

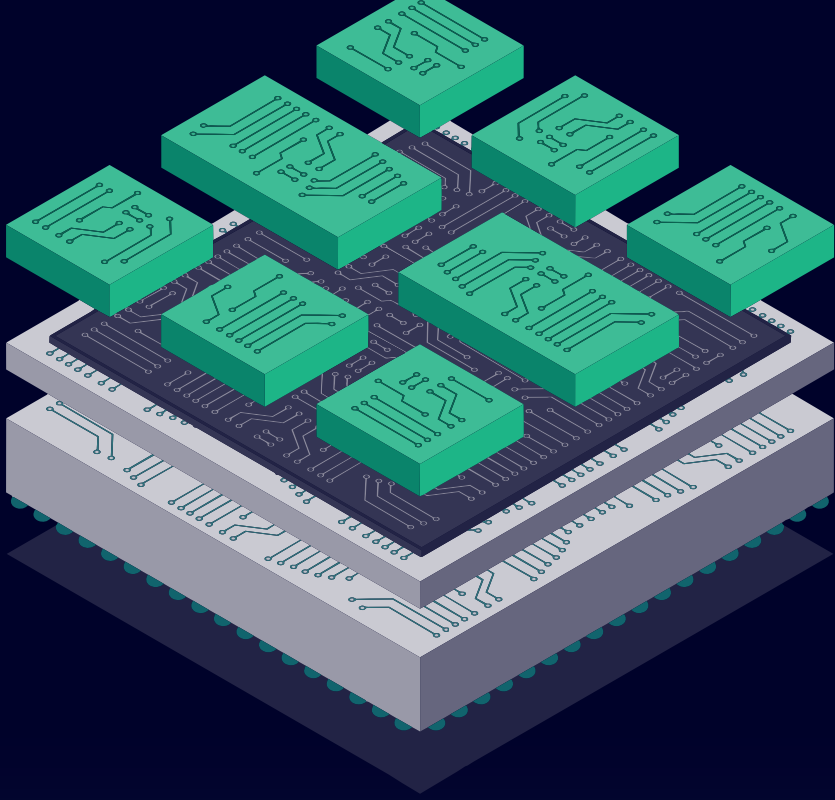
Advanced packaging – more performance for less

How chiplets, 2.5D/3D integration and ecosystem collaboration are reshaping semiconductor economics

[siemens.com/software](https://www.siemens.com/software)

“Advanced packaging is giving us more for less.”

Bob Patti
CEO
NHanced Semiconductors



Advanced packaging is more expensive than traditional packaging such as wire bonding or flip-chip assembly – but often far less expensive than forcing a design to a smaller geometry. For many products, a chiplet-based architecture plus a small custom IC can be significantly more achievable and lower risk than a fully monolithic leading-edge device.

Shorter interconnects



Micrometer-scale links reduce latency, power and signal loss.

Heterogeneous integration



Combine the best technologies – logic, memory, analog, photonic, RF, MEMS.

Better economics



More performance for less cost and risk compared to monolithic scaling.

Smaller, more capable systems

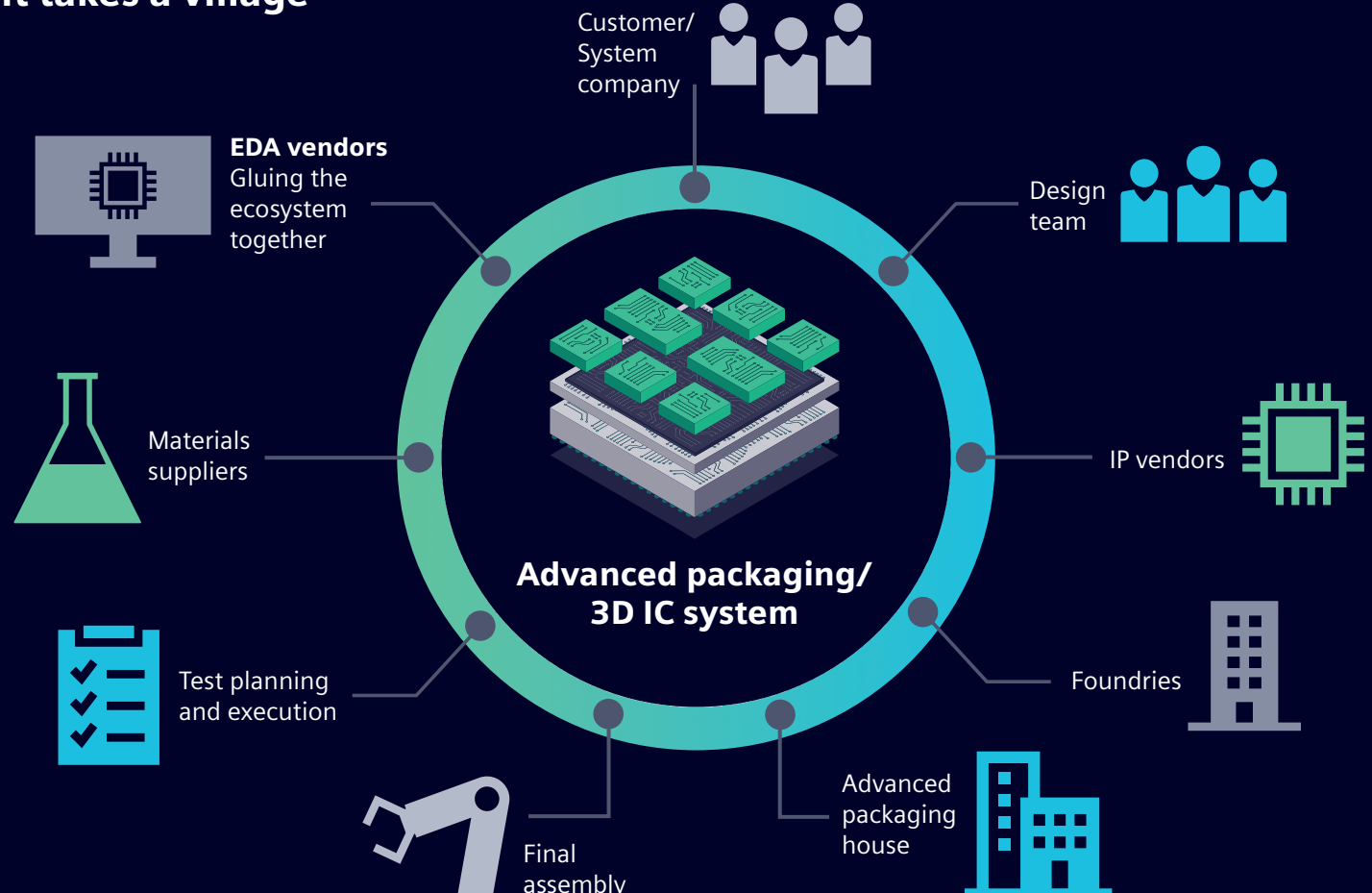


Higher performance density enables new form factors and experience.



The biggest gains come from **reducing wire length.**

It takes a village



Complex 3D ICs do not come to life through one team alone. They require close collaboration across design, foundry, packaging, assembly, test and software/tool providers. Early alignment reduces risk, improves manufacturability and speeds time-to-market.

Design for manufacturability starts on day one

- ✓ Build the right expert team early.
- ✓ Plan package, assembly and test together.
- ✓ Define known-good-die strategy.
- ✓ Think through downstream assembly and use environment.
- ✓ Identify critical handoffs across the flow.
- ✓ Focus on where shorter wire length creates real value.
- ✓ Align stakeholders before manufacturing begins.

In **advanced packaging**, test can be a hidden cost if not planned early.



What the ecosystem still needs

Better EDA flow maturity



More robust, scalable flows for 2.5D/3D IC design, analysis and sign-off.

Stronger ADK/PDK alignment



Consistent, accurate models and data across the tool and silicon stack.

Faster tool-to-market flow



Shorter development cycles to keep pace with rapid packaging innovation.

Earlier ecosystem coordination



Shift-left collaboration to reduce iterations, risk and time-to-market.

Chiplets – from niche necessity to broader adoption

Now

Proven technology Growing traction

- Strong technical foundation
- Early adopter success stories
- Expanding use cases
- Cost and performance wins proven

1-3 years

Commercial expansion

- Broader use of chiplet architectures
- More mixed-node integration
- Better tools reduce barriers to entry
- Lower-volume and specialized teams gain access

3-5 years

Mainstream momentum

- Broader commercial and consumer uptake
- More heterogeneous systems
- Increasing use of photonics, GaN, MEMS and other exotic materials
- Stronger ecosystem coordination
- Faster time-to-market as flows mature

The technology is not radically new – **the big shift is broader adoption.**



Based on insights from the Siemens 3D IC podcast conversation with Bob Patti, President and CEO of NHanced Semiconductors. Listen to the [full episode](#).

Learn more about [Siemens solutions for 3D IC design](#).