FIRST DVCON IN TAIWAN!

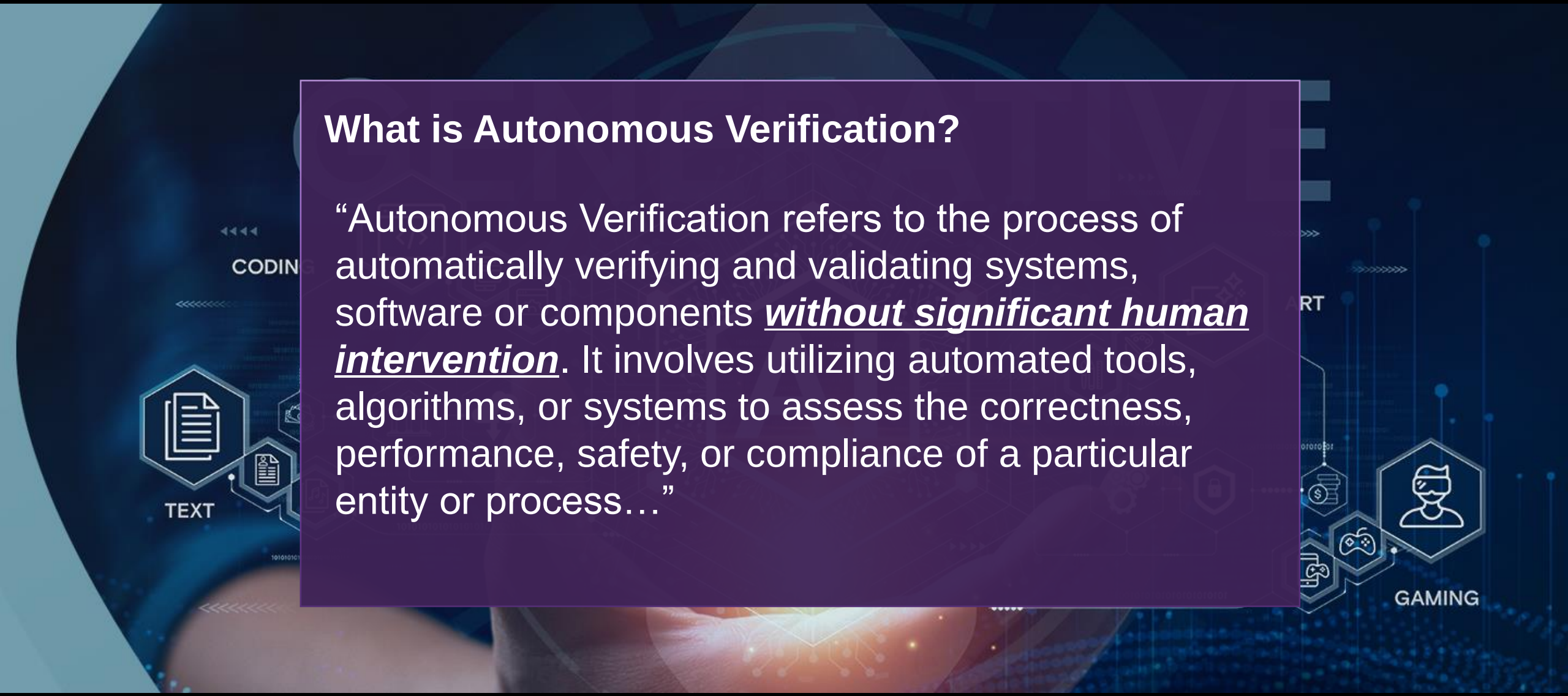
Congratulations & Thank You to the Organizers & Participants

SYNOPSYS®

Autonomous Verification: Are We There Yet?

Ajay Singh
SVP of Engineering, Design Creation & Verification

Question for ChatGPT



What is Autonomous Verification?

"Autonomous Verification refers to the process of automatically verifying and validating systems, software or components ***without significant human intervention***. It involves utilizing automated tools, algorithms, or systems to assess the correctness, performance, safety, or compliance of a particular entity or process…"

Robotaxi expansion gets green light in San Francisco

11 August

BBC NEWS

Autonomous Taxis Are Here Today

LEVELS OF DRIVING AUTOMATION

0	1	2	3	4	5
No Automation The Human performs all the driving tasks	Driver Assistance The Vehicle features a single automated task (e.g cruise control)	Partial Automation The Vehicle features multiple automated tasks, but Human involvement is needed for other tasks	Conditional Automation The Vehicle can perform most driving tasks, but Human override is still required	High Automation The Vehicle performs all driving tasks under specific circumstances. Human override is an option	Full Automation The Vehicle performs all driving tasks without any Human intervention or attention
The Human monitors the driving environment			The Vehicle monitors the driving environment		

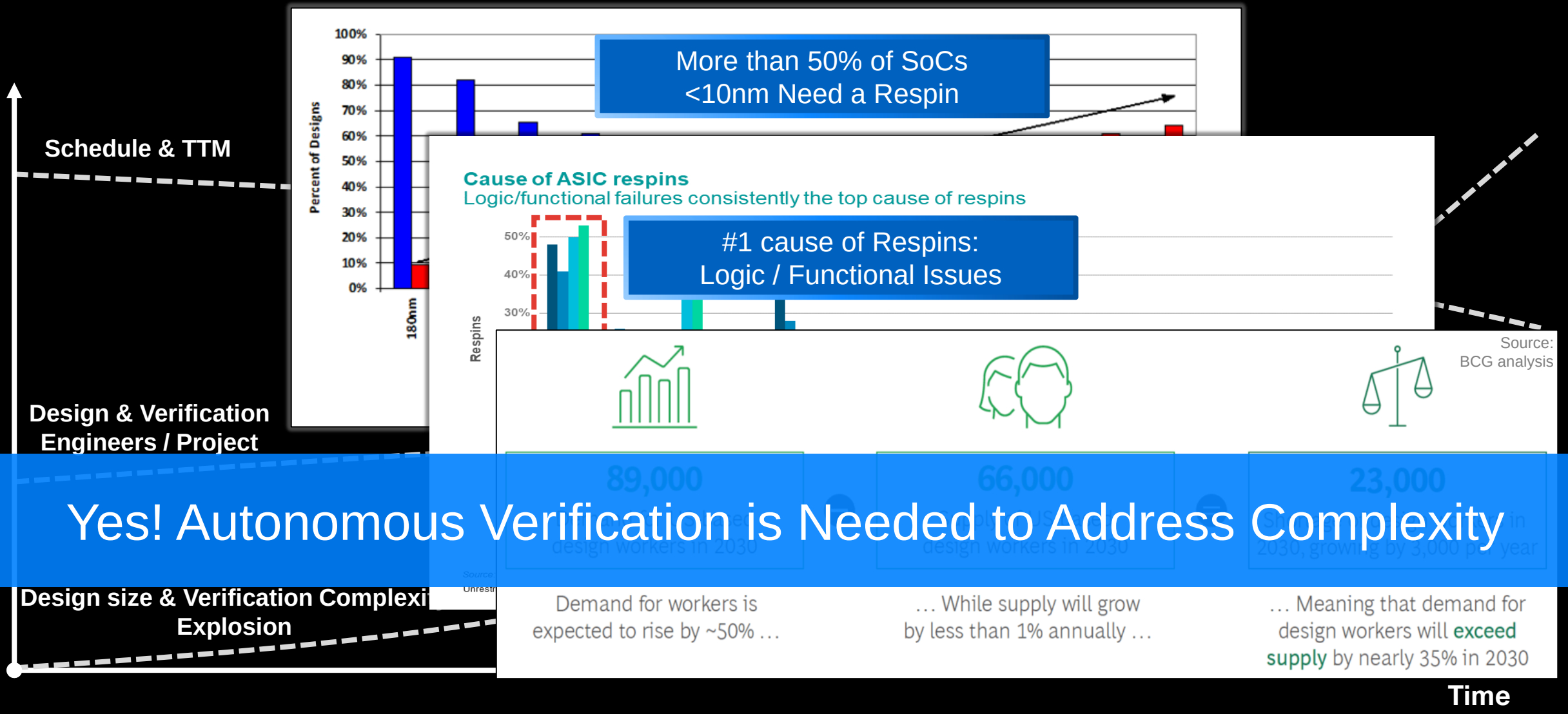
LEVELS OF VERIFICATION AUTOMATION

0	1	2	3	4	5
No Automation The Human performs all the Verification tasks	Engineer Assistance The tool features a single automated task (e.g Constraint Random Verification)	Partial Automation The tool features multiple automated tasks, but Human involvement is needed for other tasks	Conditional Automation The tool can perform most verification tasks, but Human overview is still required	High Automation The tool performs all verification tasks for certain kind of designs. Human override is an option	Full Automation The tool performs all verification tasks without any Human intervention or attention

The Human controls the scope of Verification

The Tool controls the scope of Verification

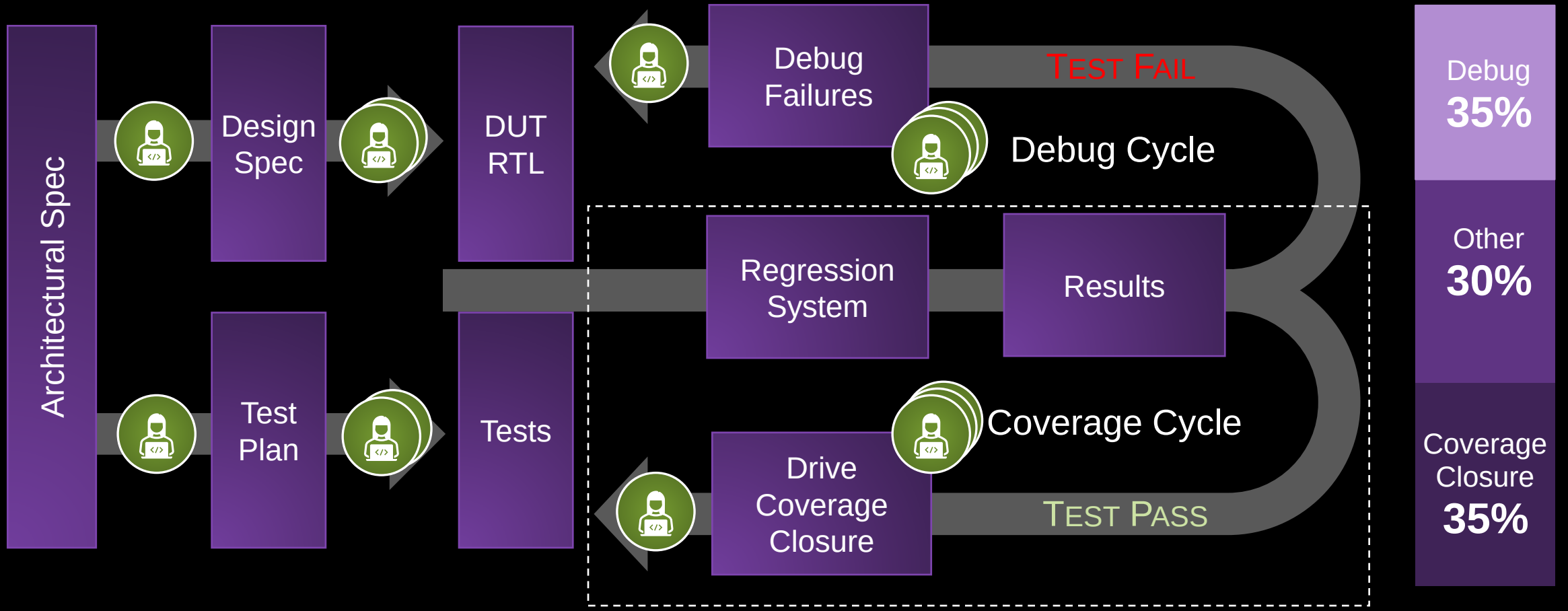
Do We Need Autonomous Verification?



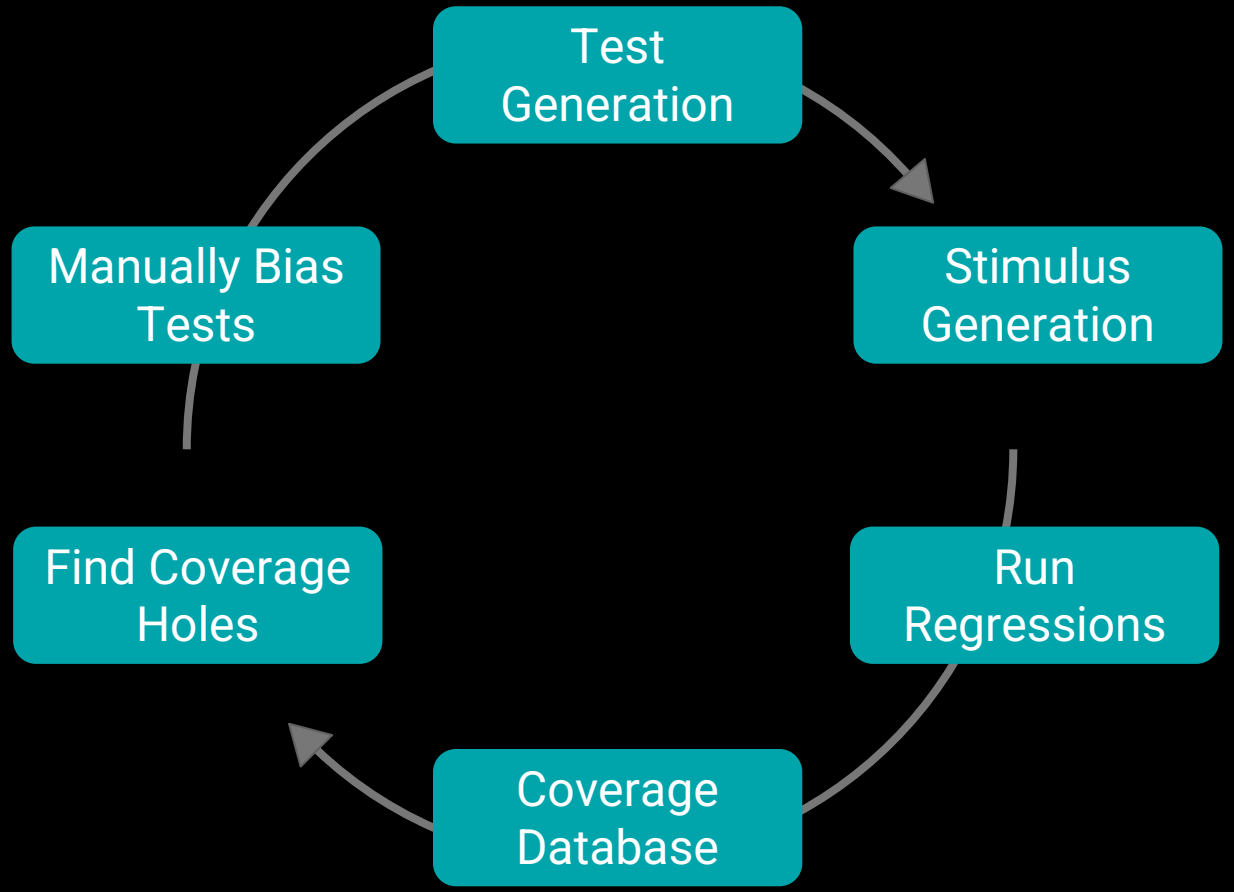
Yes! Autonomous Verification is Needed to Address Complexity

Manual Process

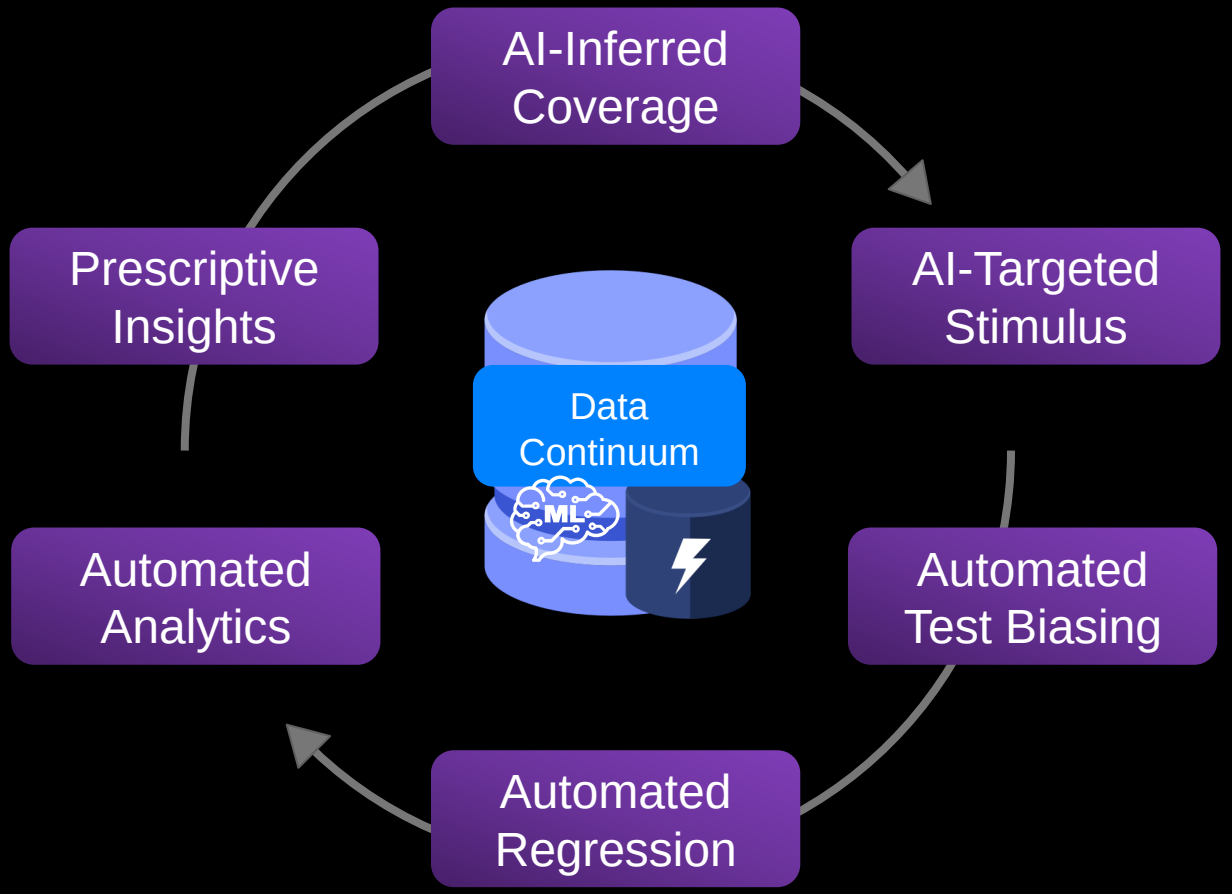
Where can we do automation in Verification?



Typical Coverage Flow

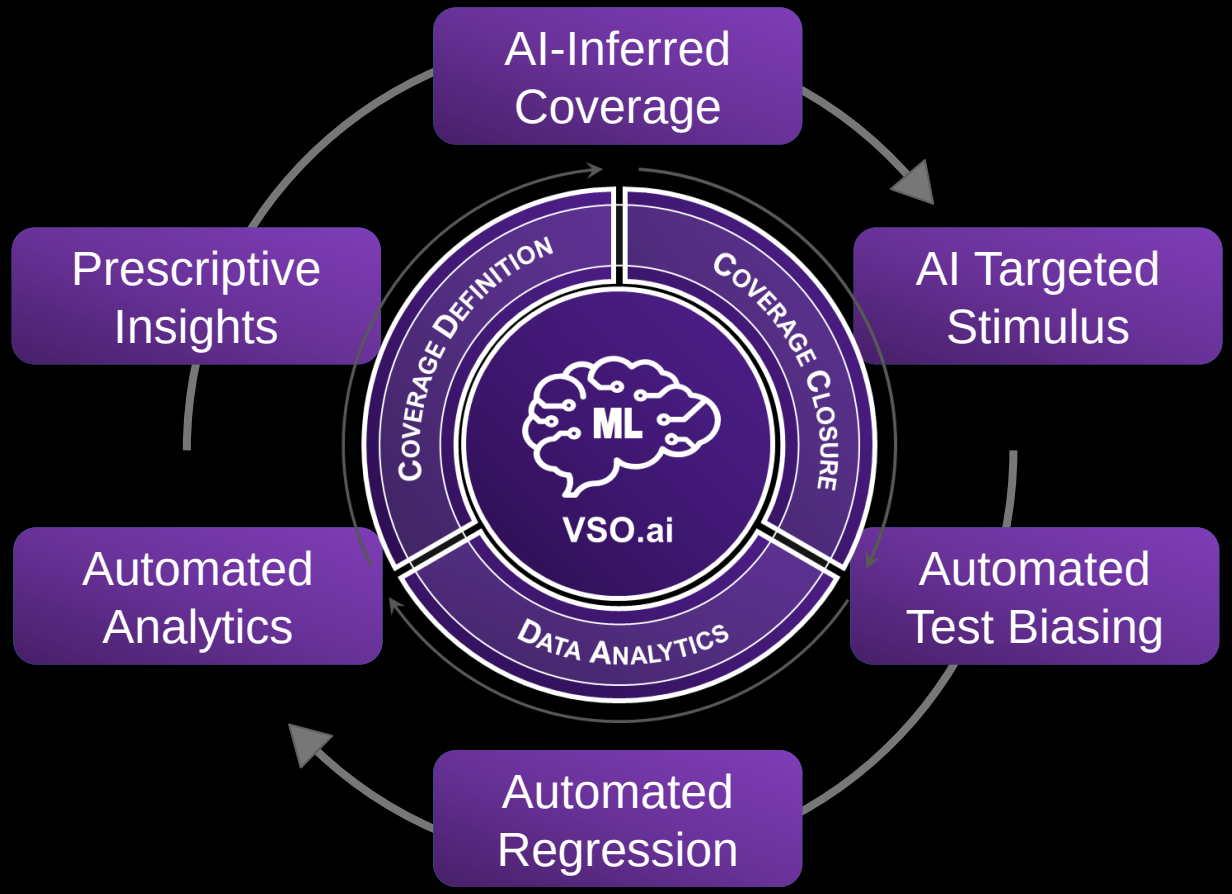


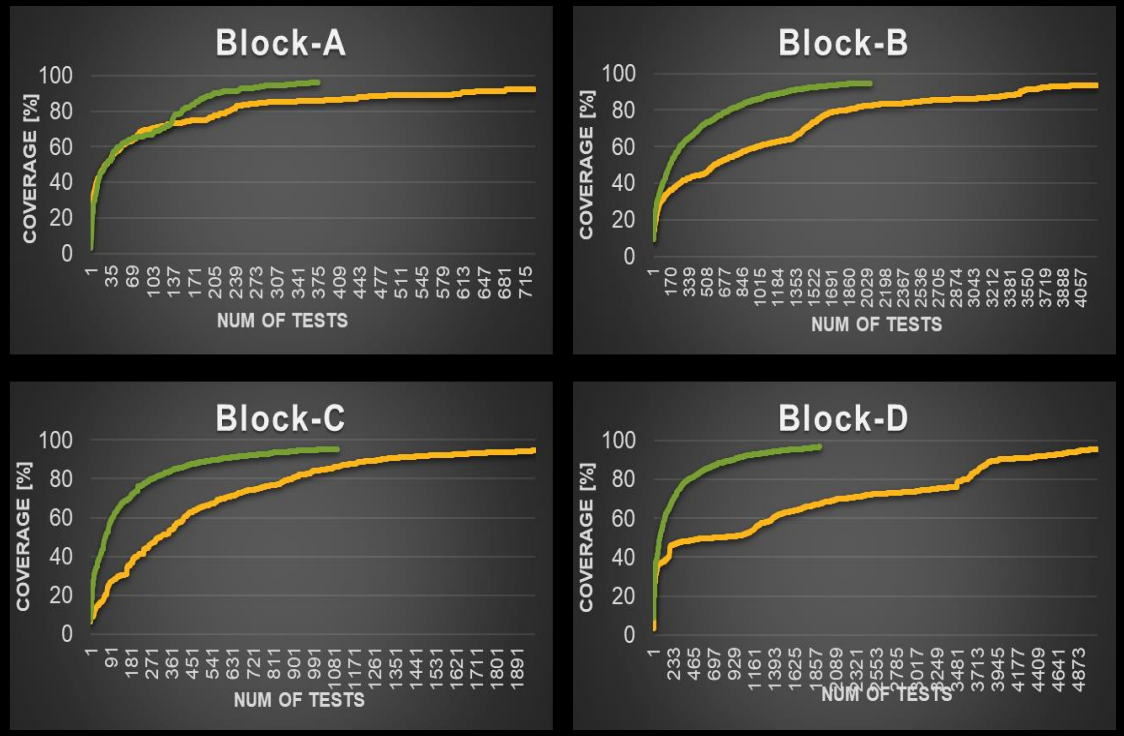
AI Assisted Coverage Flow



VSO.ai: Autonomous Coverage Closure

Accelerating coverage closure upto 3x-5x





VSO.ai: Customer Results

Faster Closure and Higher Coverage

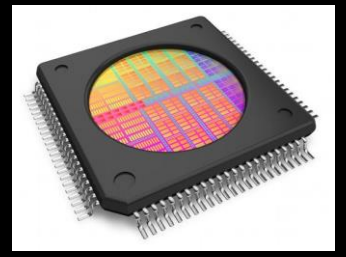
10-15% Higher Coverage

Automotive

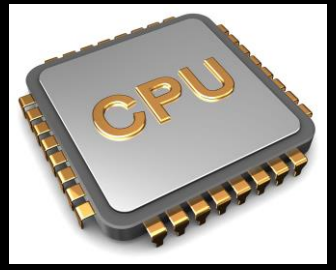
IP Provider

26% Higher Coverage

3X Reduction In Tests



Memory



Processor

2X Reduction in Tests

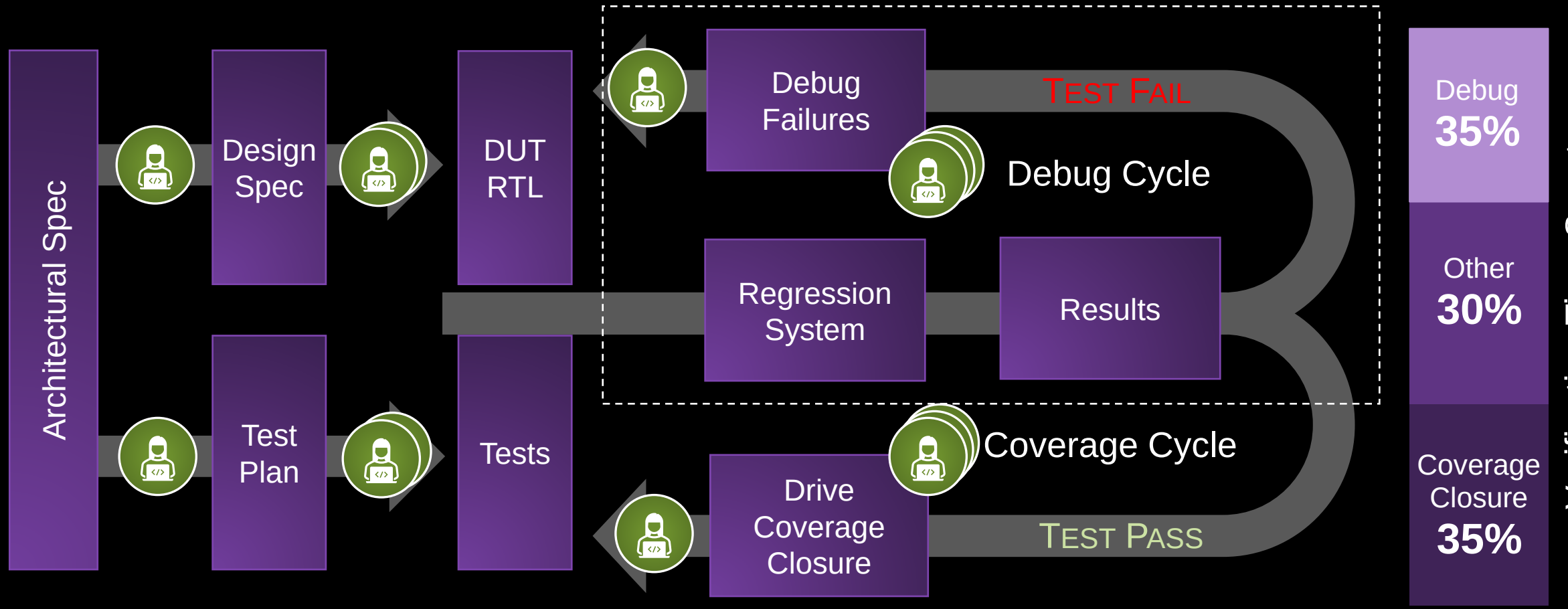
68% Reduction in Tests

Mobile SoC

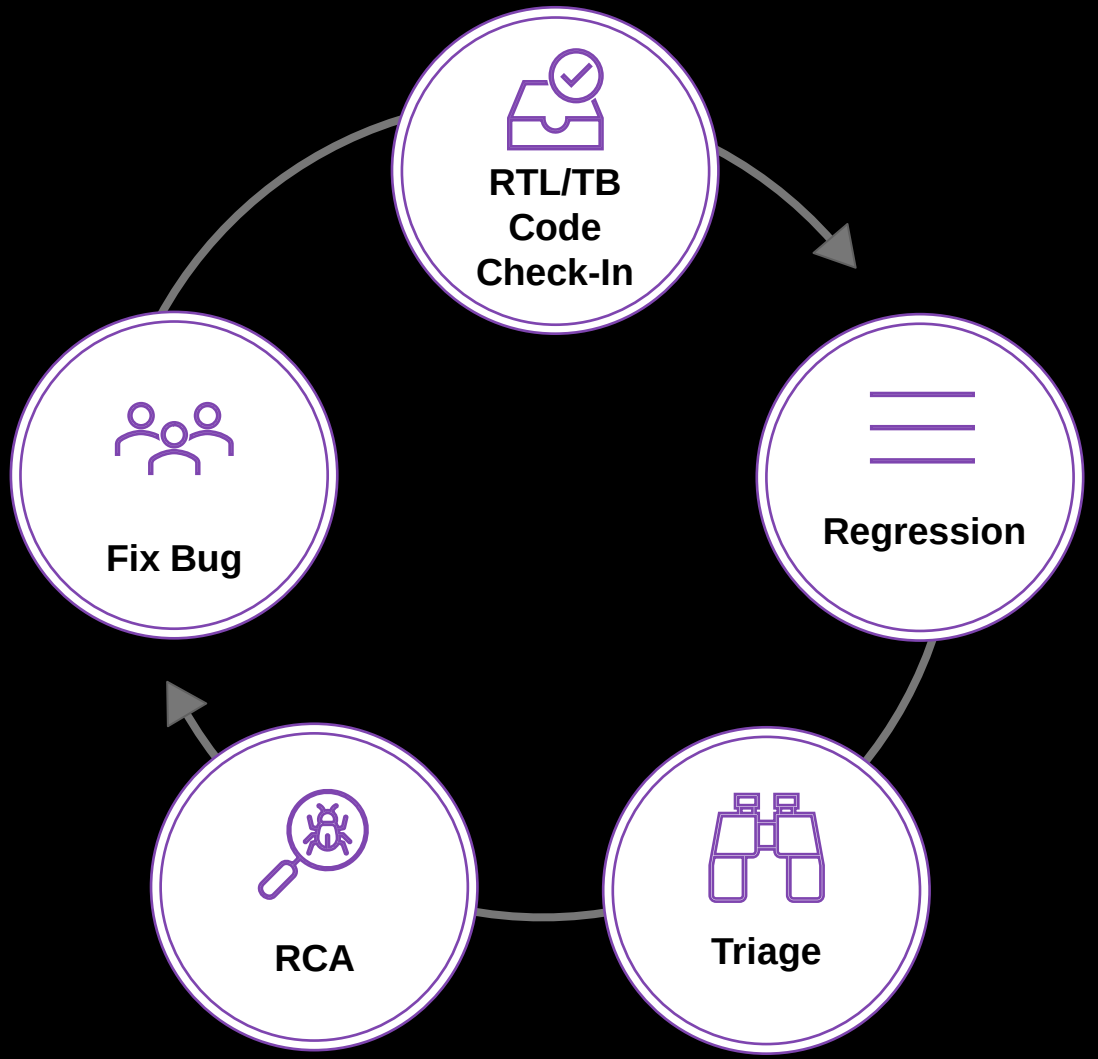
5-10X Reduction In Tests

AP Mobile

How is Debug Automated Today?

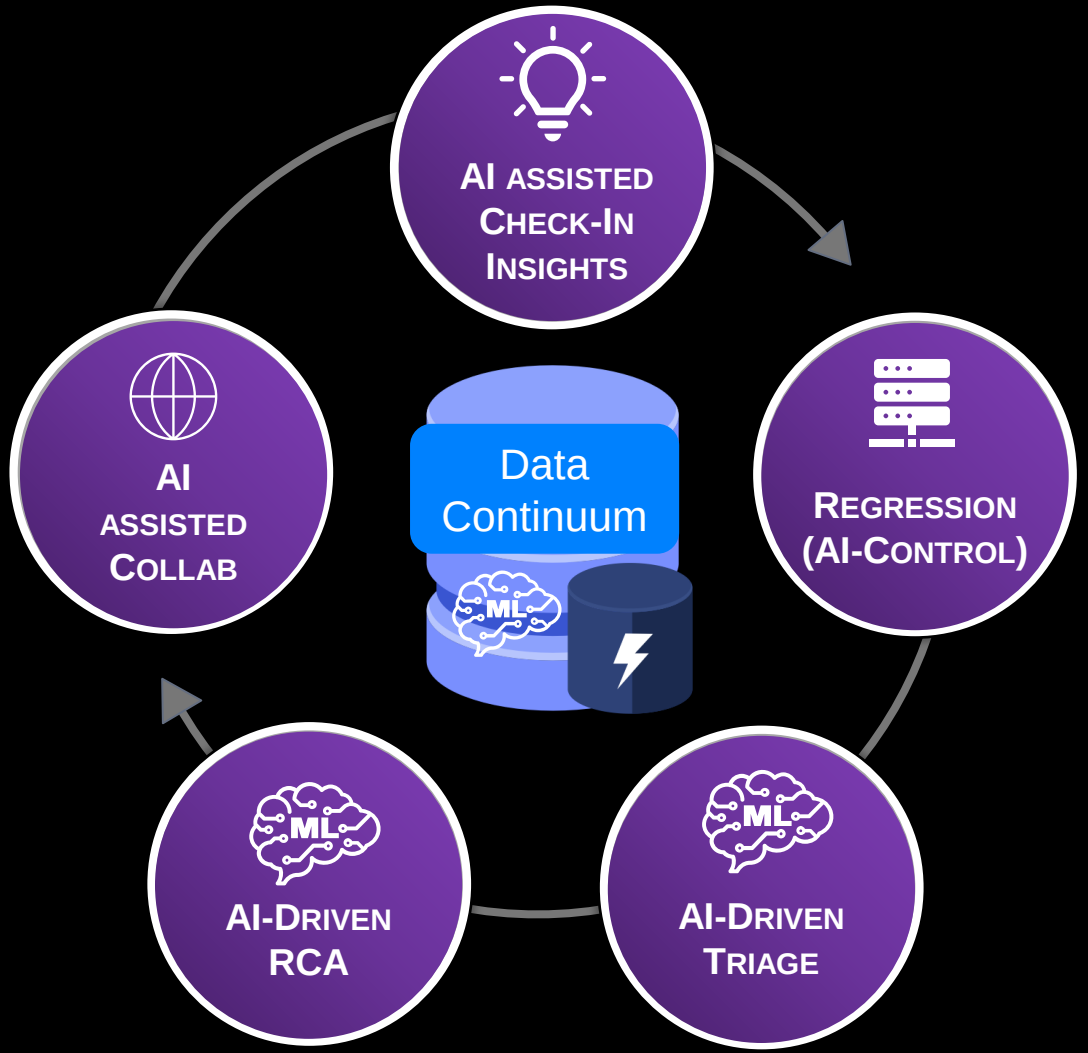


Typical Debug Flow



AI Assisted Debug Flow

Next-Generation Verdi: Improves debug productivity up to 10X



Next-Gen Verdi: Accelerate Debug Automation

Customer Examples

Gate-level with Many Xs

60x

XRCA Engine

DUT Code Change

20x

DUTRCA Engine

Multiple Failing Assertions

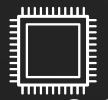
10x

DUTRCA Engine

DFT with X Monitors

10x

XRCA Engine



Massive Log Files

5x

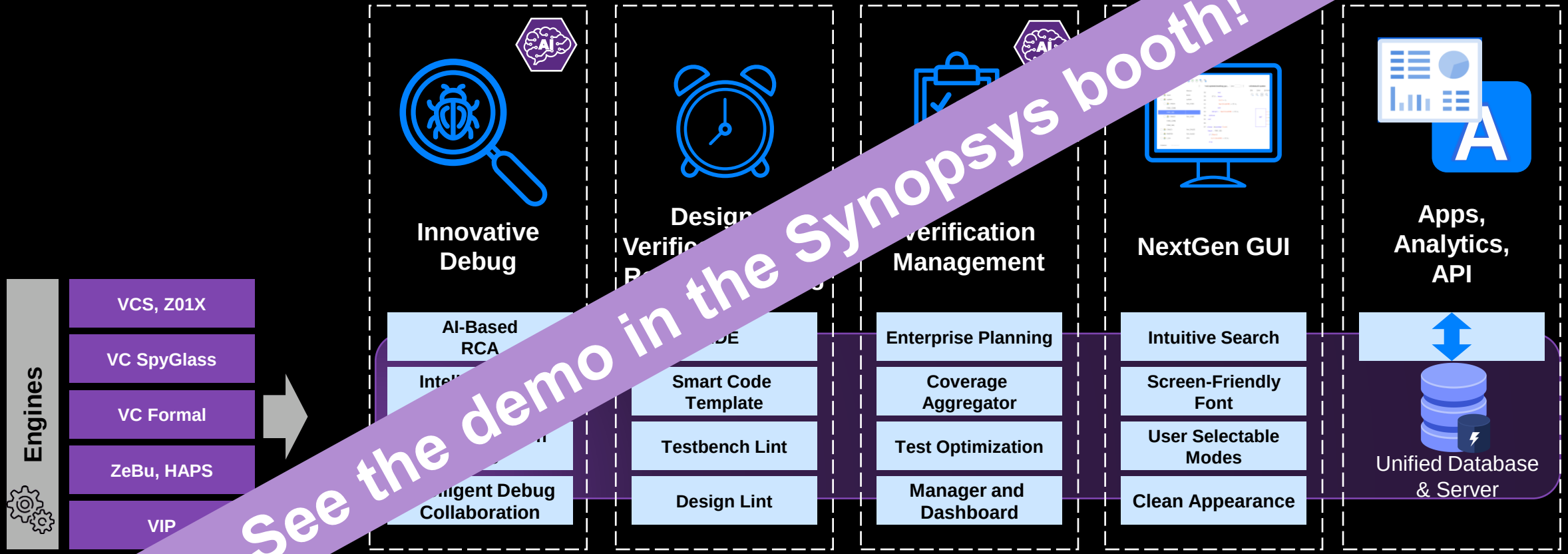
ML-Binning

DUT Hang

48x

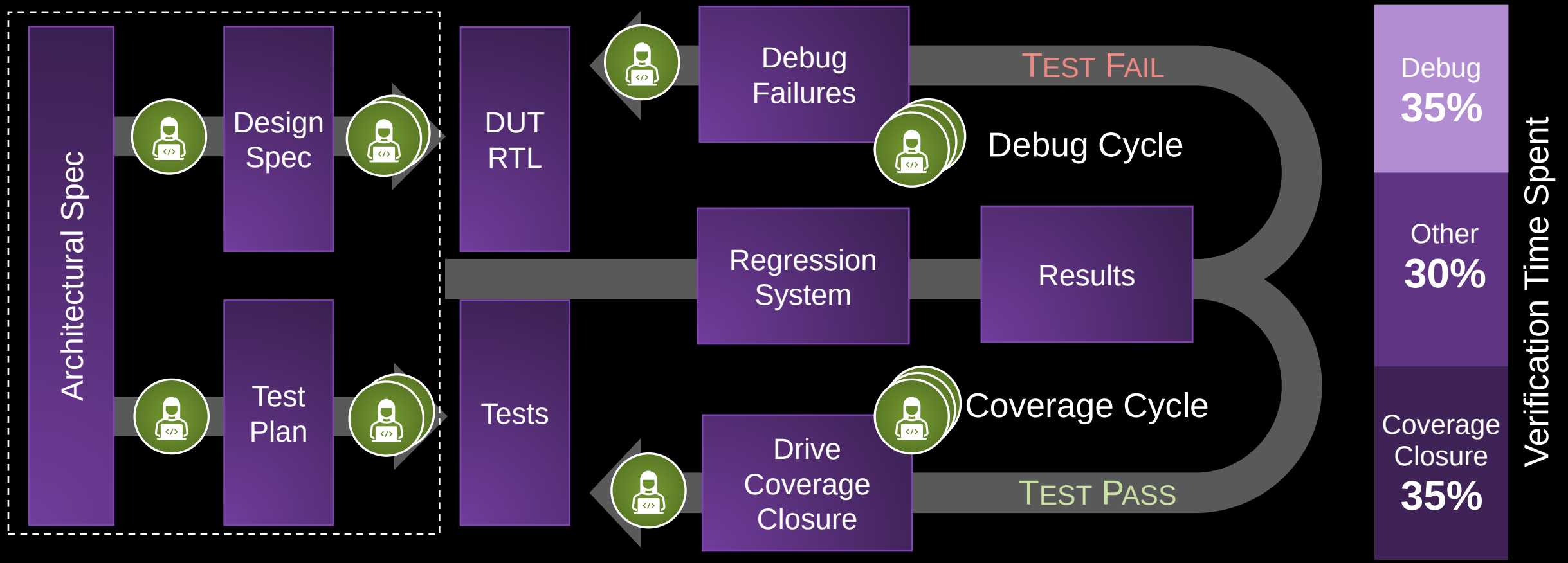
DUTRCA Engine

Introducing Next-Generation Verdi Platform

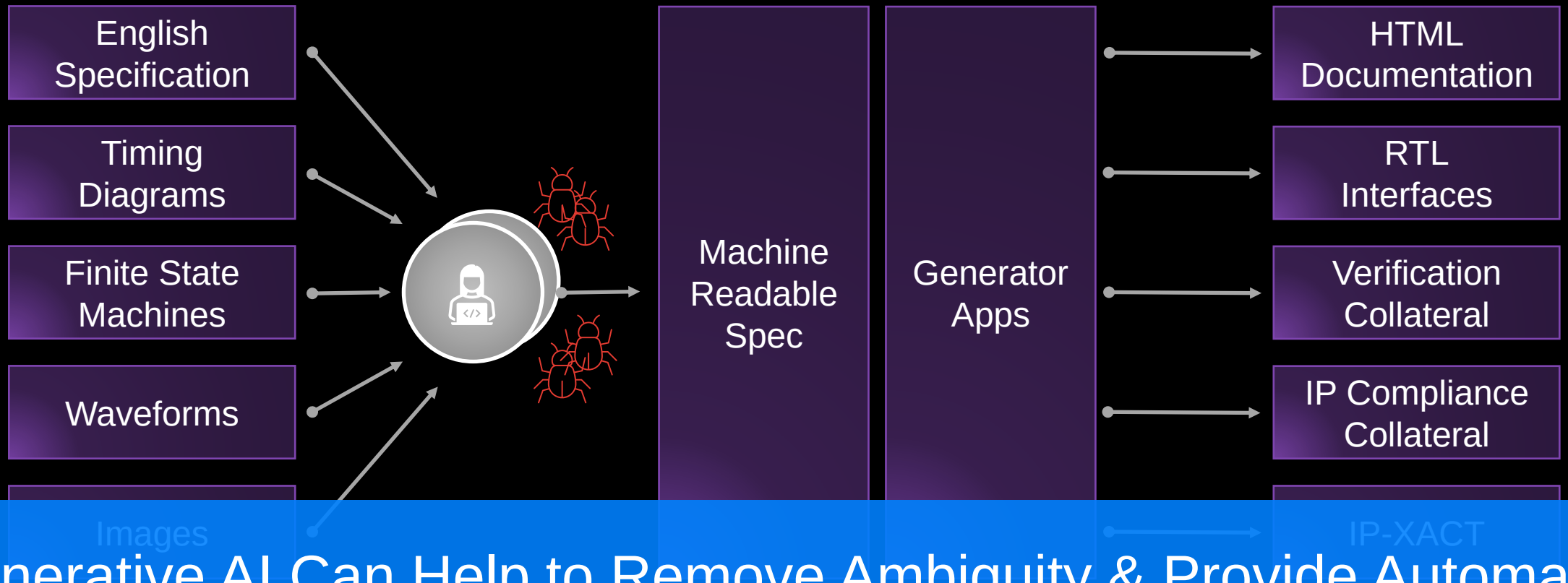


See the demo in the Synopsys booth!

What About Specification Automation?



Typical Specs → Collateral Flow



Generative AI Can Help to Remove Ambiguity & Provide Automation.

Introduction to Generative AI

- Generative AI: a branch of AI used to create new content, including audio, code, images, text, simulations, and videos.
- Recent advances in GPT (Generative Pre-trained Transformer) technology have enabled applications like ChatGPT
- ChatGPT is an LLM interface that can converse with a human, write essays, create websites automatically etc.

If Generative AI can create “intelligent” responses, can it write Verilog, automate chip design flow, and create layouts?

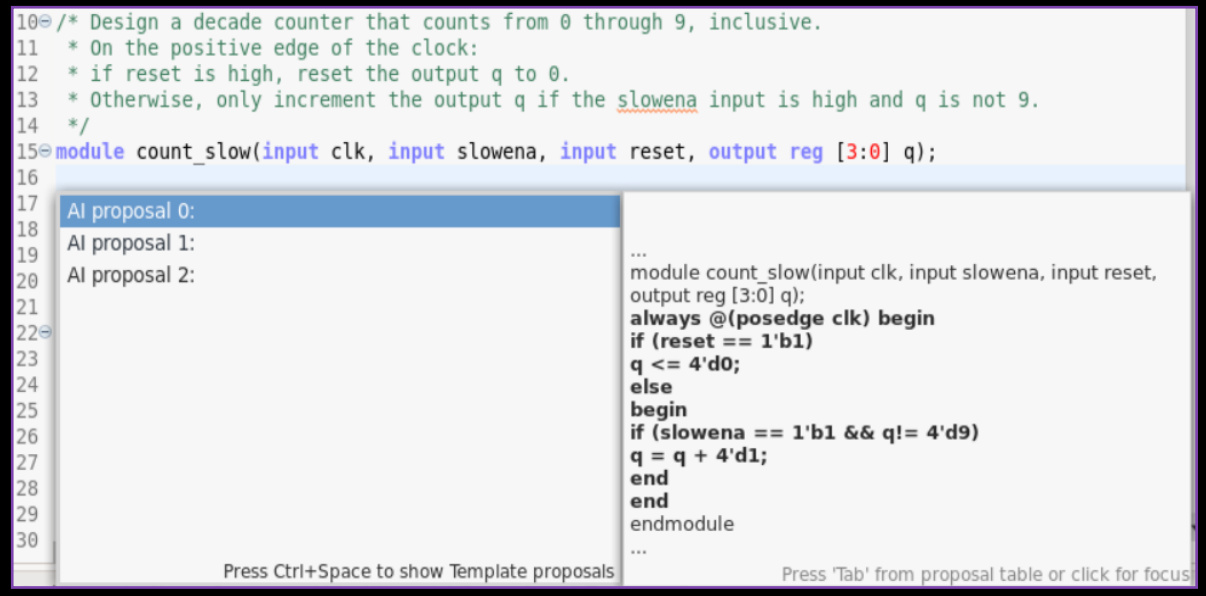
LLM Application Landscape

How about EDA?

RTL Copilot

Natural Language Text → SystemVerilog Code

DV Assistants with Engineer in the Loop



Provide Spec in Natural Language

Use LLM interface to Generate RTL code

Review Code

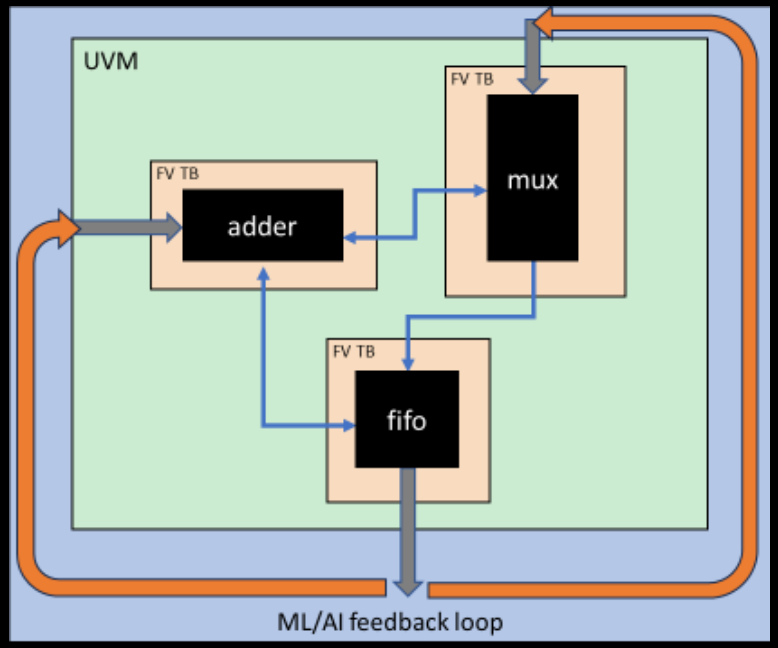
Accept / Reject

Generative AI Vision TechTalk

Presented by Microsoft (Eric Berg) at DAC 2023

HW Vision

- Generate RTL modules (adder, mux, fifo)
- Generate Formal Verification Testbench (FV TB) for design exercise
- Generate connection logic
- Generate UVM TB for connected block
- Optimize random test stimulus using ML/AI tools



Generative AI Promises

Generative AI: Key Challenges

Reinforcement Learning with Human Feedback
& EDA Tools as Agents in the Loop can help

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Question to DALL-E

Show the Level 5 vision of Autonomous Verification

Robots Doing Verification

We Focusing on What's Important

Thank You

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