



# Harnessing AI/ML for Superior Regression Management

Boost Verification Efficiency

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**SYNOPSYS**®



# 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

Source:  
BCG analysis



Integration and Automation Needed to Overcome Worker Shortage!

More Respins

Main Cause of Respins

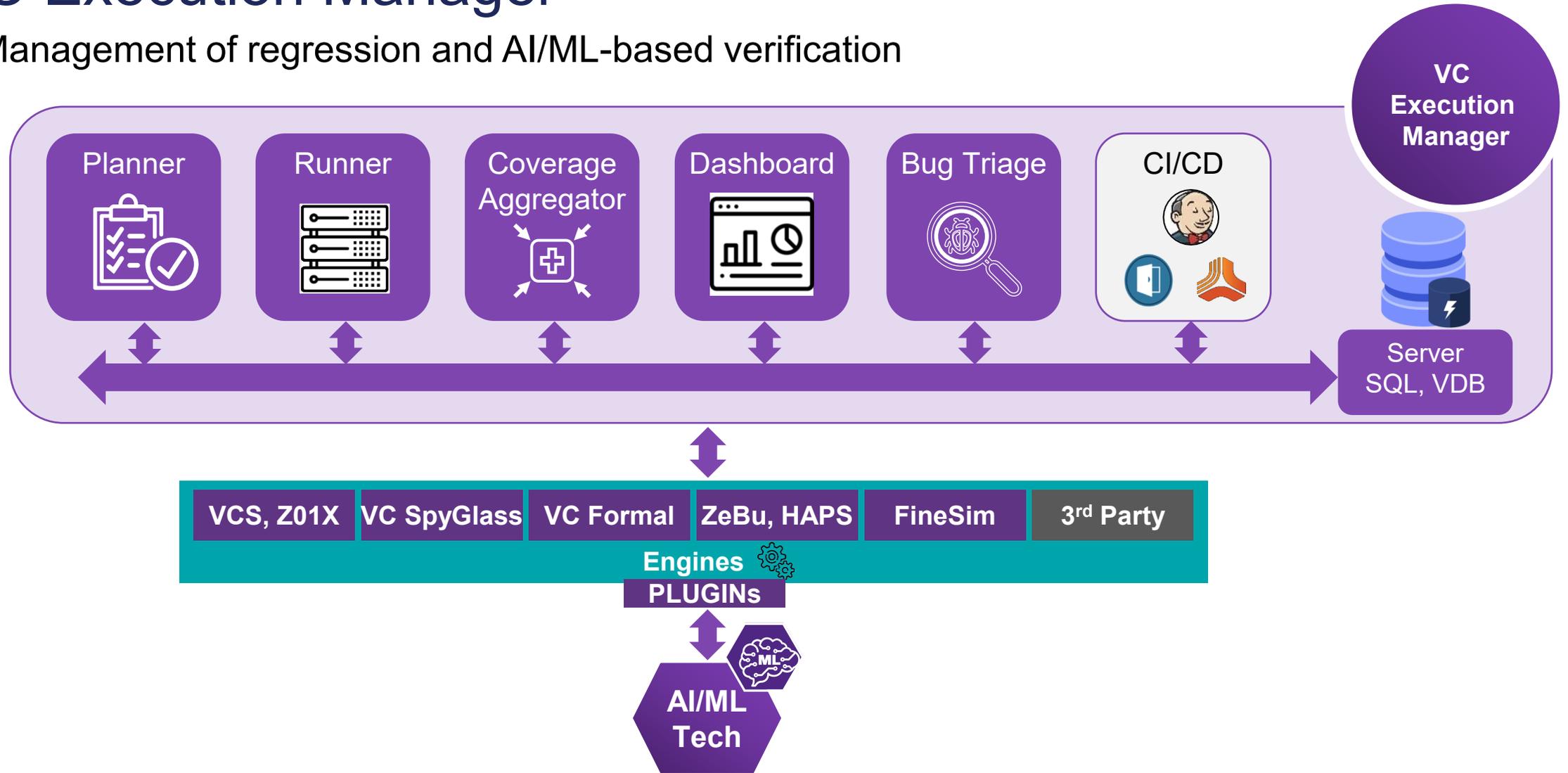
Need to Reduce TAT!

Source:Wilson Report

# What is VC Execution Manager (VMS)?

# VC Execution Manager

Management of regression and AI/ML-based verification

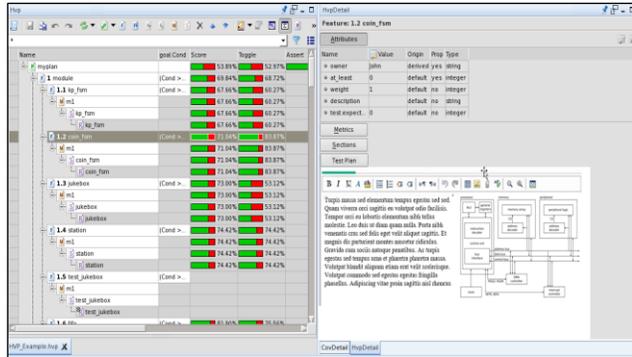


Complete Solution with Connections to AI/ML Verification

# VC Execution Manager - Key Modules

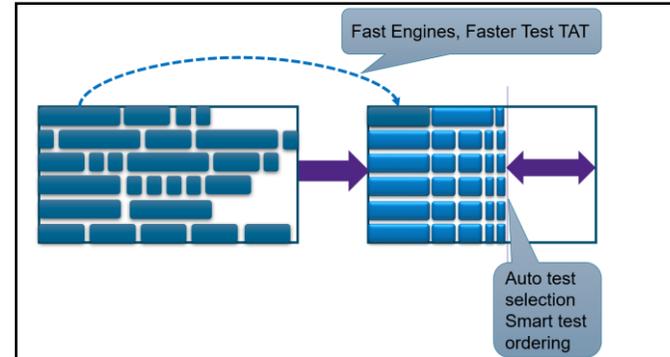
(Also referred to as VC Execman or EMAN)

## Planner



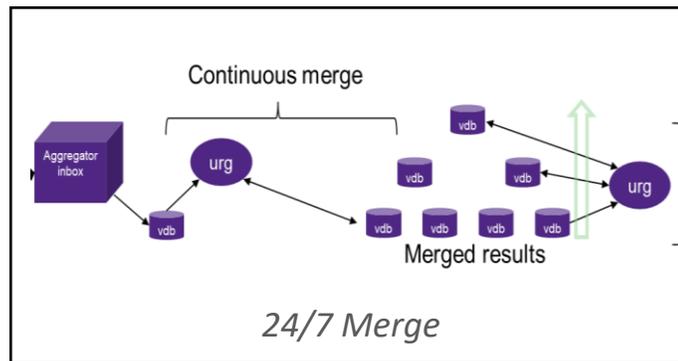
- Multi-user test scheduling/planning
- Supports change history and restore
- API for automated report generation and updates

## 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)**

The screenshot displays the Verdi Planner application interface. The main window shows a hierarchical tree view on the left and a detailed table of features in the center. The table columns include Name, owner, figure\_p, dueTo, Line, Cond, and FSM. A callout labeled "Plan Explore" points to the tree view. Another callout labeled "Project Detail" points to a sub-window showing a table with columns: Identifier, Attribute, Lim, Child, Limit. A third callout labeled "Richstring Viewer" points to a window showing a Richtext Viewer with a toolbar and a waveform diagram. A fourth callout labeled "Change History" points to a window showing a table with columns: Name, Score, Line, FSM, Condition. A fifth callout labeled "Plan Search" points to a window showing a table with columns: Name, Score, Line, FSM, Condition. A sixth callout labeled "Restore Items" points to a window showing a table with columns: Name, Score, Line, FSM, Condition.

Name	owner	figure_p	dueTo	Line	Cond	FSM
jukebox_top_plan			2025-09-30	91.11%	46.84%	74.
1FT_1: feature1	Will	<p><i>...	2025-08-29	91.34%	46.96%	74.
1.1jukebox_CD:vita		<p><i>...	2025-08-29	91.34%	46.96%	74.
2FT_1: feature2	Will		2025-07-31	91.03%	46.78%	74.
2.1jukebox_coil:Will			2025-07-31	91.03%	46.78%	74.
2.1.1FT_1: Will			2025-07-31	90.51%	46.65%	74.
2.1.2FT2: c:Will			2025-07-31	91.03%	46.58%	76.
2.1.3jukebo:Will			2025-07-31	91.34%	46.96%	74.
3FT_1: feature3	John		2025-09-26	91.09%	46.84%	74.
3.1jukebox_sta:John			2025-09-26	91.09%	46.84%	74.
3.1.1FT_1: John			2025-09-26	89.66%		66.
3.1.2FT2: s:John			2025-09-26	89.66%		66.
3.1.3jukebo:John			2025-09-26	91.03%	46.78%	74.
3.1.4jukebo:John			2025-09-26	91.34%	46.96%	74.

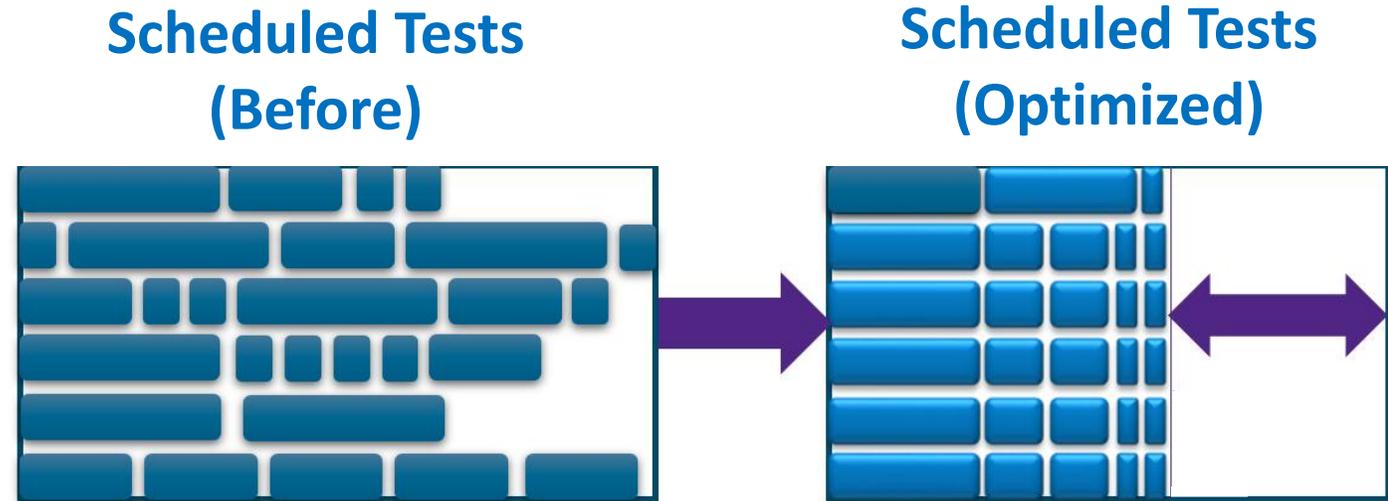
Identifier	Attribute	Lim	Child	Limit
FT2	<All>		FT_1,com...	
FT_1	<All>		<All>	
common	<All>		common,...	

Name	Score	Line	FSM	Condition
test_jukebox	70.50%	90.85%	73.39%	47.25%
cd1	100.00%	100.00%		
fifo1	65.99%	88.24%		43.75%
jb1	77.45%	96.00%	100.00%	36.36%
st0	69.12%	89.09%	71.43%	46.85%
st1	70.02%	90.01%	71.43%	47.75%

# Optimize Regressions

## Runner

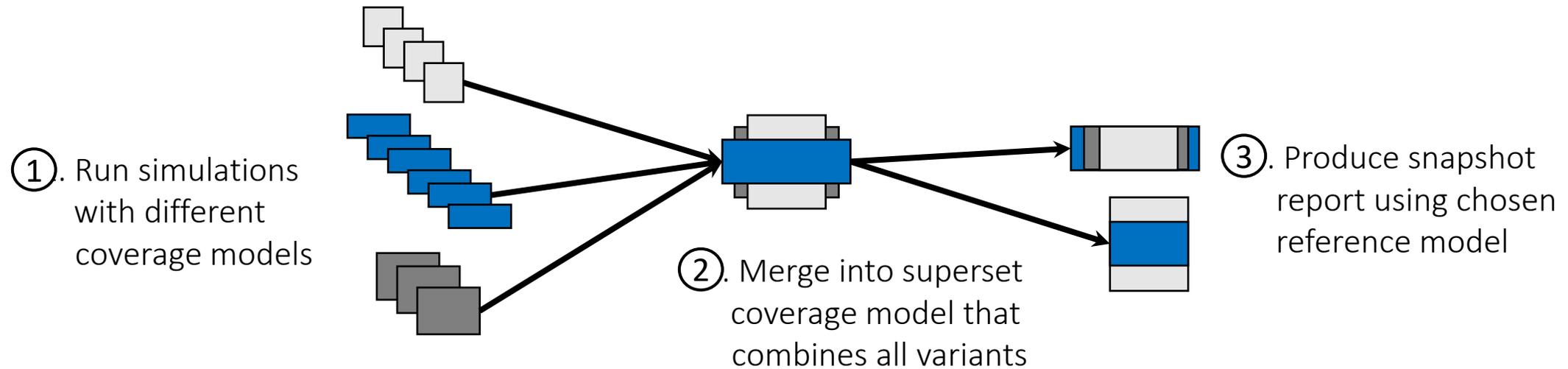
- Reduce regression TAT and resources
- Schedules tests based on history to eliminate long tail
- Improves compute resources utilization, reducing costs



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

The screenshot displays the 'VeriVidCoverage1' web interface. It features a top navigation bar with 'Home', 'bart2', 'modes', 'session\_thielges\_20180613\_173217', and 'ala test\_add\_sub'. Below this, there are sections for 'Session Attributes', 'Saved session files', and 'Filter Filter'. A table lists test runs with columns for Name, Status, Start Time, RTIME(s), Hostname, Log File, Comment, Cndline, First Error, and Test Trend. The main area shows a hierarchy of test groups with their respective scores and instance counts. A detailed view of a specific test group is shown below, including a 'Cover Group' table and a 'Bin Name' table.

Engineer View

VC  
Execution  
Manager  
API

The screenshot shows the Synopsys Execution Manager dashboard. At the top, there is a trend chart with four data series: /Wishbone:Assert (green), /Wishbone:Cmd (blue), /Wishbone:Group (orange), and /Wishbone:Line (yellow). Below the chart is a table with columns: Name, #Sessions, Latest Session, Tot, P, F, W, A, U, Summary, Created, Test Trend, and Plan Trend. The table lists various test runs with their respective metrics and trends.

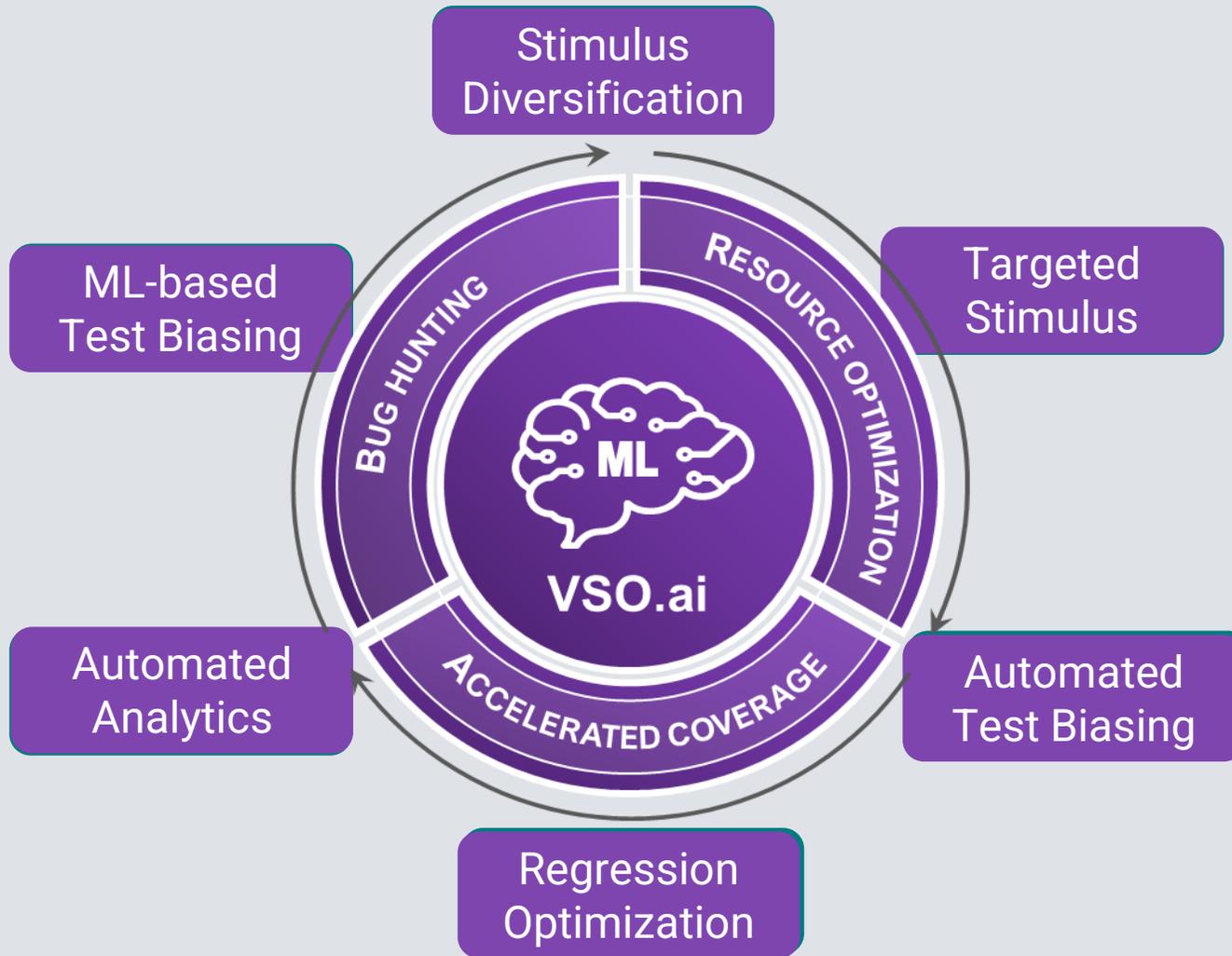
Name	#Sessions	Latest Session	Tot	P	F	W	A	U	Summary	Created	Test Trend	Plan Trend
modes	42	session_thielges_20180613_135341	7	3	4	0	0	0	43% 57%	2018/01/17 23:37:50		
etrend	161	session_thielges_20180613_111627	10	10	0	0	0	0	100%	2018/02/13 14:40:39		
alu_uvm	137	session_thielges_20180612_145759	7	3	4	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 85%	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		

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*

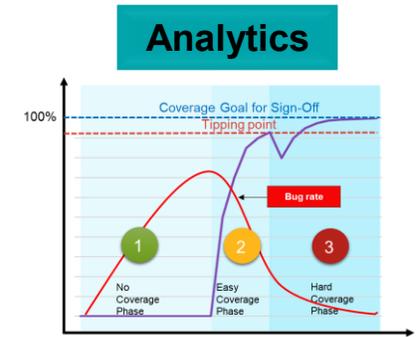
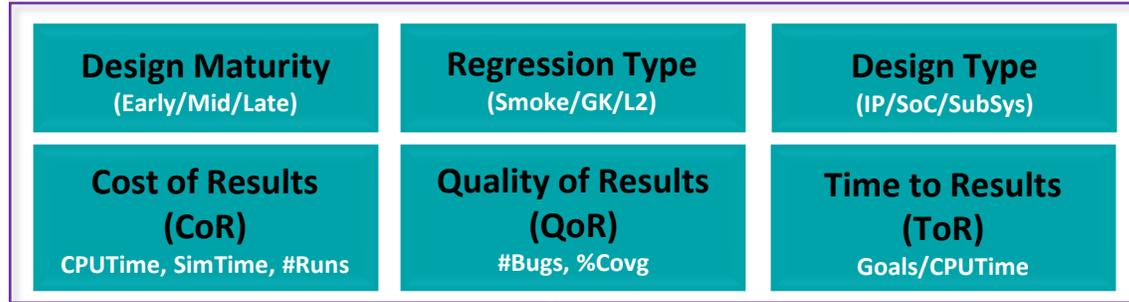
**Productivity Boost:** *Advanced dashboards, metrics to analyze to converge on goals*

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

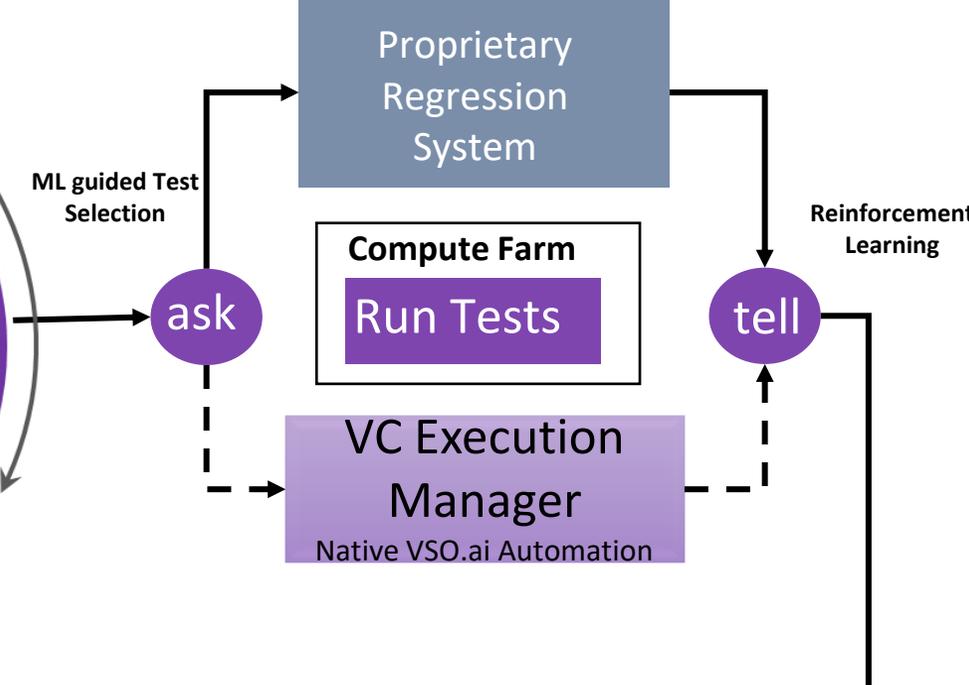
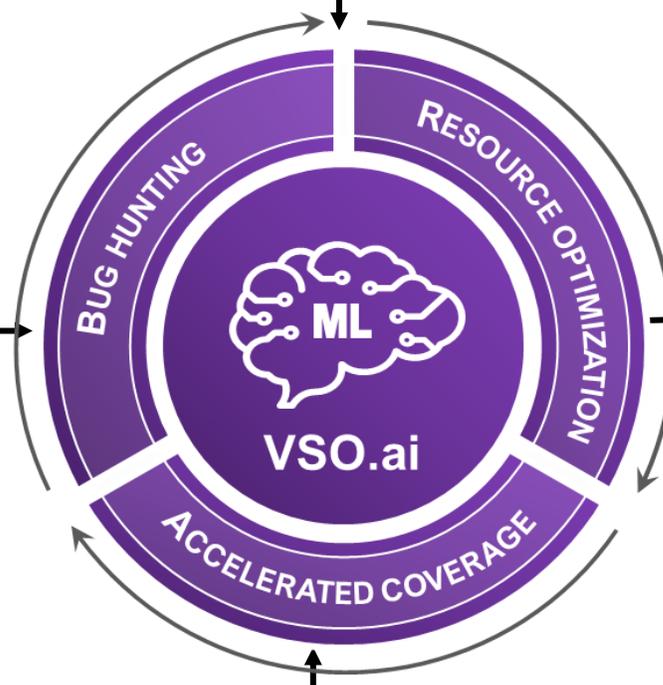
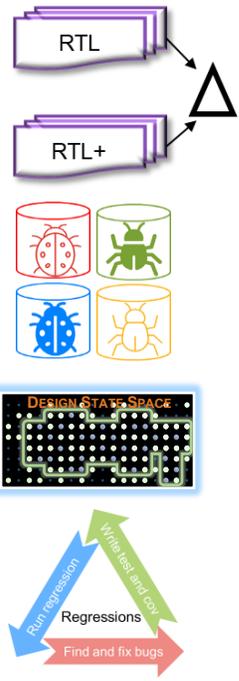
**Higher Verification Efficiency:** *High ROI tests to achieve coverage targets*

# VSO.ai: Verification Space Optimization

## Verification Objectives

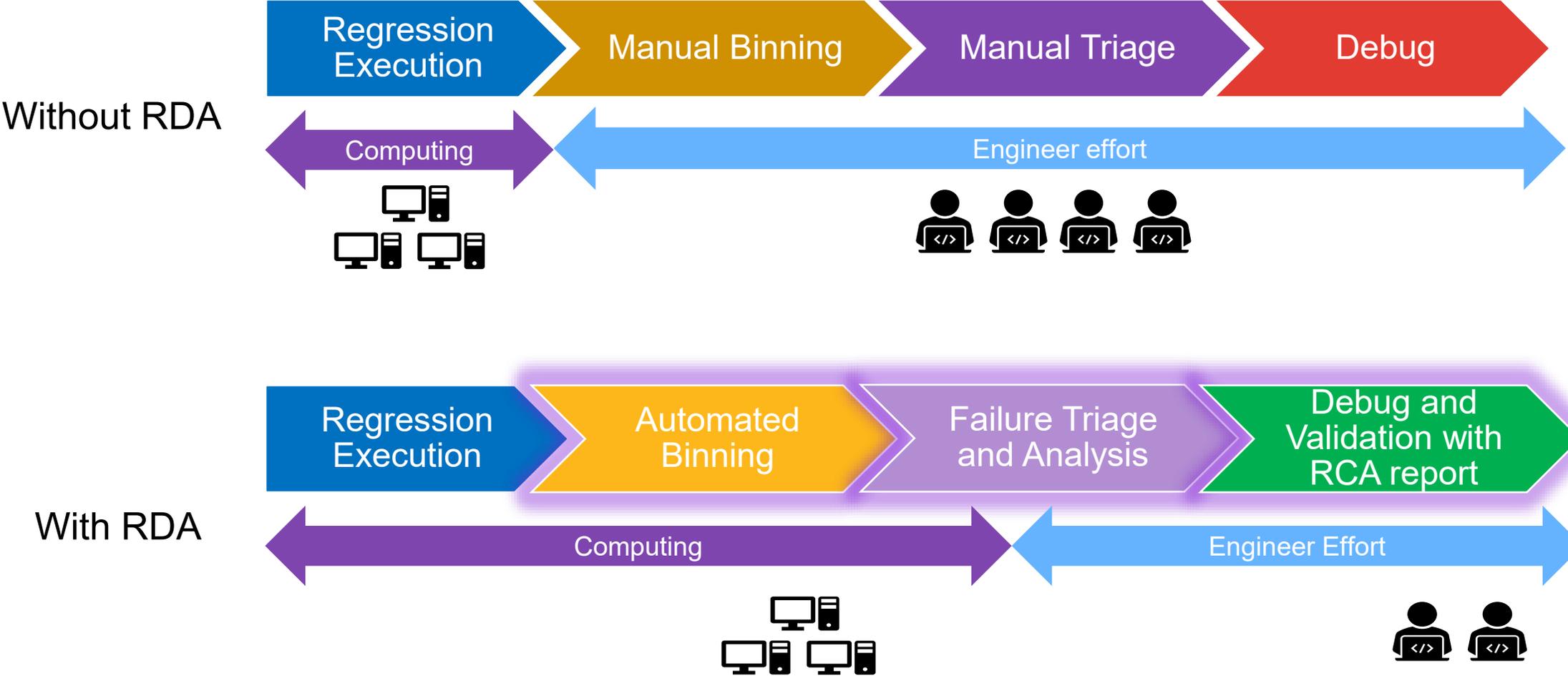


## Verification Aspects



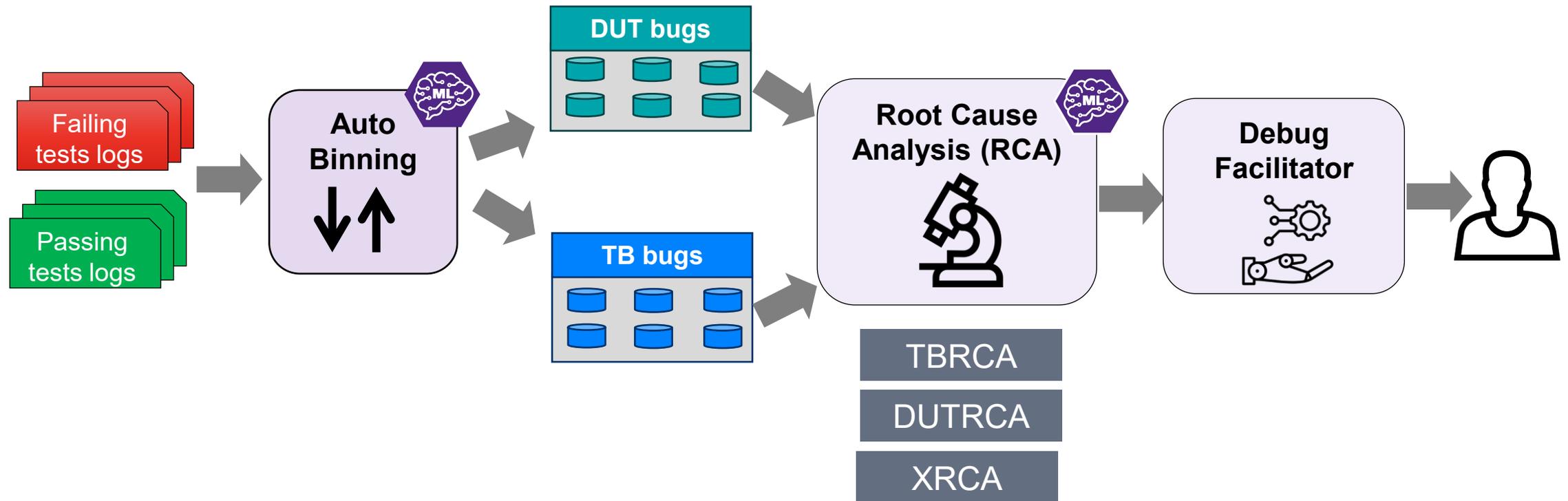
# Regression Debug Automation (RDA) Motivation

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

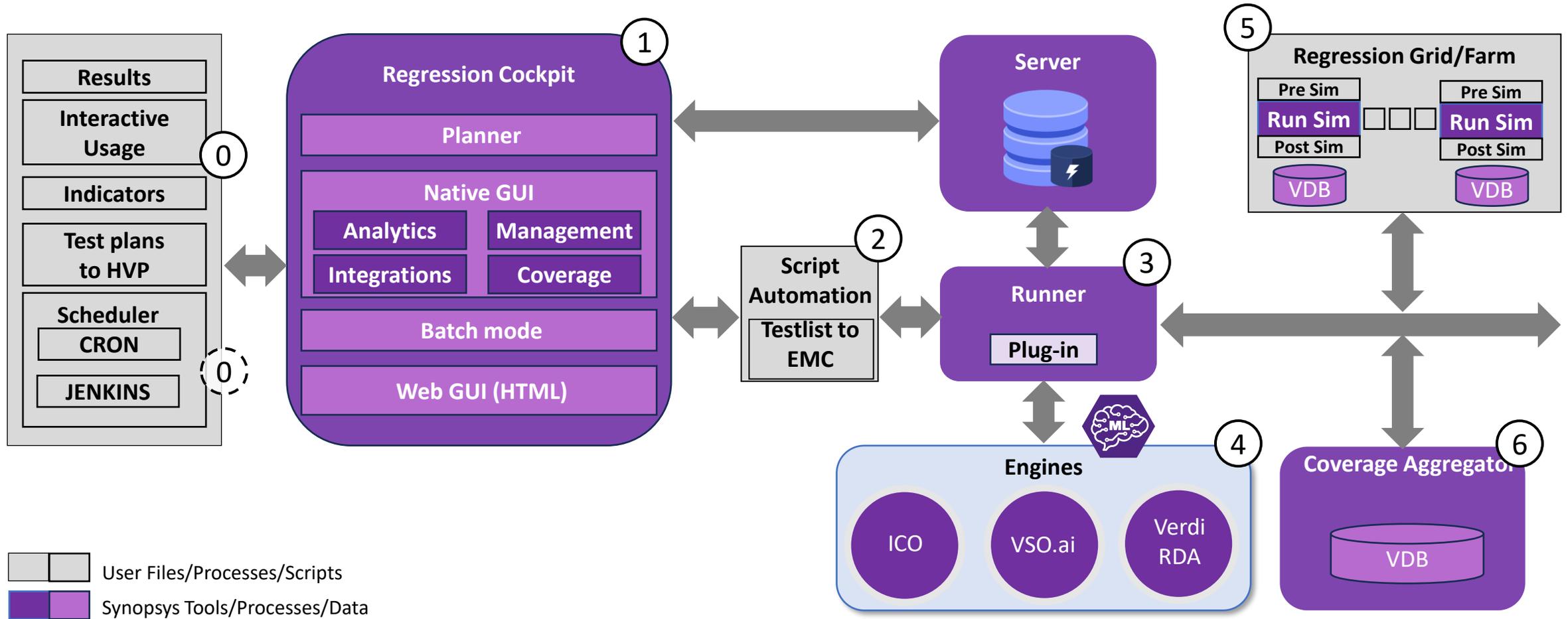
## Reduced Risk, Simpler Maintenance

- 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

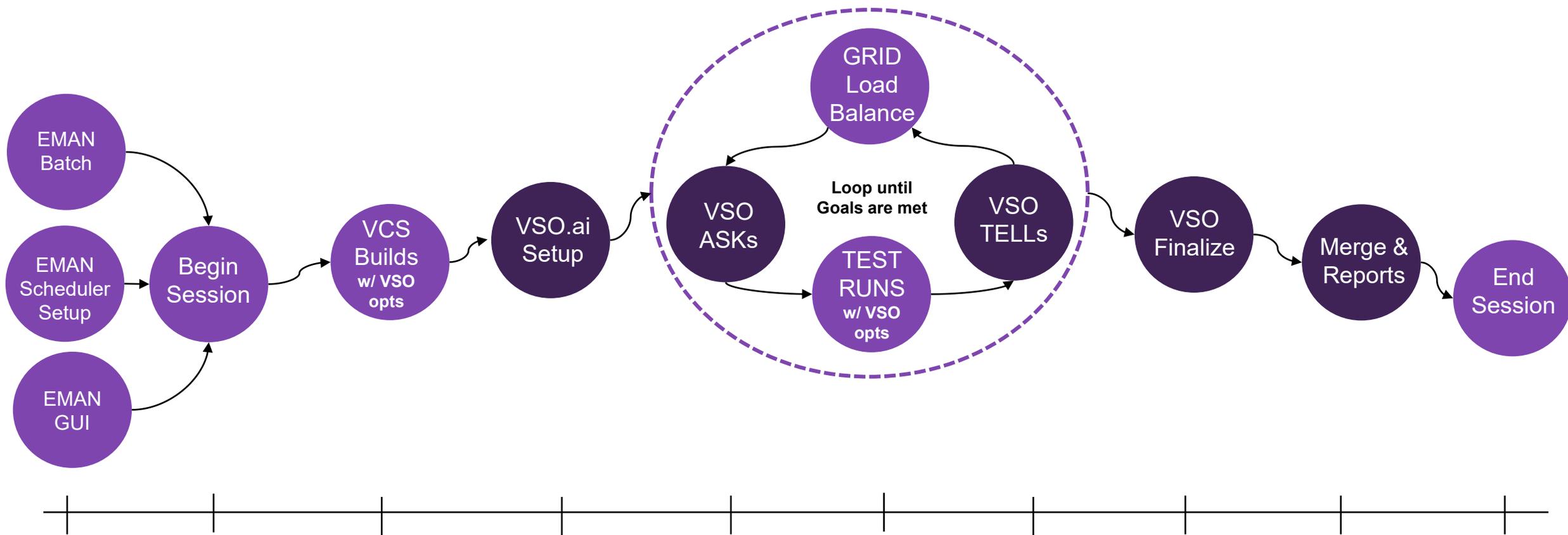
## Regular AI/ML Rollouts and Updates

- 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)

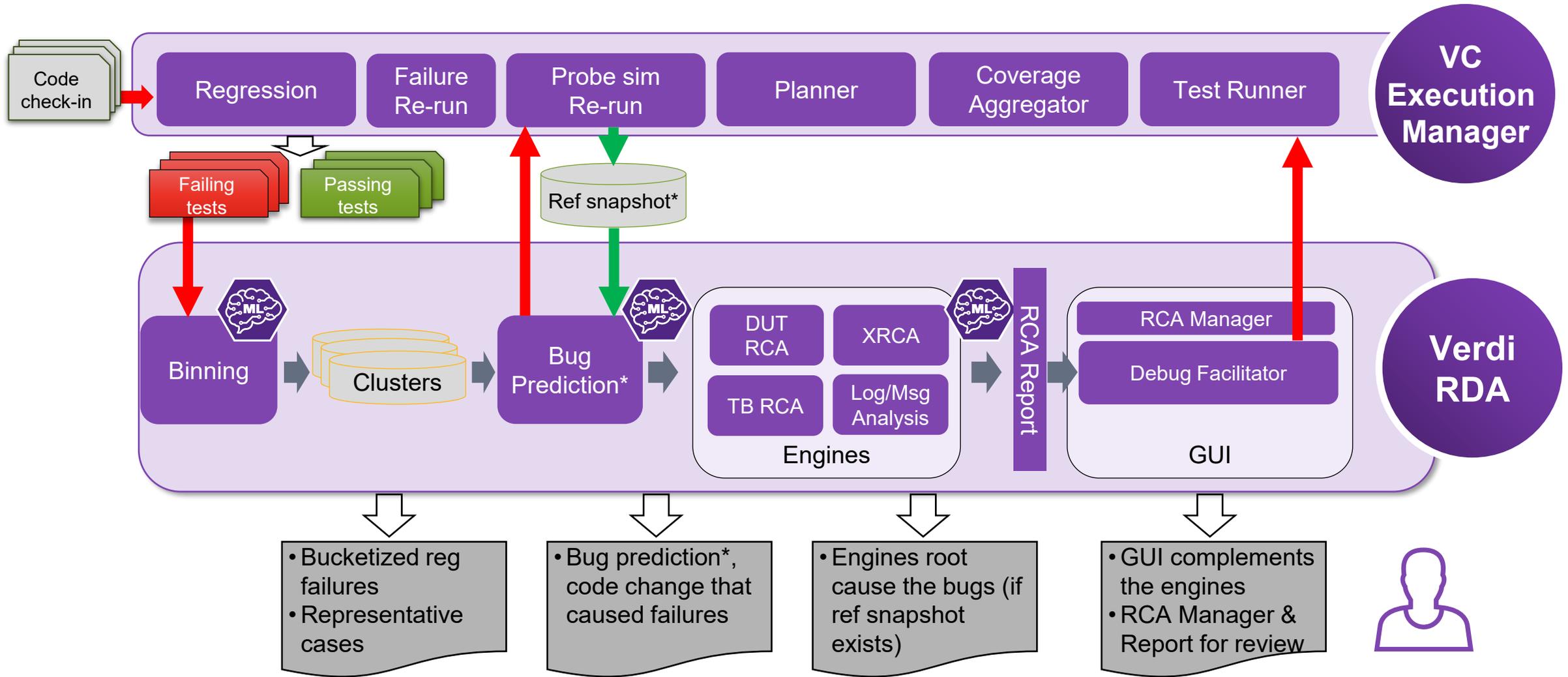
# Integrated View: VC Execution Manager with VSO.ai & Verdi RDA



# VC Execution Manager VSO.ai Plugin Handshake



# ML-Based, Automated Regression Debug



# 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