

Intel 32nm Technology

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Logic Technology Development

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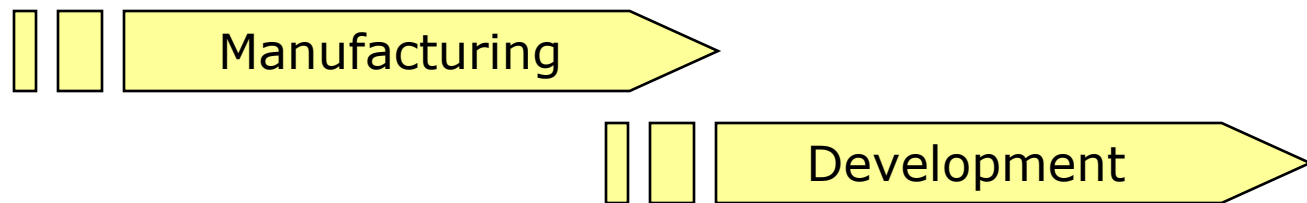
Key Messages

- Intel has developed a 32nm logic technology with industry-leading features
- Intel is first to demonstrate working 32nm processors
- Intel's 32nm process is on track for production readiness in Q4 '09
- Both CPU and SoC versions of this 32nm process will be available
- Intel's strength as an integrated device manufacturer allows us to continue to deliver new generations of advanced process technology on a 2 year cadence

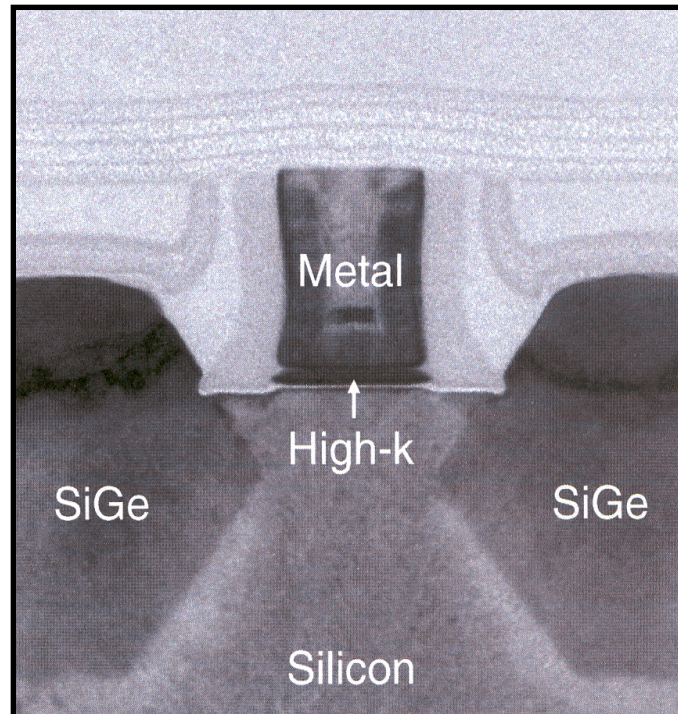


Intel Logic Technology Development

Process Name	<u>P1264</u>	<u>P1266</u>	<u>P1268</u>	<u>P1270</u>	<u>P1272</u>
Lithography	65nm	45nm	32nm	22nm	16nm
1 st Production	2005	2007	2009	2011	2013



45nm High-k + Metal Gate Transistors

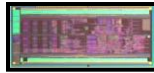


Revolutionary transistor technology for improved performance and lower leakage

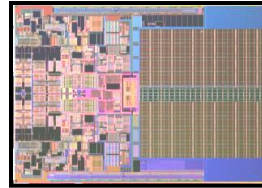


45nm Microprocessor Products

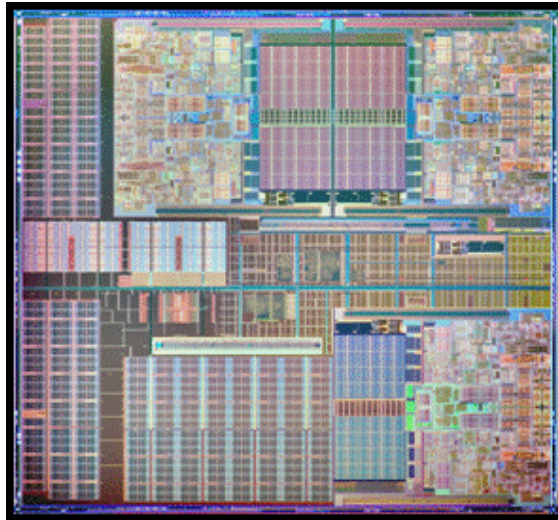
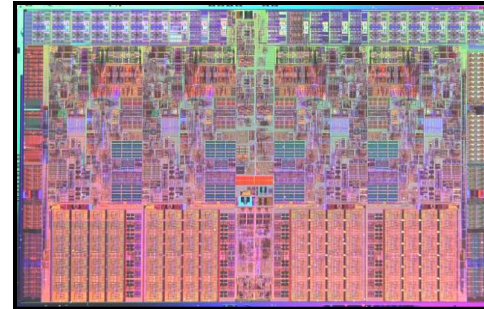
Single Core



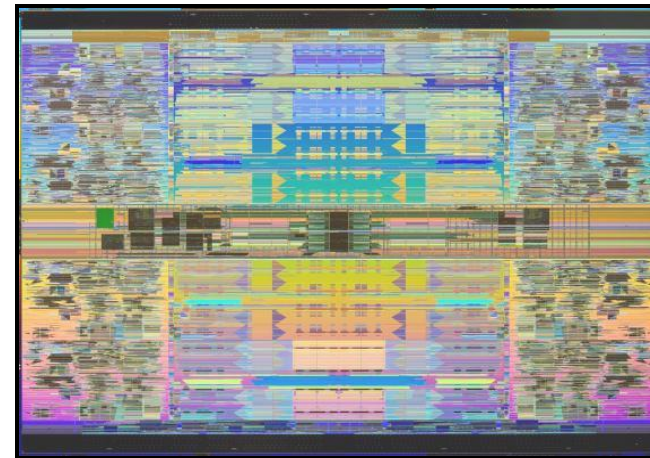
Dual Core



Quad Core



6 Core



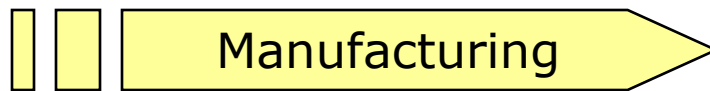
8 Core

45nm production ramp has been the fastest yet
Twice as fast as the 65nm ramp in its first year



Intel Logic Technology Evolution

Process Name	<u>P1264</u>	<u>P1266</u>	<u>P1268</u>	<u>P1270</u>	<u>P1272</u>
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32nm Technology

- 2nd generation high-k + metal gate transistors
- Immersion lithography on critical layers
- 9 copper + low-k interconnect layers
- ~70% dimension scaling from 45nm generation
- Pb-free and halogen-free packages

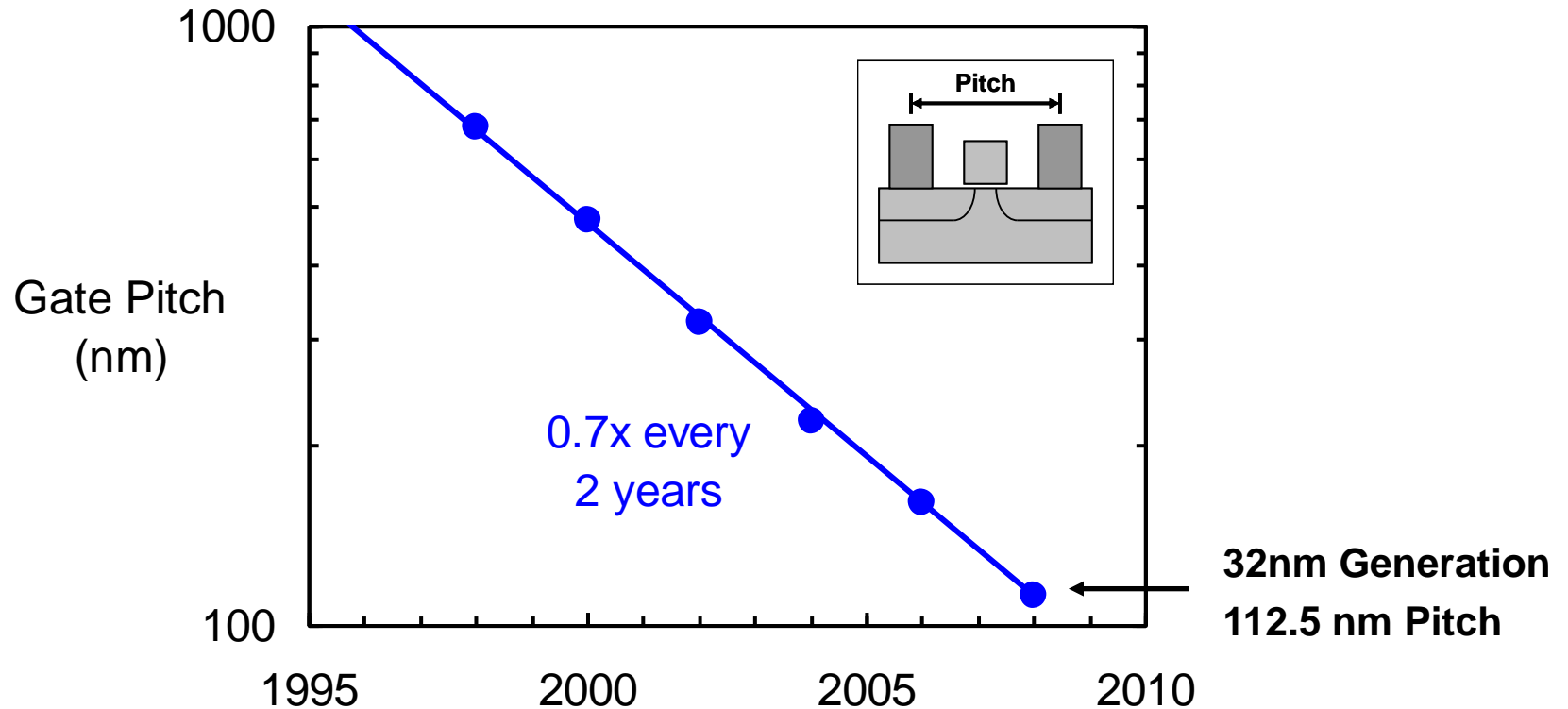


32nm Transistors

- 2nd generation high-k + metal gate
 - 0.9nm equivalent oxide thickness high-k (scaled from 1.0 nm on 45nm)
 - Replacement Metal Gate process flow
 - 30nm gate length
 - 4th generation strained silicon
- >22% performance increase
- Tightest reported gate pitch
- Highest reported drive currents



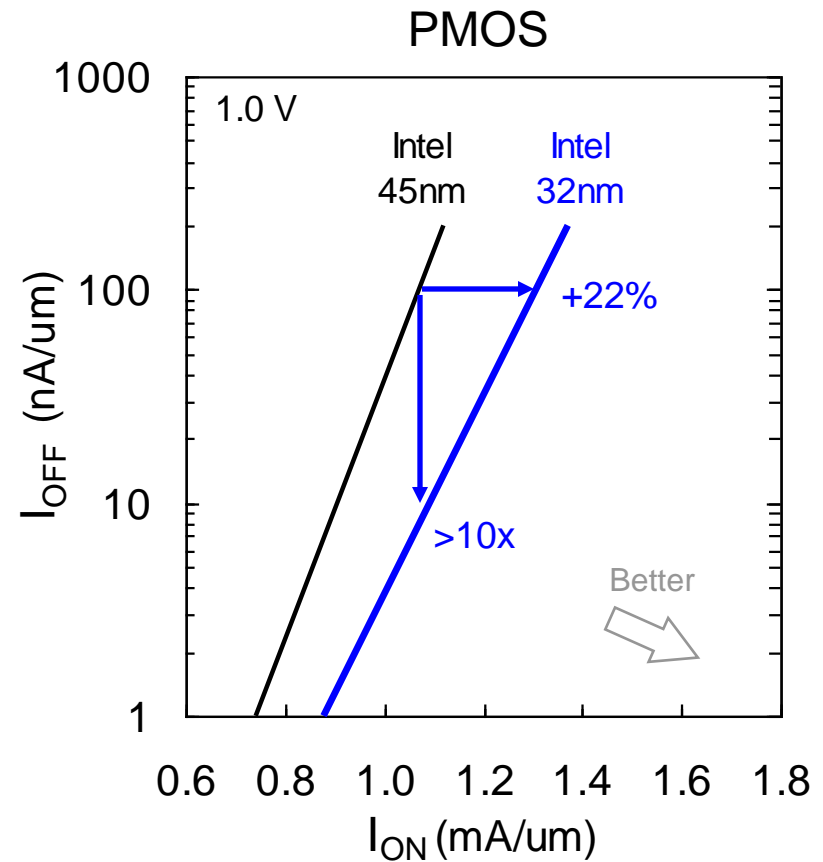
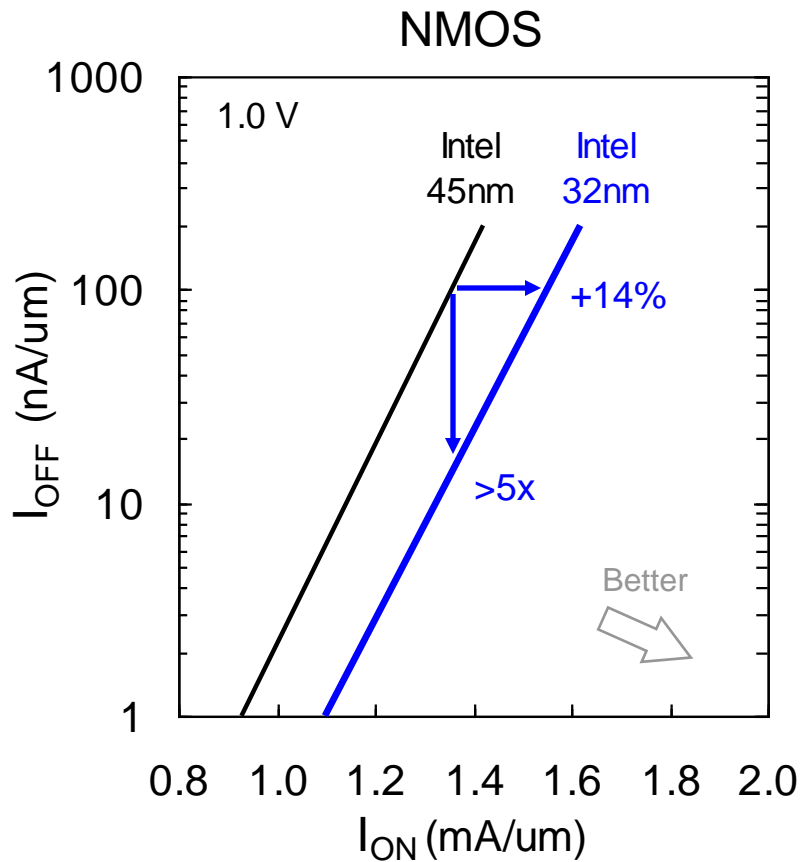
Transistor Pitch Scaling



Transistor gate pitch continues to scale 0.7x every 2 years
Tightest gate pitch of all reported 32nm technologies



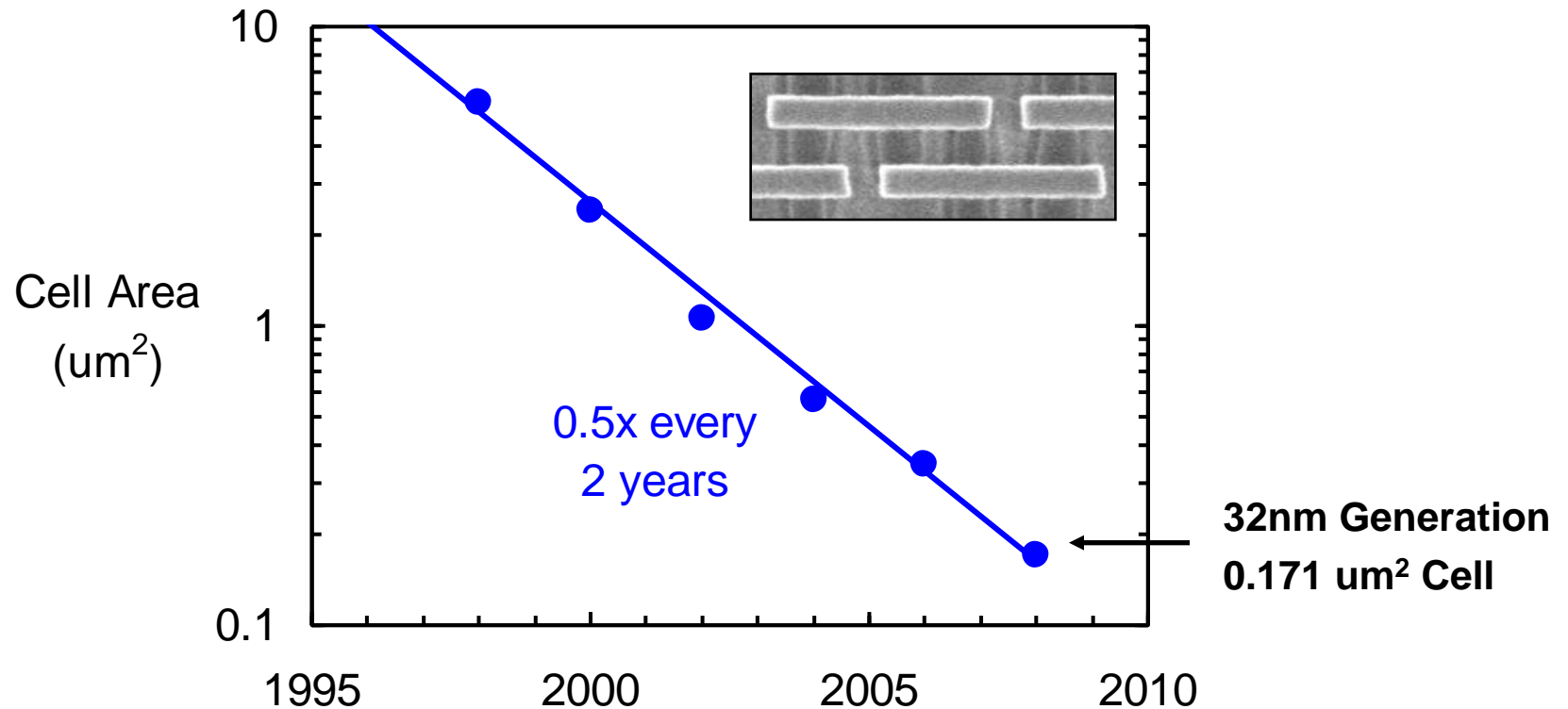
32nm Transistor Performance



32nm provides improved performance or reduced leakage
Highest drive current of all reported 32nm technologies



SRAM Cell Size Scaling



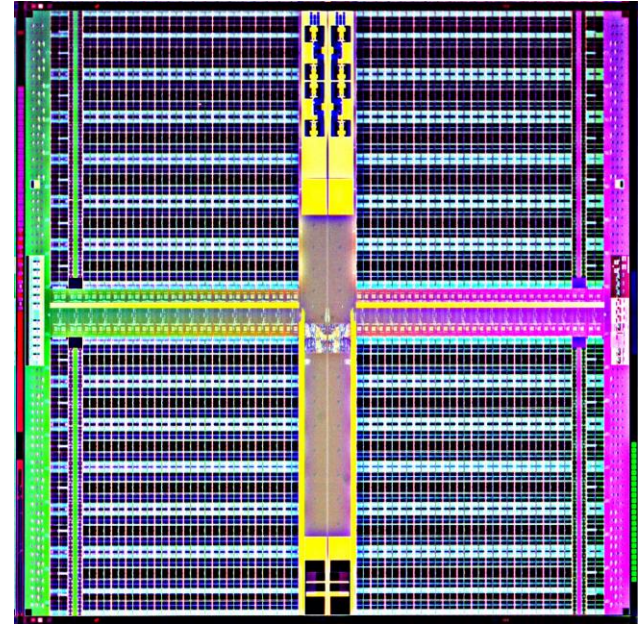
Transistor density doubles every 2 years

Moore's Law continues!

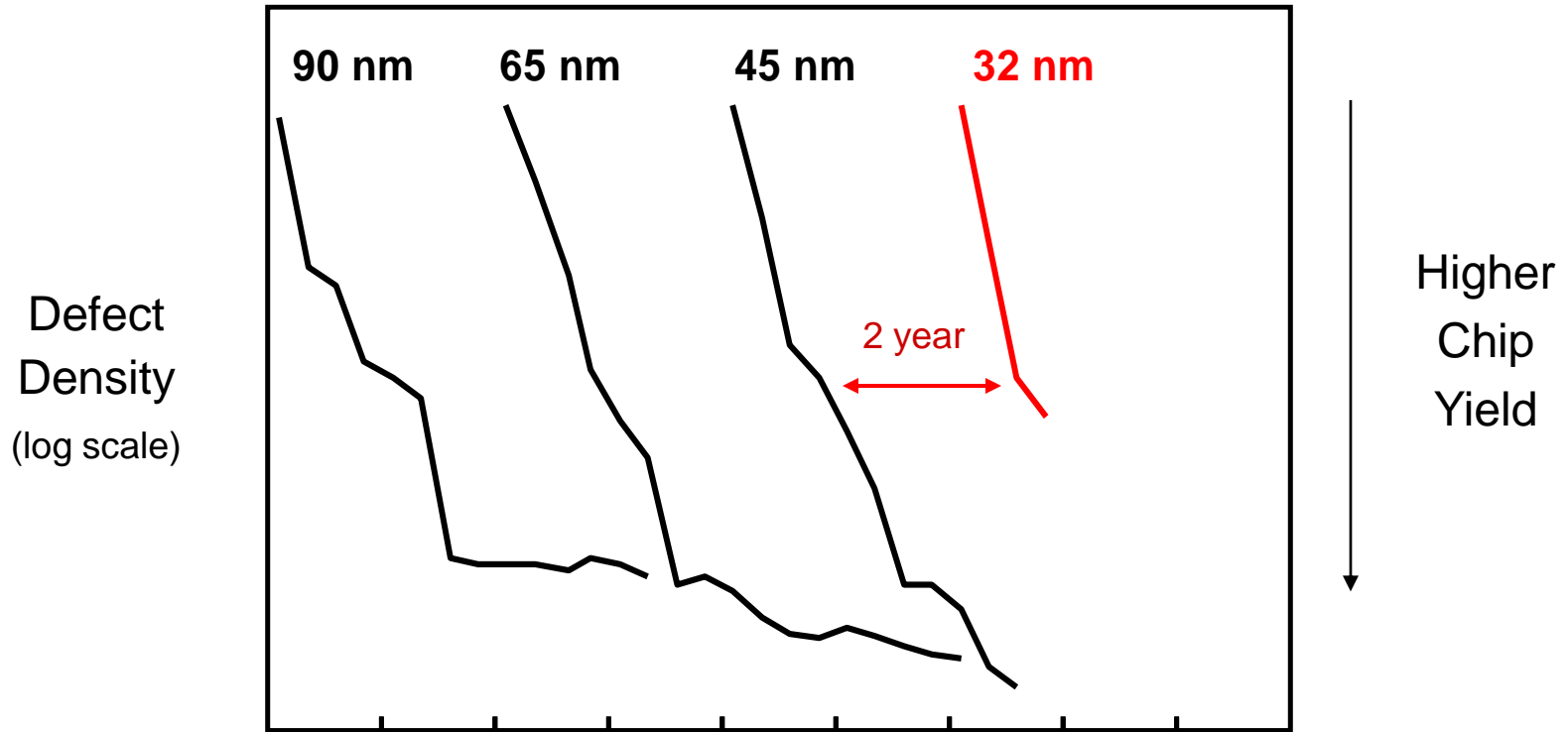


32nm SRAM Test Chip

- 0.171 μm^2 cell
- 291 Mbit
- >1.9 billion transistors
- 4 GHz operation
- First demonstrated Sep '07



Rapid Yield Improvement



32nm yield improvement on track for Q4 '09 production



32nm Manufacturing Fabs



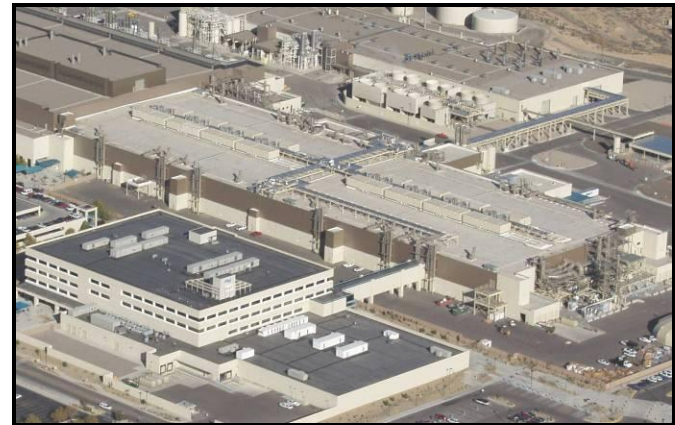
D1D Oregon - Now



D1C Oregon - 4Q 2009



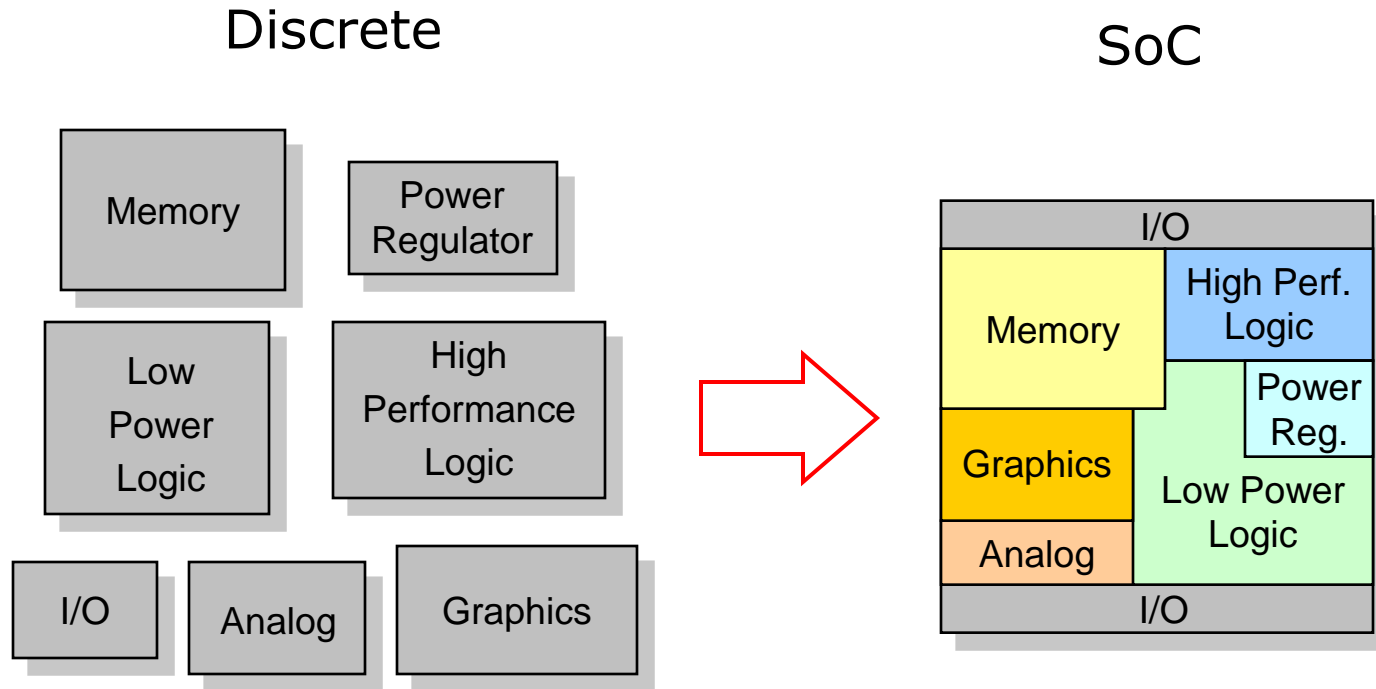
Fab 32 Arizona - 2010



Fab 11X New Mexico - 2010



System Integration



System integration will continue, using key elements such as the Atom™ core, to realize improved performance and power in a smaller form factor

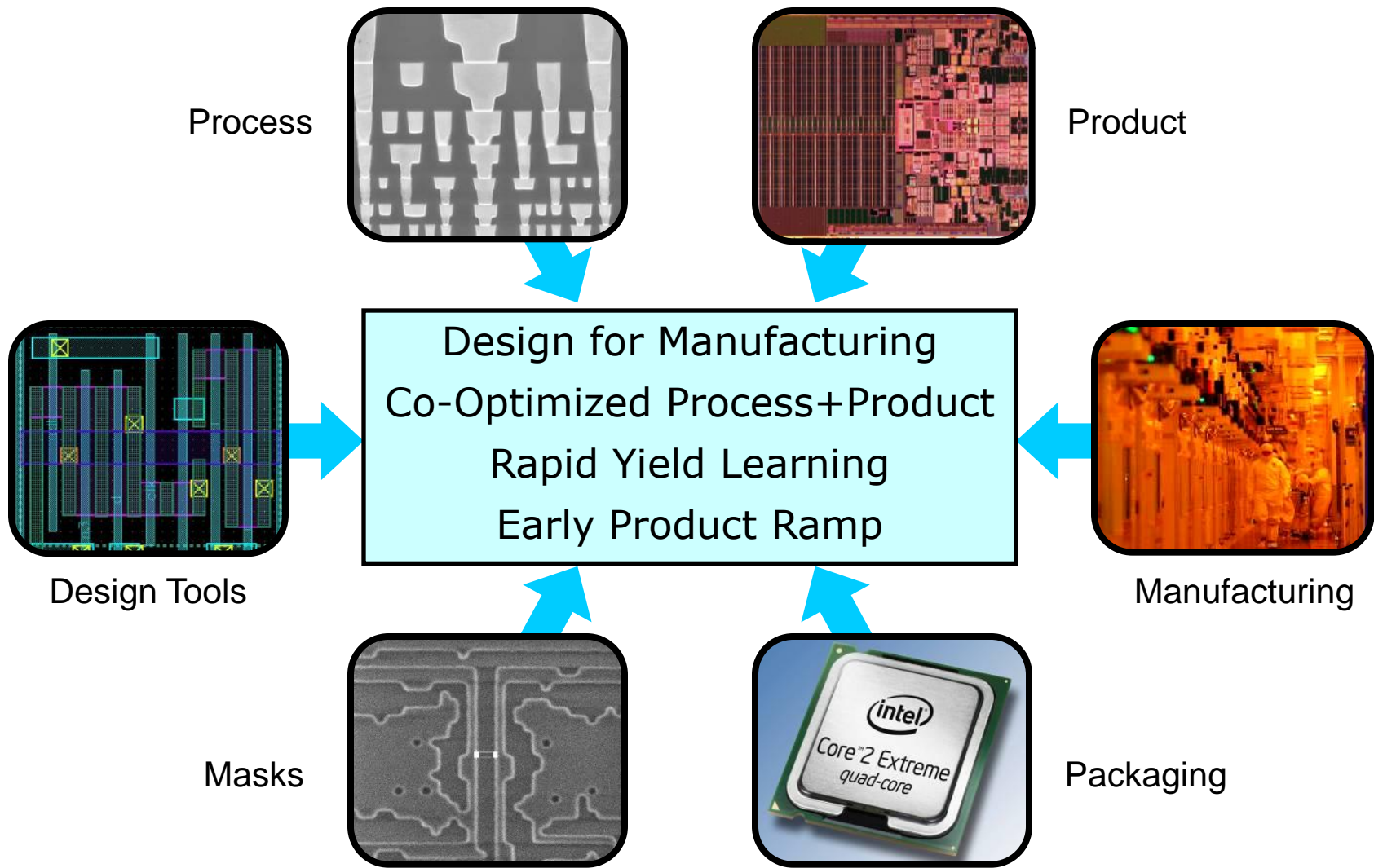
32nm SoC Process

	<u>45 nm</u>		<u>32 nm</u>		<u>22 nm</u>	
Process:	P1266	P1266.8	P1268	P1269	P1270	P1271
Products:	CPU	SoC	CPU	SoC	CPU	SoC

Intel is developing both CPU and SoC versions of each process generation, to provide transistors, interconnects and other device features optimized for each product line



Integrated Device Manufacturer Advantage



Summary

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