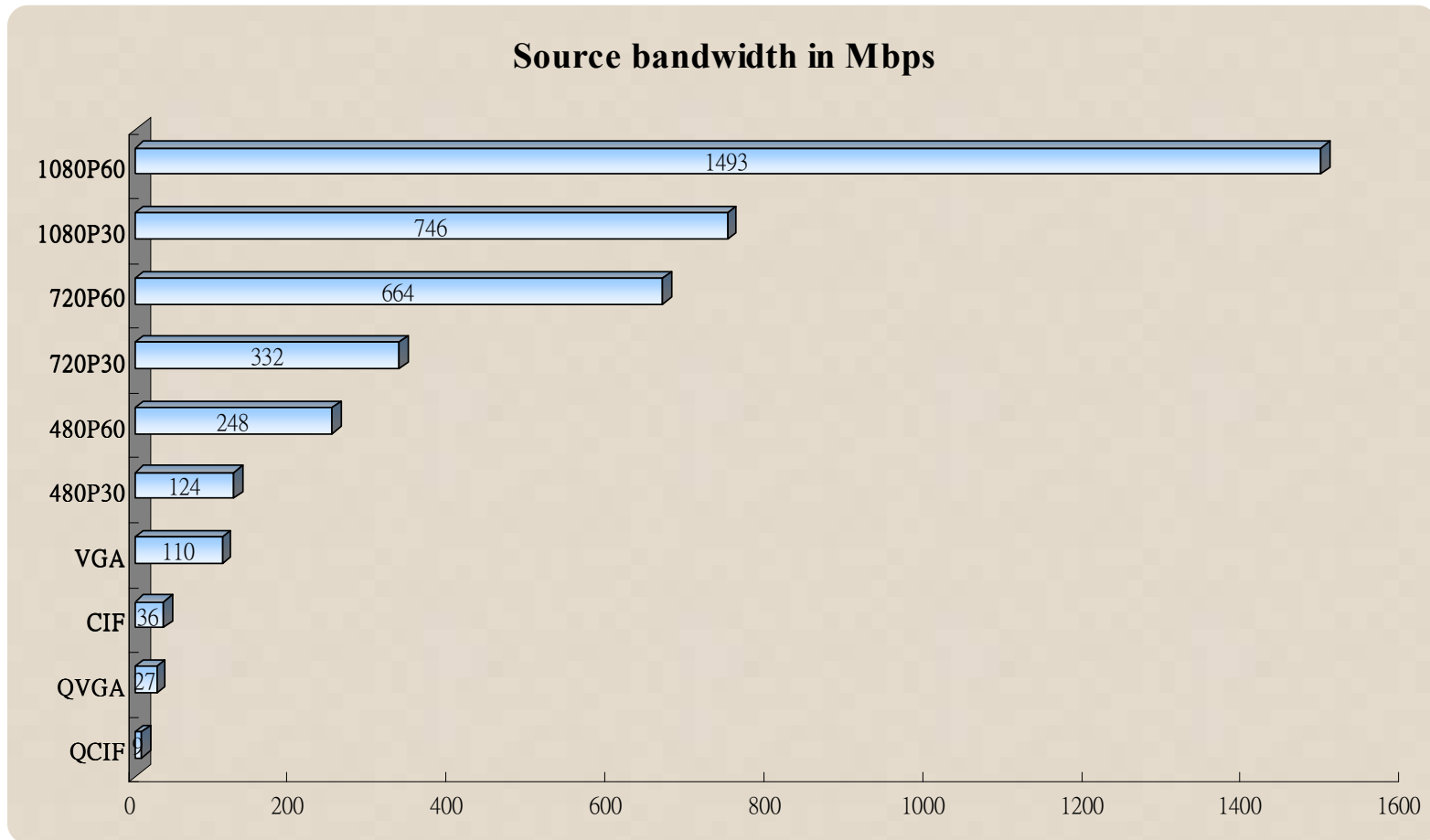


**Why is HD Video so Hard ?**

# There are many forms of HD



# HD Poses Challenges in Bandwidth

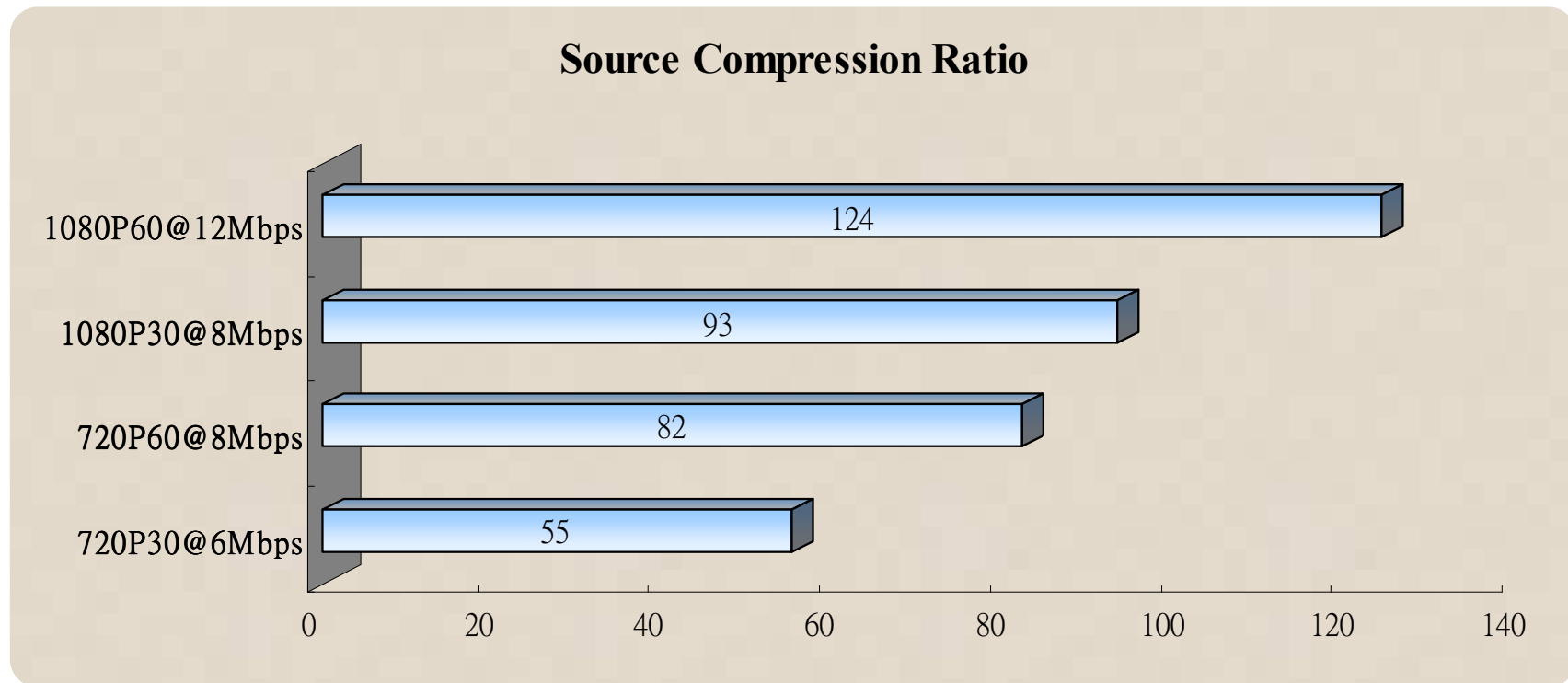


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**Why is H.264 Needed?**

# High Compression Ratio is needed



**MPEG-2/MPEG-4 can't deliver such high compression ratio !**



**Which Architecture?**

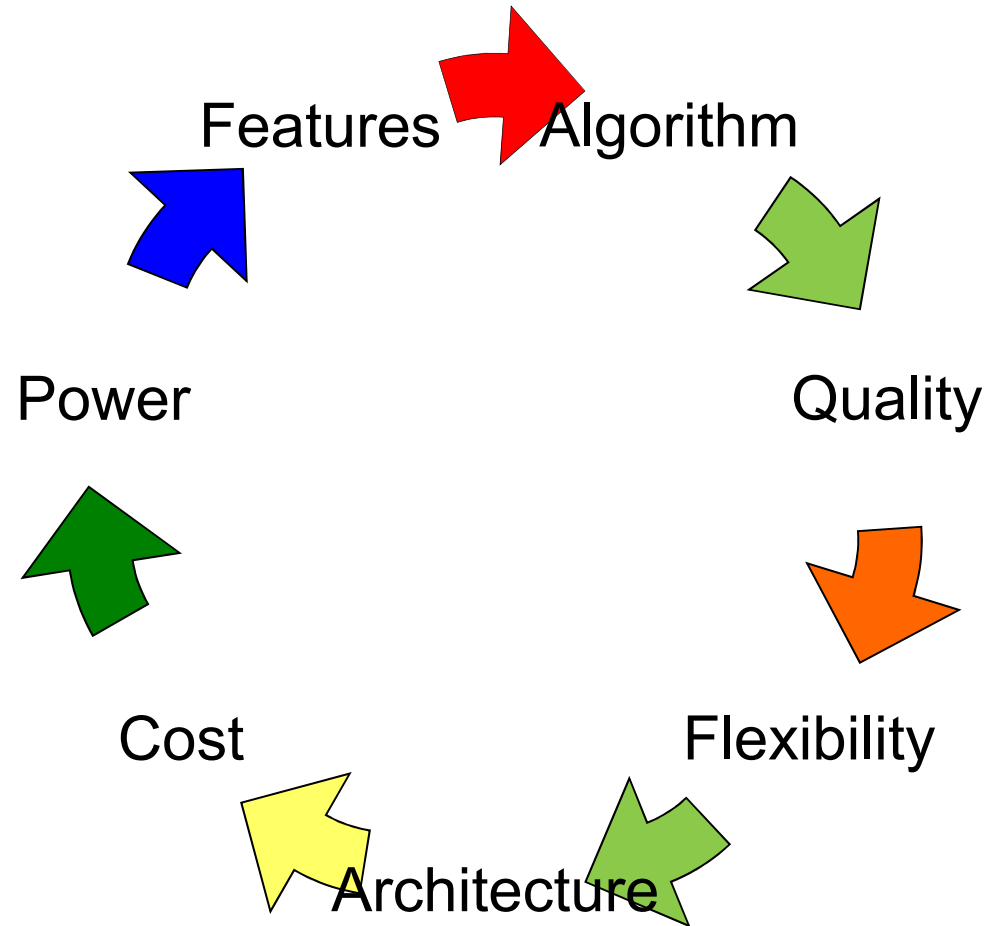


# Media Processing Challenge



- ◆ **AV codec performance: 40+ Billion Operations per second**
- ◆ **Power: <~ 0.5 watts for consumer applications**
- ◆ **Price: < \$15 for consumer applications**
  - **Die Size limited**
- ◆ **Factors to be considered**
  - **Video quality**
  - **Power**
  - **Flexibility**
  - **Cost**
    - **Die size, clock rate, integration, BOM**
- ◆ **Joint optimization of algorithm and architecture**

# Algorithm + Architecture = Best Chip



**Optimization with multiple design iterations of algorithm and architecture!**

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# Hardwired Processing



## ◆ Advantages:

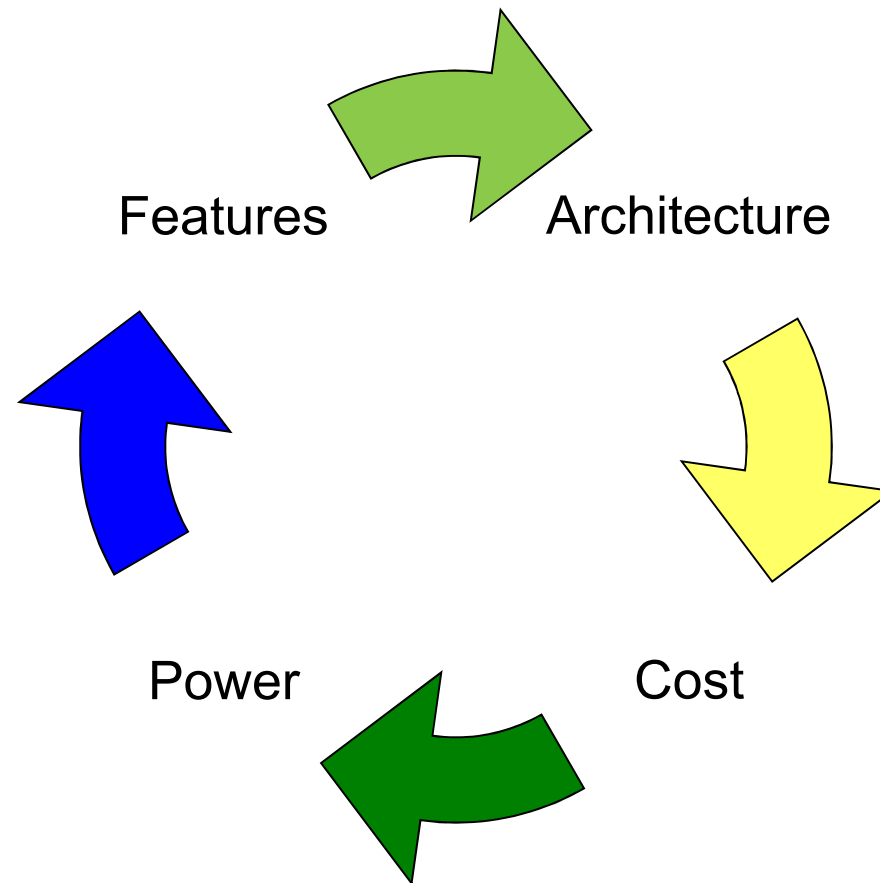
- Best power and die size efficiency
- Typically 10-100x better than general purpose programmable equivalent

## ◆ Disadvantages:

- Evolving features and standards
- Bug fix cost and time
- Development time and cost

## ◆ Examples

# Hardwired Approach

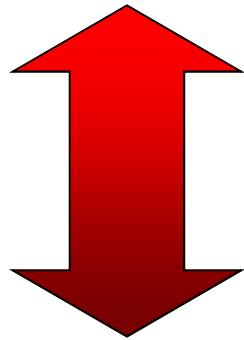


**Optimization without consideration of algorithm, quality and flexibility!**

# Common Processor Directions



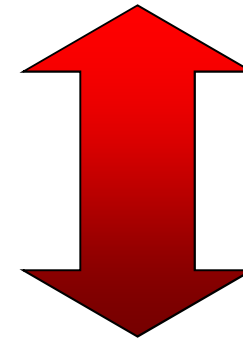
Media SOC



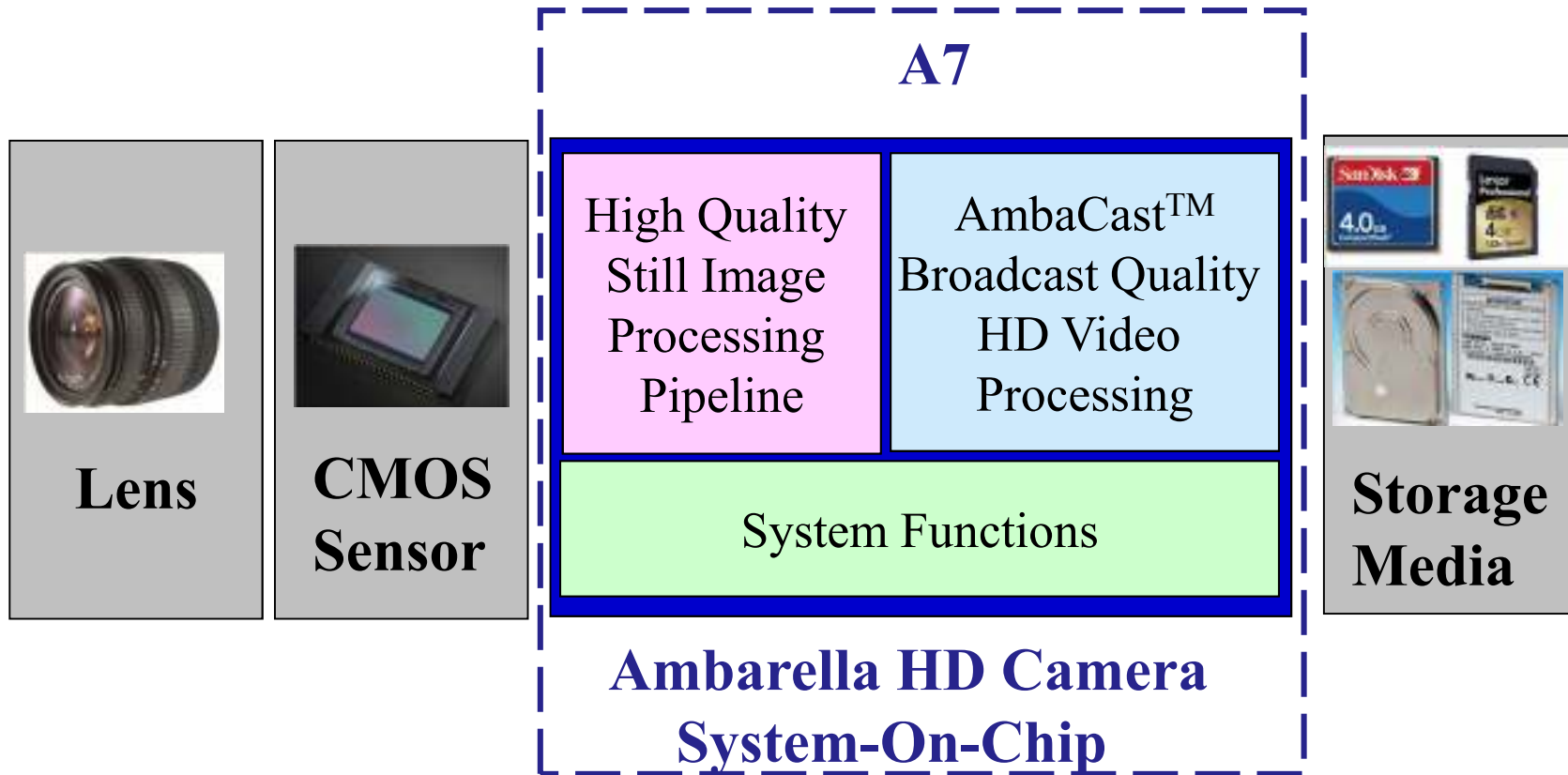
Themes

- ◆ Multi core
- ◆ Multithreading
- ◆ More on-chip memory
- ◆ Special purpose accelerators
- ◆ Higher integration
- ◆ Application performance instead of clock rate

PC processor



# Integrated SoC for DV/DSC



- ◆ Integration enables cost effective product



**What Applications?**

# HD Broadcasting Encoder



- ◆ Superior Picture Quality
  - Save bandwidth
  - More revenue
- ◆ HD Digital STB
  - Terrestrial
  - Satellite
  - Cable
  - MOD



Most broadcasters has adopted Ambarella's H.264 Solutions

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# HD Hybrid Cameras Shipping in Volume



Japan



Korea



Taiwan



Amazingly affordable, low cost HD model at \$119

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# HD Hybrid Camera Reaches Low Price



Low cost high quality hybrid camera is a reality

Hybrid DV/DSC for  
Youtube @ \$129



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