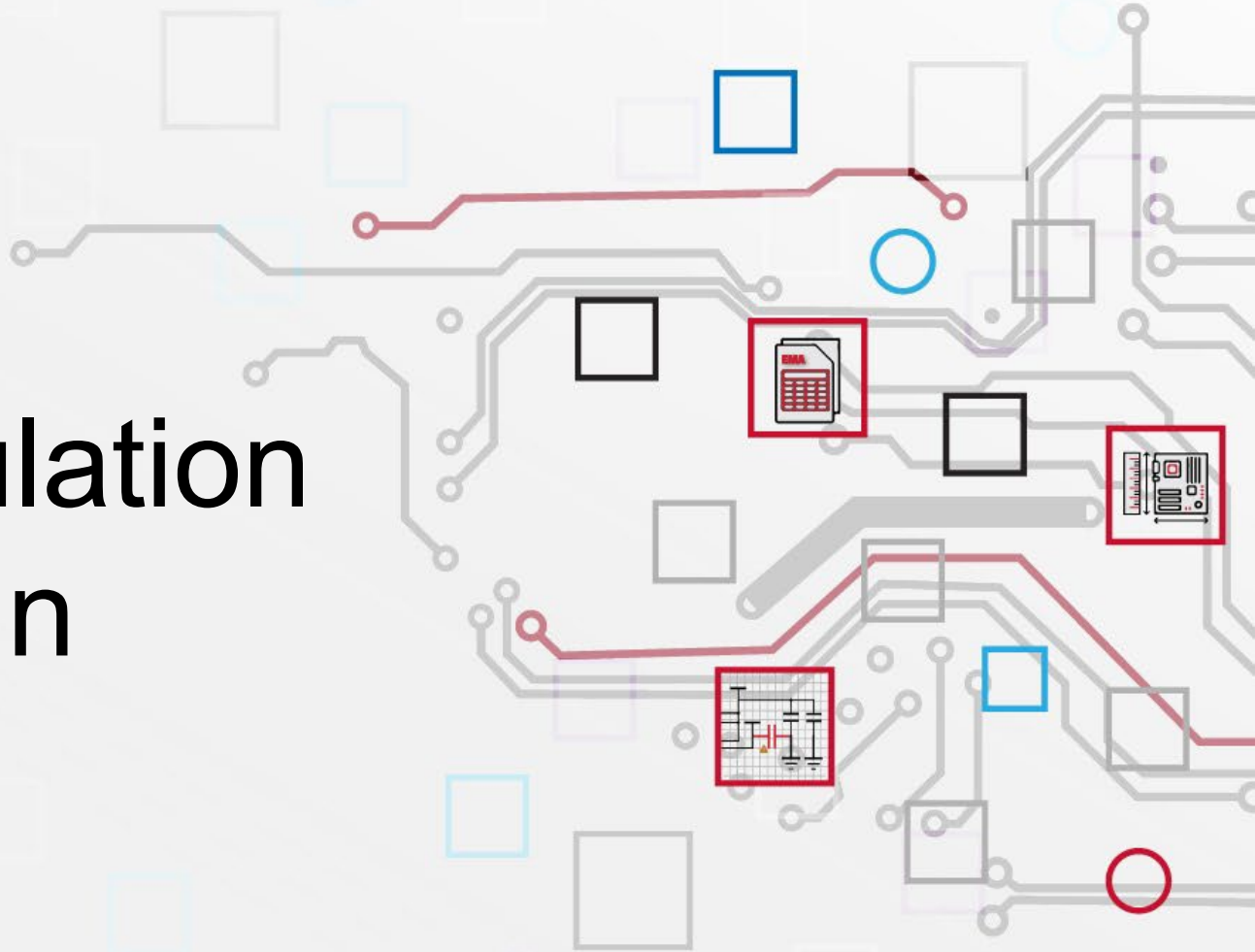
WEBINAR

Sigrity X:
Reimagining Simulation Driven PCB Design



Presented by EMA Design Automation

Speakers

Matthew Harms
AE Team Leader, EMA Design Automation

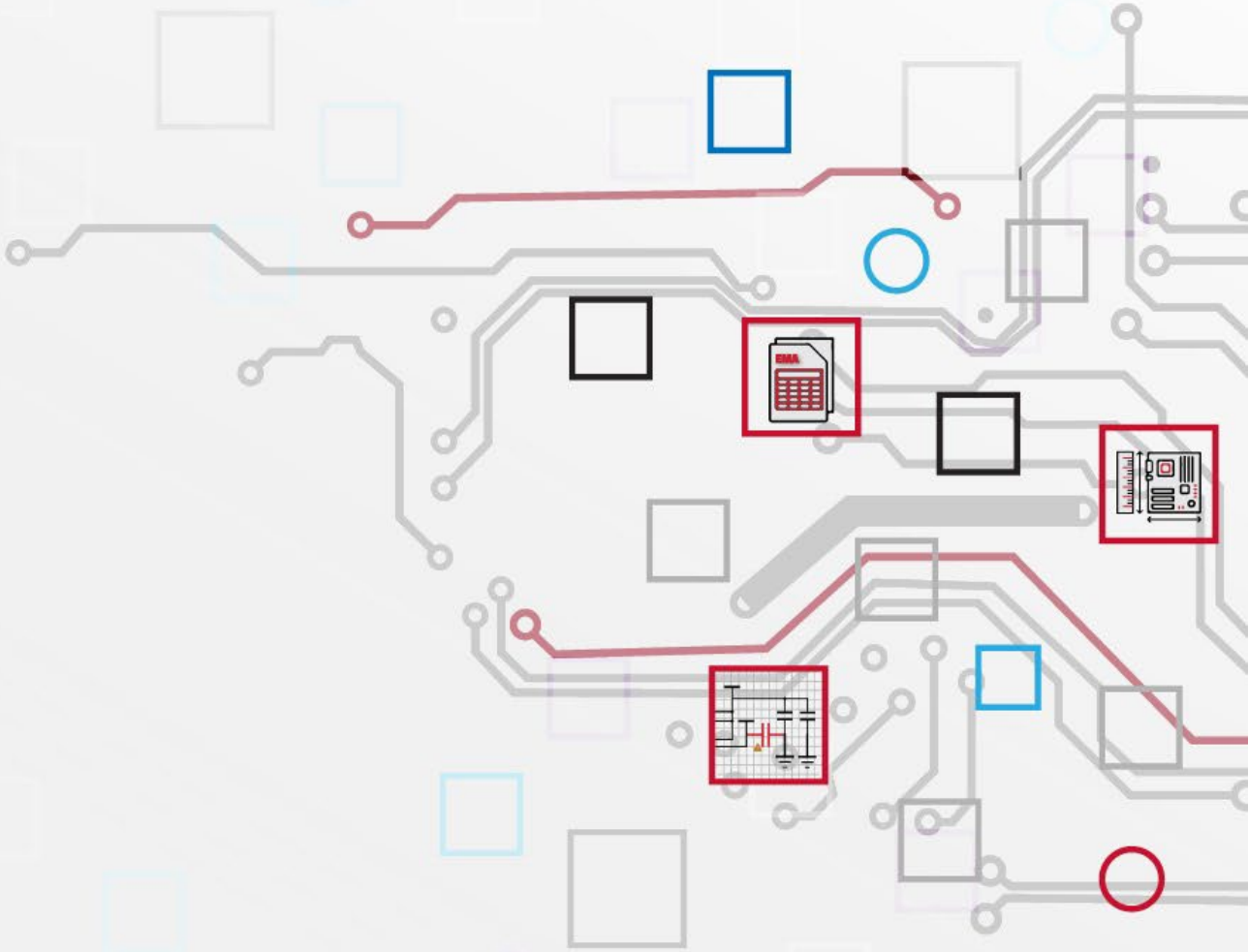
Matthew Harms is an Electrical Engineer from Canada and has been with EMA as an Application Engineer since 2003 and as the Application Engineer Team Leader since 2018. At EMA, he specializes in design side issues pertaining to part management, circuit simulation, signal integrity and power integrity but is conversant in all facets of ECAD design.

Chris Banton
VP of Marketing, EMA Design Automation

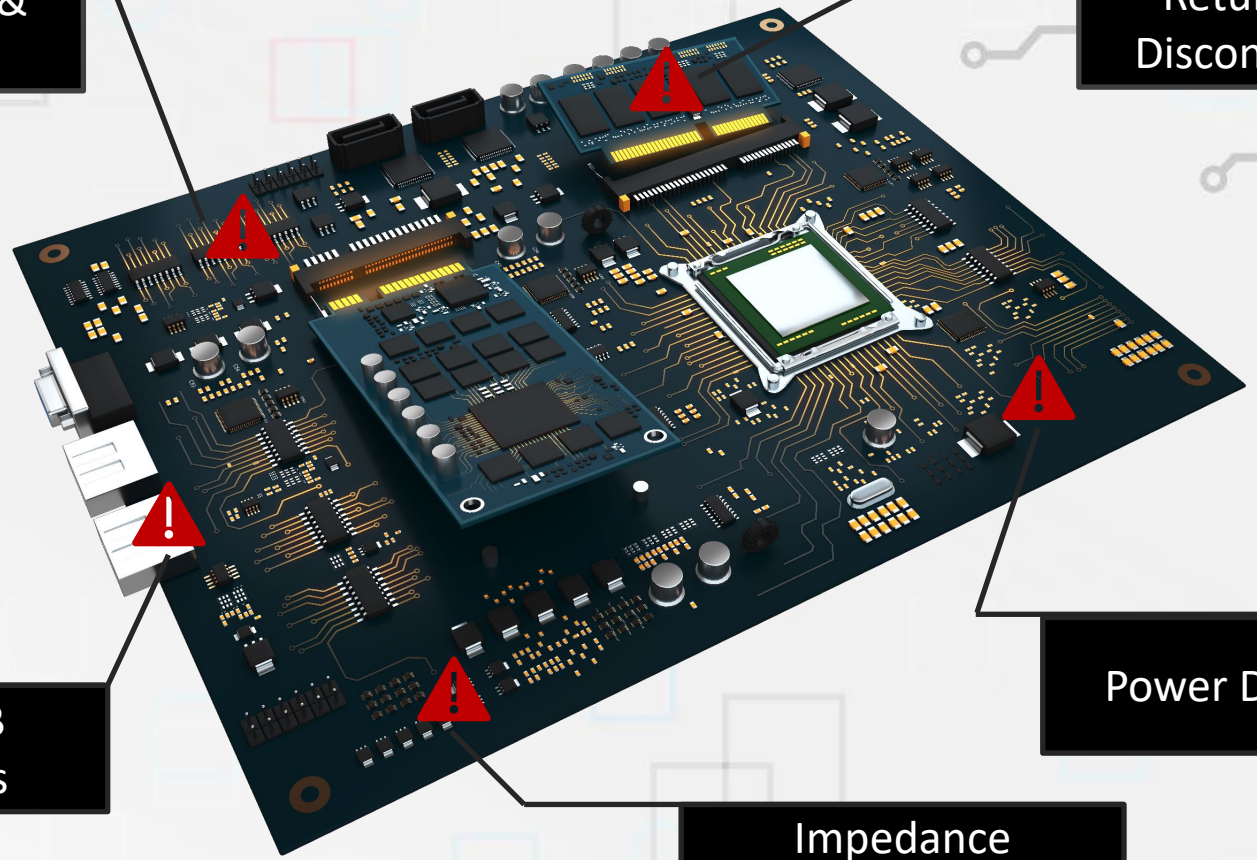
Chris Banton is the VP of Marketing at EMA Design Automation. He is responsible for all marketing and outreach activities at the company. Chris has been with EMA for over 20 years in various Sales, Product Management, and Marketing roles and has been a speaker at numerous partner and industry events. His focus is on driving long term value for EMA and their customers. Chris holds a bachelor's degree in Environment Economics from the University of Rhode Island.

Agenda

- Modern Design Challenges
- Why Don’t We Simulate (more)
- Why Sigrity X
- Sigrity X Platform
- Simulation Driven Design
- Optimality AI Explorer
- Sigrity Tokens
- Demo
- Q&A



Design Challenges



Resonance & EMI

Return Path Discontinuities

Multi-GB Interfaces

Power Delivery

Impedance Discontinuities

Which If Not Caught Lead to

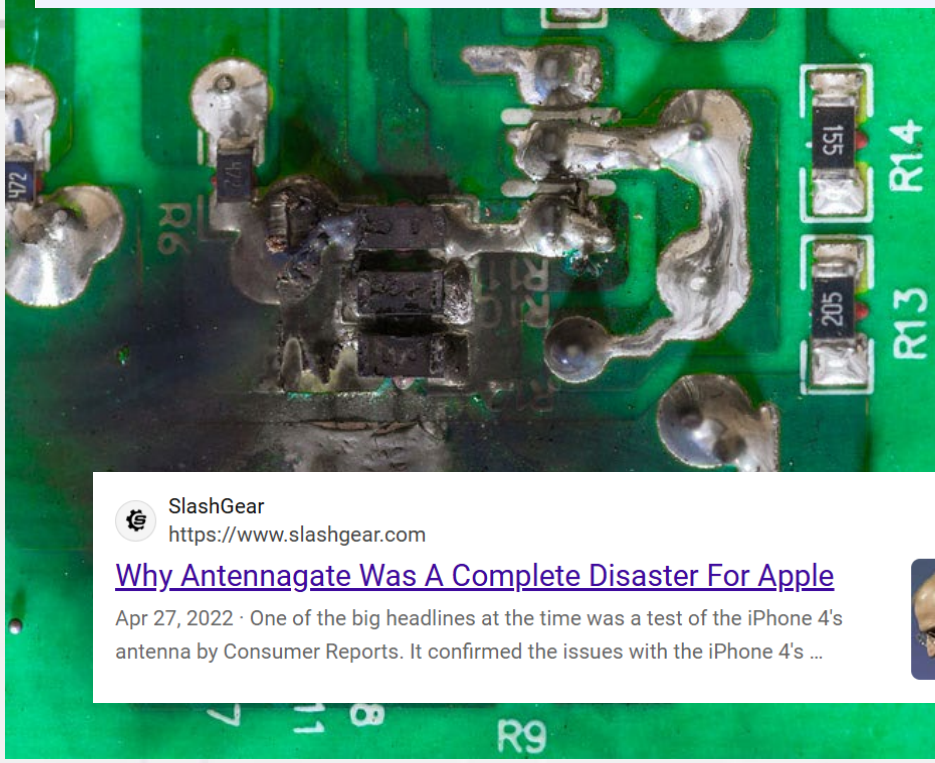
- **Missed Schedules**
- **Re-Spins**
- **Field Failures**
- **Increased Costs**

And these issues are often relational one affecting the other

Why We Don't Simulate (More)

- Too Much Setup
- Learning Curve / Expertise
- Usage & Cost
- Can't Cover Everything
- Not Enough Time
- Haven't Had Any Issues….Yet

The **Red Ring of Death** was a notorious issue that plagued Microsoft's Xbox 360 consoles. It was caused by connectors inside the components of the console breaking. Wikipedia +2



Why Sigrity X

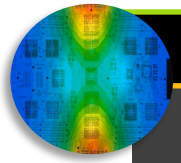
Comprehensive: SI / PI / EMI / EMC Analysis at all phases

Easy to Use: Workflow Driven Analysis with Automated Guided Setup In-design simulation

Fast & Accurate: 10x Speed Up with Hardware Validated Accuracy – Multi-Core & Cloud Ready

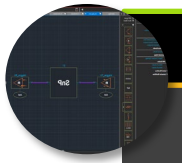
Scalable & Flexible: Easily add workflows and functionality with on-demand use model through **Sigrity X Tokens**

COMPLLETE MULTI-PHYSICS SIMULATION PLATFORM



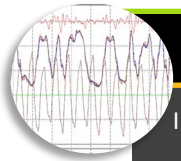
Power Integrity

IR Drop | Resonance
Loop inductance | DeCap Opt



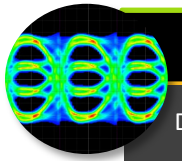
Topology Exploration

SI | PI | Solution Sweeping | Requirement Definition



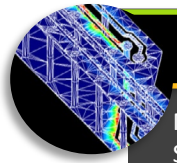
Signal Integrity

Impedance | Coupling | Crosstalk
Noise | TDR/TDT | Return Path



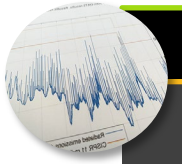
Channel Compliance

DDRx | USB | PCI-e | MIPI | HDMI | SATA | AMI Modeling



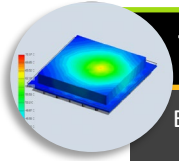
EM Analysis

Model Extraction | Full 3DEM | S-Parameters |



EMI/EMC

Near Field | Far Field | SAR
Radiated Emissions | DeCap Opt



Thermal

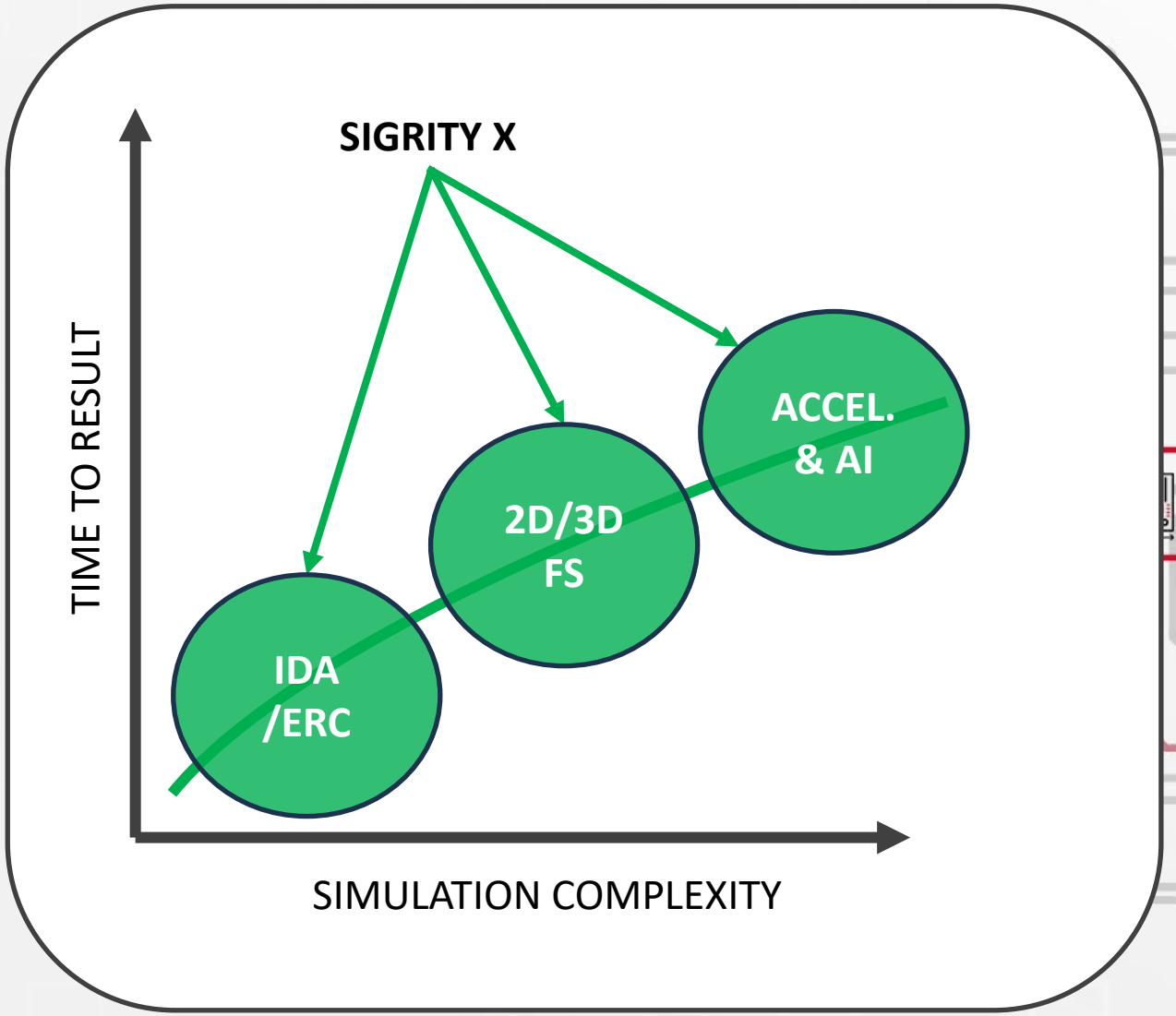
E-T Co-Sim | Transient Thermal
On-Board Thermal | CFD

ESD

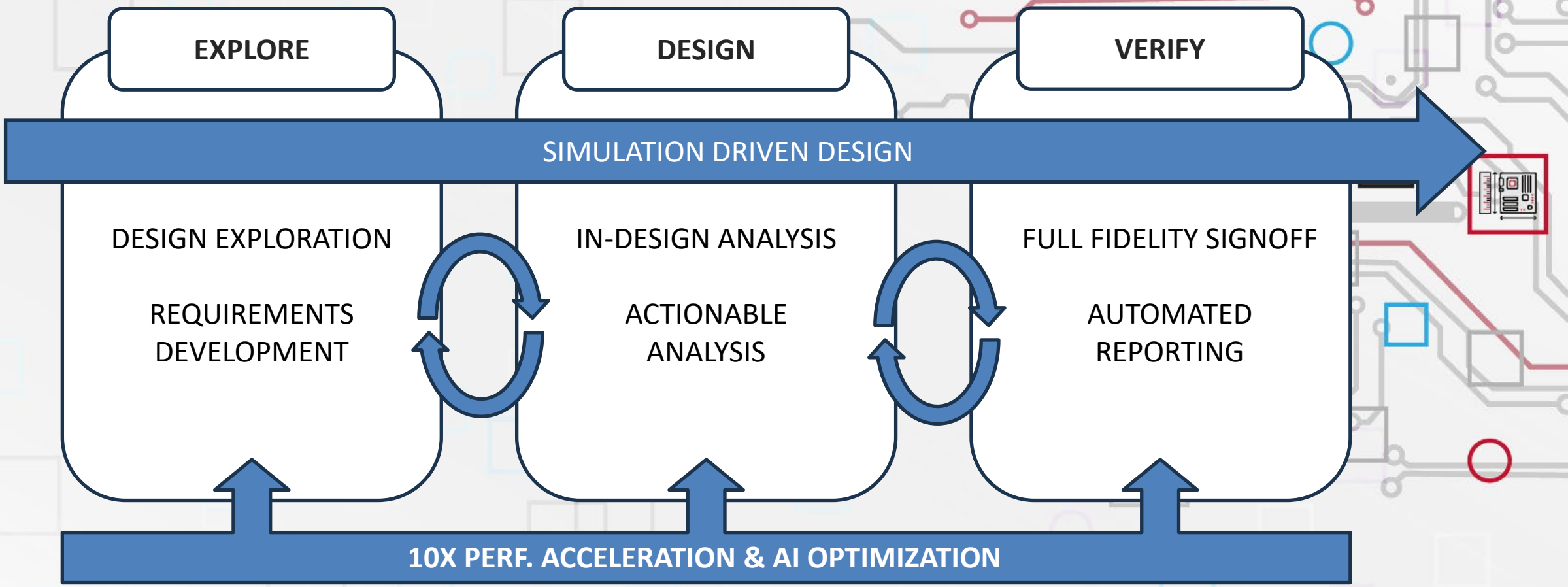
Virtual ESD Gun | TVS analysis |

Scalable Simulation

- Scale performance **TO** solve faster what others can't
- Scale in configuration **TO** enable more simulation to occur by more people
- Scale in fidelity **TO** deliver accuracy needed at all times



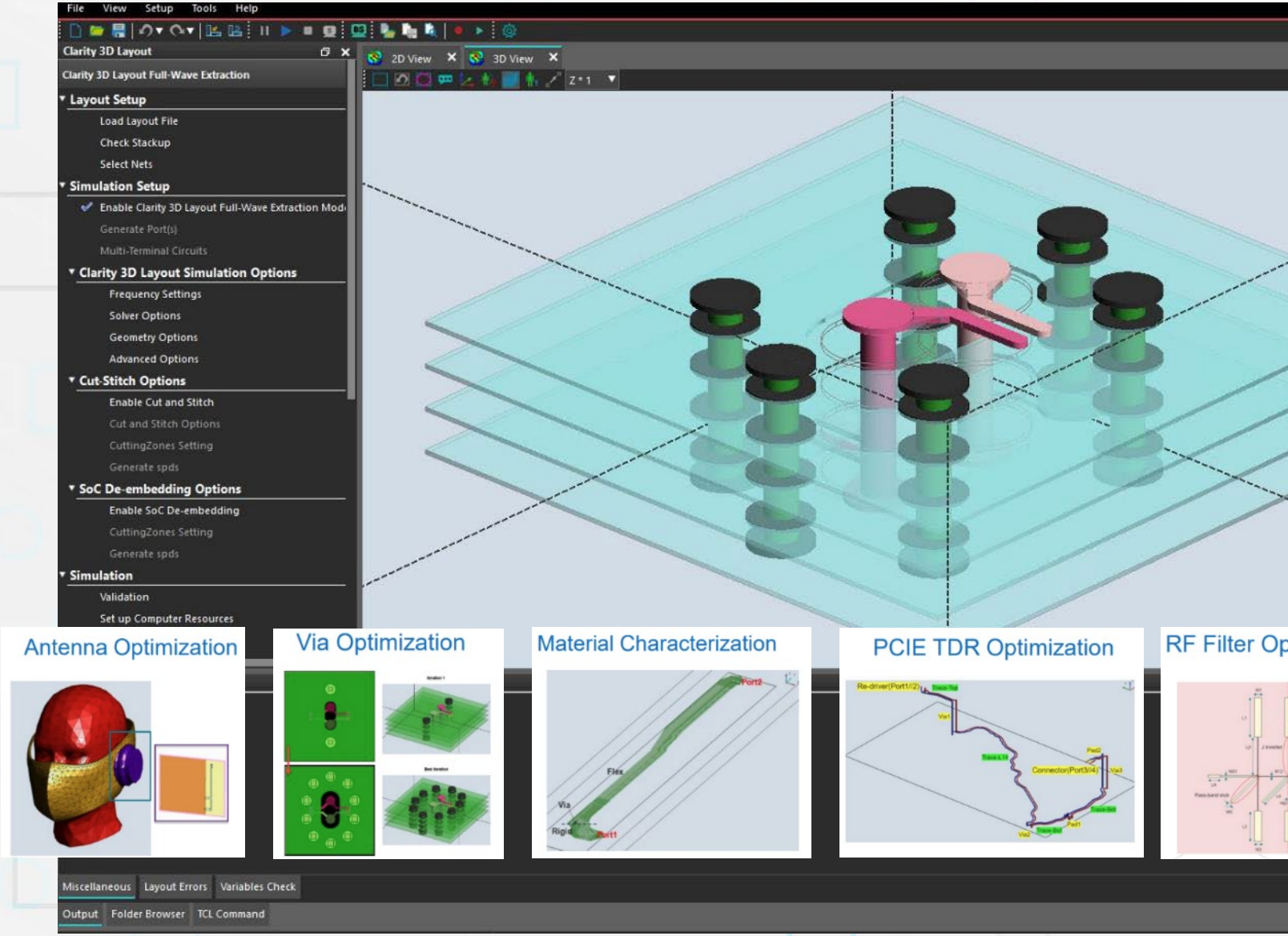
Simulation Driven Design Flow



AI for Simulation

Optimality

- Adaptive AI
- Built to accelerate solution space exploration & optimization
- Integrated directly inside Sigrity X, Clarity, and Celsius



Optimality Intelligent System Explorer

EMA Design Automation

System Criteria

- Return loss
- Insertion loss
- Cross-talk
- Isolation

Optimality™
Intelligent System Explorer

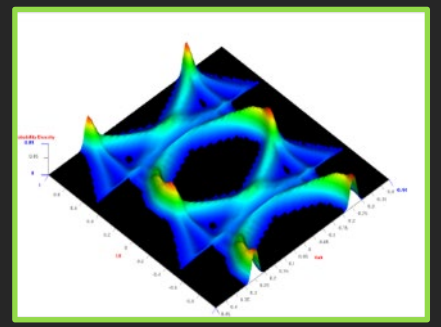
Electromagnetic and Electrothermal Analysis

In-Design Analysis

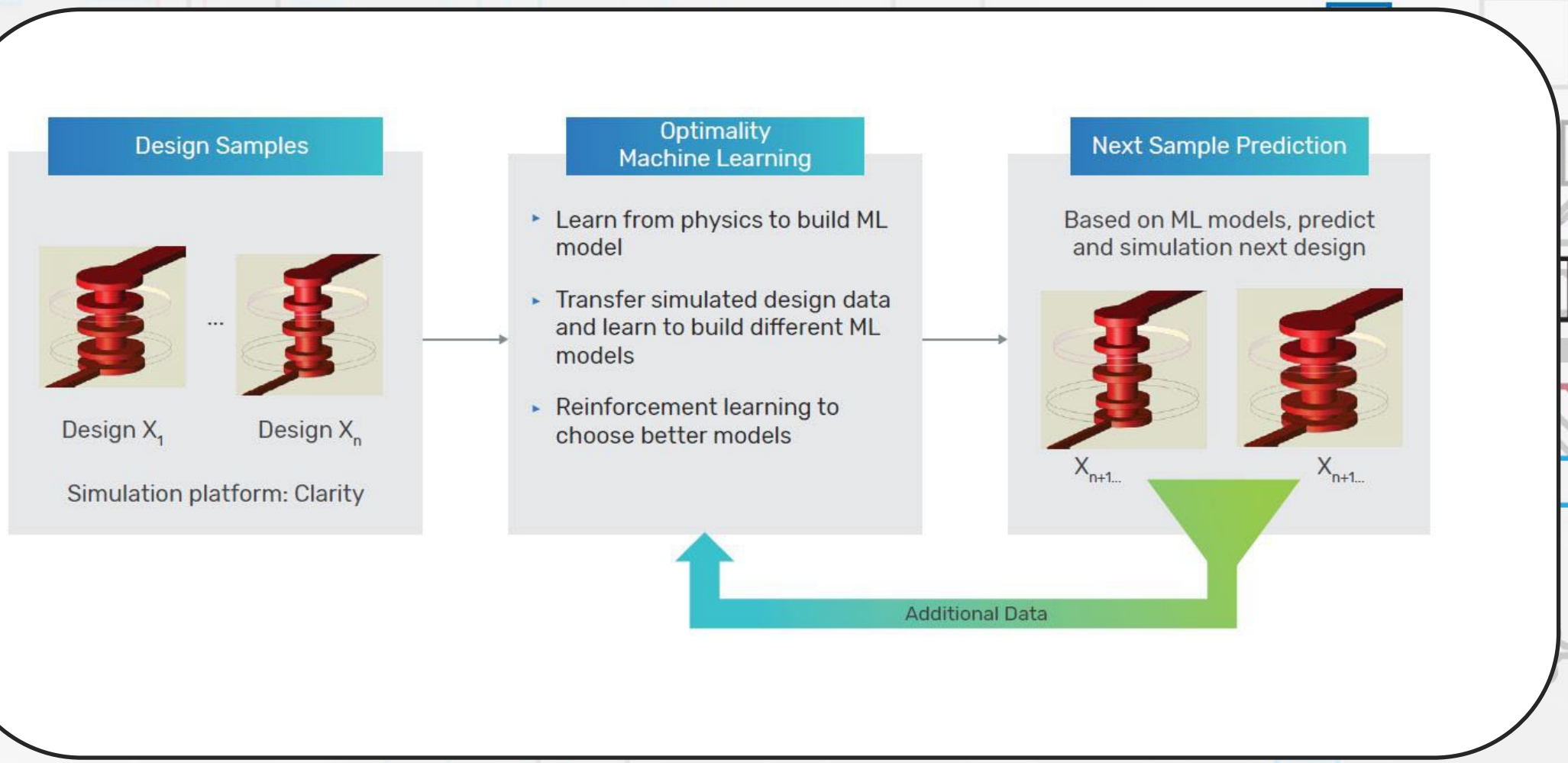
System Design Optimization

AI-driven In-design optimization

Optimized Performance



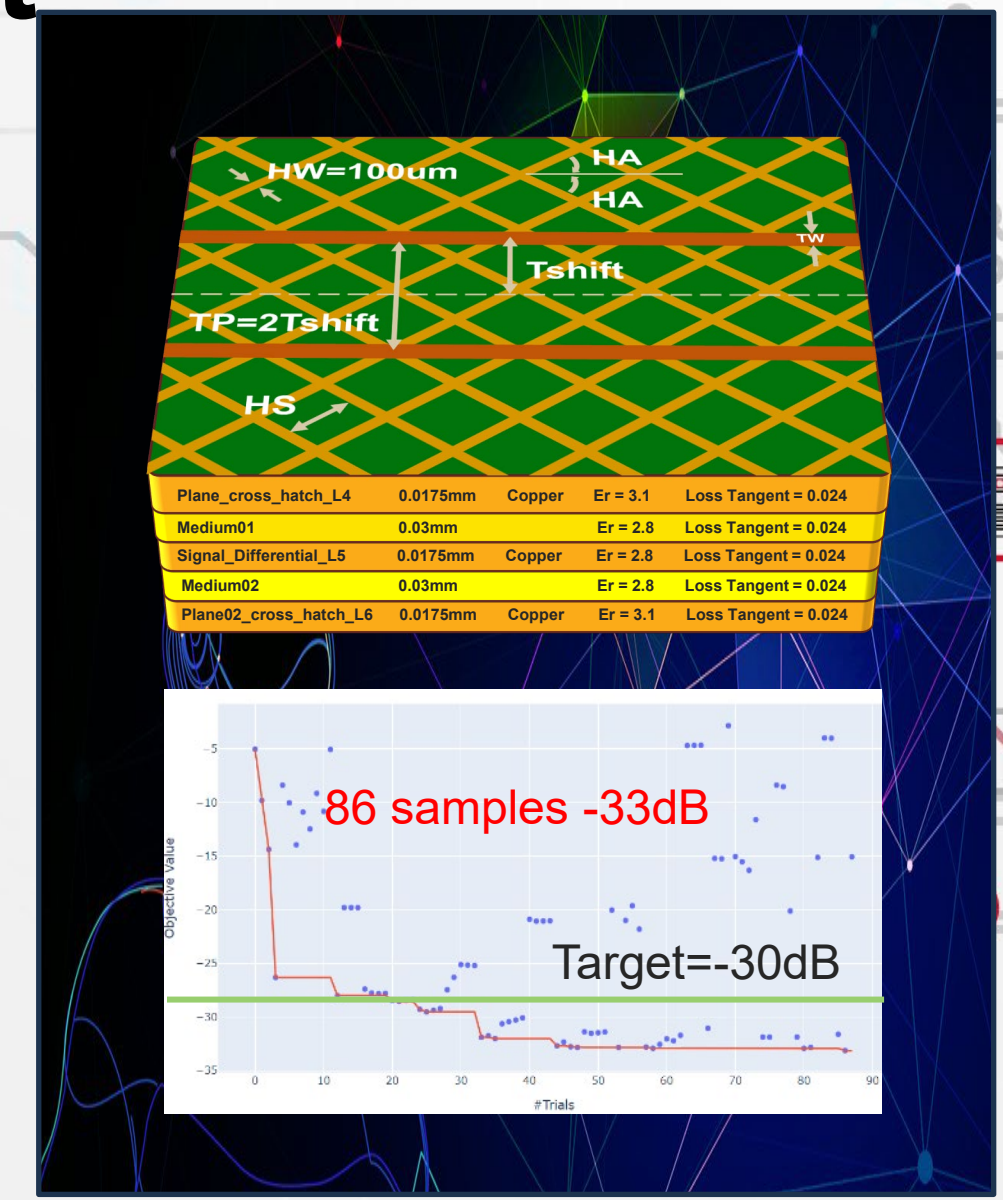
Adaptive AI Engine



Optimality™ Intelligent System Explorer

Example:

- Minimize transmission line return loss:
- -30dB target in the frequency band [0GHz-15GHz]
- 5 physical variables: HW, HS, HA, TW, TP
- Brute-force sweeping requires 2,880,000 evaluations (20x20x18x20x20)
- Only 86 samples required with Optimality to achieve -33dB



Customer Results

Microsoft

As an early adopter of the Cadence Optimality Intelligent System Explorer we stressed its performance on a rigid-flex PCB with multiple via structures and transmission lines. The Optimality Explorer's AI-driven optimization allowed us to **uncover novel designs and methodologies that we would not have achieved otherwise.**

Kyle Chen, Principal Hardware Engineer at Microsoft

Baidu 百度

With Cadence's Optimality Explorer, we **reduced the amount of time we spent on optimizing transmission line performance from hours to minutes**. We were able to tune the physical parameters of a high-speed differential pair routing constraint much faster than previous methodologies.

Canghai Gu, Chief Chip Architect of Kunlunxin at Baidu

MEDIATEK

The Cadence Optimality Explorer and Clarity 3D Solver allowed us to realize a **75% performance improvement** for our recent 112G PAM4 SerDes project. The optimal return and insertion loss, and TDR waveforms, were determined quickly and efficiently due to Cadence's breakthrough AI-driven optimization.

Aaron Yang and Howard Yin, Design Directors at MediaTek

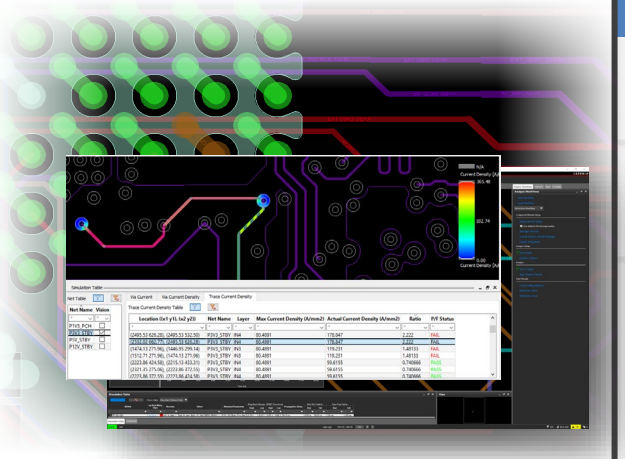
Sigrity X

EMA Design Automation

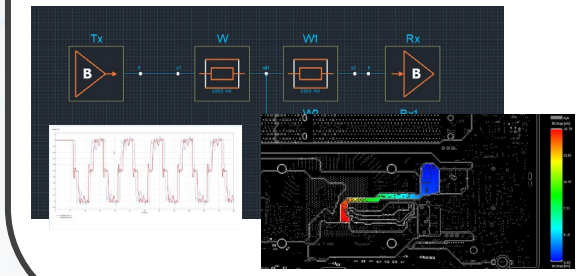
From Nominal SI/PI Analysis within Allegro…
…to Full Advanced Sigrity flows.

Allegro Canvas

Layout based SI/PI/EMI analysis and checking for design/layout/SI/PI engineers



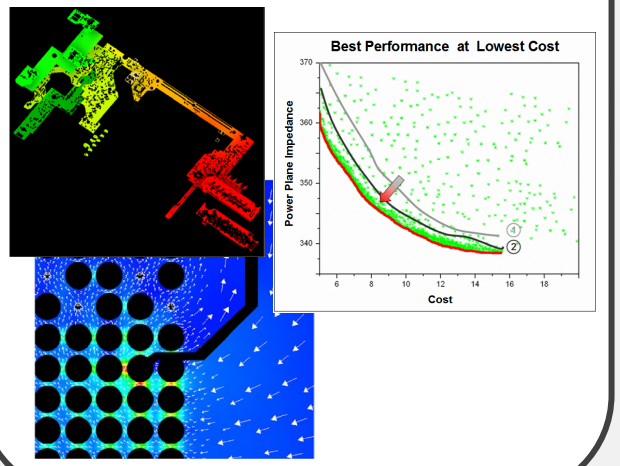
+ Aurora (inside OrCAD / Allegro)



Direct path to more focused analysis

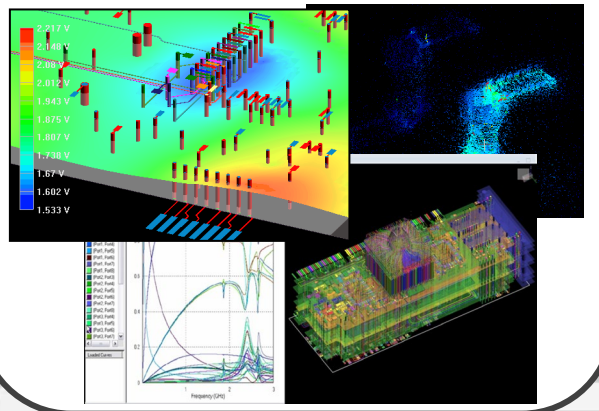
Power Analysis

Detailed IR Drop, Current Density, Thermal, and De-coupling analysis



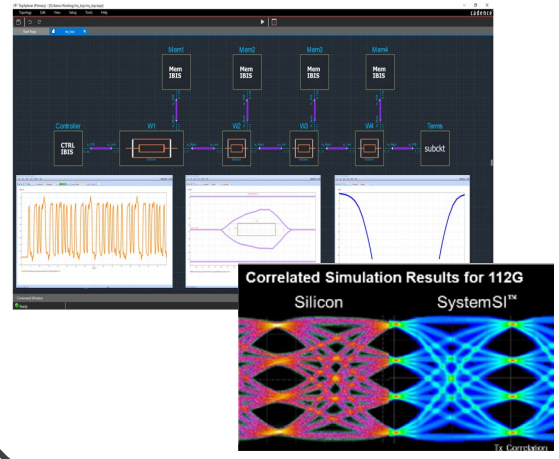
Model Extraction

Multi-Gigabit extraction capability for highly accurate parasitic models



Signal Analysis

Basic model extraction and advanced parallel and serial link signal analysis

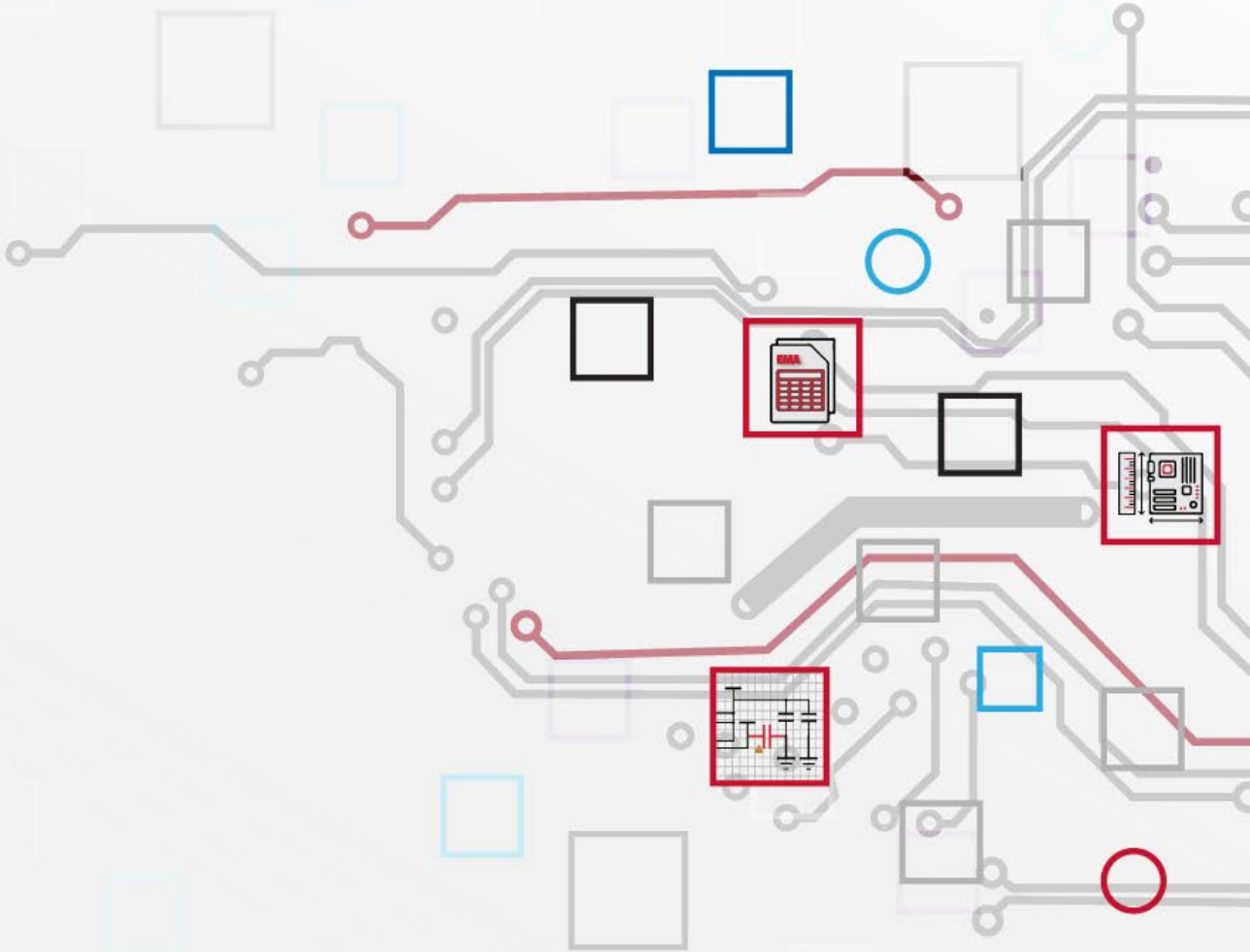


Simulation On-Demand
Sigrity X Tokens

- Access all the Sigrity X simulation engines you need when you need them, on-demand
- Maximize usage and minimize downtime with access to In-Design engines as well higher Fidelity simulation as needed
- Easily scale on general and/or project level requirements
- Your design problems are multiphysics. Your simulation capability should be as well.

> “We have access to all the major Sigrity SI and PI tools via the **Cadence Sigrity token system** – a genius way to access all the Sigrity tools as we wish – Knowing that we have access to the latest tools and expert support from gives us confidence to take on challenging projects and deliver exceptional results for our clients.”
>
> advanced layout solutions

Demo



Sigrity X

Redefining Electronics Design & Simulation

- Complete Multiphysics Simulation
- High Speed High Capacity
- Gold Standard Accuracy
- AI Enabled
- Seamless Integration

Sigrity X technology for signal and power integrity analysis allows us to verify designs quickly and accurately, this is critical to ensure we can provide our customers with a reliable product promptly.

Ted Larson
CEO OLogic Inc

OLogic

Not only can many designs be analyzed 10X faster with the same accuracy level, but the capability has also been extended to larger and more complex designs that previously could not be analyzed. This productivity builder is allowing us to cut weeks off our design cycles.

Tamio Nagano
Senior Principal Engineer Renesas

RENESAS

Thank You

For more information contact us at
info@ema-eda.com

A recording of this session will be made available within 1-2 days of the event.