AI for EDA/Physical Design

Driving the AI Revolution: The Crucial Role of 3D-IC

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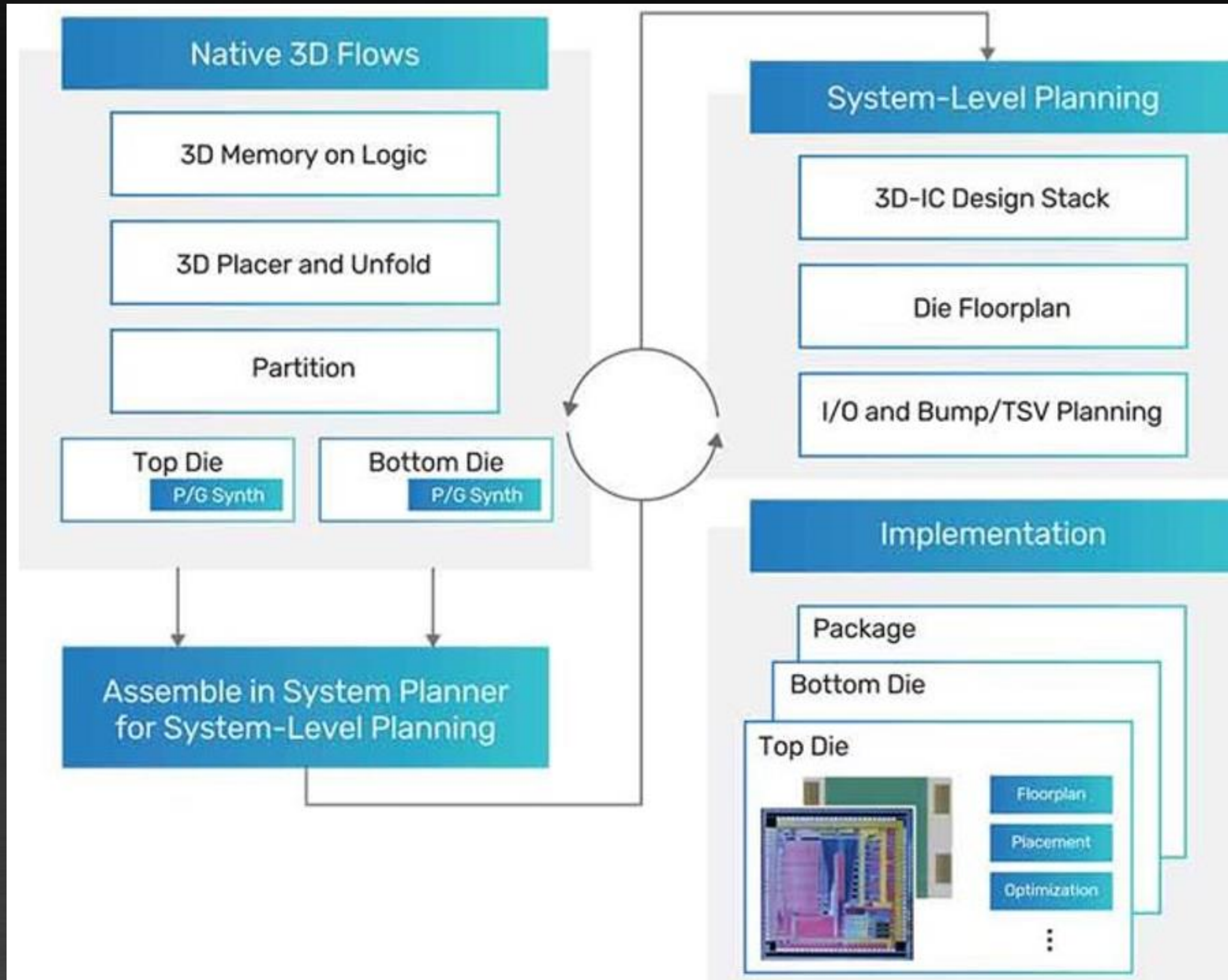
AI-Driven 3D-IC Solution – Our Focus is to Eliminate the Iteration



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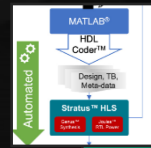
3D-IC System Planning and Optimization

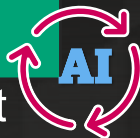
An AI Platform that can manage/connect all of stages



Architect In C

- **Architect Optimization in C**
  - From system spec to RTL
  - Architectural exploration and optimization
  - AI-inspired technology, eliminates iterations

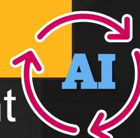
IP Development

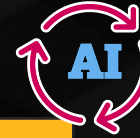


2D Architect in RTL

- **2D Architect Optimization in RTL**
  - Automated flow to handle multiple RTL sources
  - Explore RTL architect . restructuring, regrouping solution
  - Early predict PPAC

2D RTL Development

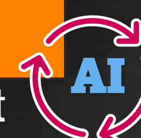


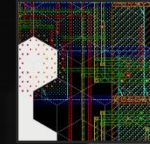


3D Architect in RTL

- **3D Architect Optimization in RTL**
  - Transform conceptual spec into 3D design
  - Smart trade-off decision by AI
  - Multi-objective to concurrently optimize bump, design partitioning, floorplanning with IR/Thermal driven

3D RTL Development

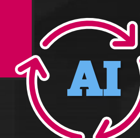




Chiplet implementation and Signoff

- **AI-Inspired Hierarchy Flow**
  - AI-driven PPA optimization
  - Generative-AI link with bigdata platform
  - Cockpit for Multi-run visualization and dashboard

R2G Full Flow Development



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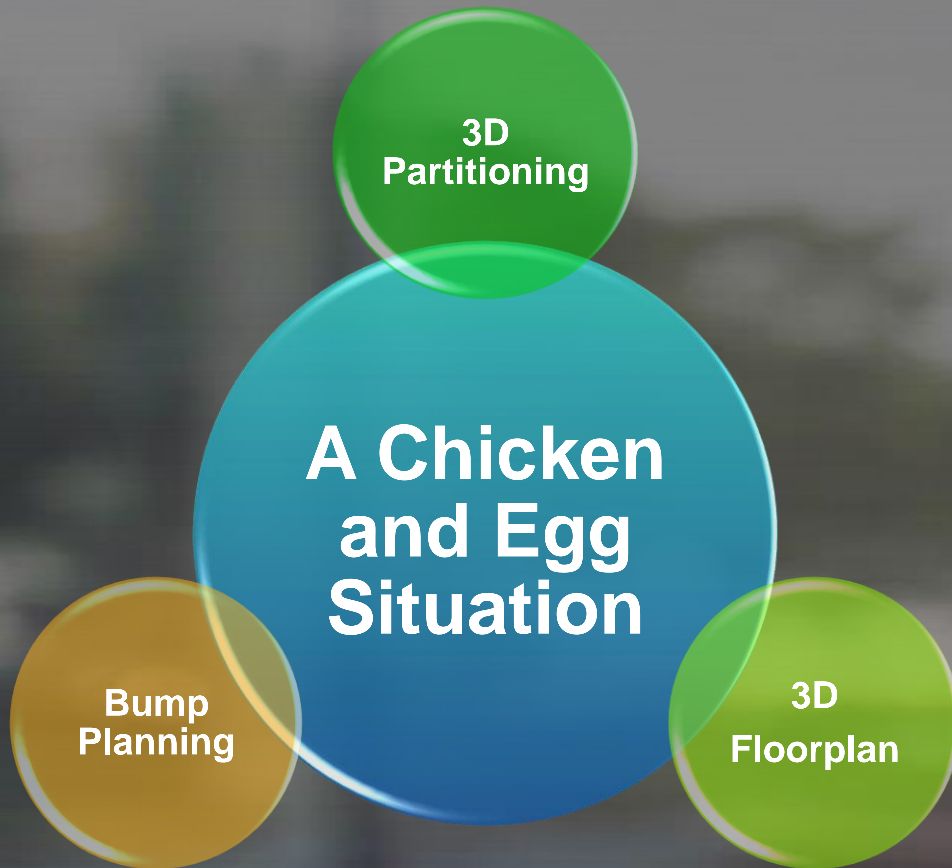
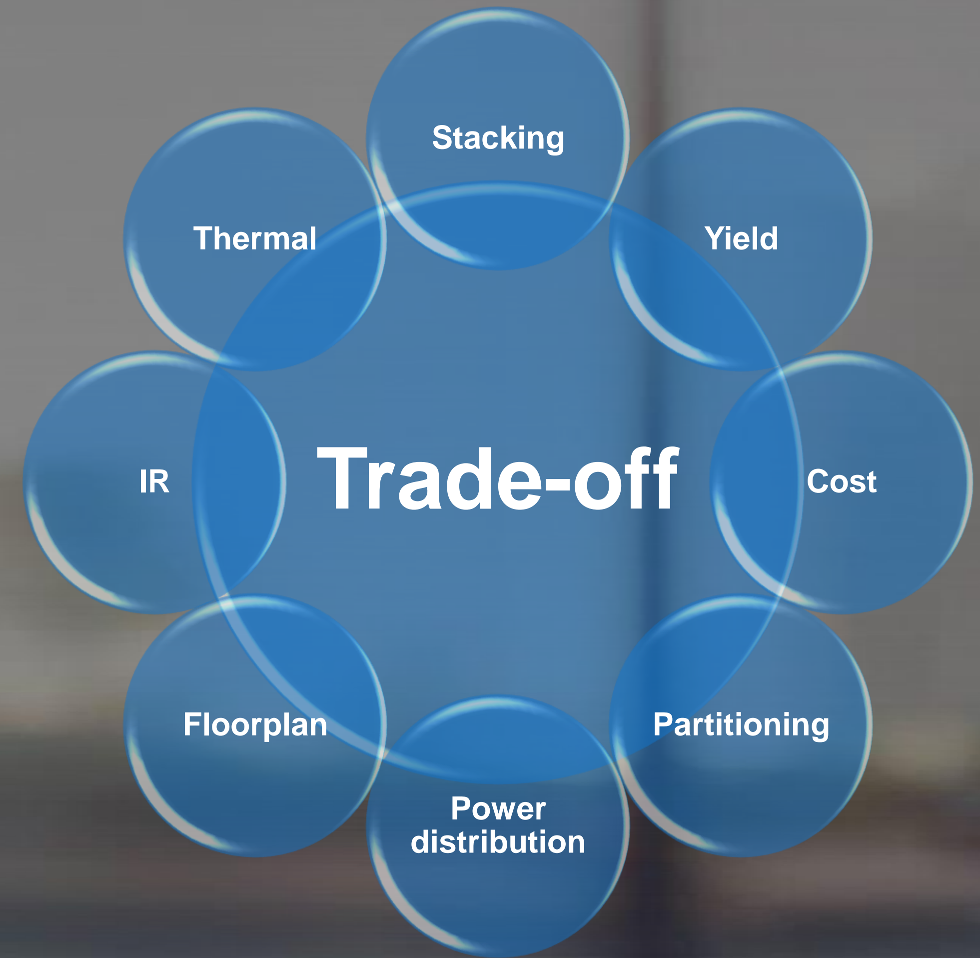
Challenges of 3D-IC in Design and Flow Methodology





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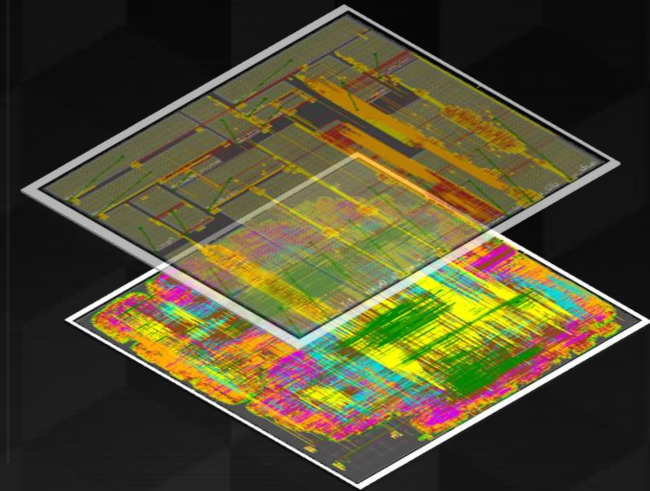
Parameters Need to Co-optimize in 3D Silicon Stacking

- Stacking
- Partitioning
- Floorplan
- I/O, P/G Bump/TSV Planning
- Thermal
- Power IR/EM

3D Silicon Stacking



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Example of Generated 3D-IC Architect Planning

3D-IC architect planning by AI

Bump planned and aware the macro placement

Multi-objective and trade-off decision by AI

	2D wirelength	Z wirelength	Target density	Macro-on-Logic	TSV utilization	Bump floating	Bump violating
base	194820	7573.93	0.41	1.11	0.43	0.04	0.69
scenario_35	223636	7021.04	0.43	0	0.2	0	0.79
scenario_28	215772	5252.55	0.37	1.01	0.33	0.03	0.58
scenario_29	345552	5047.77	0.34	0.58	0.29	0.04	0.72

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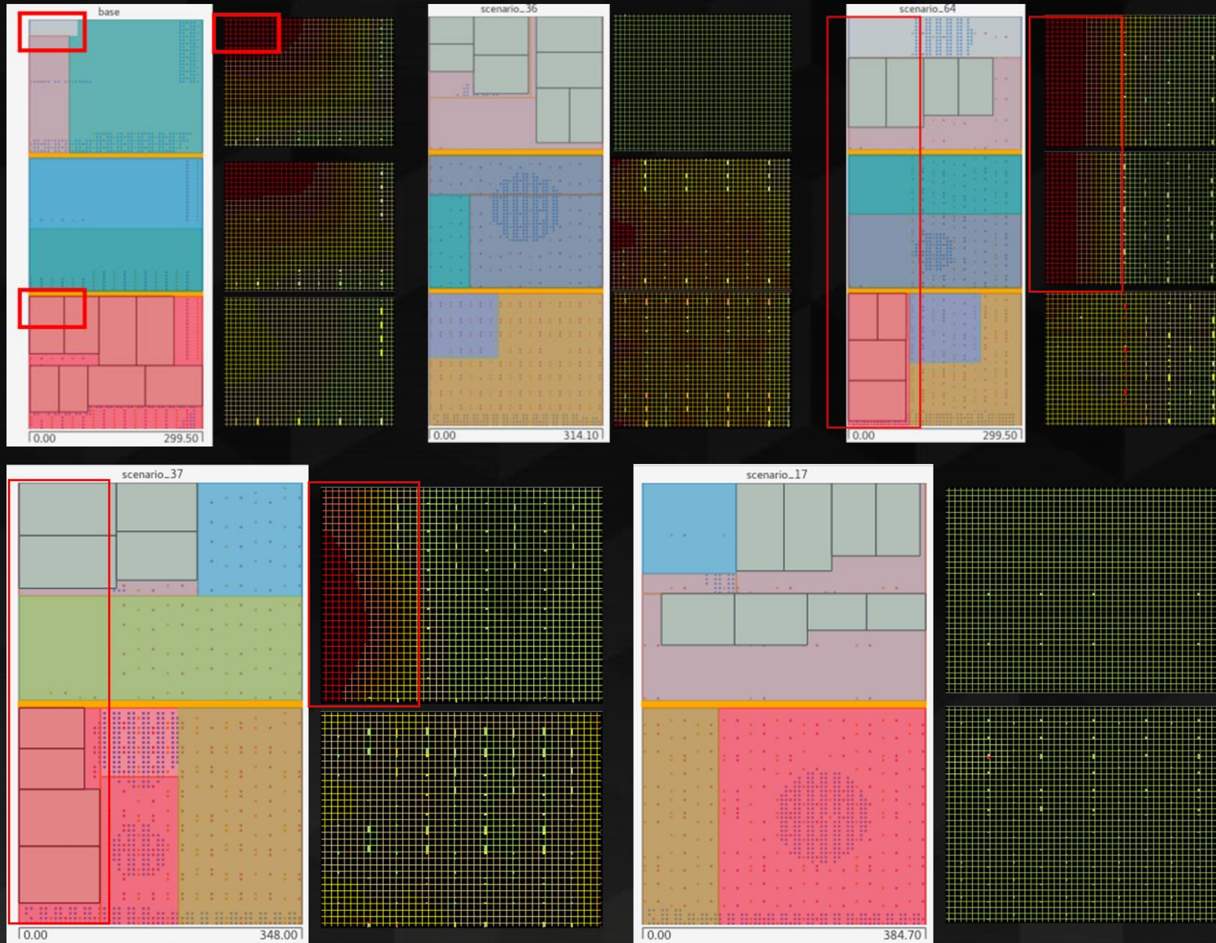
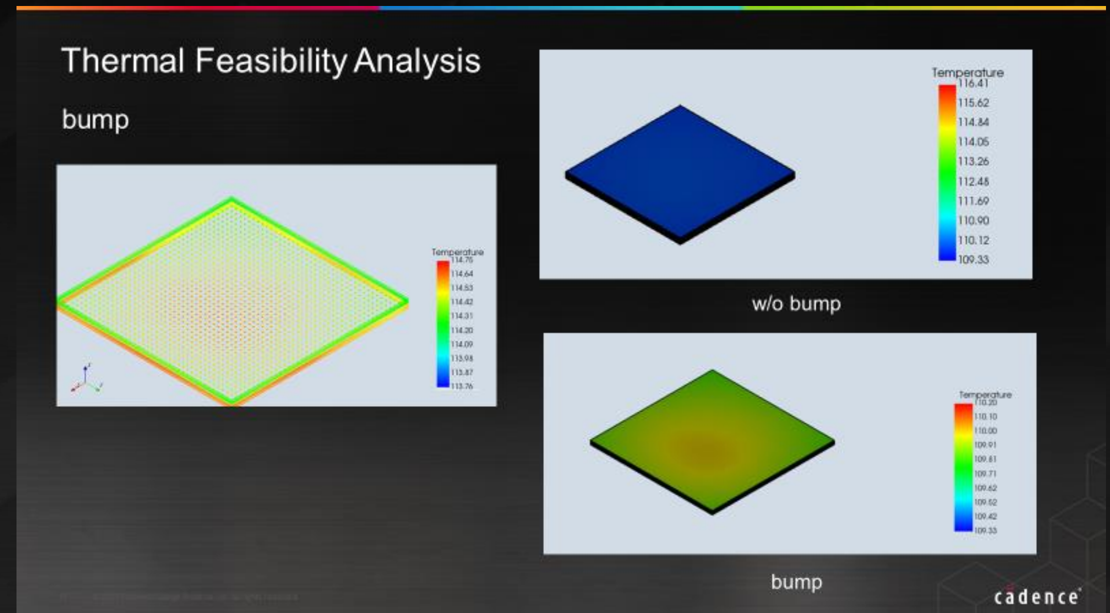
IR and Thermal Trade-Off Considering



- Bump connectivity impacts to thermal analysis
- Building the bump connectivity is important to successful early architect planning



Transform IR/Thermal into costing component to enable the learning of AI from the end-result

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Summary

- Make design cycle collaboration efficiency and short TAT
- Early planning to reduce risk
- Comprehensive consideration to make immediate trade-off decision
- Enlarged productivity and performance optimization

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