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IDT INNOVATIVE DEFENSE TECHNOLOGIES

Innovative Defense Technologies' Automated Test and ReTest (ATRT) Integrated with an Architecture Analysis and Design Language (AADL) Model

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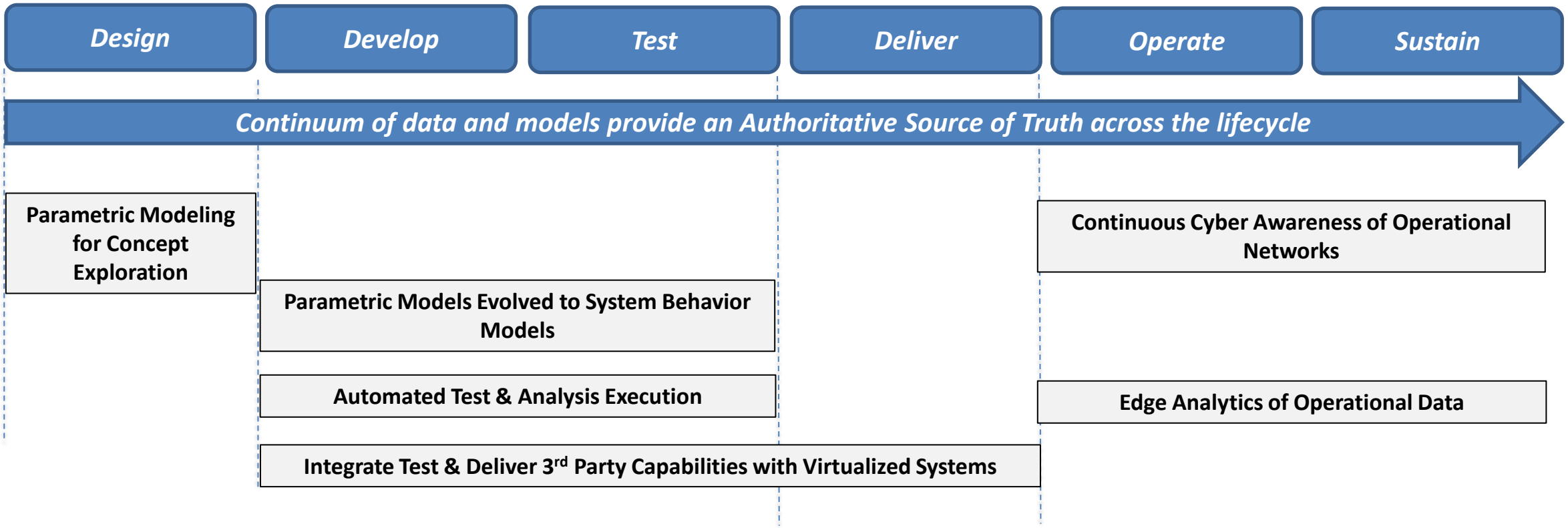
U.S. Patent Numbers: 8,826,084; 9,135,714; 9,983,965; 10,572,821; 10,678,666; 10,929,258

This work was done under U.S. Army Combat Capabilities Development Command Aviation & Missile Center contract W911W6-19-C-0008.

IDT's Digital Engineering Thread Capability



Aligned with OSD's Digital Engineering Strategy

1. Formalize Development, Integration and Use of Models
2. Provide an Authoritative Source of Truth (AST)
3. Incorporate Technological Innovation
4. Establish Infrastructure and Environments
5. Transform Culture / Workforce

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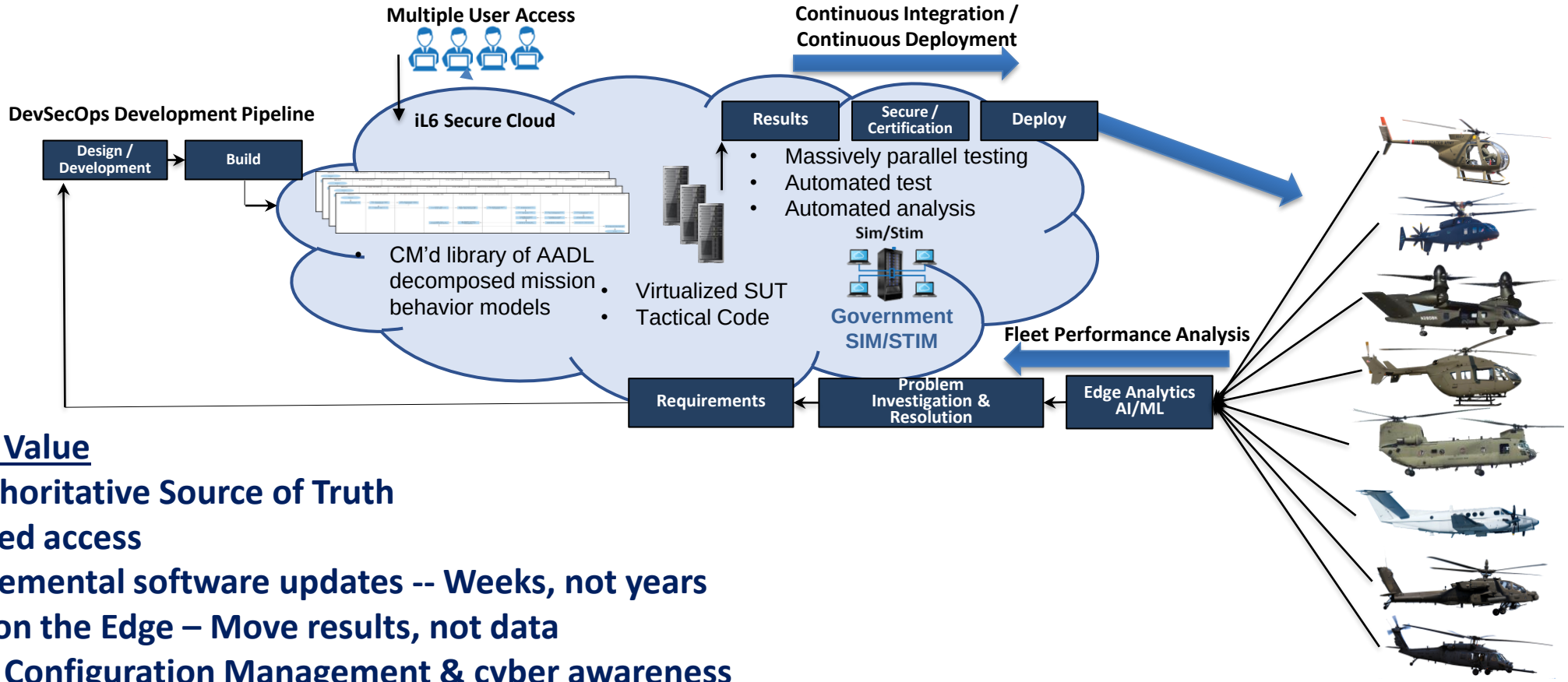
IDT's Notional U.S. Army System of Systems Ecosystem

- PEO Aviation
- OT&E Communities
- Prime Contractors
- Combat Capability Development Command (DEVCOM)
- Operational bases



Compelling Value

- Single Authoritative Source of Truth
- Cloud-based access
- Rapid incremental software updates -- Weeks, not years
- Analytics on the Edge – Move results, not data
- Persistent Configuration Management & cyber awareness

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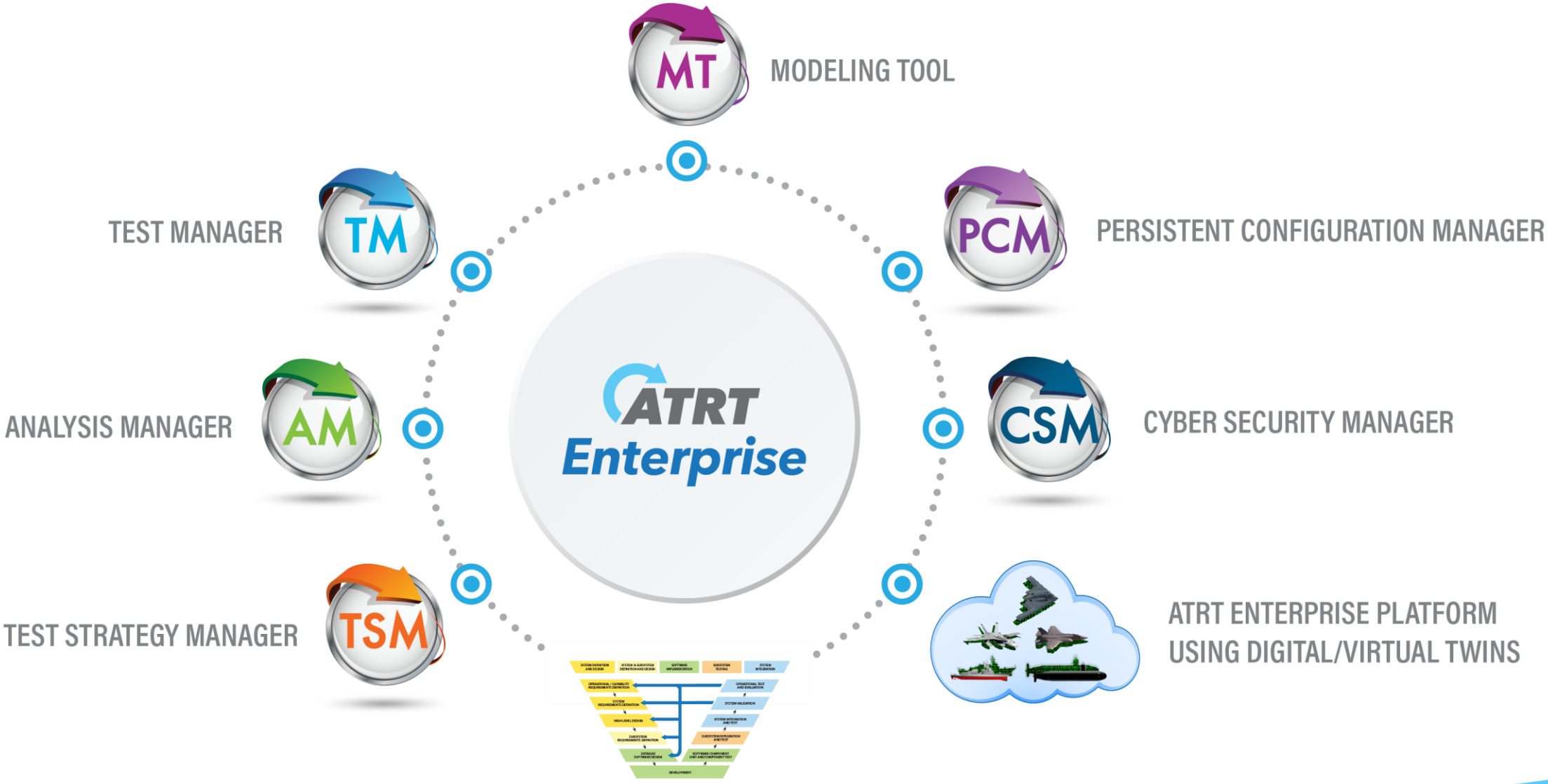
IDT's Automated Test and ReTest (ATRT) Enterprise Toolset



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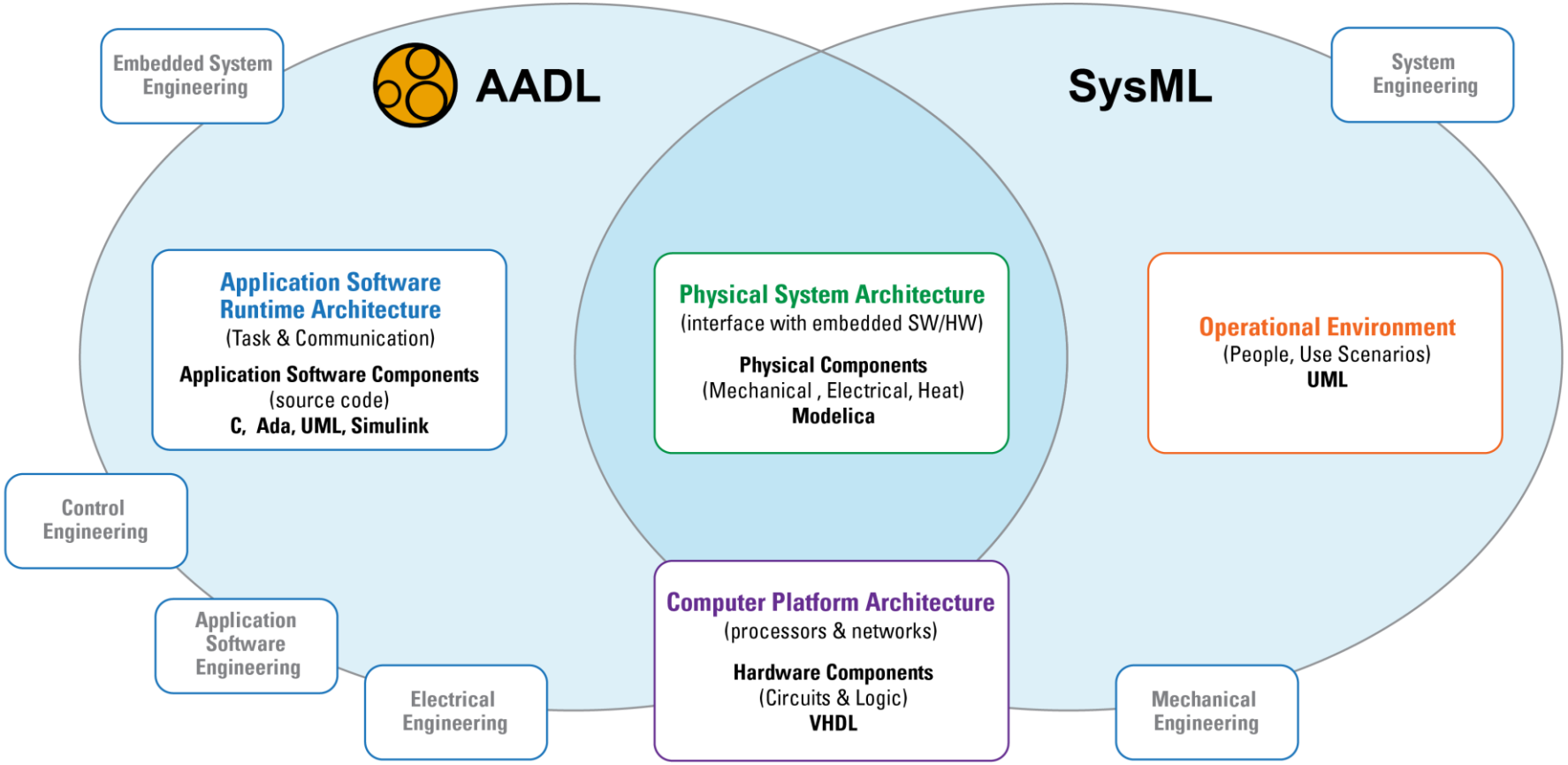
IDT's ATRT Enterprise Tool's Tactical Value Proposition

- ATRT Enterprise identifies requirement & software faults earlier in the development & test process
  - By decomposing requirements in a mission-based context
  - By applying automated test and analysis
  - By leveraging massively parallel testing using virtualized systems
- ATRT optimizes a cloud-based enterprise digital ecosystem

CAPABILITY DEPLOYED TO WARFIGHTERS FASTER WITH FEWER DEFECTS

Cooperative Engineering of Systems

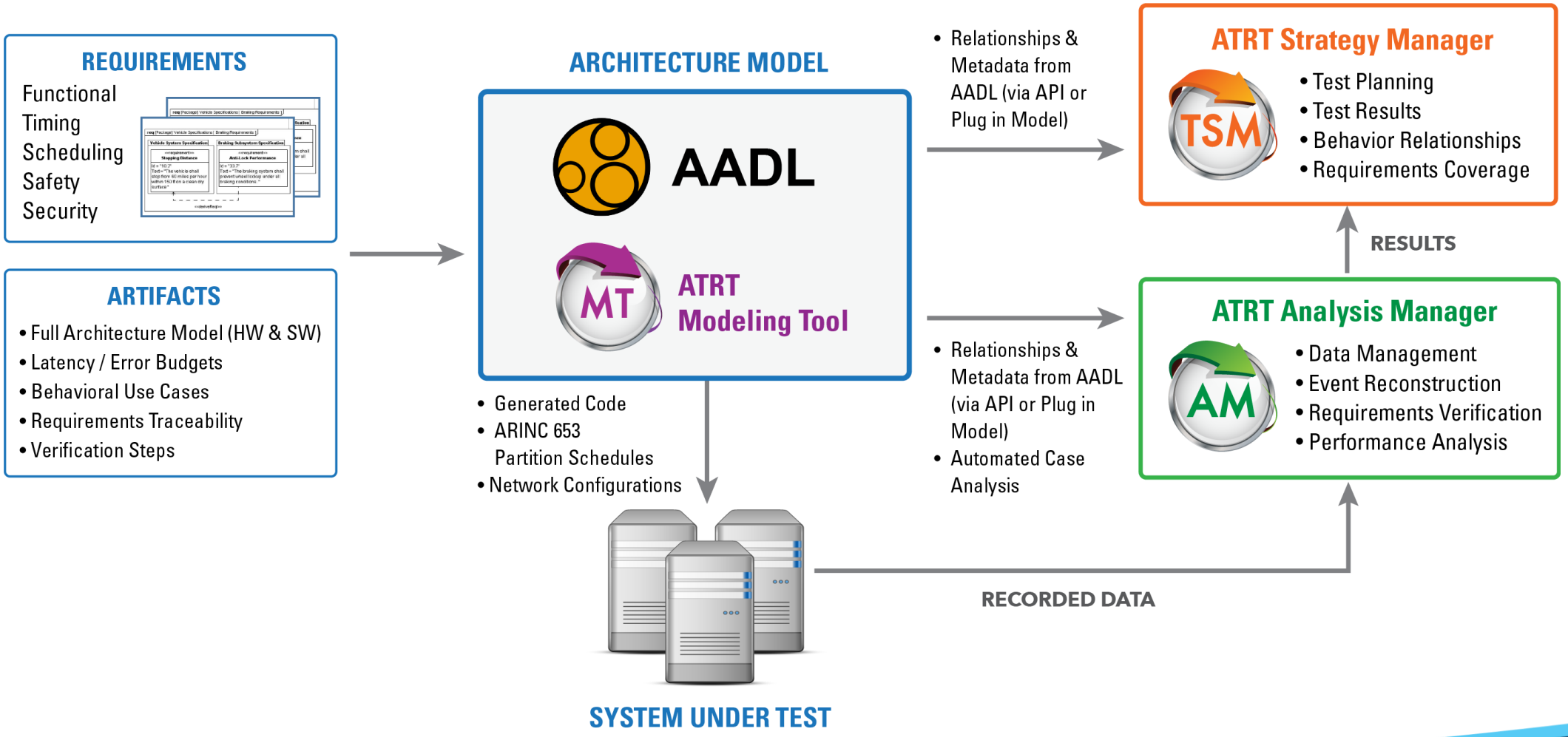


Key elements of physical system are captured as component abstractions & properties relevant to embedded software system analysis

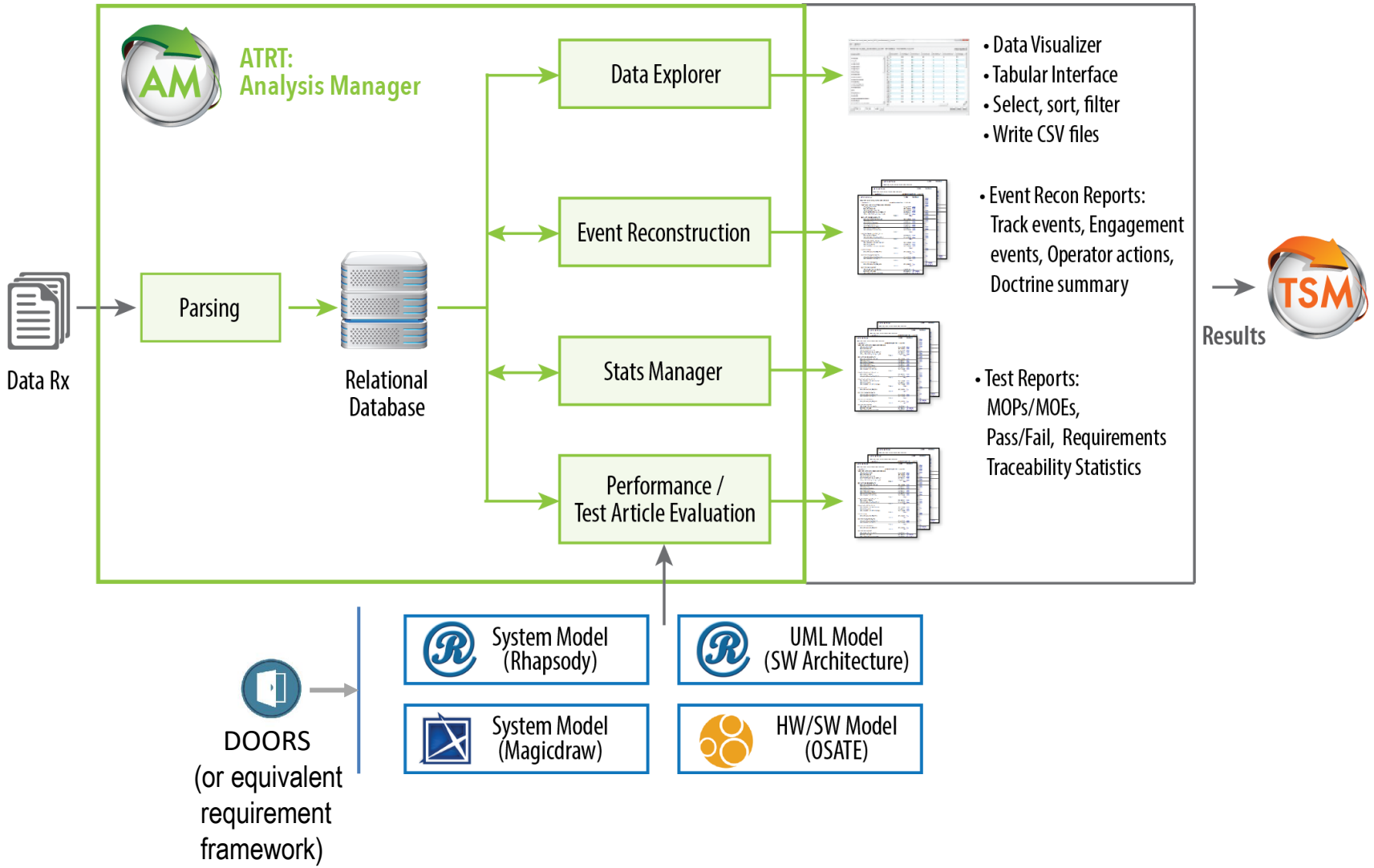
Benefits of Architecture-centric Engineering

- Reduce risks
  - Analyze system early and throughout life cycle
  - Understand system wide impact
  - Validate assumptions across system
- Increase confidence
  - Validate models to complement integration testing
  - Validate model assumptions in operational system
  - Evolve system models in increasing fidelity
- Reduce cost
  - Fewer system integration problems
  - Fewer validation steps through use of validated generators

ATRT / AADL Model Based Testing



ATRT MBSE Block Diagram



IDT's Analysis Manager supports automated test and analysis of multiple platforms including:

- AEGIS (IWS1)
- AEGIS BMD (MDA)
- SPY-6
- MQ-25
- CCS
- LCS SUW MP
- Link-16
- F-16
- F/A-18
- F-35
- Tomahawk

IDT/SEI ATRT & AADL Summary

Characteristics that can be leveraged from AADL to ATRT elements

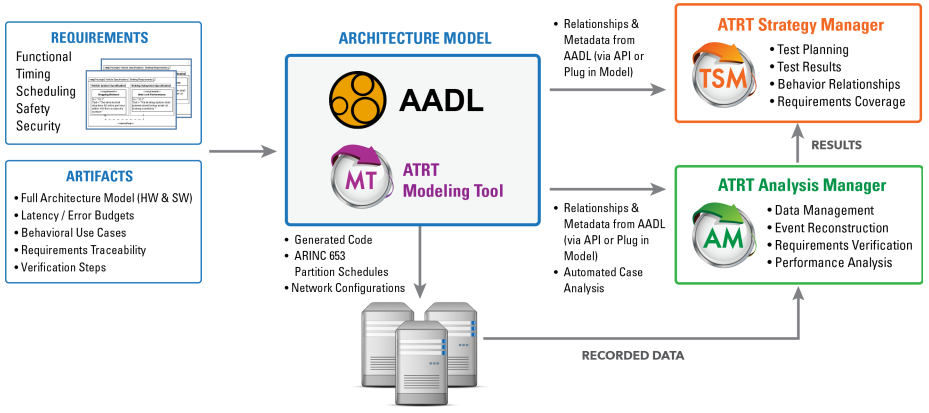
AADL Feature/Property Implemented	Ph-I with Composite Model	Ph-II with Composite Model	Ph-II UAV Platform/Testbed
End to End flow (of data, events, or both)	X		X
Latency (between/through logical components, execution of threads)	X		X
Modes attached to threads	X		X
Communication bus bandwidth (worst case loads, scheduled loads)	X		X
Power bus capacity (power)	X		X
System & component weight			X
Resource utilization of bound loads (memory, CPU)	X		X
Error flow (ensure error types are handled/mitigated)	X		X
Functional hazard analysis		X	X
Fault tree analysis		X	X
Security (confidentiality)		X	-
Data access & Subprograms		X	X

ATRT/AADL Project as Demonstrated

- Verification of system requirements
  - SEI built an AADL model of a UAV system
  - Data collected by executing the simulated UAV system
  - Data verified / validated using ATRT tools
    - Analysis is performed by comparing collected data to the AADL Model

- Areas covered during the demo
  - AADL SUT model with three concurrent sensor threads
  - The HW/SW platform & testbed build out of AADL design
  - ATRT Analysis Manager applied to recorded data
  - ATRT TSM dashboard integrates automated test results with model relationships

System Under Test (SUT) Testbed



MBT via ATRT

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IDT's Partners and History

- **Six Patents Awarded**
- **More than $280M Invested**
- **More than 200 Active/Completed Projects**
  Including AEGIS, F-16, Minuteman III, F-35, AN/USQ.225, Tomahawk, FA-18, E-2D, SM-6, SM-2, MQ-25, JMPS, TTWCS, Link-16, and AADL
- **No tool licensing fees for the government**
- **Seven Active SBIR Phase III contracts**

Questions & Discussion

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