Amending Moore's Law for Embedded Applications Panel Discussion

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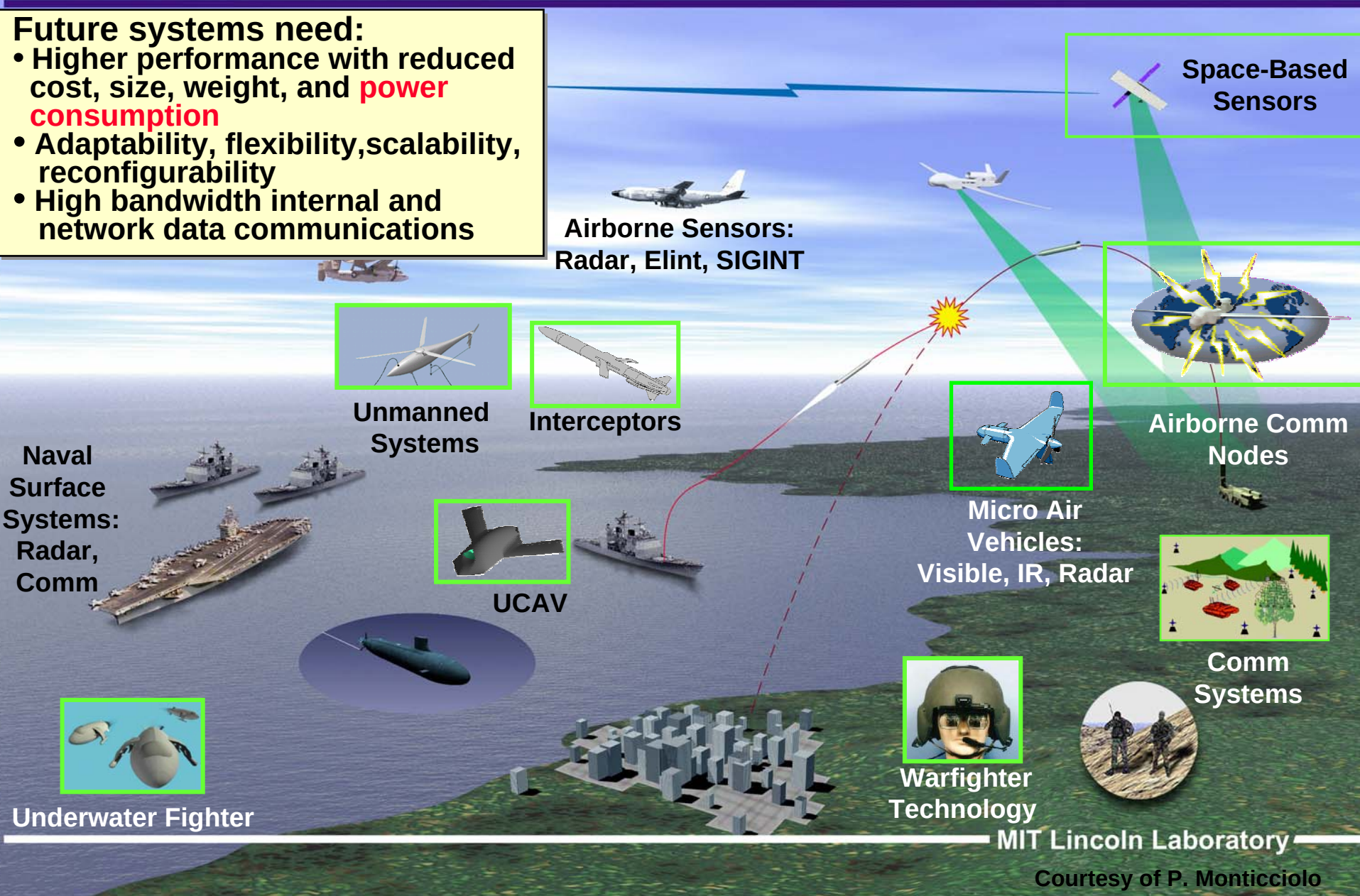
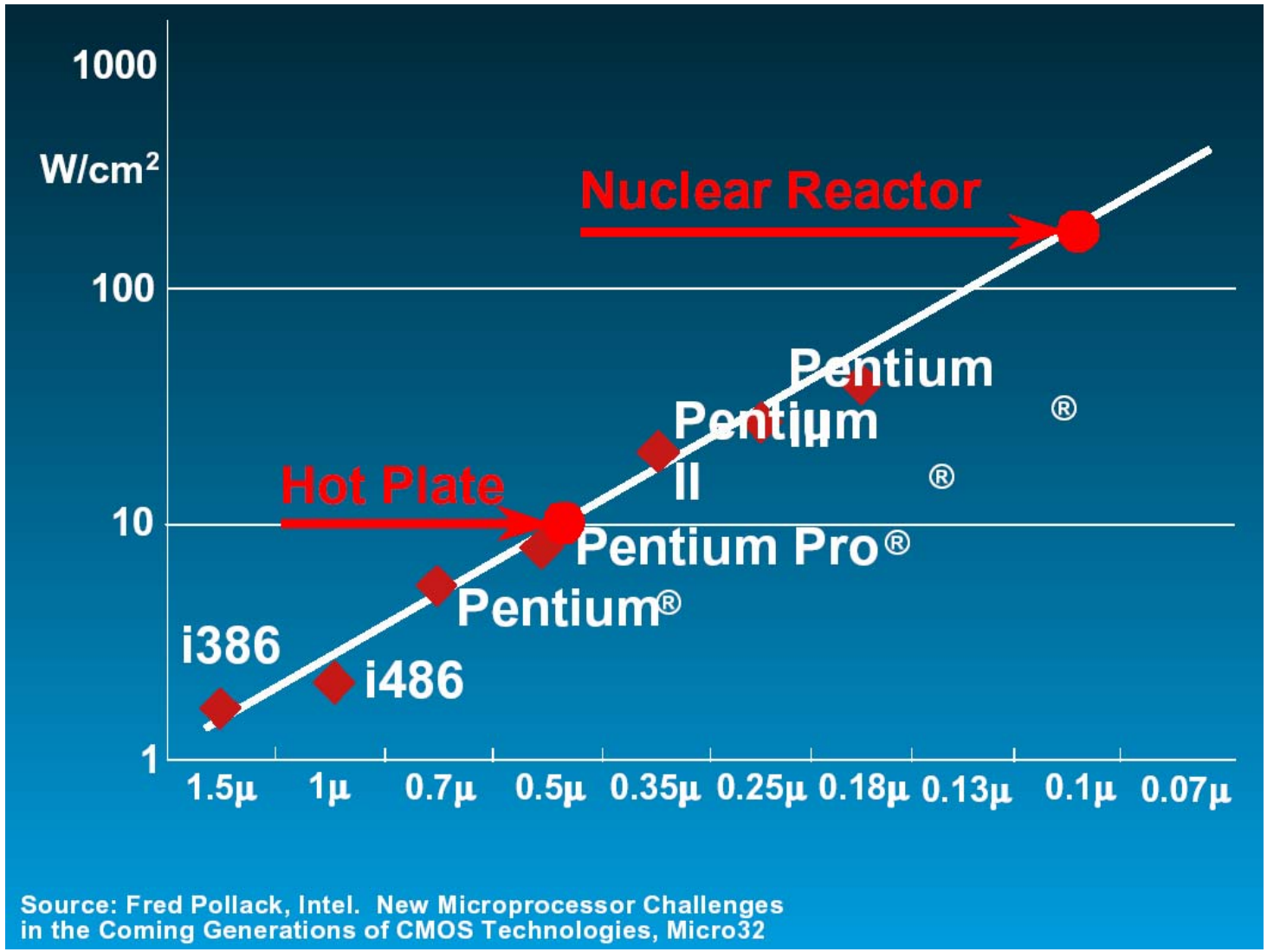
DoD Embedded Processing Applications

Future systems need:
- Higher performance with reduced cost, size, weight, and power consumption
- Adaptability, flexibility,scalability, reconfigurability
- High bandwidth internal and network data communications



Courtesy of P. Monticciolo

Power Density: The Fundamental Problem



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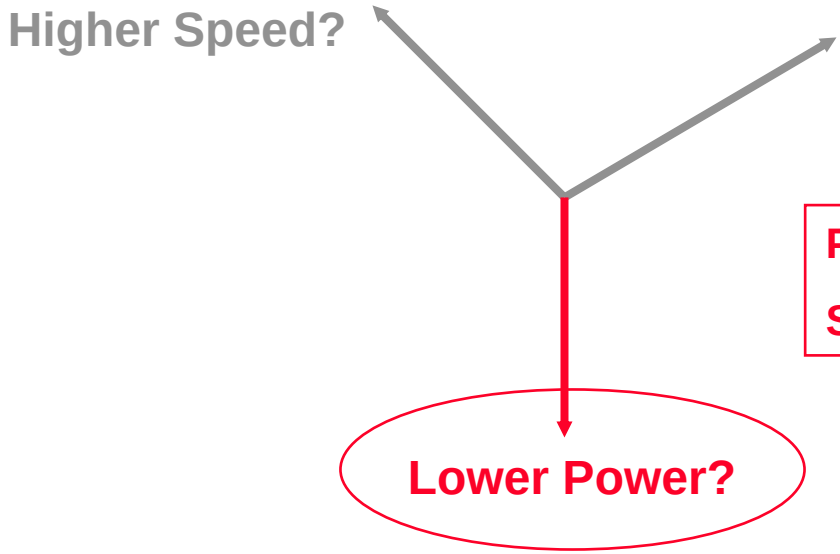
Prognosis For Moore's Law Benefits



Pentium 4 (90nm): ~80 W/cm^2

Stovetop: ~10 W/cm^2

Past

Supply voltage (V) scales as 1/s

Capacitance (C) scales as 1/s

Energy per op scales as $CV^2 \propto 1/s^3$

⇨Voltage scaling from 5V to 1V accounts for 25X reduction in power, just by itself

Future Issues

Only 2x voltage scaling planned (1V now to ~0.5V in 2016)

⇨ Scaling energy per op is critical to long endurance battery powered systems and to supercomputers (getting power in and heat out)

Courtesy of D. Shaver