



Agentic AI in Semiconductors



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Executive Summary

Agentic AI represents a step-change from analytics to autonomous execution across fab operations, design, and supply chain. For semiconductor companies, it is emerging as a material driver of yield, margin, capital efficiency, and resilience. Early adopters are realizing 10–20x ROI with sub-12-month payback.

Strategic Rationale (Why Now)

Advanced fabs require \$20–25B+ capital investment per site.

Downtime costs \$100K–\$300K per hour.

Design complexity and supply volatility continue to rise.

Traditional AI informs decisions; Agentic AI executes them autonomously.

Bottom line: Autonomous systems are now required to operate at scale, speed, and margin.



Where Value Is Created (Primary Financial Levers)

Value Lever	Typical Impact
Yield Improvement	+2–4%
Asset Utilization (OEE)	+5–8%
Downtime Reduction	–10–15%
Design Cycle Time	–20–30%
Inventory Reduction	–15–25%
Engineering Productivity	+20–40%

Quantified ROI Business Model

Foundry / Advanced Fab

- 2% yield uplift → \sim \$600M revenue / \sim \$300M gross profit (on \$30B revenue base).
- 10% downtime reduction → \$75-100M cost avoidance.
- Higher utilization → \$200-400M deferred capex.
- Annual Value: \$500M+.

IDM

- 20-30% faster design cycles.
- 15-25% fewer re-spins.
- Faster ramp to volume production.
- Annual Value: \$350-700M (NRE savings + revenue acceleration).

Fabless

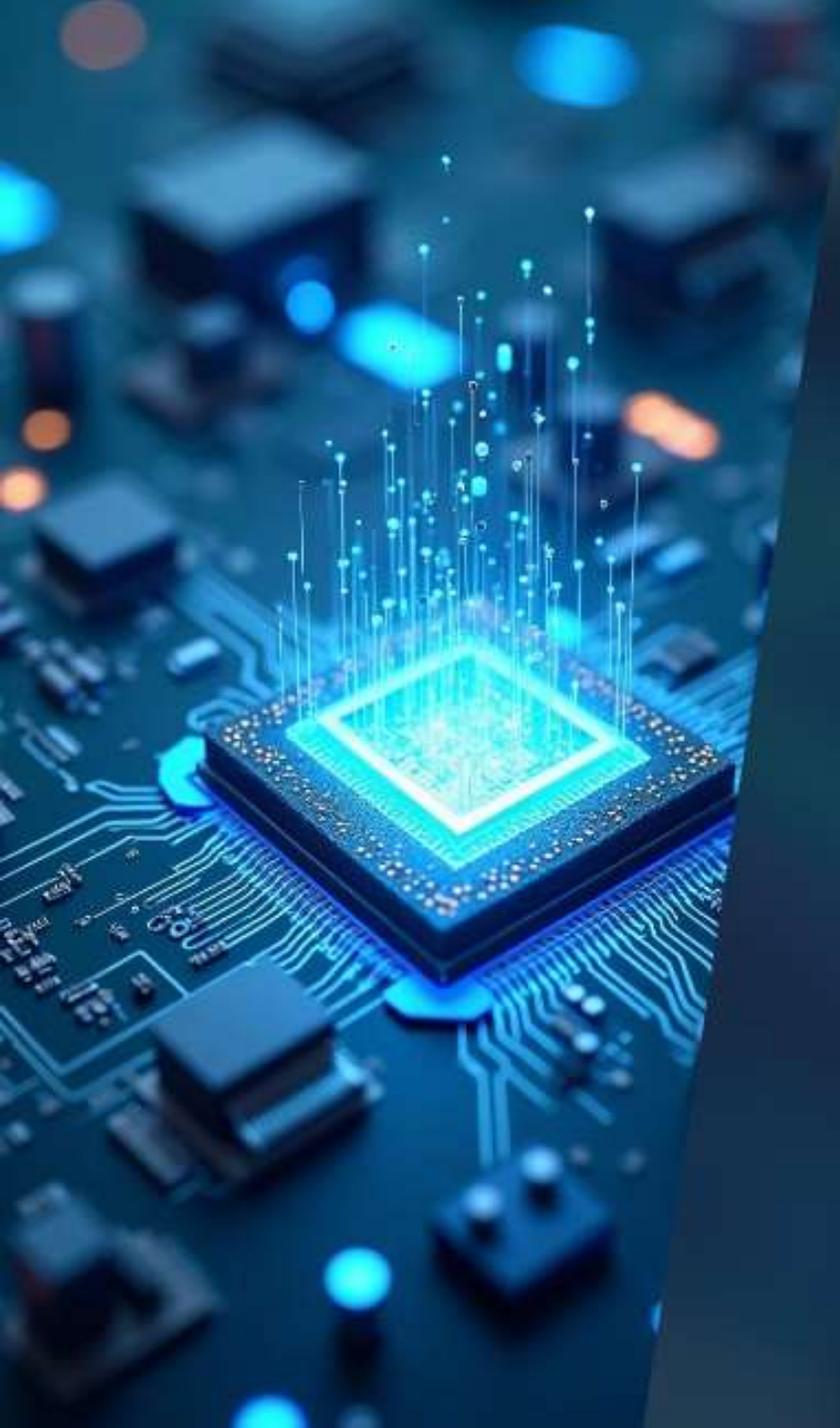
- 15-25% inventory reduction.
- 5-10pt service-level improvement.
- Improved capacity commitments.
- Annual Value: \$500M+ (P&L + working capital).



Investment Profile (3-Year)

Category	Typical Range
Platform & Infrastructure	\$5-10M
Integration & Data	\$10-20M
Talent & Operating Model	\$5-10M
Governance & Change	\$2-5M

Total 3-Year Investment: \$25-45M.



ROI & Payback

ROI: 10–20x.

Payback: <12
months.

Benefits
compound
annually as
agents learn and
scale.

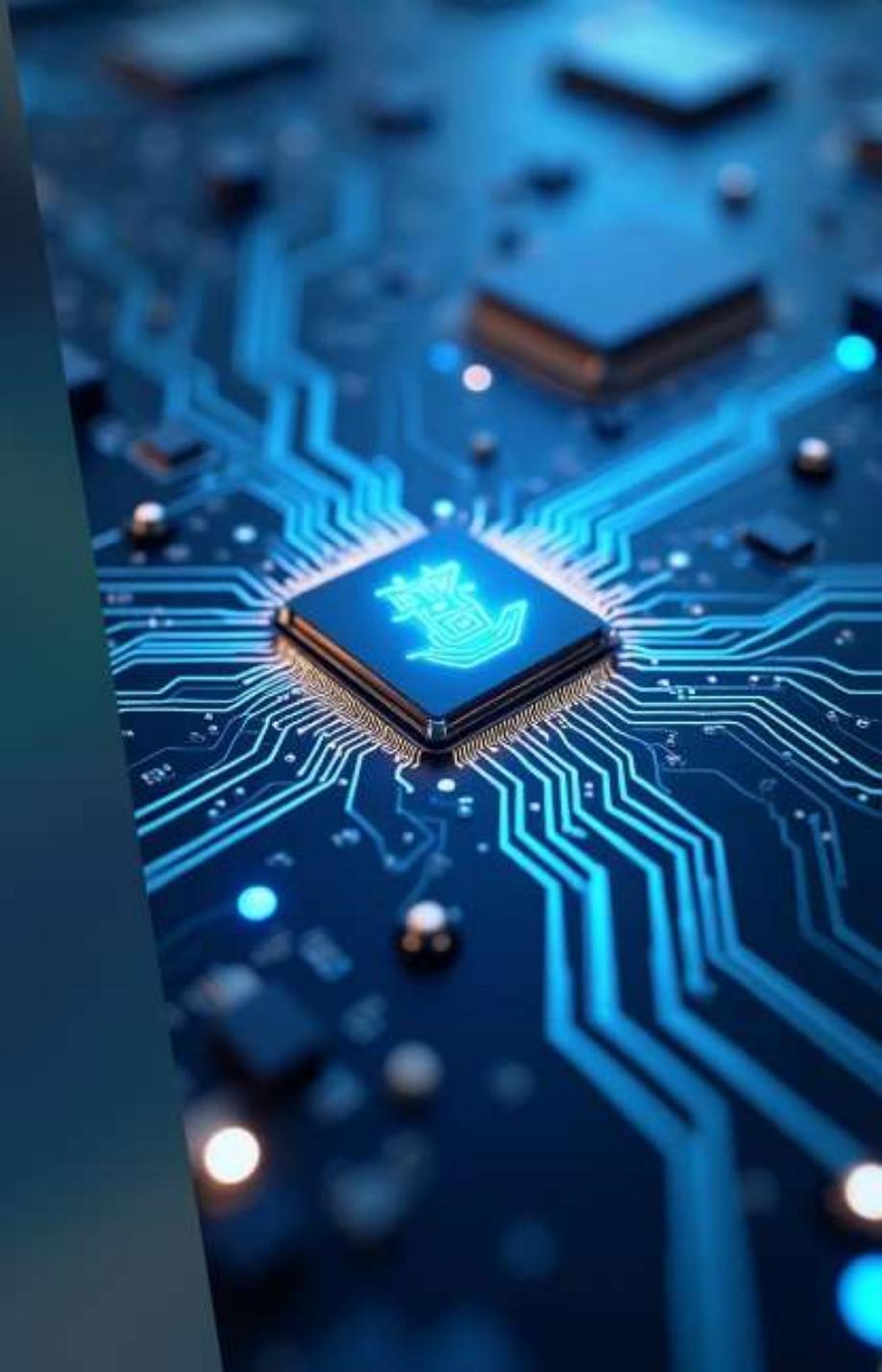
Risk & Governance (Board Controls)

Start with closed-loop domains (fab ops, planning).

Human override thresholds for critical actions.

Full auditability and explainability.

KPI-based agent performance governance.



Board Decision Ask

Approve phased enterprise rollout of Agentic AI, anchored to:

Yield & utilization KPIs.

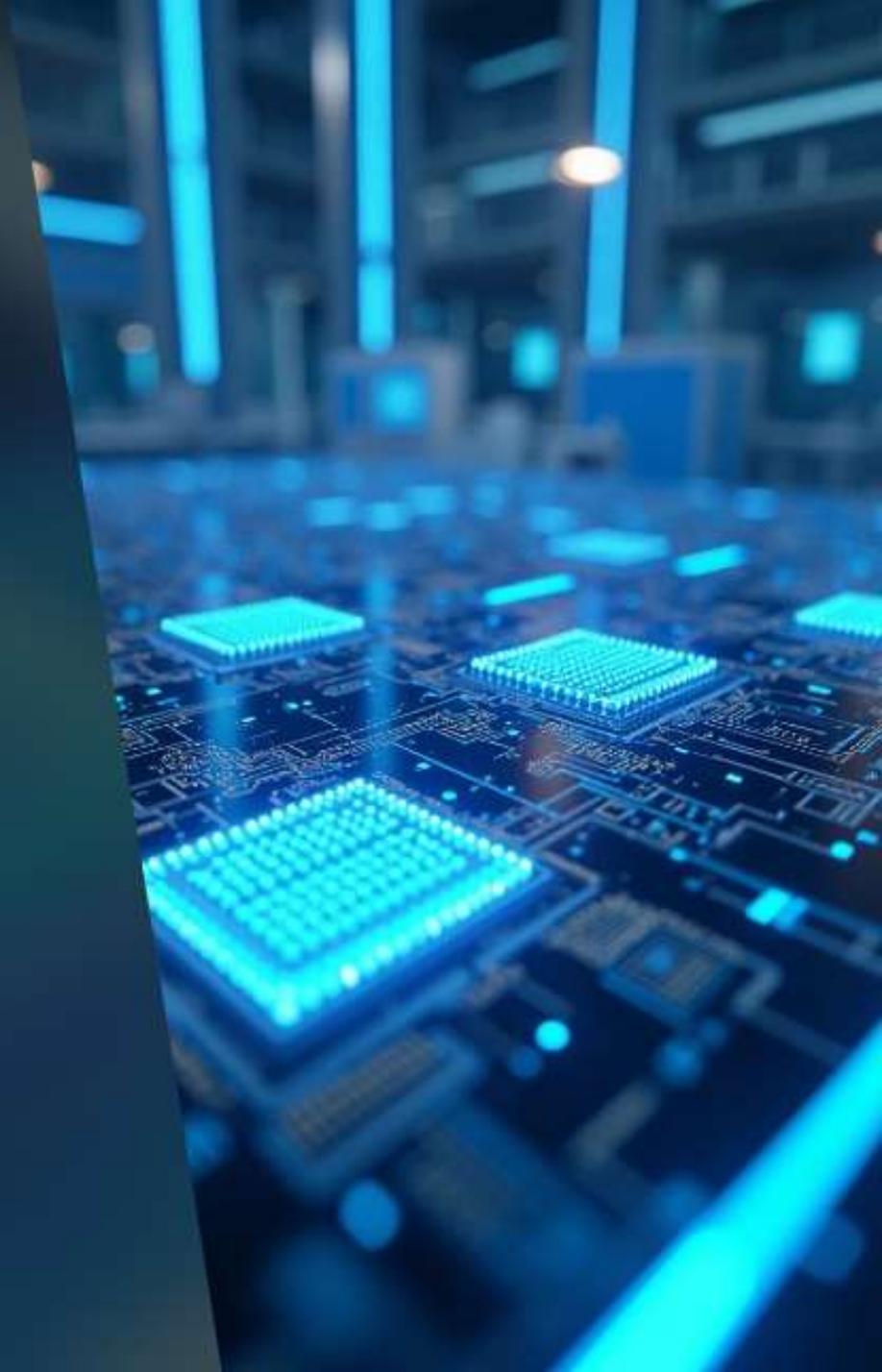
Margin and capital efficiency targets.

Strong governance and human-in-the-loop controls.



Strategic Outcome

Structural margin advantage, faster innovation cycles, and superior resilience in a capital-intensive industry.





Thank You

Connect with our talented team for a detailed conversation.

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