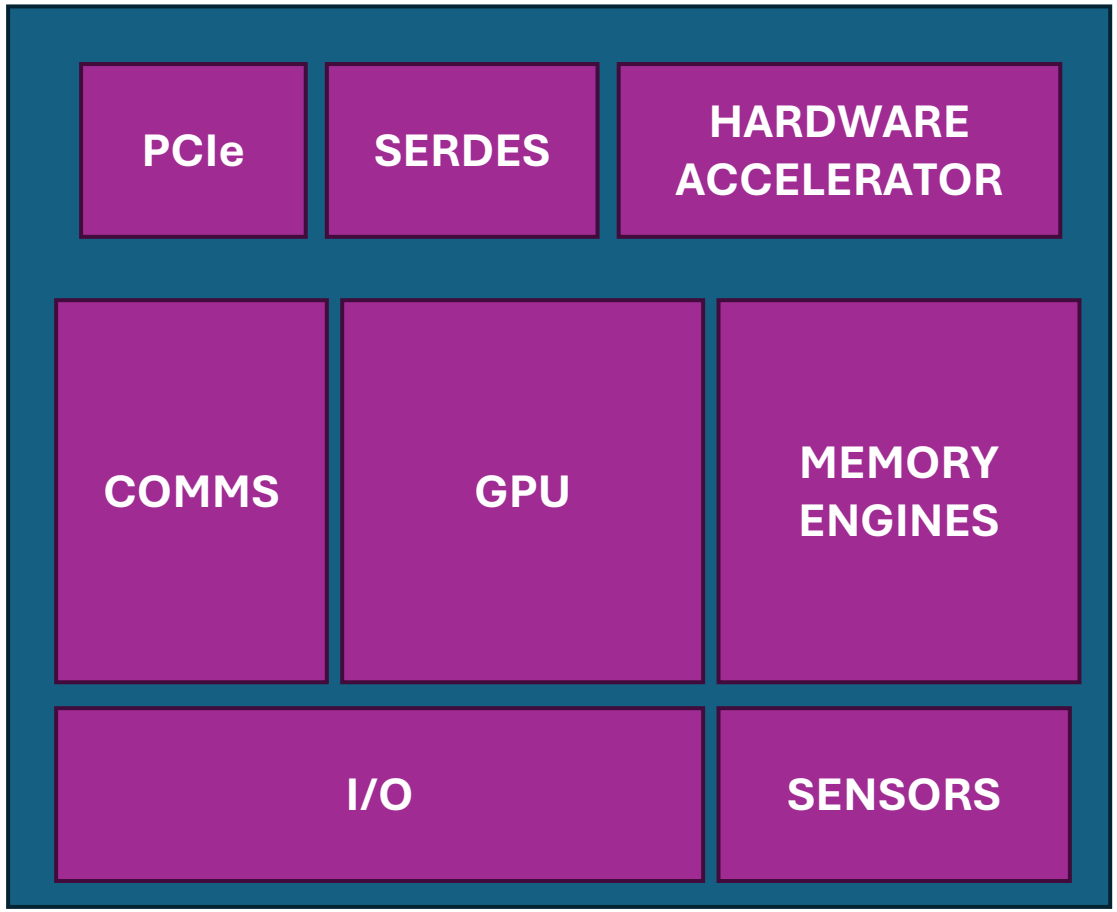
SYSTEM ON CHIP

vs

CHIPLETS

RAGHAVENDRA ANJANAPPA

SYSTEM ON CHIP



SoC, **System on Chip**, is a system-level single chip, which is a combination of multiple computing units responsible for different types of computing tasks, which are fabricated on the same wafer through photolithography.

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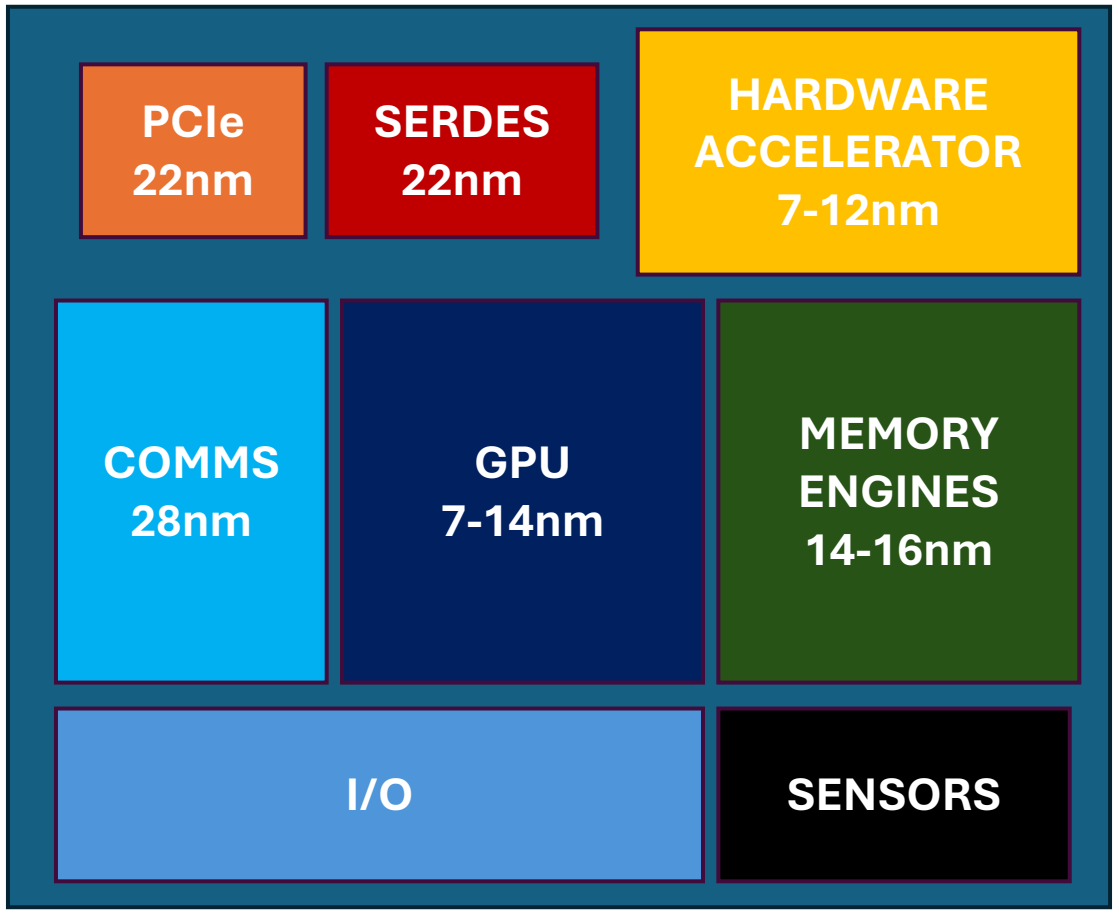
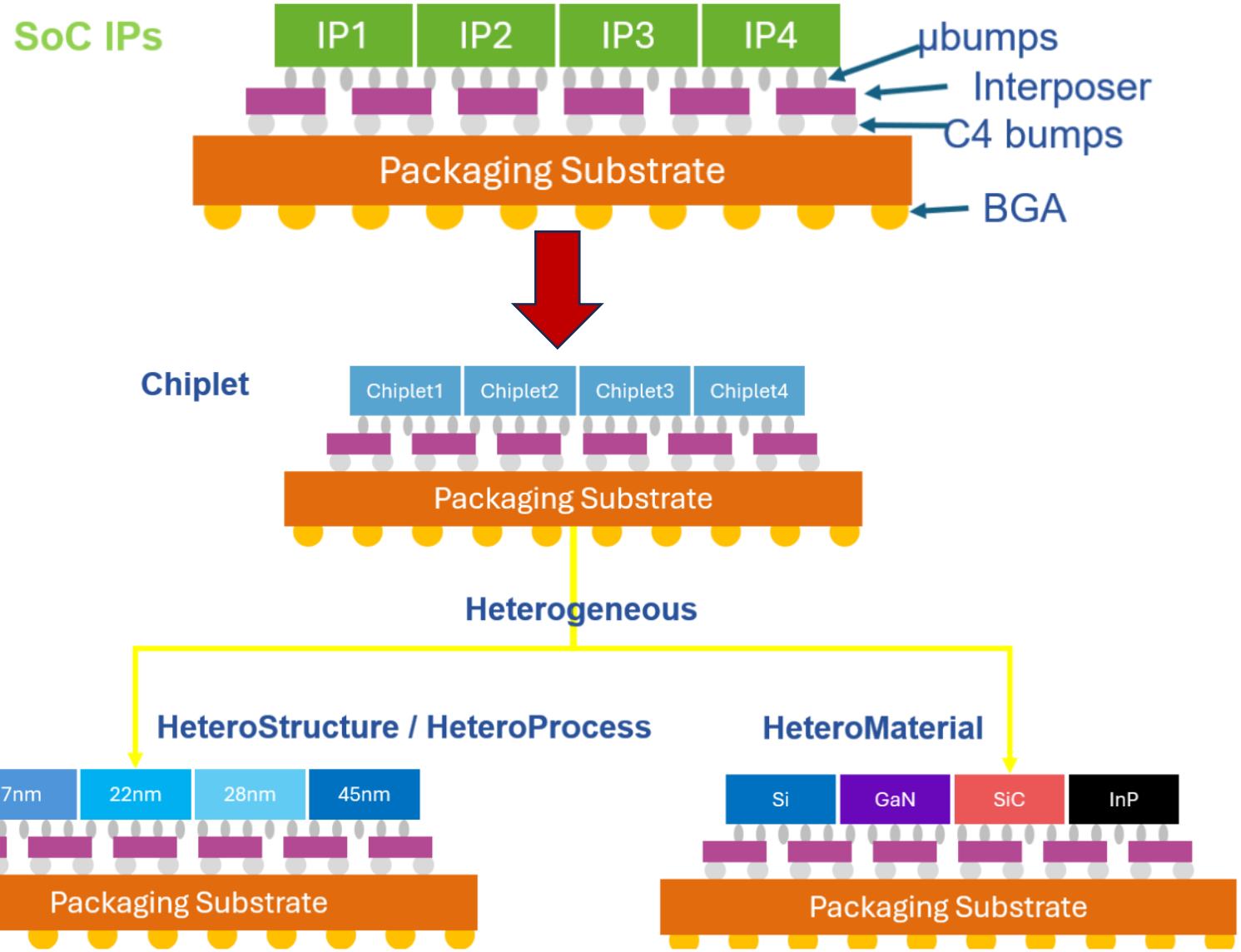
CHIPLET



In contrast to SoC, **Chiplet** is a complex SoC chip that is decomposed into different computing units or functional units at the beginning of the design, and then each unit is manufactured separately using the most suitable semiconductor process technology, and then the various units are interconnected through advanced packaging technology and finally integrated and packaged into a system-level chipset.

RAGHAVENDRA ANJANAPPA

SYSTEM ON CHIP vs CHIPLET



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ADVANTAGES OF CHIPLETS

There are several key benefits of adopting chiplet technology:

1. **Optimized Performance and Power:** Chiplets can be optimized for their specific functions and technologies, improving the SoC's performance and power efficiency. Chiplets can also be placed closer together, reducing the interconnects' latency and power consumption.
2. **Lower Manufacturing Cost:** Chiplets can be fabricated using different process nodes and foundries, which reduces the cost and risk of producing large, complex chips. Chiplets can also be reused across different SoCs, which increases the return on investment and reduces the time-to-market.
3. **Higher Flexibility and Scalability:** Chiplets can be easily added or removed to adjust the functionality and performance of the SoC. Chiplets can also be updated or replaced without affecting the rest of the SoC, which enables faster innovation and adaptation to changing market demands.

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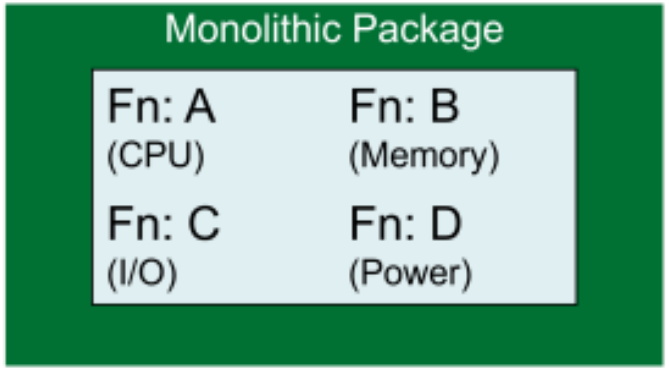
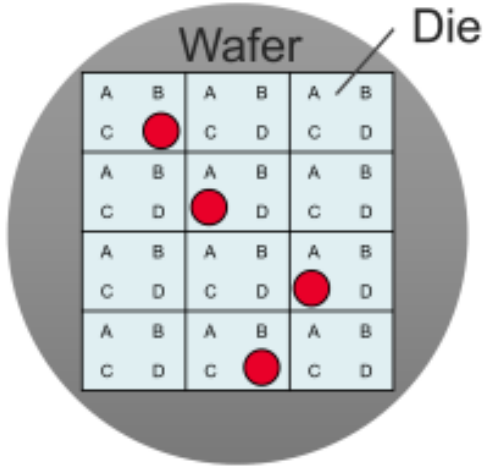
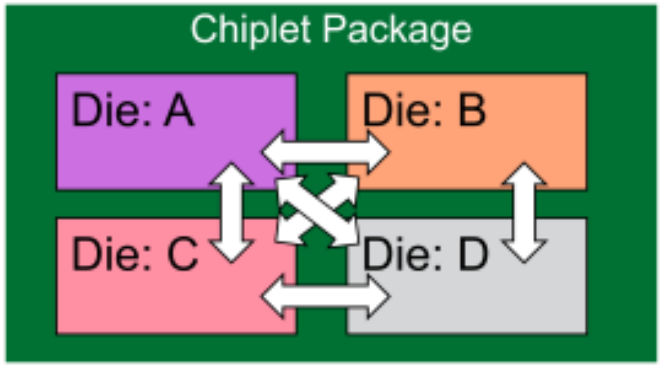
YIELD - CHIPLETS

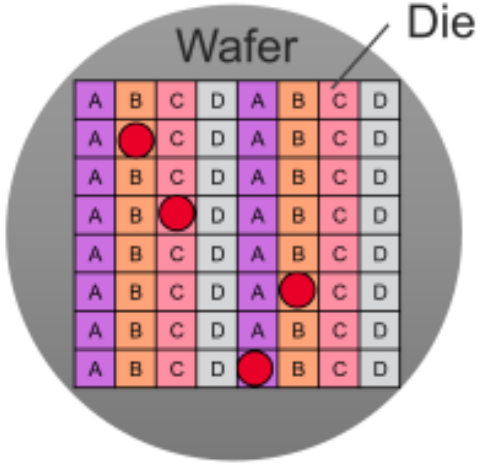




Defect

Designed: 12 Chips
Produced: 8 Chips
Yield: 66.7 %





Defect

Designed: 64 Chiplets
Produced: 60 Chiplets

Designed: 16 Chips
Produced: 15 Chips
Yield: 97.3%

Image Source – semiengineering.com

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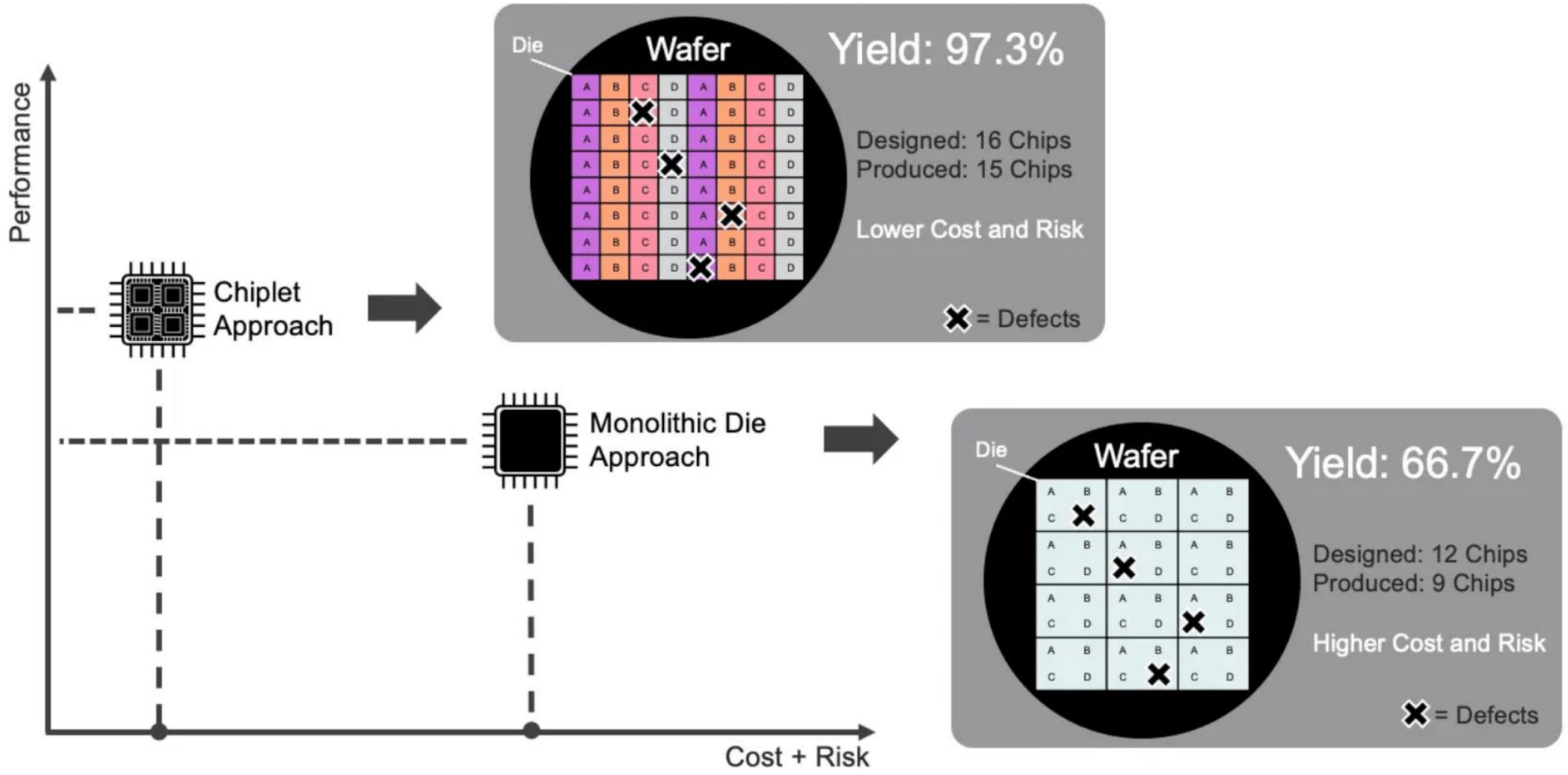
YIELD - CHIPLETS



Chiplet vs. monolithic die approach performance and cost comparison.
Image Source – semiengineering.com

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