2025 DESIGN AND VERIFICATION™ DVCON CONFERENCE AND EXHIBITION TAIWAN

Harnessing AI/ML for Superior Regression Management

Boost Verification Efficiency

Vita Liao, Product Engineer

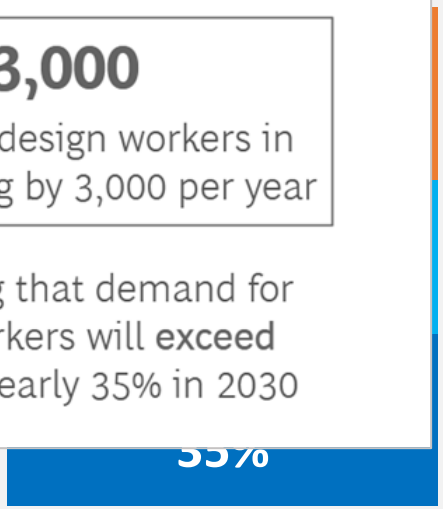
SYNOPSYS®

accellera SYSTEMS INITIATIVE

Agenda

- Trend and Resource Challenges
- What is VC Execution Manager (VMS)?
- Introduction to VSO.ai and Verdi RDA
- VSO.ai RDA Plugins

Bug-Free Silicon – Trend and Resource Challenges



Integration and Automation Needed to Overcome Worker Shortage!

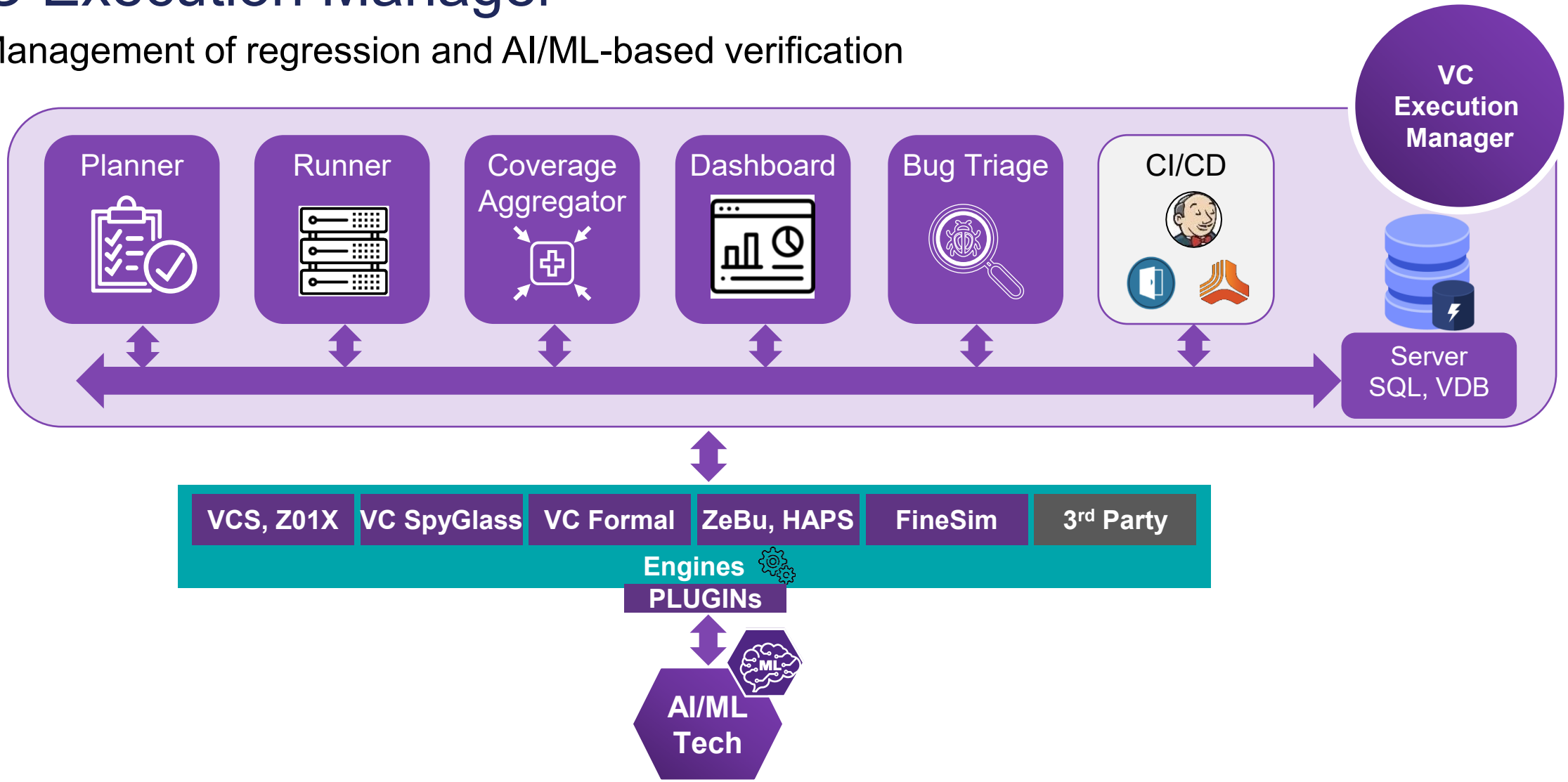
More Respins	Main Cause of Respins	Need to Reduce TAT!

Source:Wilson Report

What is VC Execution Manager (VMS)?

VC Execution Manager

Management of regression and AI/ML-based verification

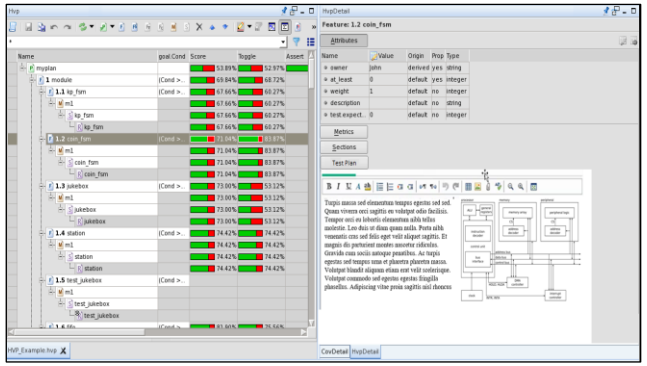


Complete Solution with Connections to AI/ML Verification

VC Execution Manager - Key Modules

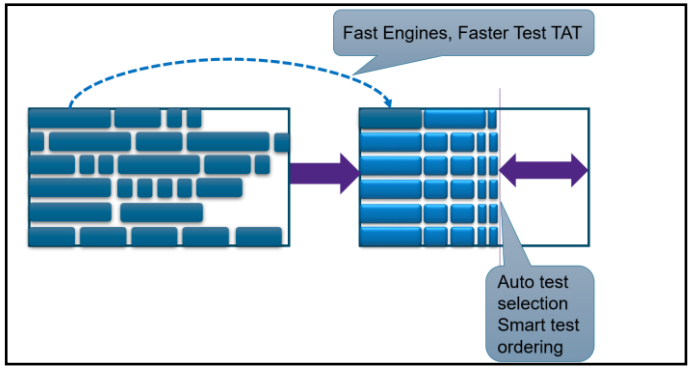
(Also referred to as VC Execman or EMAN)

Planner



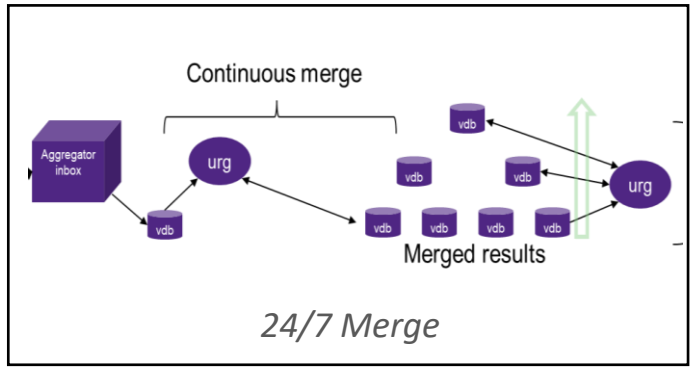
- Multi-user test scheduling/planning
- Supports change history and restore
- API for automated report generation and updates

Runner



- Runs regressions
- Order tests to eliminate long tail
- VCS engine performance enhancement

Coverage Aggregator



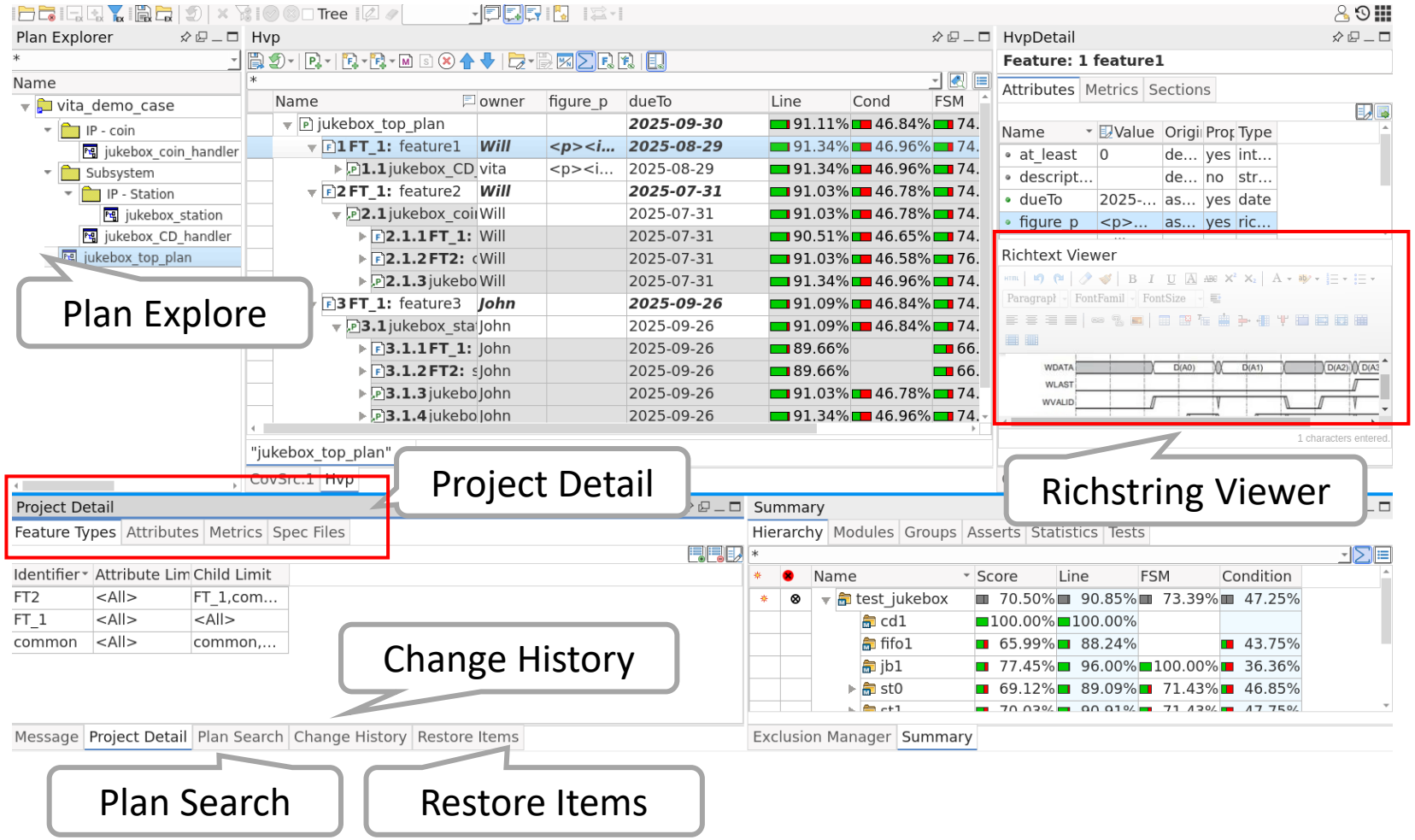
- Continuously merges incoming coverage
- Integrated tagged VDB from ad hoc regression runs
- Can generate moving window merge VDB

Dashboard

- Test planning, execution & debug, coverage merge and annotation
- Enables verification data-over-time to be mined for analytics

Planner

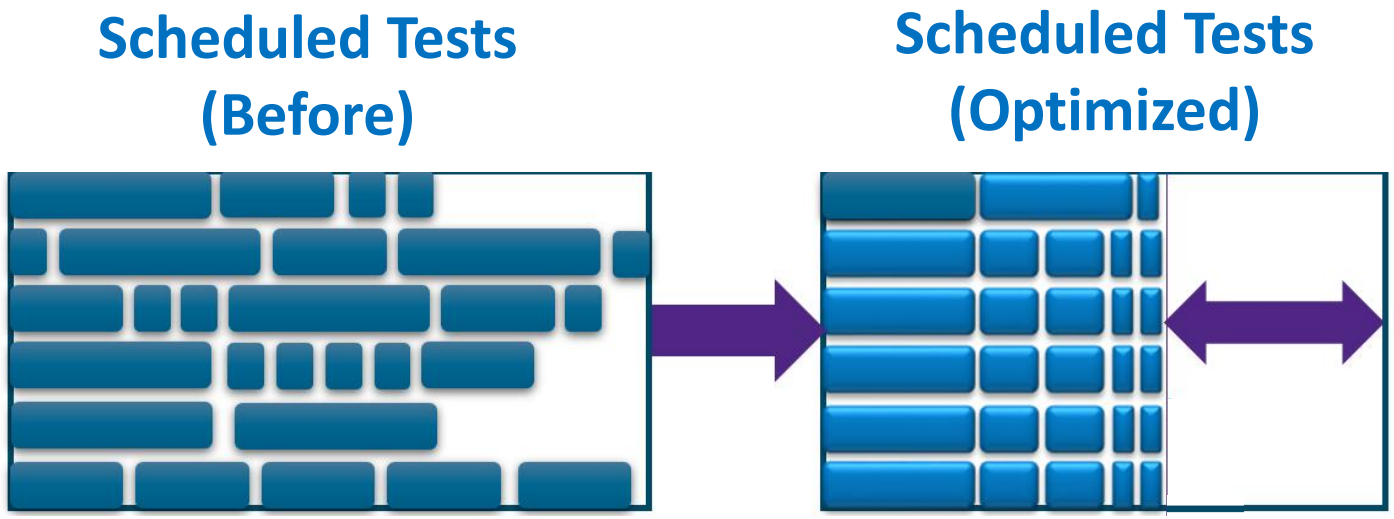
- **Database** backed application enables real-time collaboration
- **Typed features** ensures that all plans satisfy project template requirements
- **Project-wide queries and bulk updates**
- **Change history and restore**
- **Verdi UI** (Linux) and **Web UI** (all platforms)



Optimize Regressions

Runner

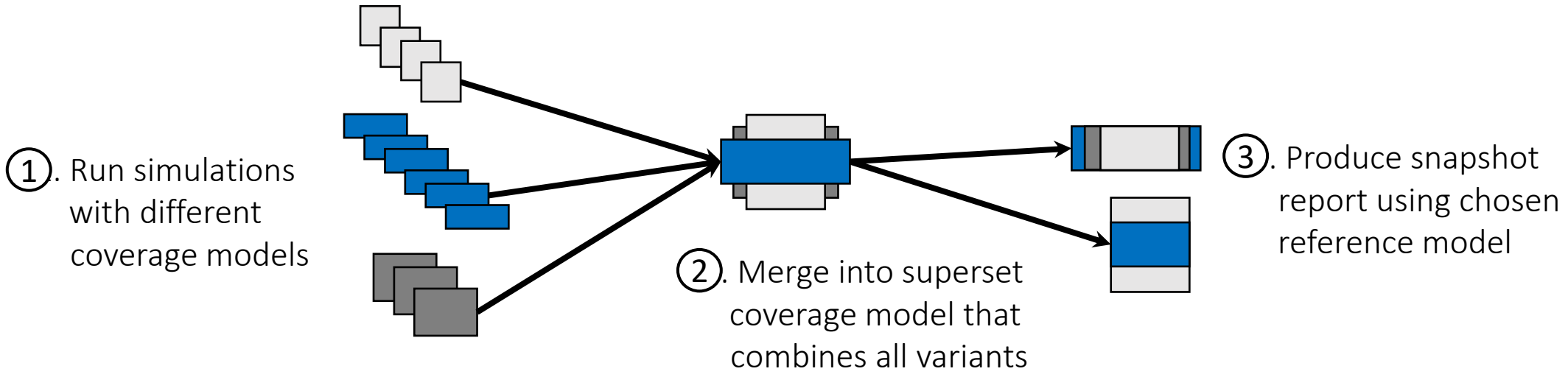
- Reduce regression TAT and resources
- Schedules tests based on history to eliminate long tail
- Improves compute resources utilization, reducing costs



Considers: coverage, engine speed, smart test ordering

Merging Coverage Continuously

Coverage Aggregator



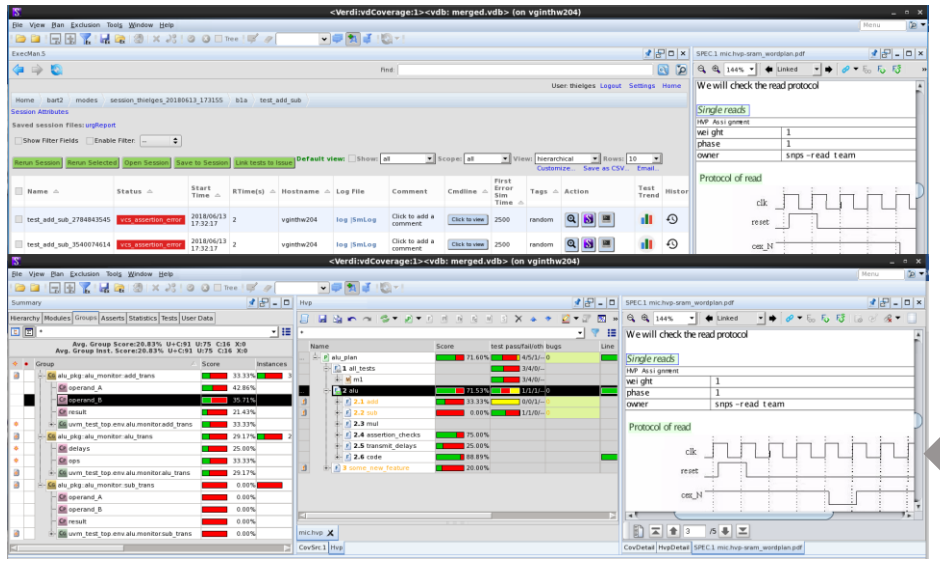
Features

- Retains results for each version of the coverage model
- Reports chosen snapshot of model
- Retains data for all coverage targets that didn't change even as model changes around them

Flexible Merging

- Merge results from different design hierarchies at module level
- Merge toggle coverage for common signals on different design versions

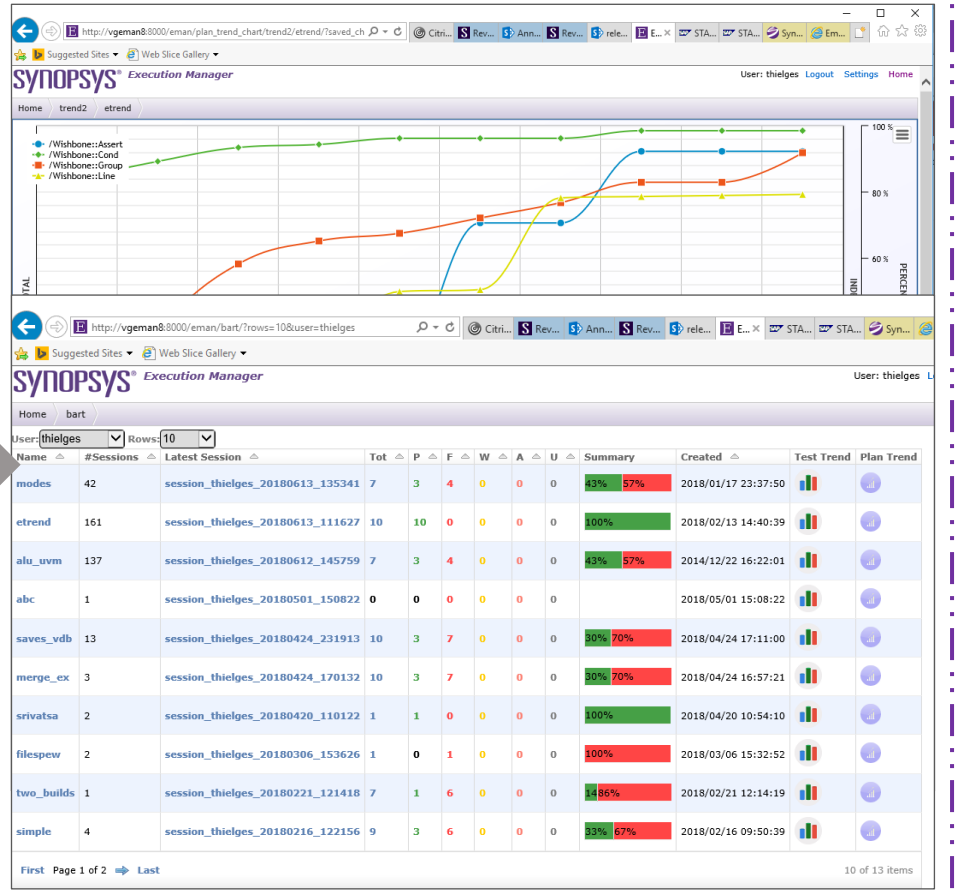
Dashboard Users View – Usability



Engineer View

VC Execution Manager

API



Name	#Sessions	Latest Session	Tot	P	F	W	A	U	Summary	Created	Test Trend	Plan Trend
modes	42	session_thielges_20180613_135341	7	3	4	0	0	0	43% 57%	2018/01/17 23:37:50		
etrend	161	session_thielges_20180613_111627	10	10	0	0	0	0	100%	2018/02/13 14:40:39		
alu_uvm	137	session_thielges_20180612_145759	7	3	4	0	0	0	43% 57%	2014/12/22 16:22:01		
abc	1	session_thielges_20180501_150822	0	0	0	0	0	0		2018/05/01 15:08:22		
saves_vdb	13	session_thielges_20180424_231913	10	3	7	0	0	0	30% 70%	2018/04/24 17:11:00		
merge_ex	3	session_thielges_20180424_170132	10	3	7	0	0	0	30% 70%	2018/04/24 16:57:21		
srivatsa	2	session_thielges_20180420_110122	1	1	0	0	0	0	100%	2018/04/20 10:54:10		
filespew	2	session_thielges_20180306_153626	1	0	1	0	0	0	100%	2018/03/06 15:32:52		
two_builds	1	session_thielges_20180221_121418	7	1	6	0	0	0	14 86%	2018/02/21 12:14:19		
simple	4	session_thielges_20180216_122156	9	3	6	0	0	0	33% 67%	2018/02/16 09:50:39		

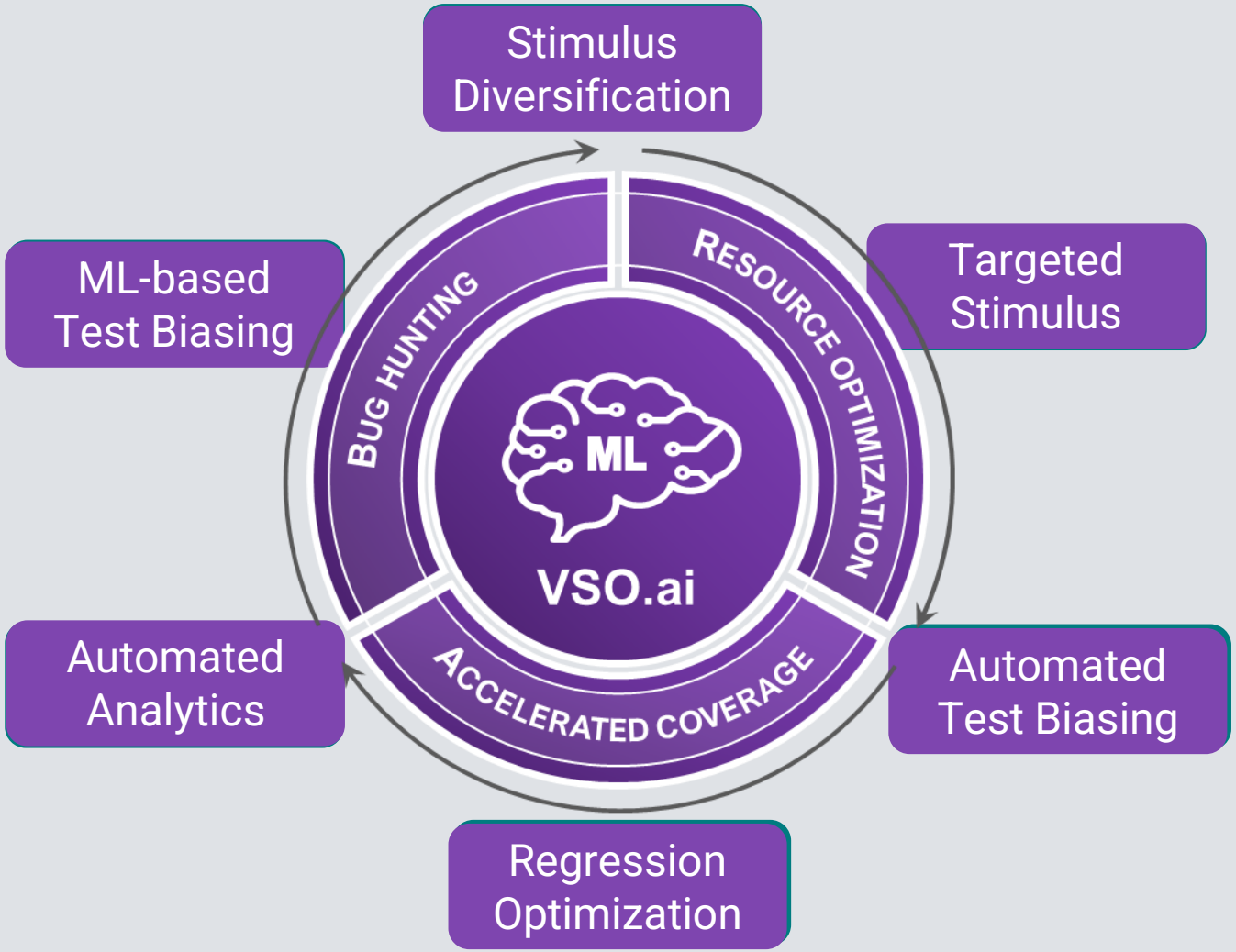
First Page 1 of 2 Last 10 of 13 items

Management View

Introduction to VSO.ai and Verdi RDA

AI Driven Verification Space Optimization - VSO.ai

Faster, Higher Coverage Closure & Analytics



Stimulus Diversity: *Uncover bugs earlier while stressing the design*

Productivity Boost: *Advanced dashboards, metrics to analyze to converge on goals*

Improved HW Utilization: *Maximum coverage for the compute budget*

Higher Verification Efficiency: *High ROI tests to achieve coverage targets*

VSO.ai: Verification Space Optimization

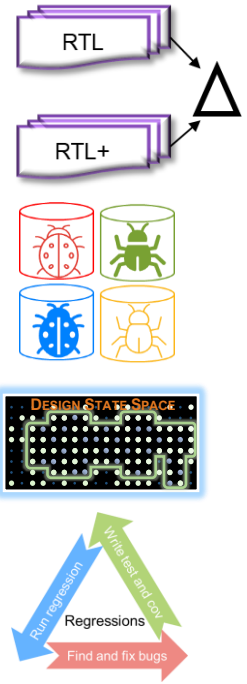
Verification Objectives

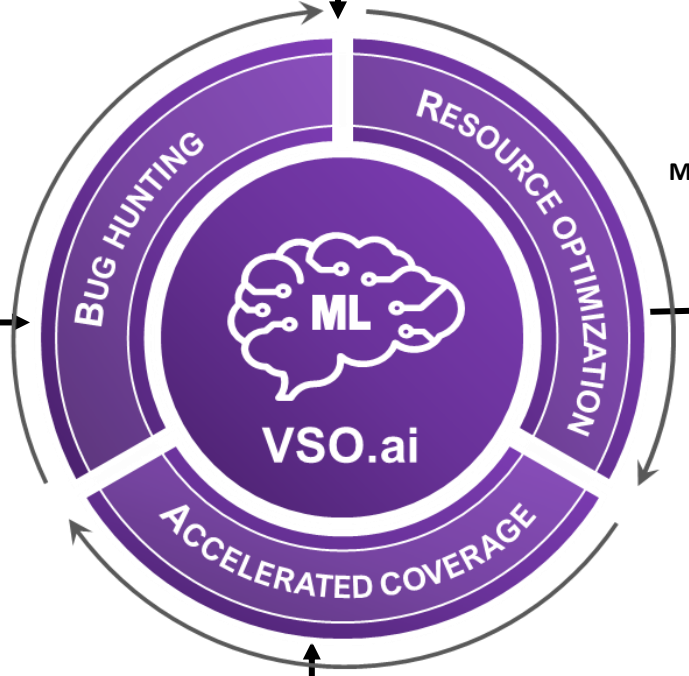
- **Design Maturity** (Early/Mid/Late)
- **Regression Type** (Smoke/GK/L2)
- **Design Type** (IP/SoC/SubSys)
- **Cost of Results (CoR)** CPUTime, SimTime, #Runs
- **Quality of Results (QoR)** #Bugs, %Covg
- **Time to Results (ToR)** Goals/CPUTime

Analytics

Verification Aspects

- **RTL Changes & Complexity**
- **Failure Buckets & Trend**
- **Code & Functional Coverage**
- **Regression Compositions** (Builds x Tests x Runs x Args)





ML guided Test Selection

ask

Proprietary Regression System

Compute Farm

Run Tests

VC Execution Manager

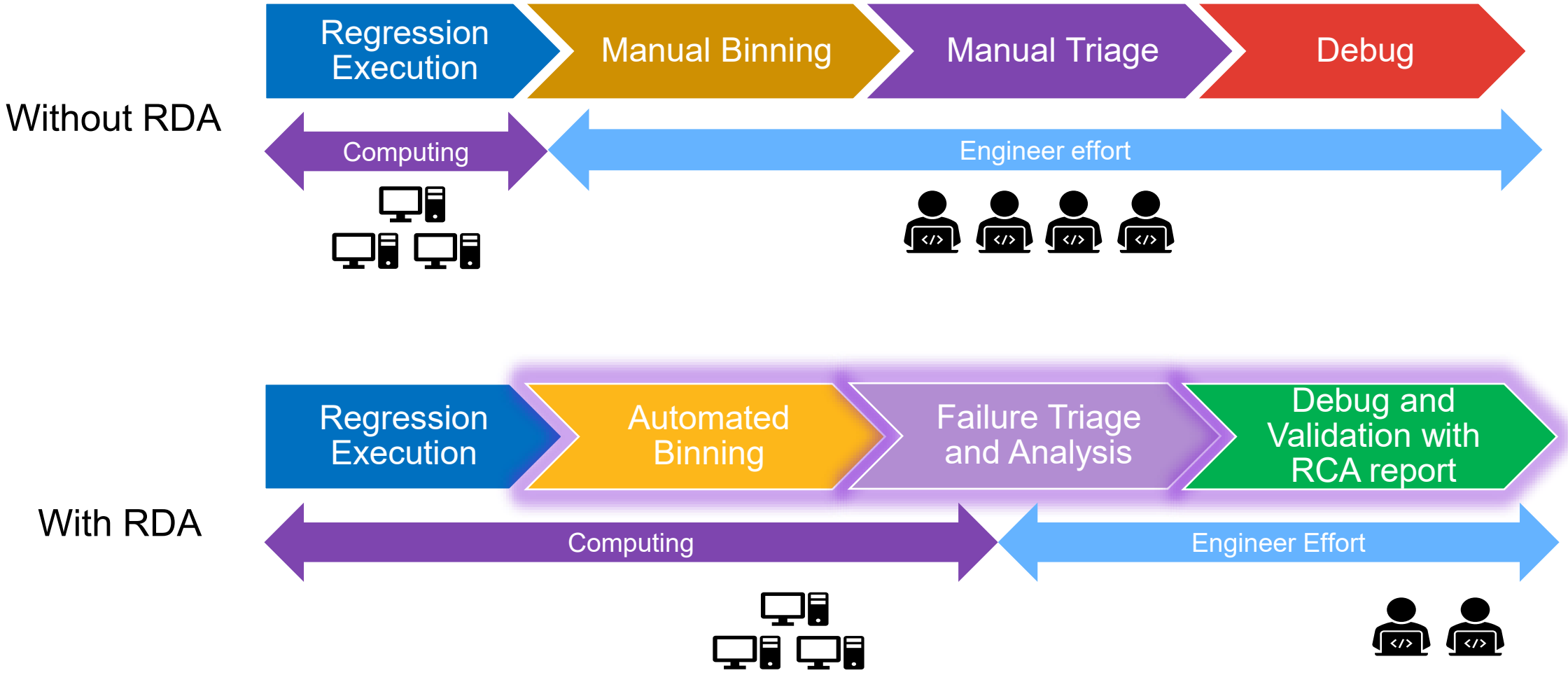
Native VSO.ai Automation

tell

Reinforcement Learning

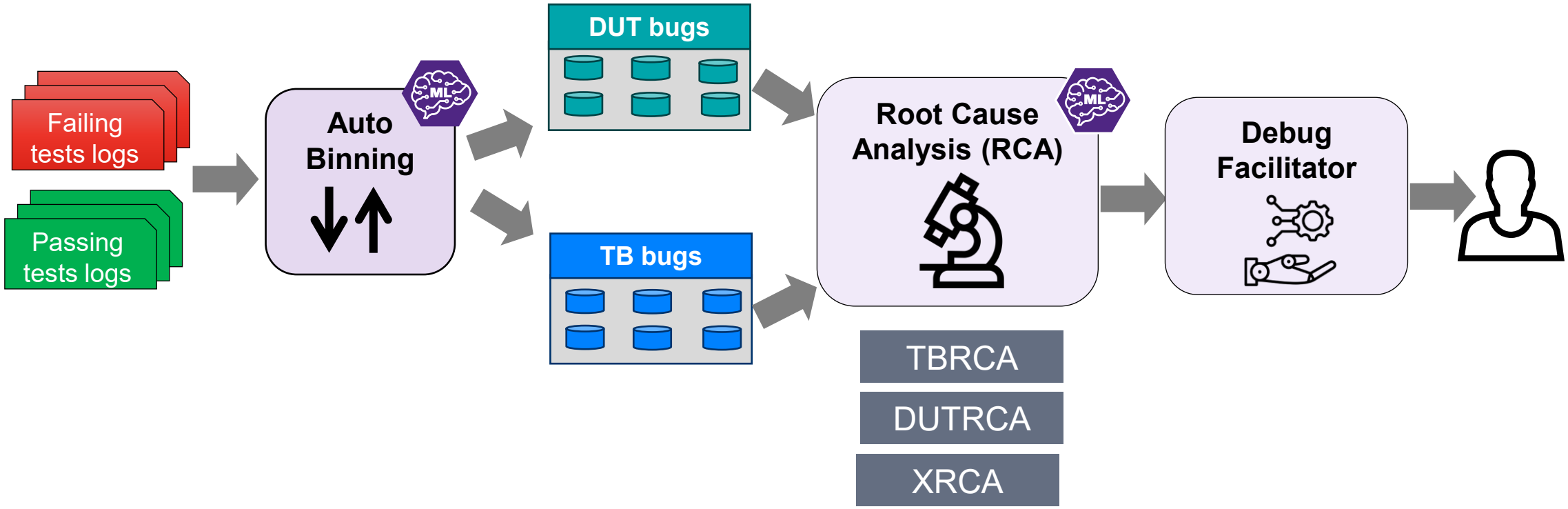
Regression Debug Automation (RDA) Motivation

Reduce engineering effort/TAT with AI and advanced RCA technologies



Verdi Regression Debug Automation (RDA)

From regression failures to root cause



RDA makes it easier to identify bugs in Test Bench (TB) and Device Under Test (DUT) through effective automation

VC Execution Manager Plugins for VSO.ai and RDA

AI/ML Regression Optimization, Debug Rerun & Facilitation

Unified VC Execution Manager with AI/ML Technologies

Optimized verification with reduced resources, risks and maintenance

Ease of Use and Data Analytics via Integration

- Faster rollout to project teams (save up to 12 months)
- Higher QoR of natively integrated solution
- Out-of-box, easy-to-customize indicators and data analytics for regression, coverage results

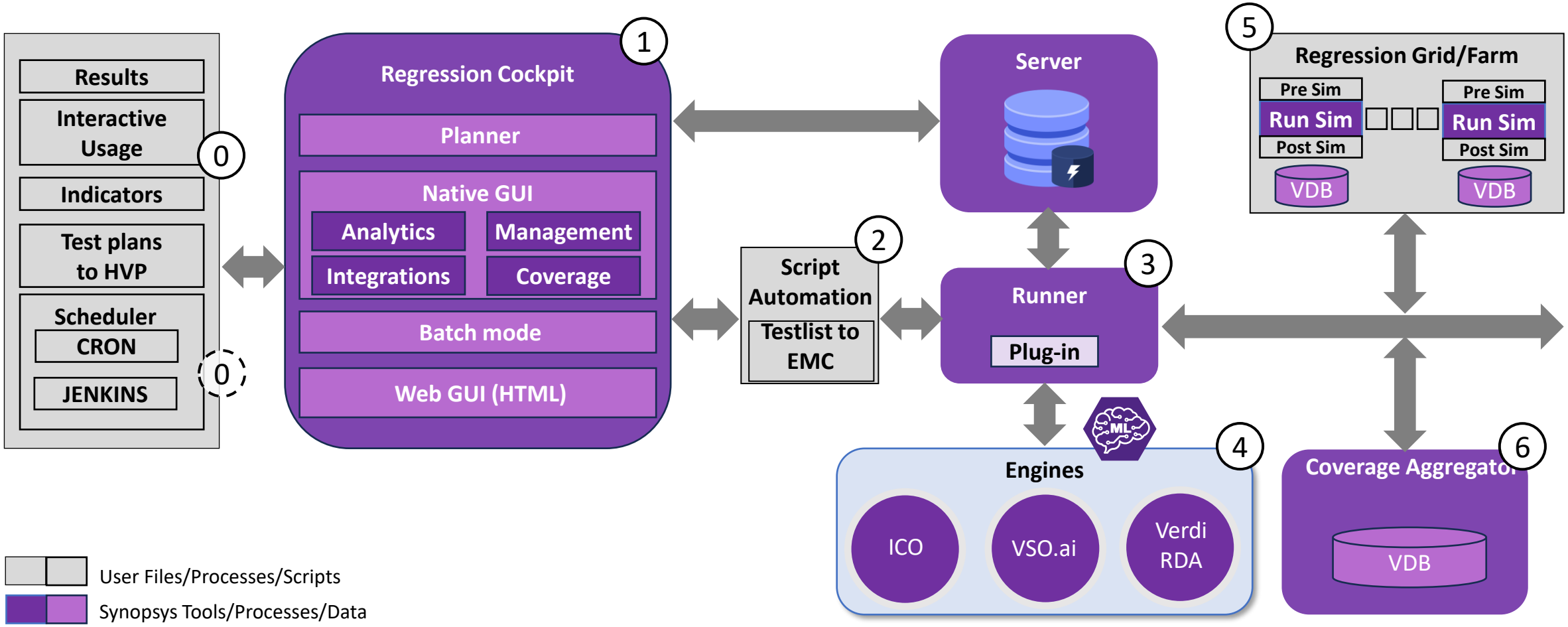
Reduced Risk, Simpler Maintenance

- Reduces incremental support overhead from weeks to days
- One DB/server (vs. multiple machines/DB/servers for hybrid systems with glue logic)
- Up to 2X reduced hardware costs

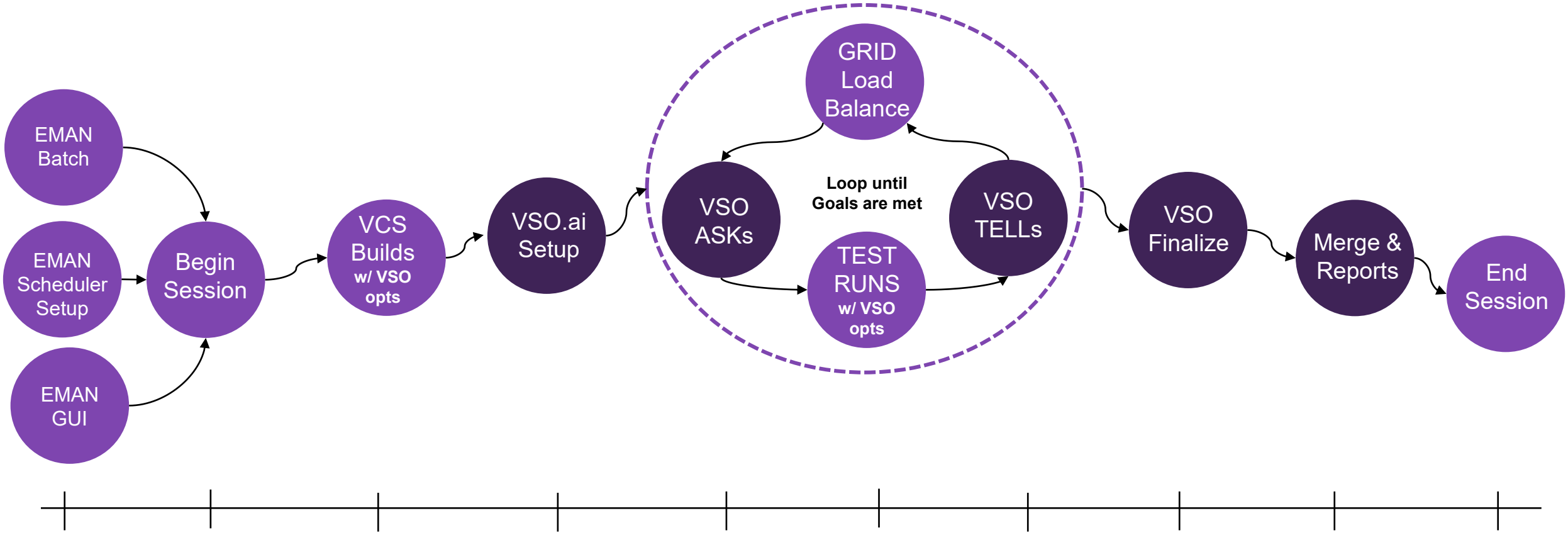
Regular AI/ML Rollouts and Updates

- 2-10X higher QoR with integrated ML and verification technologies when having full data access/control
- Immediate deployments of updates of VSO.ai, RDA, DPO, ICO and VC Formal rollouts (vs. multi-months of integration effort)

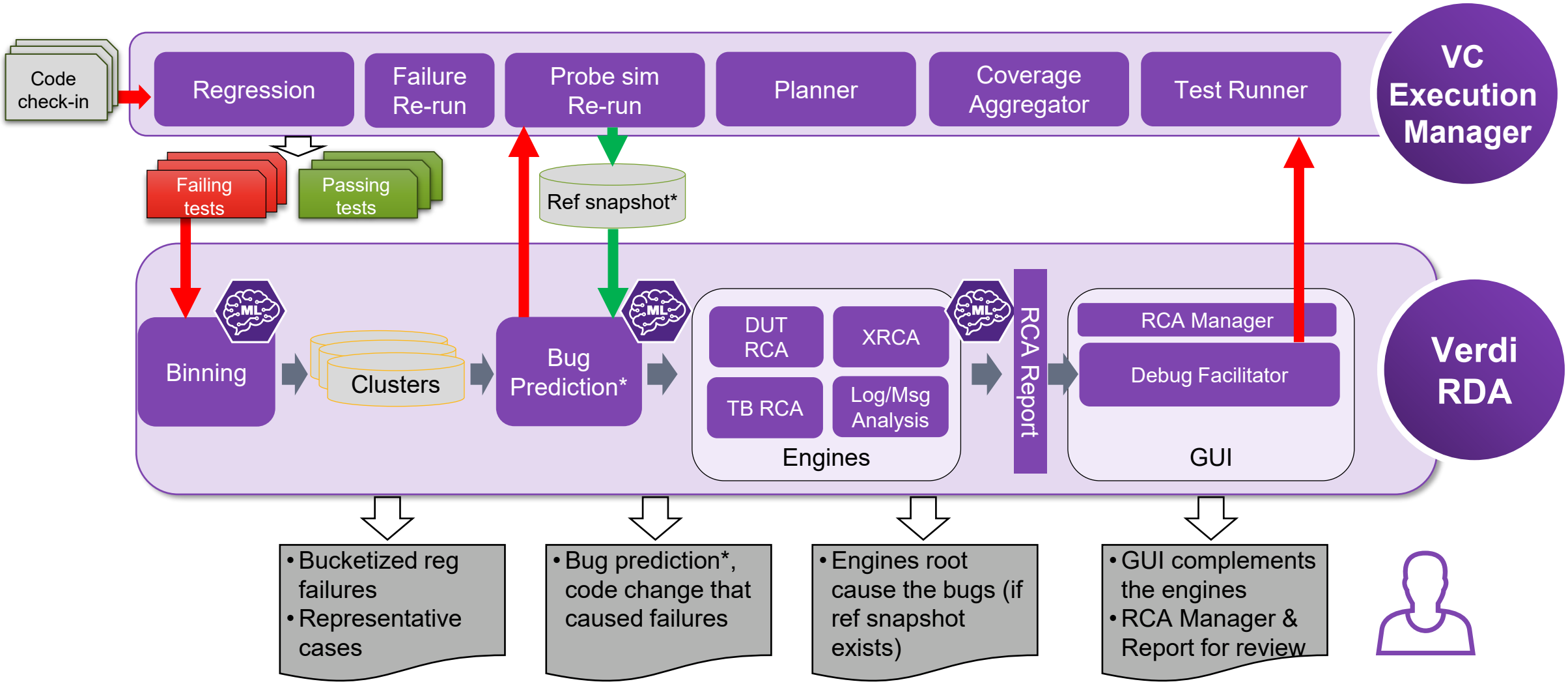
Integrated View: VC Execution Manager with VSO.ai & Verdi RDA



VC Execution Manager VSO.ai Plugin Handshake



ML-Based, Automated Regression Debug



* In early release

Conclusion

Verification quality, productivity is a constant concern. It's always possible to do more verification!

Integration of VC Execution Manager with VSO.ai and Verdi RDA offers a comprehensive solution improving productivity while accelerating coverage closure.

Questions

Thank You