



# Unleashing the Potential of Agentic AI Within Design & Functional Verification

Darron May, Mark Carey, Frank Armbruster  
Gabriel Chidolue & Hans-Joerg Peter

SIEMENS

accellera  
SYSTEMS INITIATIVE

## Presenters



**Darron May**  
Director of AI  
Product Management



**Gabriel Chidolue**  
Product Engineering  
Manager



**Hans-Joerg Peter**  
R&D Product  
Lead



**Mark Carey**  
Product  
Engineering



**Frank Armbruster**  
Product  
Engineering

## Agenda

### Introduction

- Introduction to Questa™ One and EDAi Platform
- How Siemens is Unlocking the Potential of AI
- Introducing Smart Verification

### Demos

- Smart Creation powered by GenAI
- Smart Regression & Smart Debug powered by Predictive AI
- Smart Analysis accelerated by Analytical AI
- Smart Engines optimized by Predictive AI

### The Future

- A look at The Future of AI Driven Functional Verification

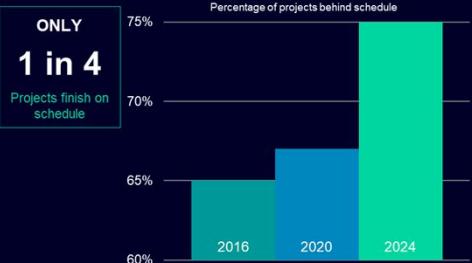
# The Design Productivity Gap is a Growing Problem

## Complexity and Resourcing become more of a Challenge

Wilson Research Group Study, 2024 Functional Verification Study

### Schedule overruns

Projects finishing late



Despite declines in first-silicon success, teams are investing more in design and verification

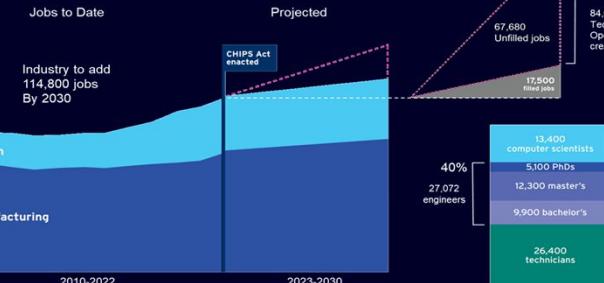
### Skilled Workers

Unfilled Semiconductor Jobs

ONLY  
1 in 4  
Job Openings will be Filled by 2030

Insufficient Graduation of Skilled Workers & Experienced Workers Retiring

Semiconductor Industry Association (SIA), July 2023

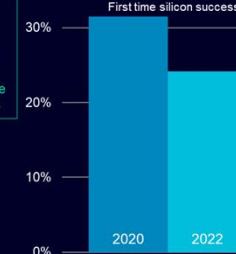


Wilson Research Group Study, 2024 Functional Verification Study

### First silicon success

Number of spins before production

ONLY  
1 in 7  
Achieve first time silicon success

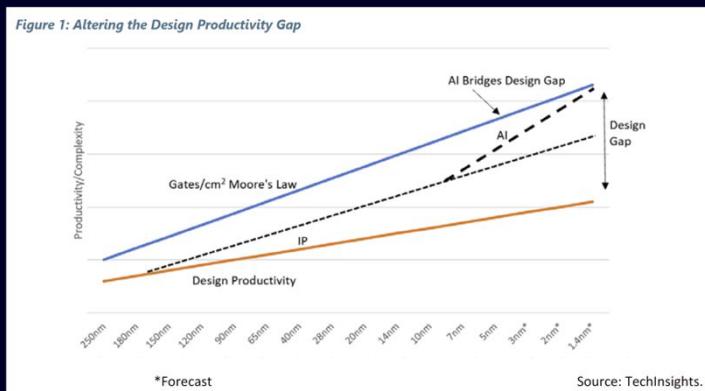


Decline in first silicon success combined with increasing wafer and mask cost

**Not enough time!**

**Not enough Engineers!**

**Not enough first-time-right!**



Advanced EDA tools, new methodologies such as “shift left”, and IP blocks (internal or 3rd party) have made it possible to close the gap somewhat ... **IT'S NOT ENOUGH**



AI won't take your job, but  
someone using AI will



... **BUT**  
oversimplifies the  
**TRUE** impact of AI

# Innovation Continually Reshapes Jobs

Transformative Change is the Constant in Story of Progress



15C

## Print

- ↓ Scribe: book dist
- ↑ Printer



17C

## Agricultural



19C

## Rail Revolution



21C

## Internet Revolution

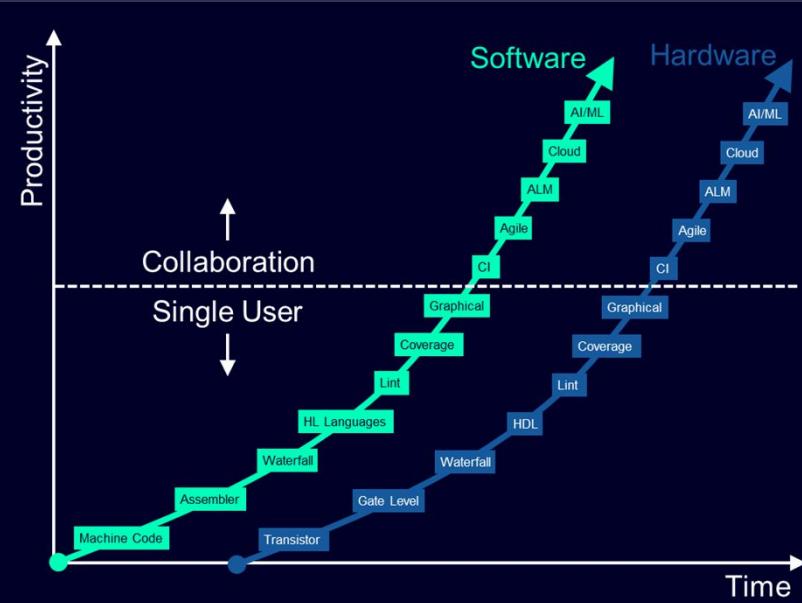
- ↓ Travel agents, print journalists, video rental, traditional retail staff
- ↑ Web developers, digital marketers, e-com managers, social media managers, app developers

## SW Dev AI Revolution

- ↓ Scribe: book dist
- ↑ Printer

- ↓ Software testers, Entry level coders, Bug triagers, basic technical support, documentation writers, Build/release engineers, Legacy code maintainers

- ↑ Prompt engineers, AI/ML engineers and data scientists, AI integration specialists, AI ethics and compliance managers, Model trainers and validators, Synthetic data creators, Human-in-the-loop quality assessors, AIOps engineers



## Gunpowder Revolution

- ↓ Archers, bow craftsmen, armoured knights
- ↑ Musketeers, gunsmiths, artillery officers, firearm tacticians, common soldiers



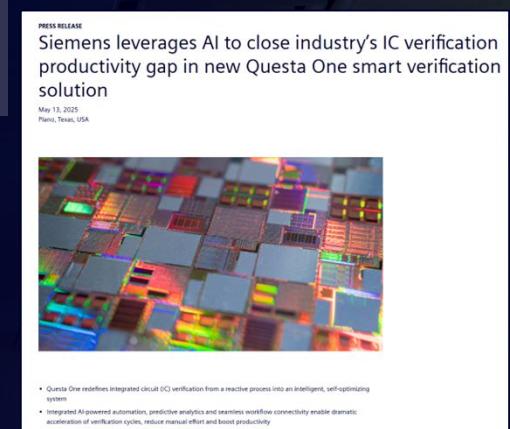
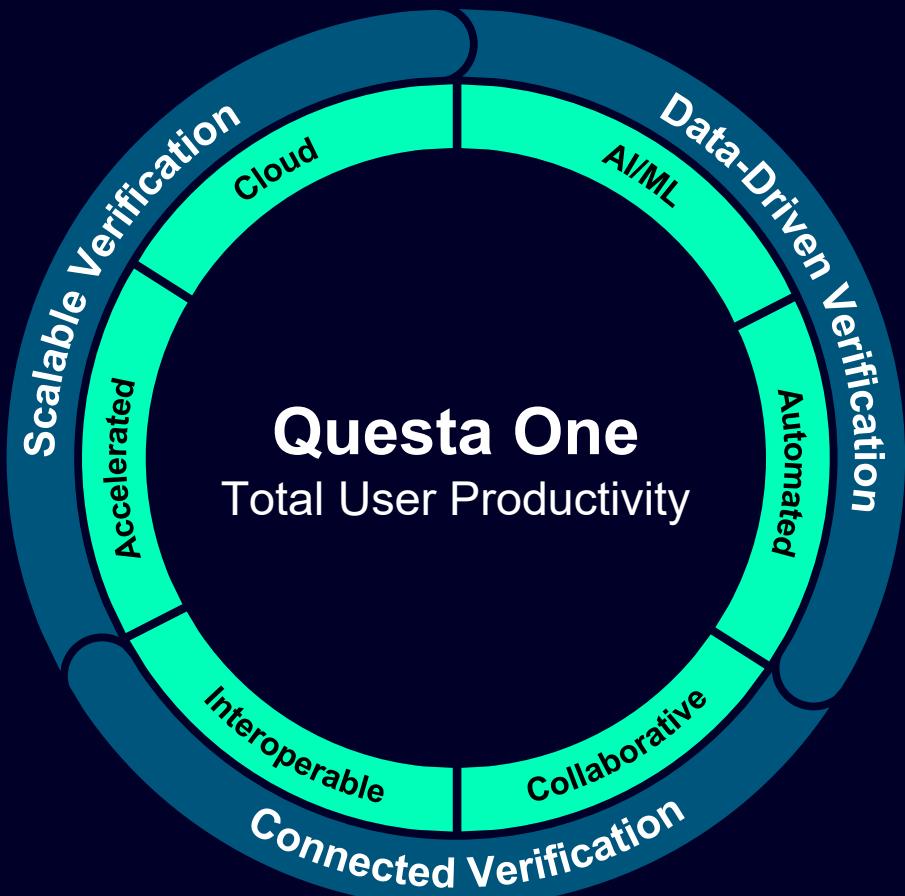
## Digital Revolution

- ↓ Typists, switchboard operators, manual accountants, assembly line workers
- ↑ Programmers, IT specialists, systems analysts, automation engineers

# Questa™ One Smart Verification Solution enabled by AI

## Preparing for Transformation and Accelerating User Productivity

Launched  
May 2025



**Faster**  
Engines  
▼

✓ Delivering up to **5x** improved  
**Total User Productivity**

✓ **Scalable, connected, data-driven**  
infrastructure for transformation to  
**Agent based verification**

**Faster**  
Engineers  
▼

**Faster**  
Engineers  
▼



# Questa™ One Smart Verification Solution enabled by AI

Supports Connected, Scalable and Data-driven Agentic Foundations

Launched  
May 2025

2025  
DESIGN AND VERIFICATION™  
**DVCON**  
CONFERENCE AND EXHIBITION  
**EUROPE**  
MUNICH, GERMANY  
OCTOBER 14-15, 2025

## Questa One Sim

One engine with *breakthrough performance* for *functional & fault sim* for *RTL, GLS, & DFT applications* with *parallel processing & profiling*

## Questa One Verification IQ

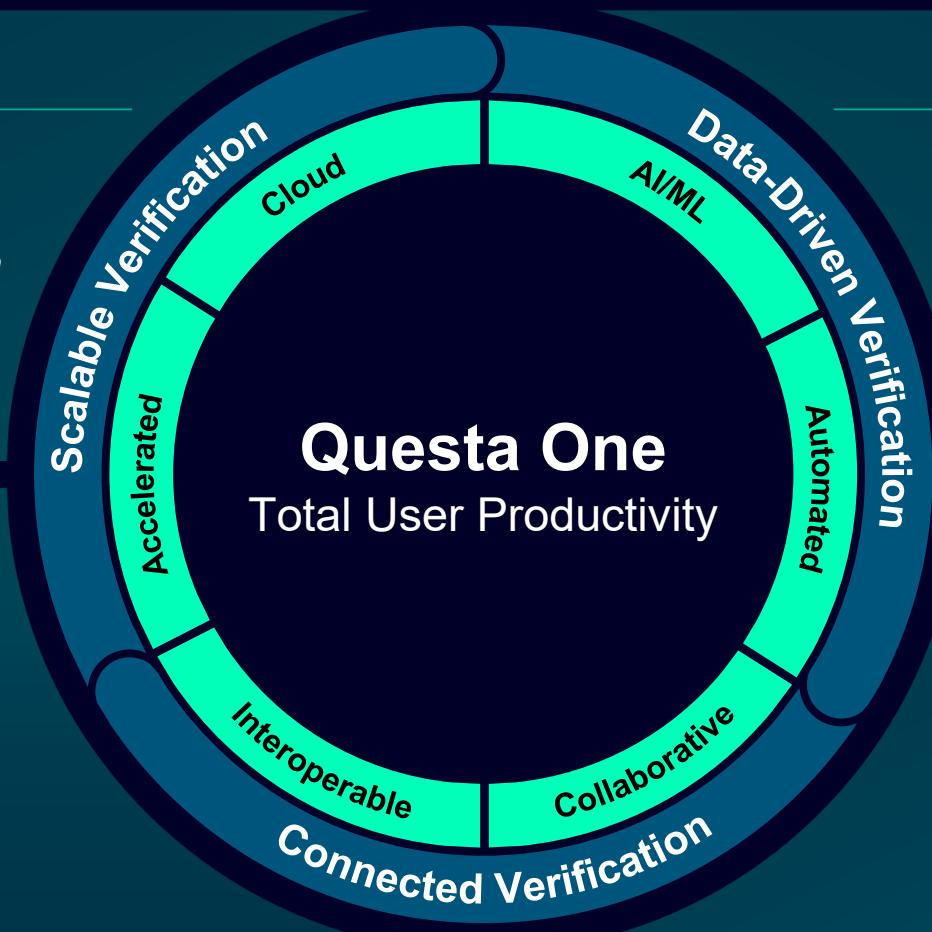
*One smart common management solution* that *utilizes generative, analytic, & predictive AI* to *drive to verification closure faster, with fewer workloads*

## Questa One SFV

*One stimulus free verification solution* delivers *total user productivity* through *synergistic combinations of static & formal analyses, AI, automation & parallelization*

## Questa One Avery VIP

*One industry-leading VIP solution* that *supports 3DIC & chiplet verification from IP to SoC, seamlessly integrating simulation & emulation*



Launched at DAC  
23<sup>rd</sup> June



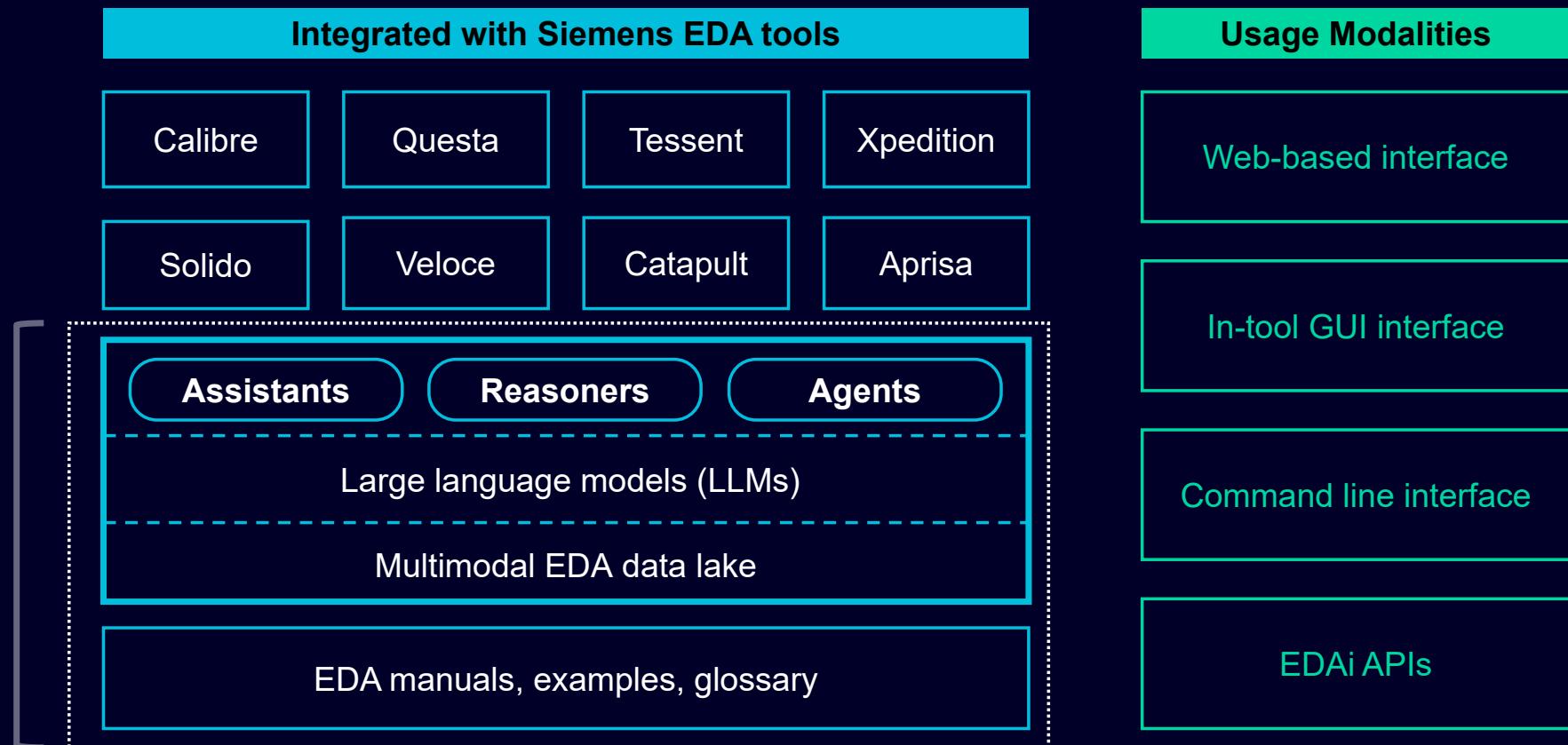
# Siemens EDA AI Platform

Built to take the journey to Artificial General Intelligence (AGI)

Launched  
June 2025

## AI platform by Siemens EDAi

Open, modular, and integrated with all Siemens EDA tools



## A Platform Developed with the Future in Mind

Each level of AI becomes increasingly capable and complex

### Level 1

#### Chatbots

Human-like conversations capabilities

ChatGPT 3.5

Claude 2

2023

### Level 2

#### Reasoners

Context-aware problem solving

ChatGPT o1 / o3,

Deepseek R1/V3

Claude 3.5

2024/5

### Level 3

#### Agents

Takes autonomous actions

OpenAI “Operator”

2025

### Level 4

#### Innovators

Produce new solutions / science / systems

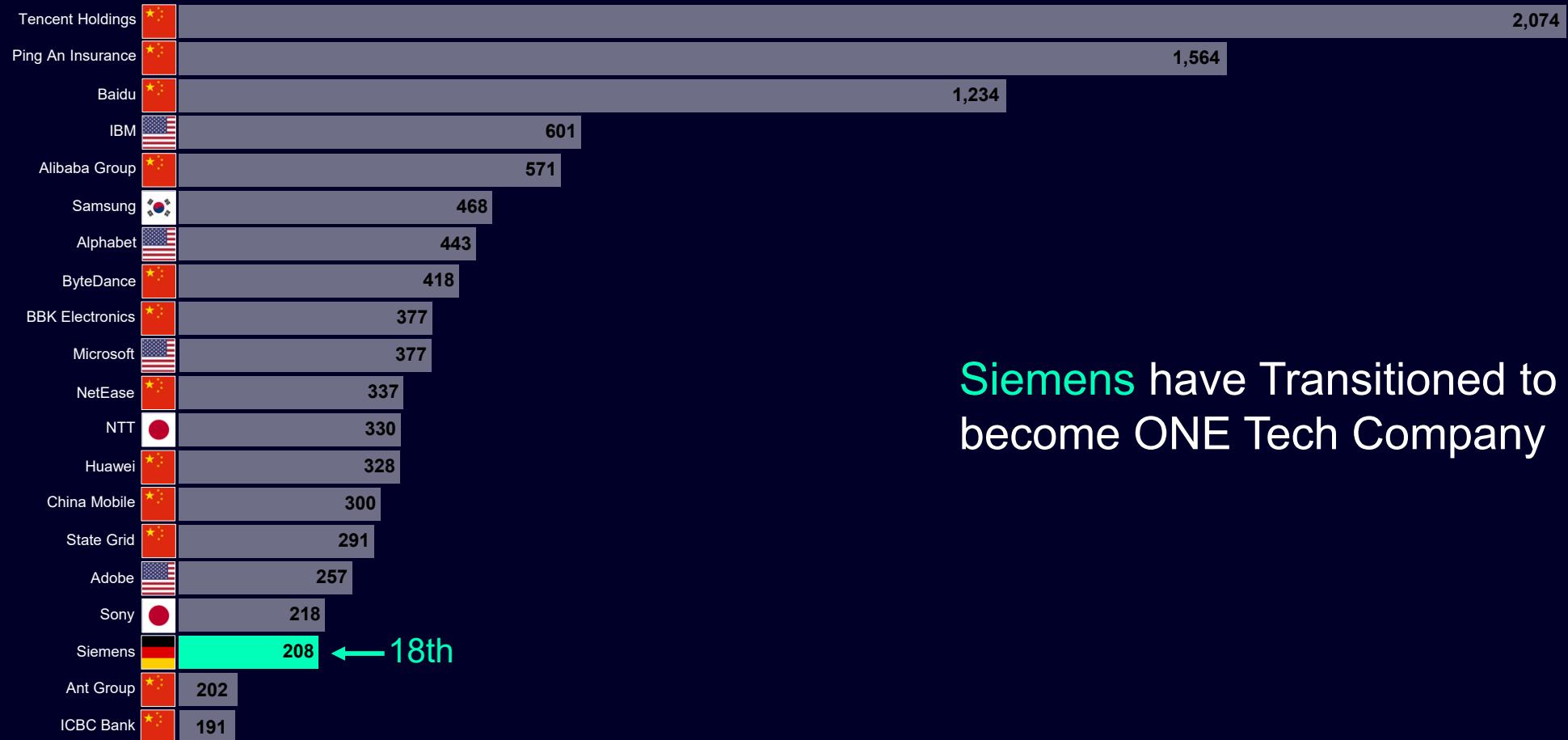
### Level 5

#### Organizers

Manages large-scale operations

# Worldwide Generative AI Patents

## Reimagining Siemens Beyond Traditional Boundaries



Siemens have Transitioned to  
become ONE Tech Company



April 2024

# An Open Platform Developed for Interoperability

Two operating models for enabled GenAI capabilities

Launched at  
DAC 2025 (June)

2025  
DESIGN AND VERIFICATION™  
**DVCON**  
CONFERENCE AND EXHIBITION  
**EUROPE**  
MUNICH, GERMANY  
OCTOBER 14-15, 2025

## Platform powers GenAI in all Siemens EDA tools

### Integrated with Siemens EDA tools

Calibre

Questa

Tessent

Xpedition

Solido

Veloce

Catapult

Aprisa

Assistants

Reasoners

Agents

Large language models (LLMs)

Multimodal EDA data lake

EDA manuals, examples, glossary

## Customers can build on standalone platform

### Integrated with Customers Environment

Scripts

3<sup>rd</sup> Party Apps

EDA Apps

In-house Tools

Integrations

Workflows

Assistants

Reasoners

Agents

Large language models (LLMs)

Multimodal EDA data lake

Design Specs, design libraries, JIRAs, Confluence, App notes, cross vendor data

Launched at DAC  
23<sup>rd</sup> June



# Unlocking the Potential of AI

Applying Artificial Intelligence to Functional Verification

# Focusing the Potential of AI for Verification Productivity

## The Different AI Approaches and Product/Feature Targets

### Analyze

Identification of key data insights not practical with traditional methods



Analytical AI

**Ai**  
Solutions

Predictive AI

Generative AI

### Optimize

Domain specific predictive models to reduce computational requirements and accelerate decision making



#### FASTER ENGINES

Complimenting heuristics and graph analytics in core engines & tools



#### FASTER ENGINEERS

Enabling new creation, analysis, assistant and debug capabilities



#### FEWER WORKLOADS

Predictive technologies to stream-line & accelerate verification

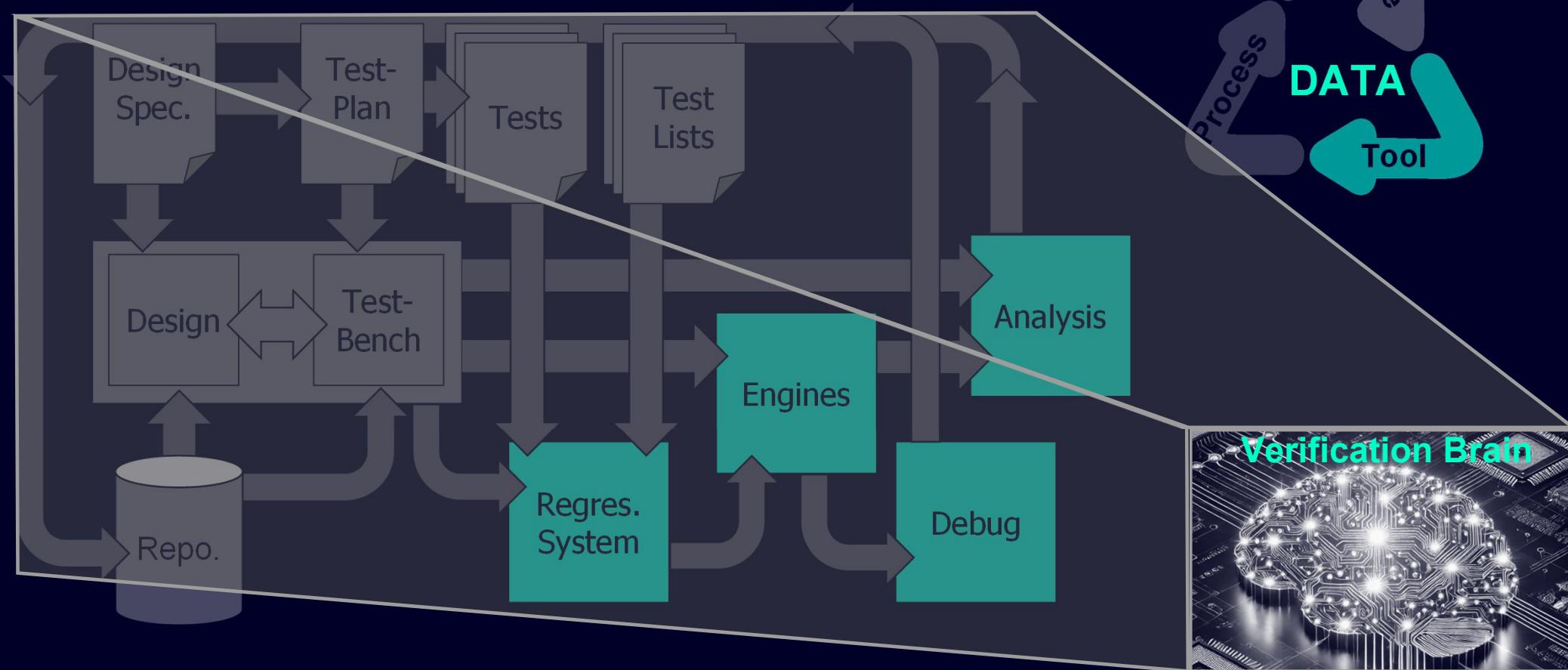
### Generate

Accelerate design creation, system optimization, and model abstraction



## Data

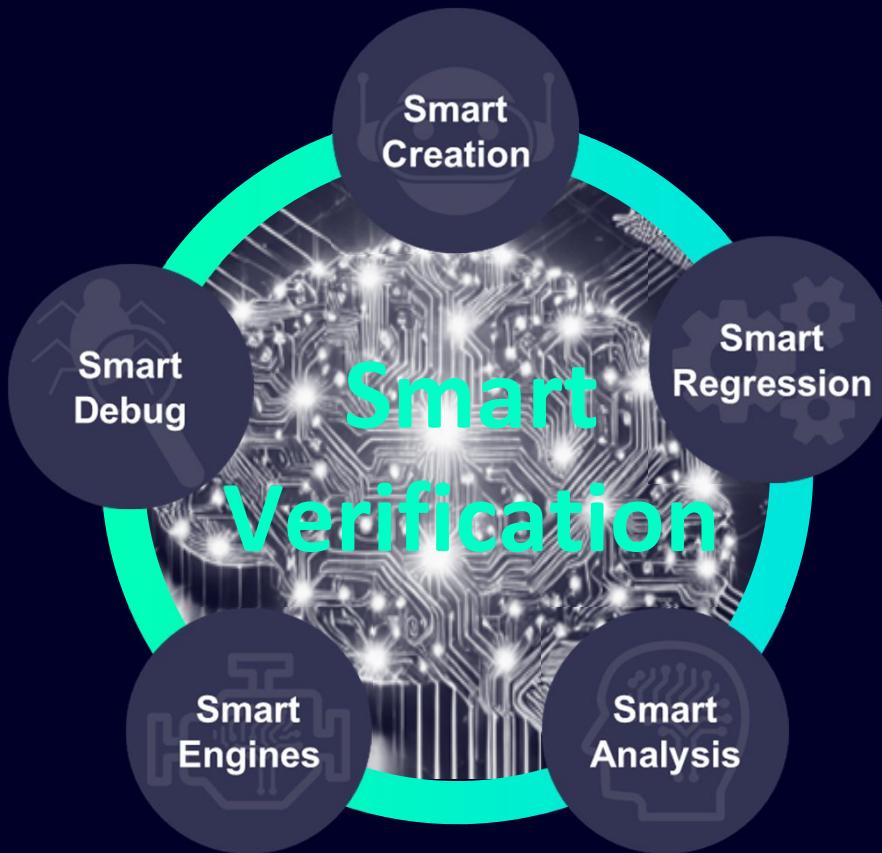
The Oxygen for Artificial Intelligence



Every Aspect can Benefit from AI

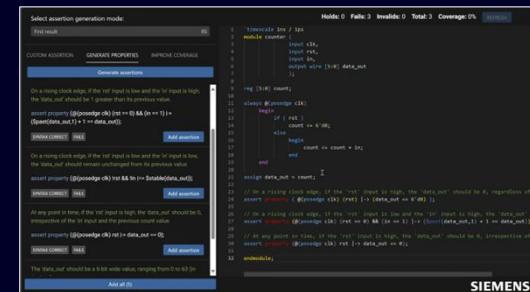
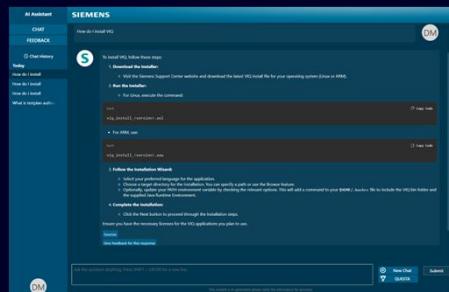
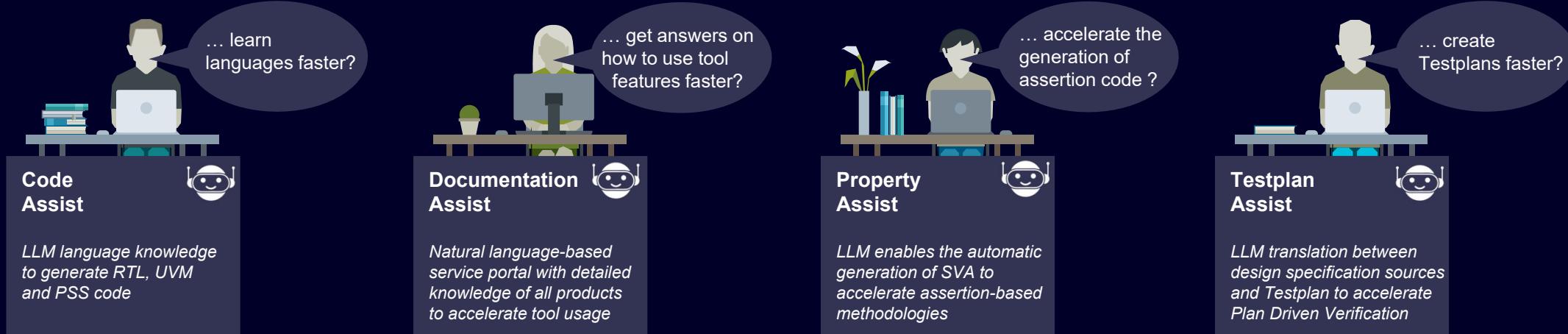
# Smart Verification

## Accelerating Functional Verification



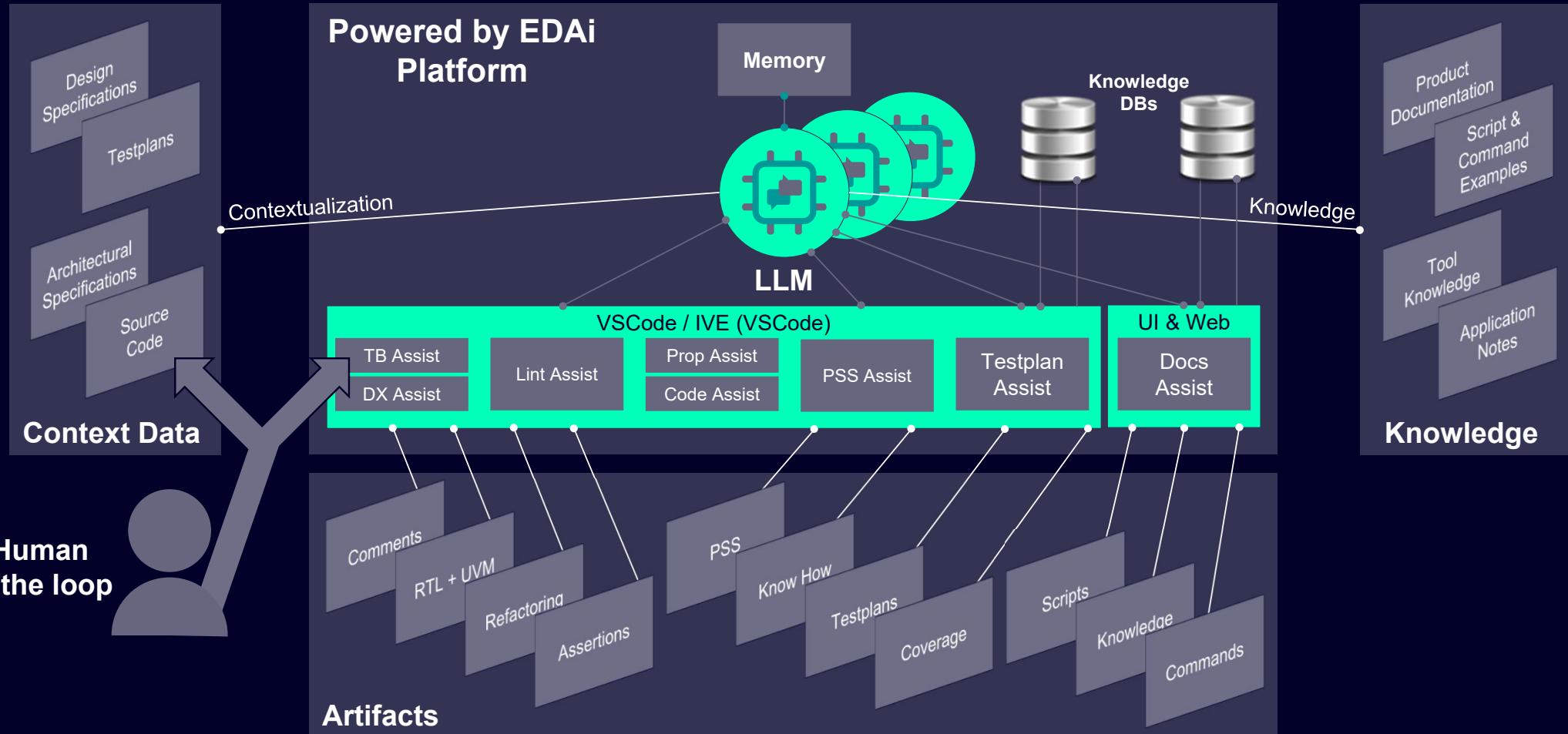
# Solving Creation Challenges with Smart Creation

## How Can AI/ML assist me to ...



# Delivering Productivity to Functional Verification

## Generative AI Powered by Siemens EDAi Platform



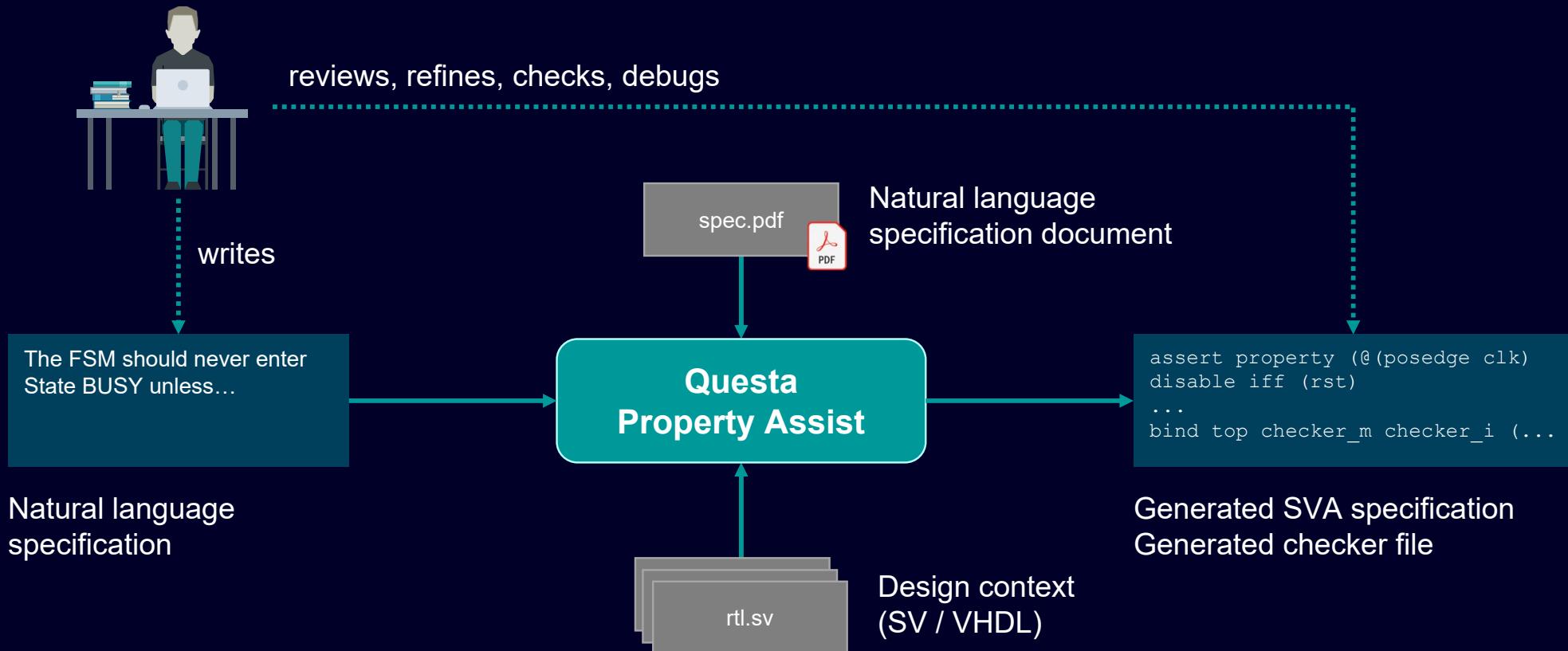
# Smart Creation Generative AI

## Faster Engineers with Property Assist

Hans-Joerg Peter - R&D Product Lead

## What is Questa Property Assist?

Productivity for both Design and Verification Engineers



## Questa Property Assist's Approach

Extending the power of Large Language Models

### Additional Knowledge

Use RAG for additional knowledge and integration with data sources such as Fuse



### Shielding

Use static and formal methods to rank, filter, and refine the LLM-generated properties



### Interactivity

Use integrated UIs to let the user debug and take action during the generation process

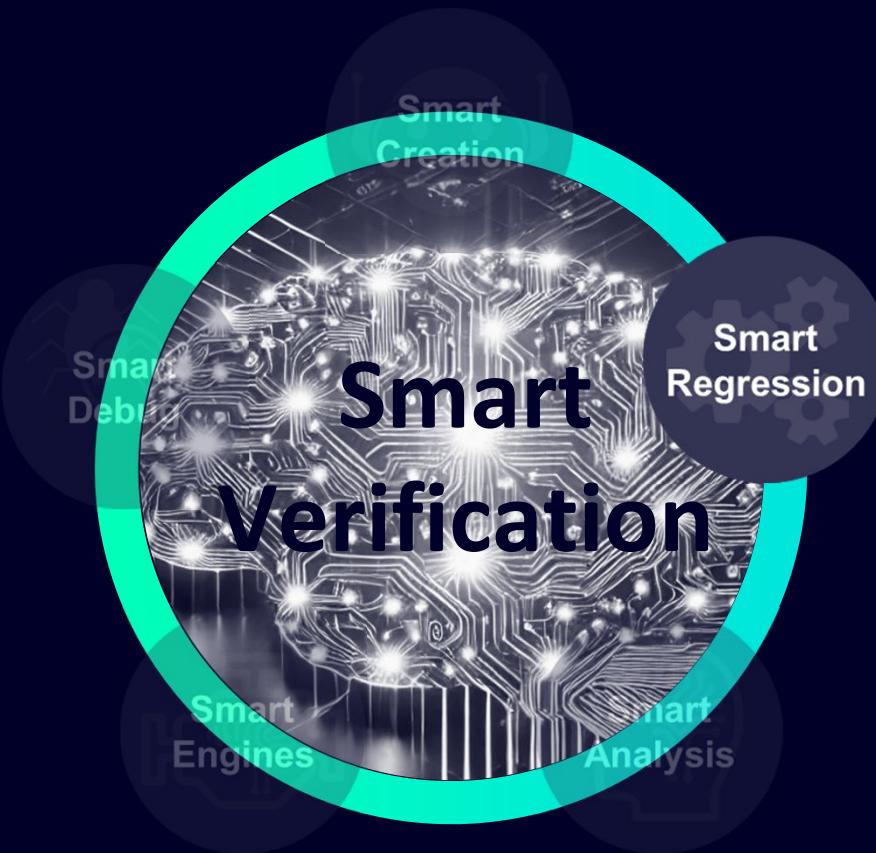


Smart Creation  
Generative AI

Faster Engineers  
with  
Property Assist Demo

# Smart Verification

## Accelerating Regressions

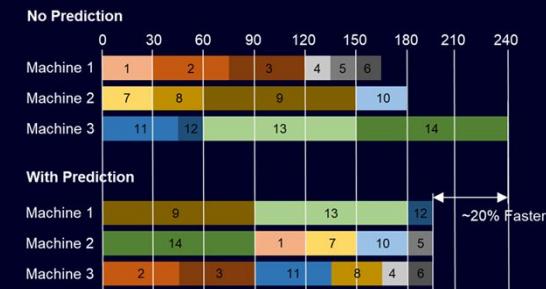
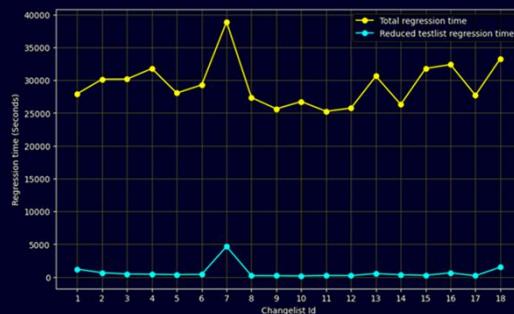
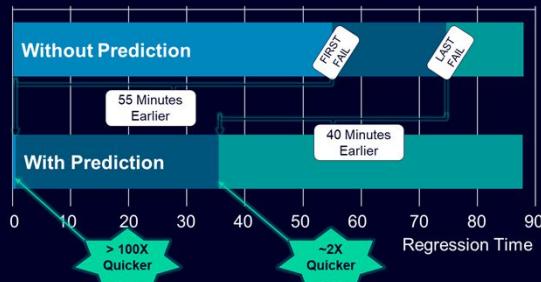
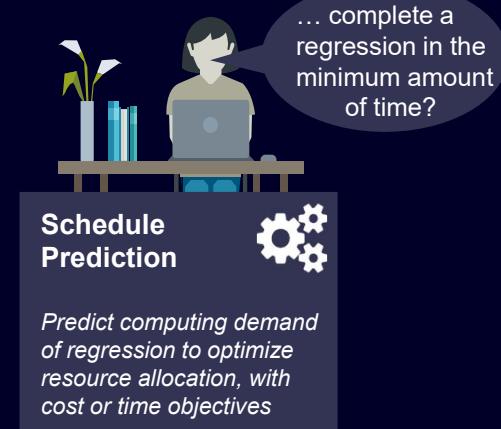


# Solving Regression Challenges with Smart Regression

## How Can AI/ML ...



FEWER WORKLOADS



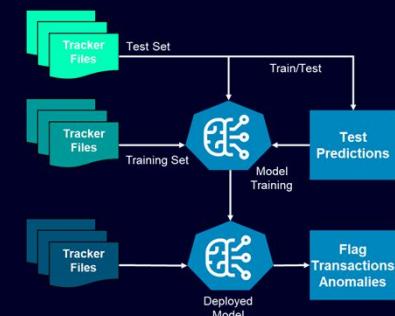
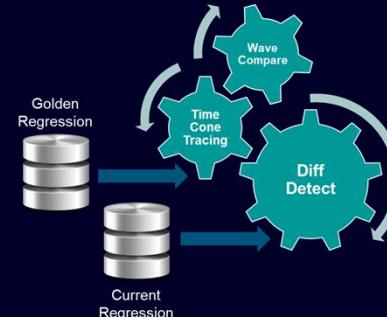
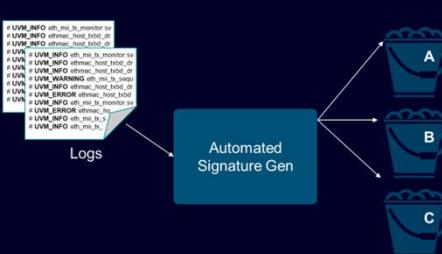
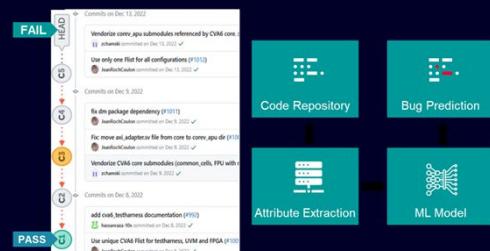
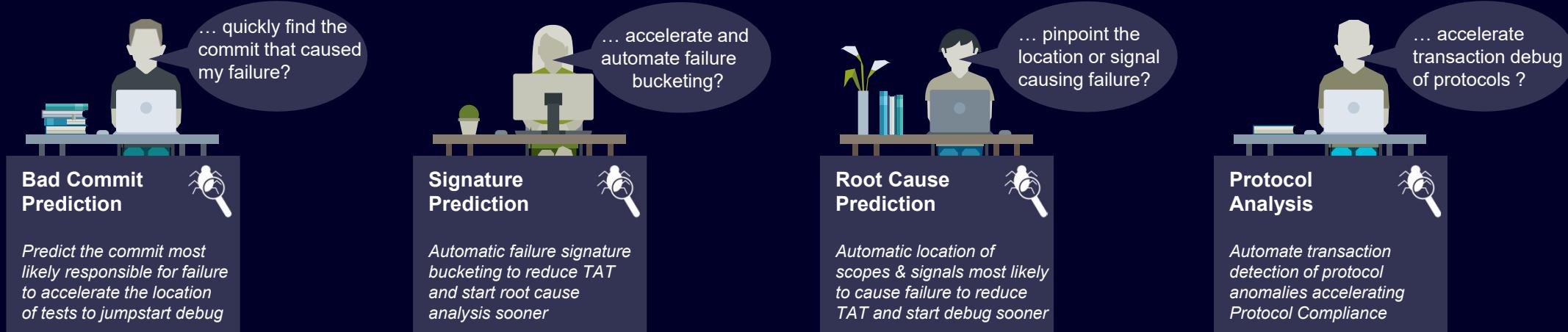
## Smart Verification

### Accelerate Debug Turn-around



# Solving Debug Challenges with Smart Debug

## How Can AI/ML ...



# Smart Debug & Regression Predictive AI

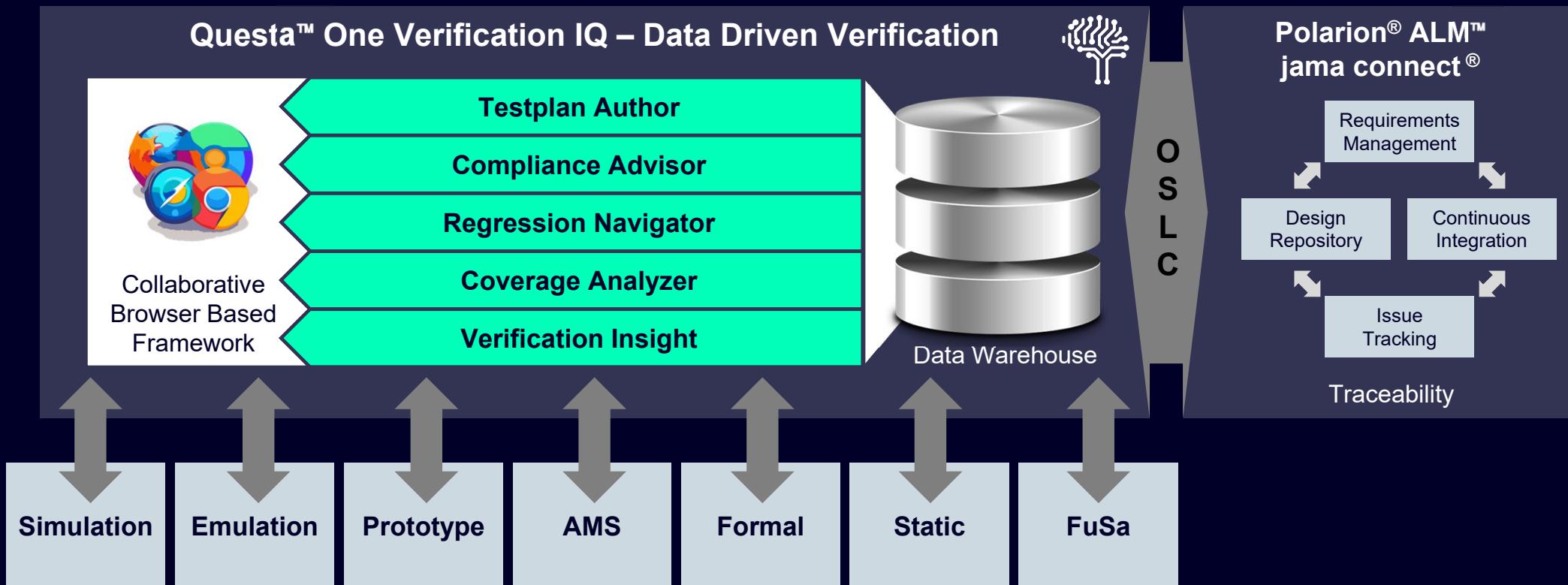
Faster Engineers & Fewer Workloads  
with  
**VIQ Regression Navigator**

Mark Carey – Product Engineer

Launched  
Jan 2023

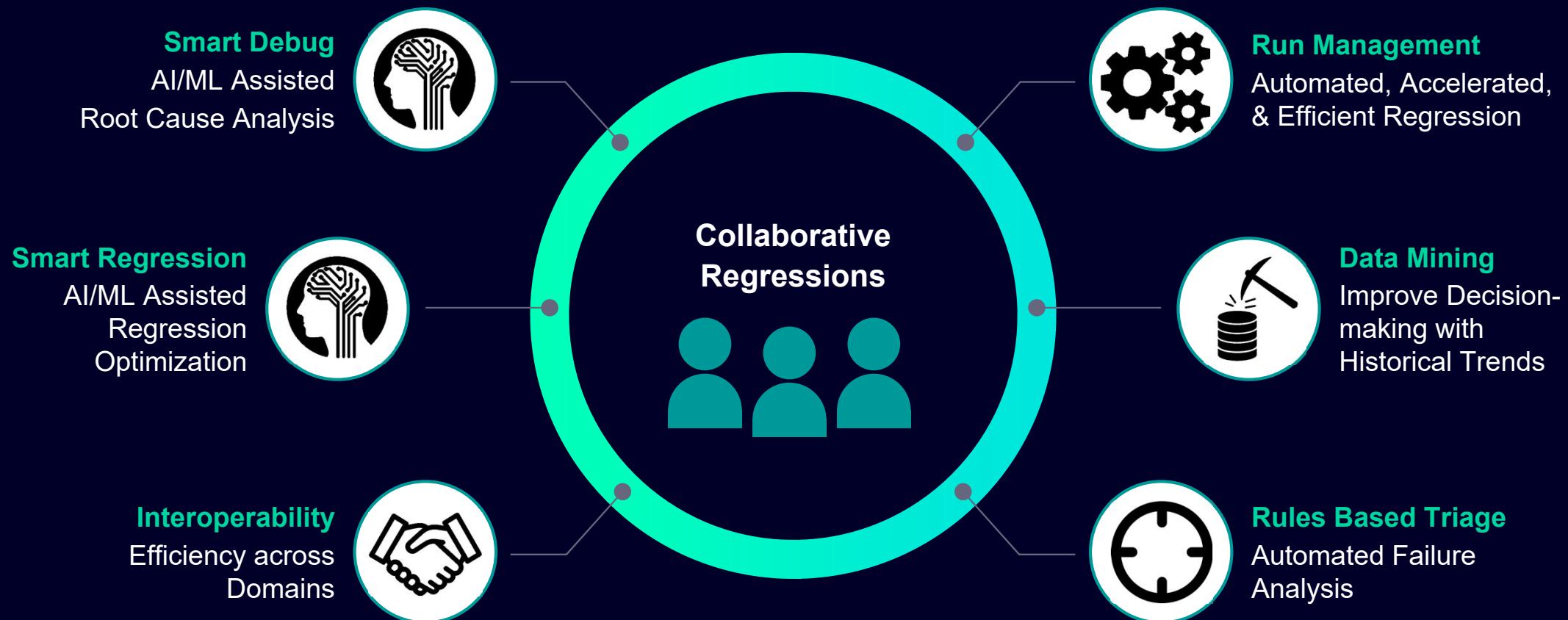
## Questa™ One Verification IQ Maximizes Productivity

### Data-Driven Verification Management Solution



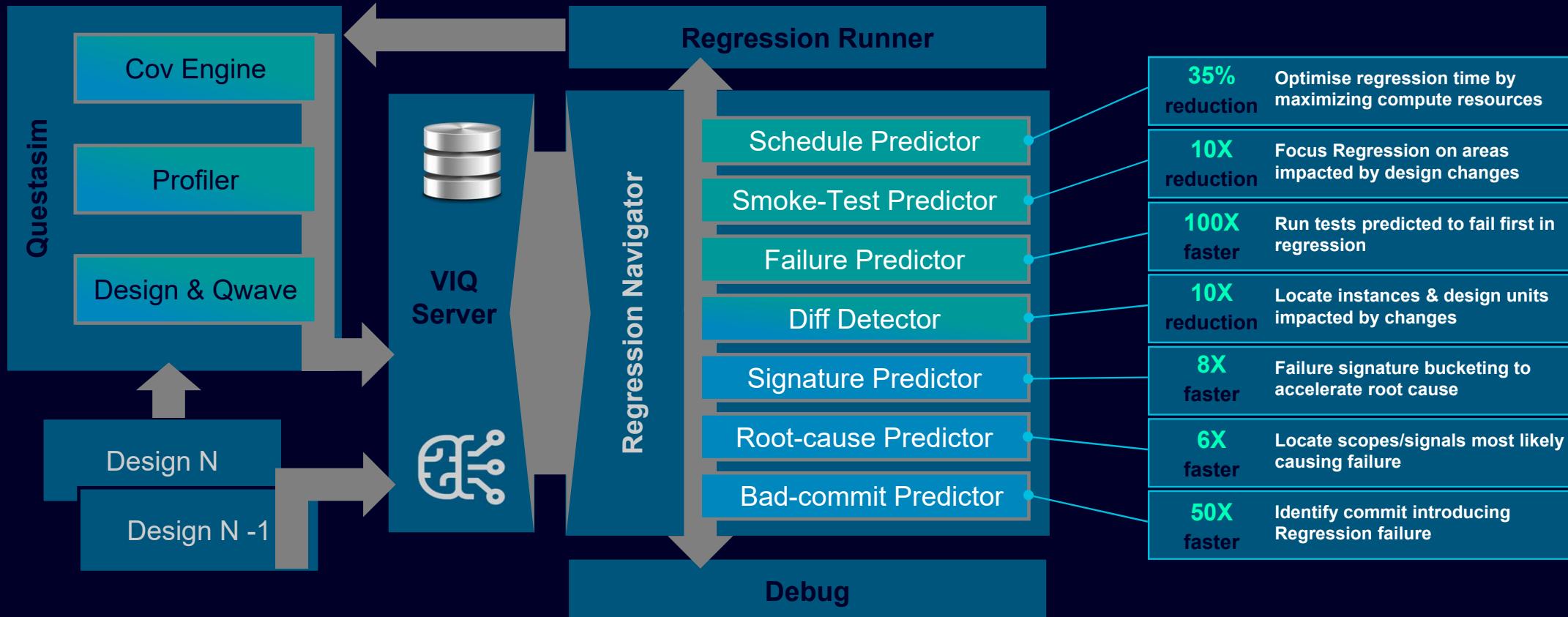
## Optimize Regression Cycles & Accelerate Turn-Around Times

VIQ Regression Navigator Provides Intelligent Regression & Debug



## VIQ Regression Navigator

Applying AI Prediction with *Smart Regression and Smart Debug*



# Smart Debug & Regression Predictive AI

**Faster Engineers & Fewer Workloads  
with  
Regression Navigator Demo**

# Smart Verification

## Accelerate Verification Analysis



# Solving Analysis Challenges with Smart Analysis

## How Can AI/ML ...



The logo for DVCon Europe 2025. It features the year '2025' in a large, bold, black font at the top. Below it, the word 'DVCON' is written in a large, bold, black font with a white outline. Underneath 'DVCON', the words 'DESIGN AND VERIFICATION' are written in a smaller, black font. At the bottom, the word 'EUROPE' is written in a large, bold, black font with a white outline. Below 'EUROPE', the text 'CONFERENCE AND EXHIBITION' is written in a smaller, black font. The entire logo is set against a dark blue background.

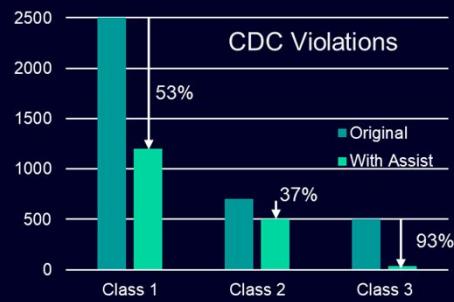
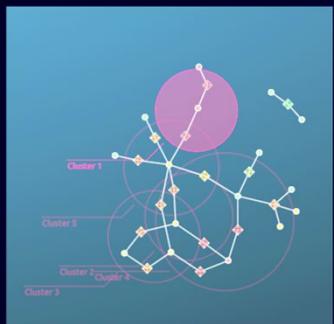
... accelerate  
cross hole  
closure

## Cross Hole Analysis

Automatically extract the worst cross coverage holes to accelerate generation of new stimulus to cover holes

The illustration shows a person with short hair, wearing a light blue shirt, sitting at a desk and looking at a laptop. On the desk are two blue books. A large speech bubble originates from the person's head, containing the text: "... group common crossing issues & configure tool?".

An illustration of a person with a blurred face, wearing a green shirt, sitting at a desk with a laptop. A speech bubble from their head contains the text "... accelerate the understanding of log output ?". Below the person is a dark blue box containing the text "Log Message Clustering" and "Automate message clustering to reduce noise, and generate easier to understand output". To the right of the text is a white icon of a human head with a brain.



# Smart Analysis Analytical AI

Faster Engineers  
with  
**VIQ Coverage Analyzer**

Mark Carey – Product Engineer

## Accelerate Coverage Closure

VIQ Coverage Analyzer Provides Intelligent Closure

### Pattern Analysis

Smart Closure,  
Expression Analysis



### Hole Analysis

Smart Closure, Cross  
Hole Analysis



### Team-base Communication

Accelerate Closure with  
Enhanced Team  
Communication



## Collaborative Coverage Closure



### Unified Coverage

Efficient Transition of  
existing methodology



### Analytical Navigation & Visualization

Accelerate  
Understanding and  
Closure



### Exclusion Management

Accelerate Exclusion  
Application and Auditing

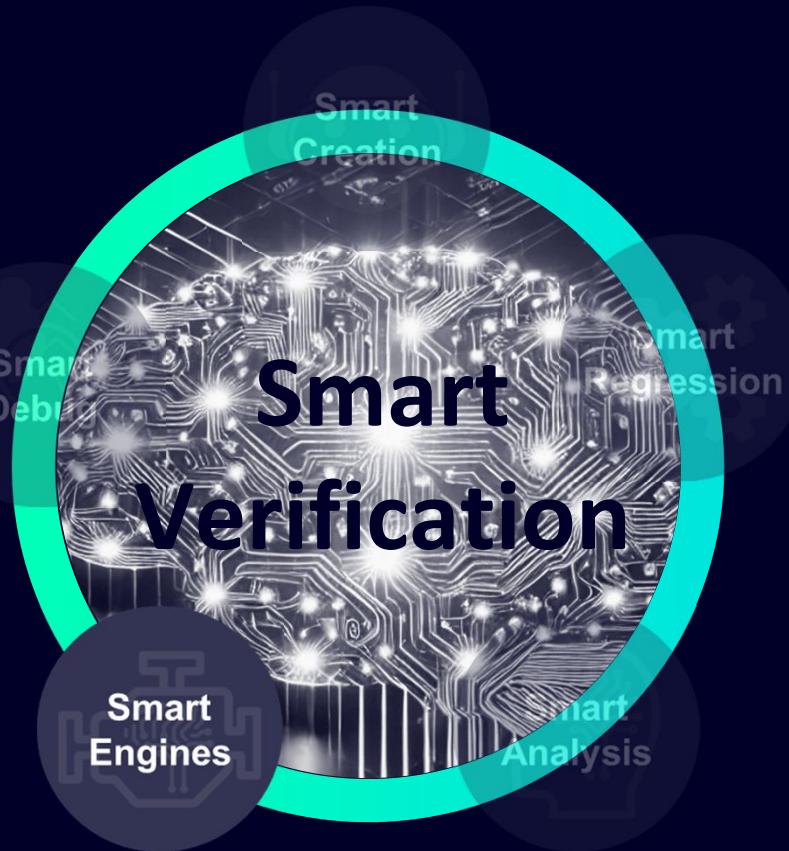


# Smart Analysis Analytical AI

Faster Engineers  
with  
Coverage Analyzer Demo

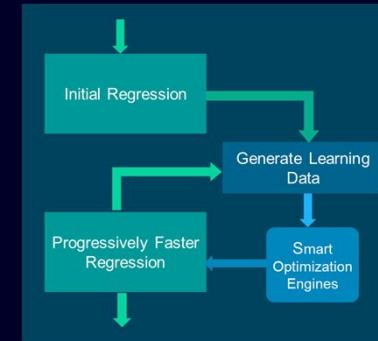
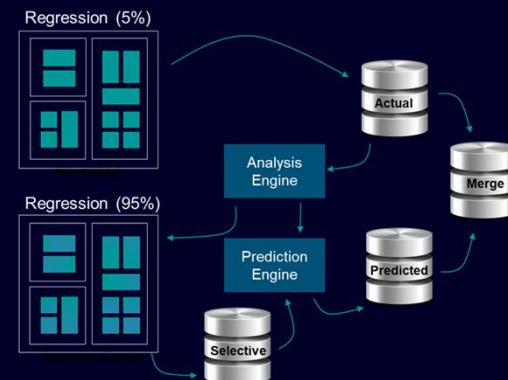
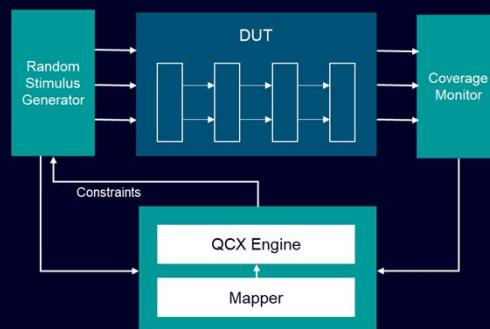
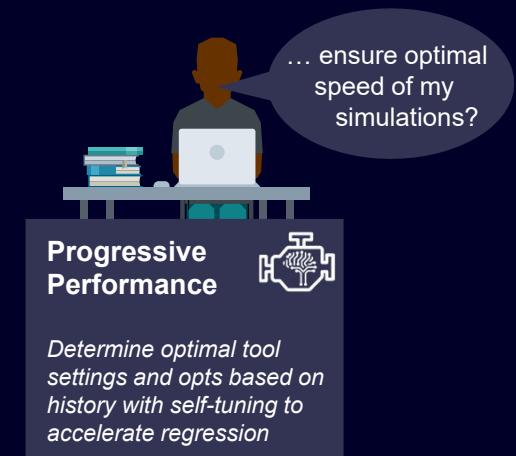
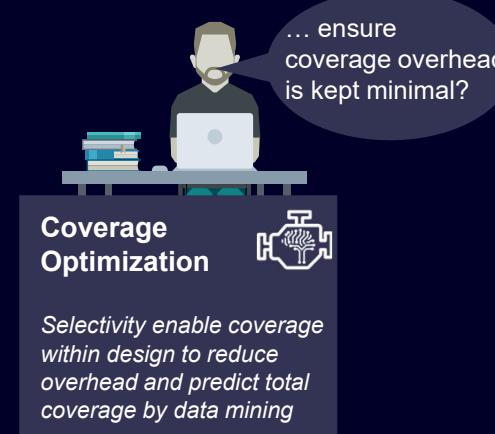
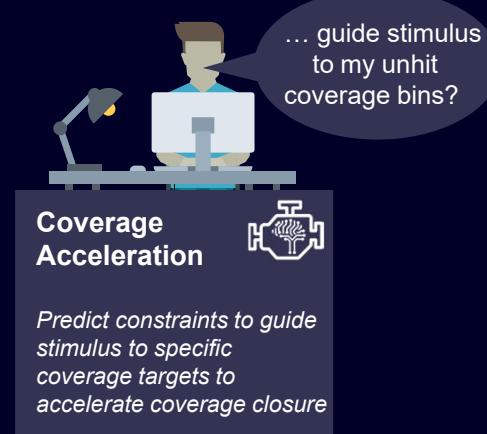
## Smart Verification

### Accelerate Verification Engines



# Accelerate Engines with Smart Engines

## How Can AI/ML ...



Smart Engines  
Predictive AI

Faster Engines  
with

**QCX – Questa Coverage Accelerator**

Gabriel Chidolue – Product Engineering Manager

## QuestaSim QCX: Coverage Closure Acceleration

### Coverage Driven Stimulus Generation

#### Coverage Driven Stimulus

Each randomization produces non-redundant stimulus using coverage as a goal  
User can provide coverage intent at command line to guide stimulus

#### Distribute Coverage Targets

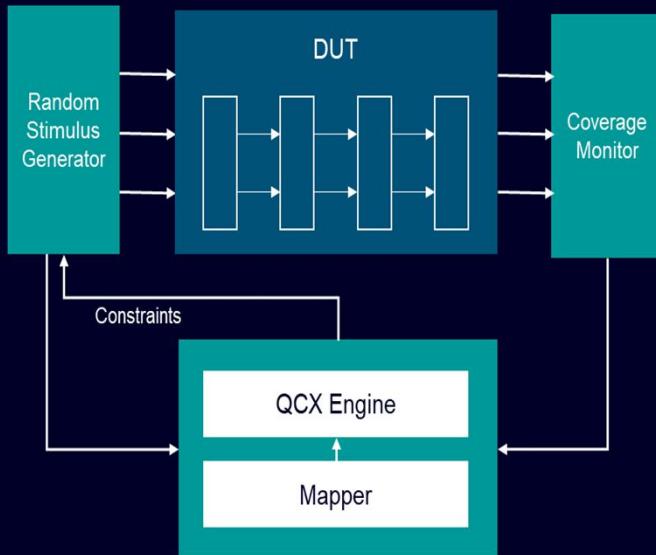
Leverage regressions to distribute unique coverage goals across parallel simulations  
Load existing coverage as a starting point to avoid duplicate effort

#### Built into QuestaSim

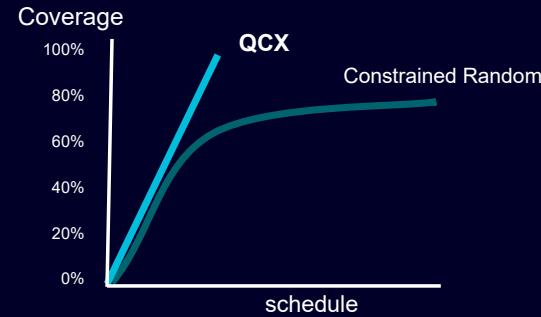
Part of constraint solver, optimized for minimal overhead  
Enabled with a single switch at optimization and simulation

# Smart Engines

## Applying Predictive AI to our Engines

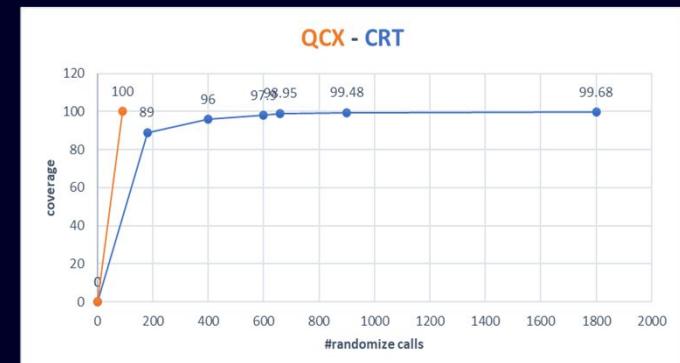


### Questa Coverage Acceleration (QCX)



- Coverage mapping provides feedback enabling smarter stimulus generation
- ML assisted to find additional connections between stimulus and coverage targets
- Achieve coverage goals faster (Save on Project time)

### Real Customer Designs



# QCX Demo Design

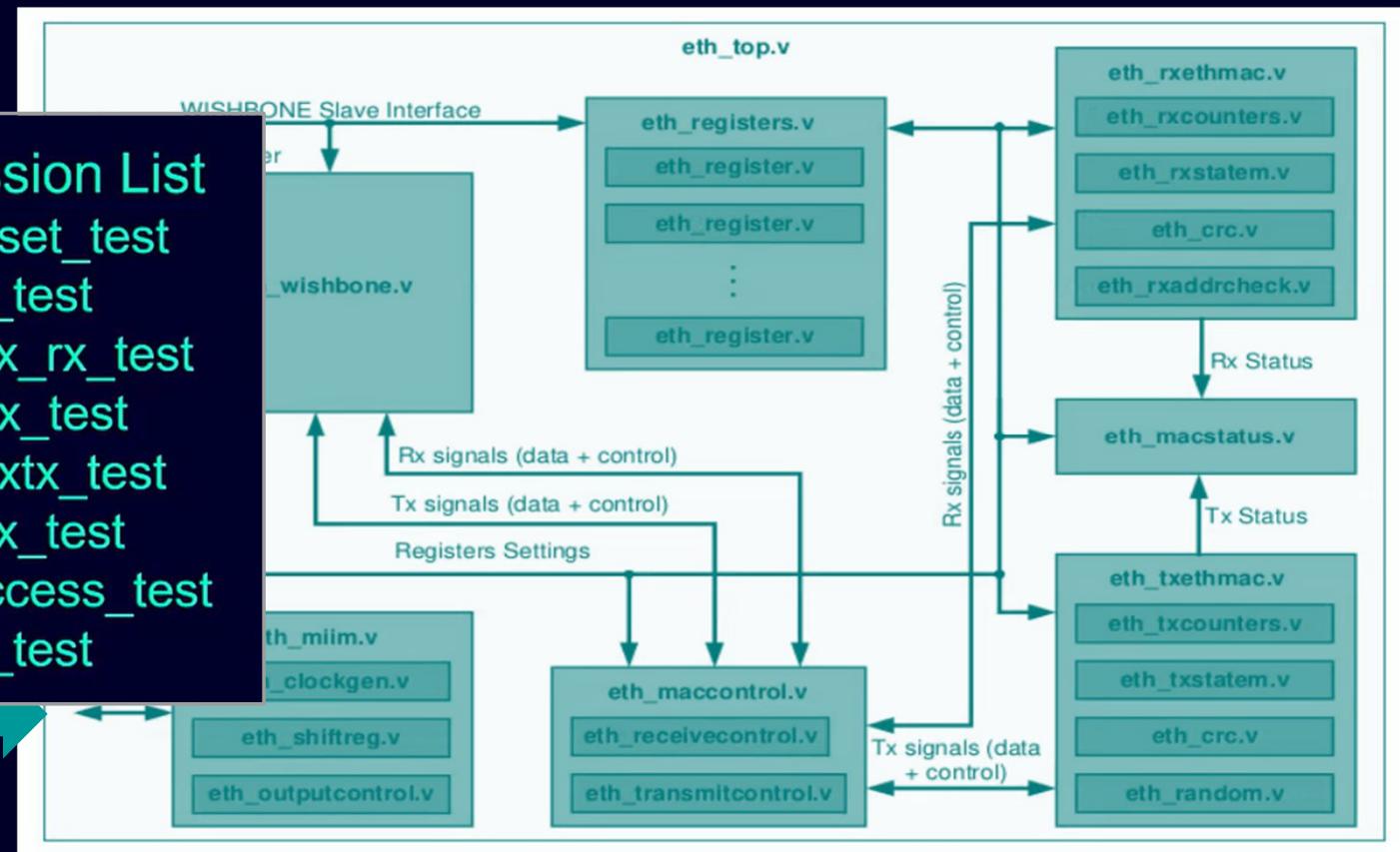
## Ethernet IP Core and UVM Testbench

### WB UVM Sequence Stimulus

### MII UVM Sequence Stimulus

**Baseline Regression List**

- ethmac\_reg\_reset\_test
- ethmac\_tx\_pkt\_test
- ethmac\_rand\_tx\_rx\_test
- ethmac\_rand\_rx\_test
- ethmac\_rand\_rxtx\_test
- ethmac\_rand\_tx\_test
- ethmac\_reg\_access\_test
- ethmac\_tx\_crc\_test



Smart Engines  
Predictive AI

Faster Engines  
with  
QCX Demo

## AI Maximising Verification Productivity

### Faster Engines, Faster Engineers and Fewer Workloads

#### Smart Debug

Intelligent Root-cause  
*VIQ Regression Navigator*



#### Smart Creation

Intelligent Assistance  
*Property Assist*

#### Smart Regression

Optimized Regression Cycles  
*VIQ Regression Navigator*

#### Smart Engines

Intelligent Verification Cycles  
*QCX*

#### Smart Analysis

Intelligent Insights  
*VIQ Coverage Analyzer*

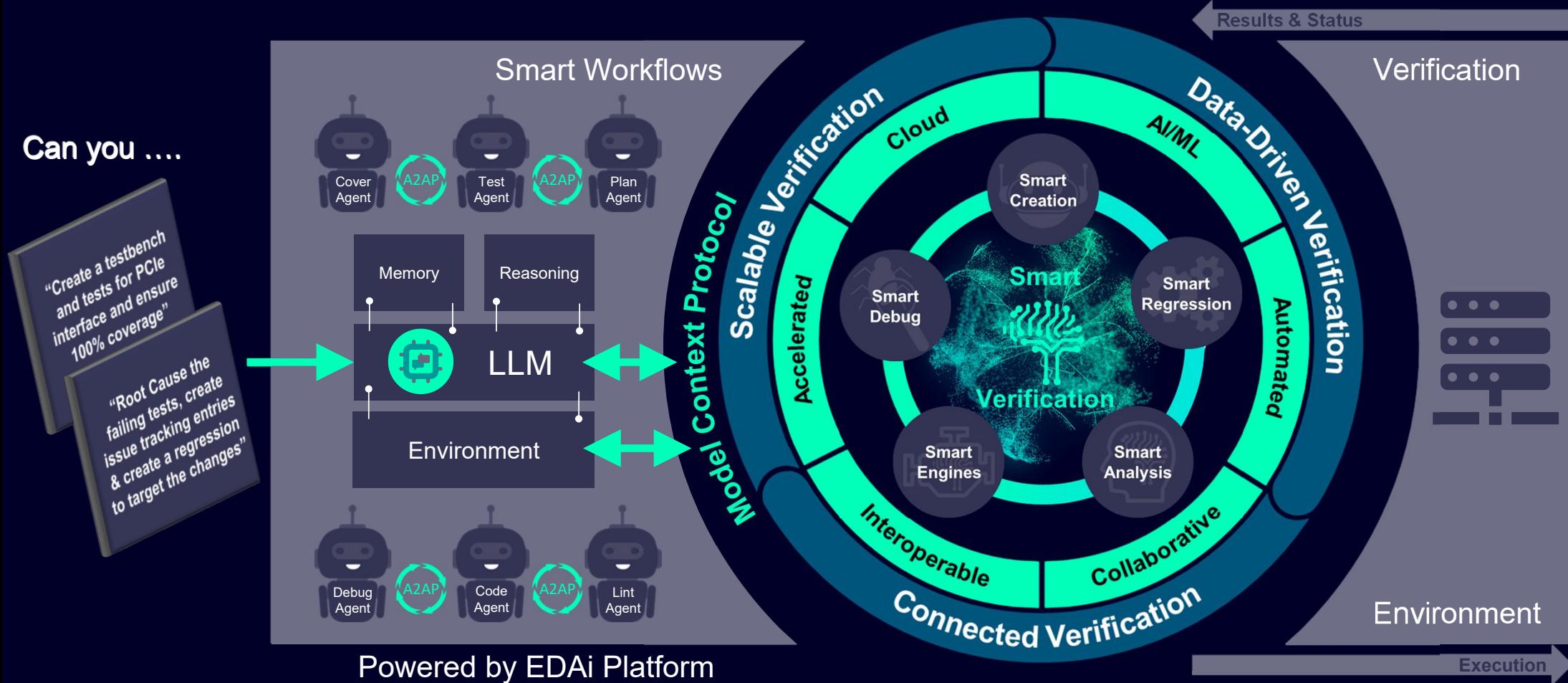
# Smart Verification

Looking at The Future  
of

# AI Driven Design & Functional Verification

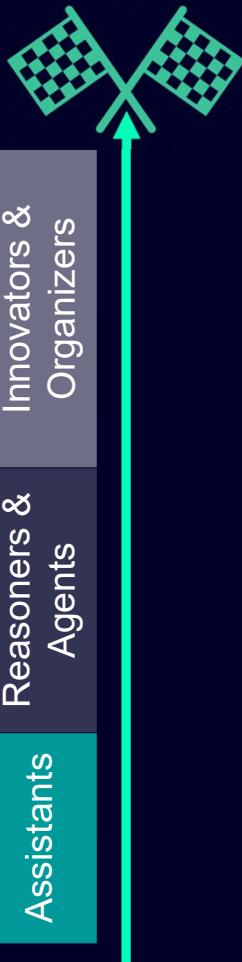
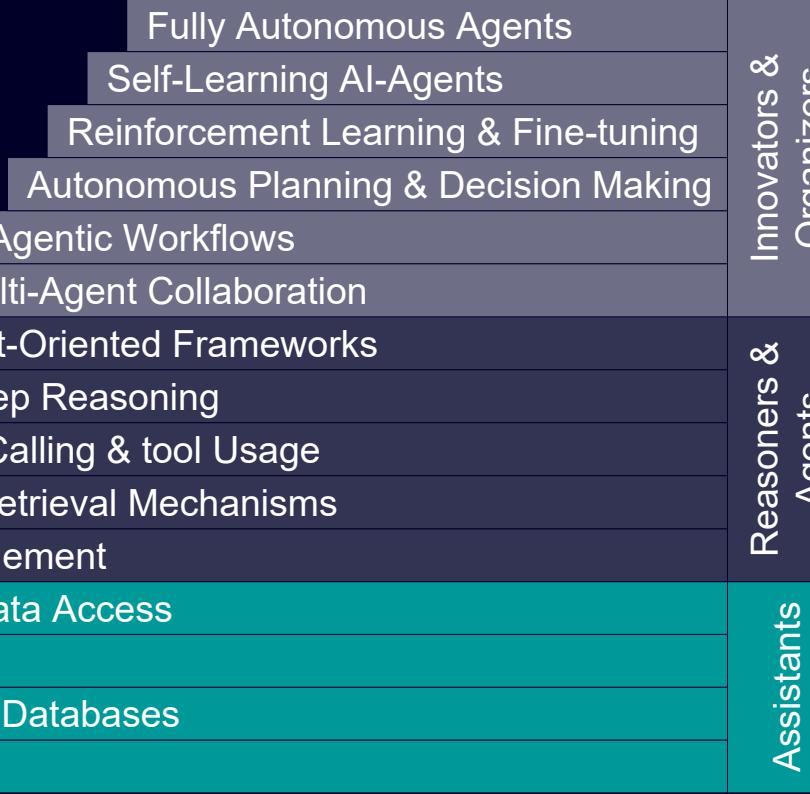
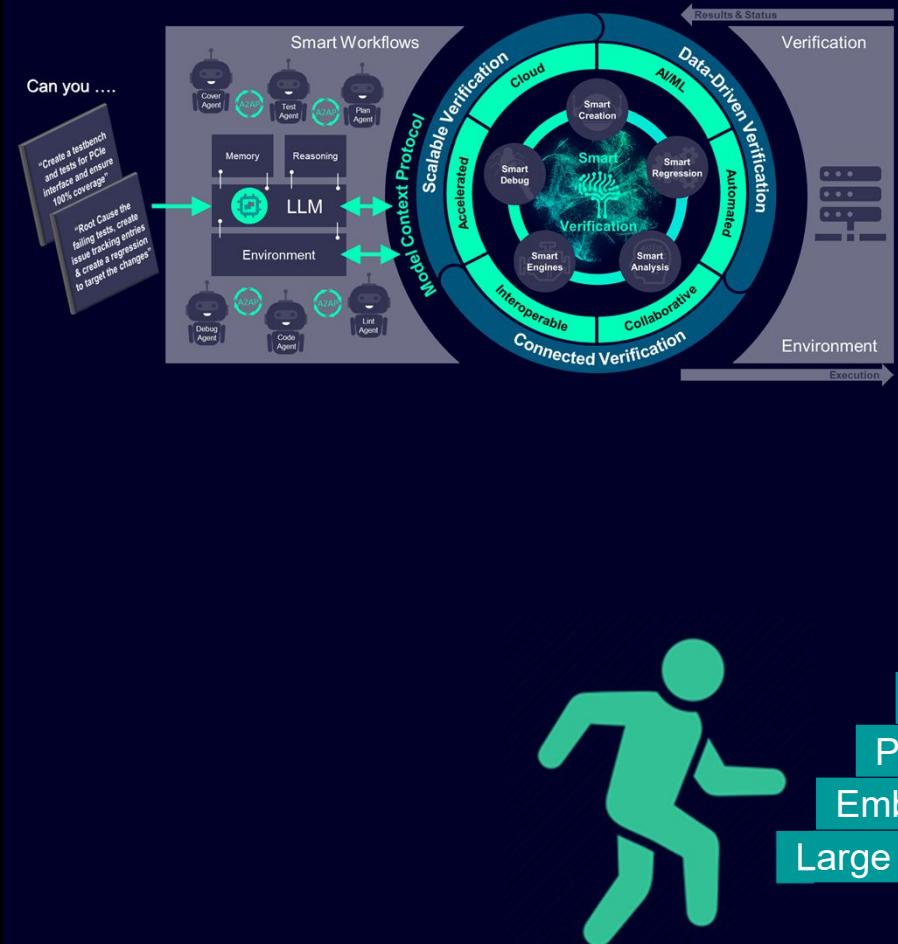
# Expansion to Agentic AI Assisted Verification Workflows

## Connected, Scalable, Data-driven Verification Technologies



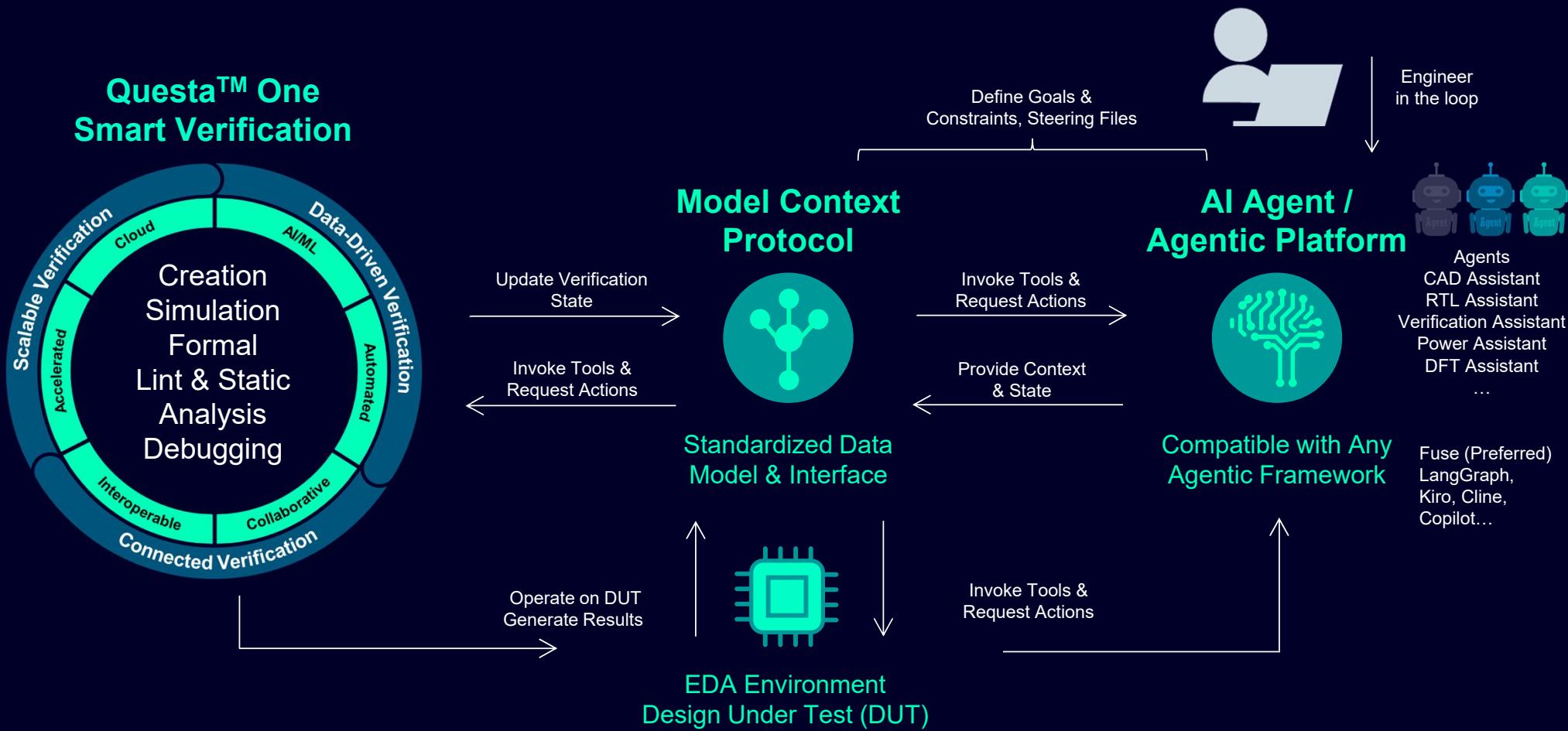
# AI Assistants Just the Start

## Smart Verification Staircase to Fully Autonomous Agents



## Enabling Intelligent Agentic Automation

Questa™ One Enables Connection to AI Agents through a Standardized Context Protocol



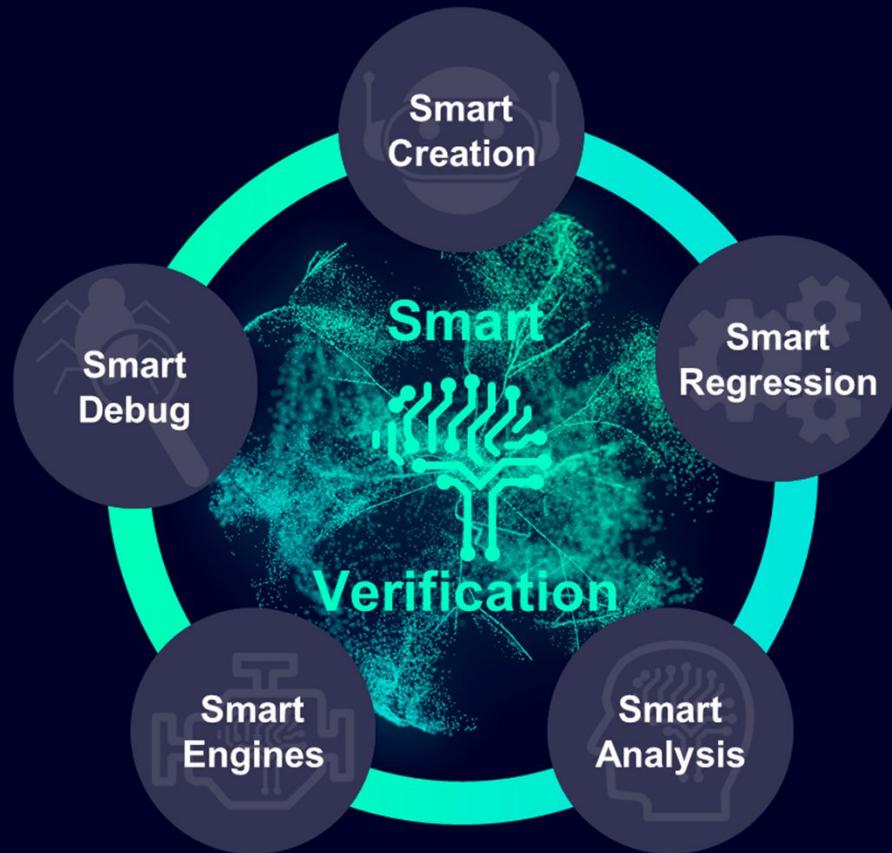
# Smart Flows

## Faster Closure Using Agentic RTL Sign-off

### Agentic AI

## Questa™ One Smart Verification

Transforming Functional Verification powered by AI



 **Faster Engines**

 **Faster Engineers**

 **Fewer Workloads**

# Contact

Published by Siemens EDA

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