MODULAR OPEN
SYSTEMS APPROACH

A Modular Open System Approach to a Digital Autonomy Testbed

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Introduction

MODULAR OPEN SYSTEMS APPROACH

Future combat vehicles and autonomy are complex systems and are difficult to fully evaluate on a physical test range.

A versatile MOSA modeling and simulation digital autonomy testbed is the answer.

Simulation-based analysis provides real answers to real problems for next generation combat vehicles.

Torch Technologies, Inc. Autonomy Testbed

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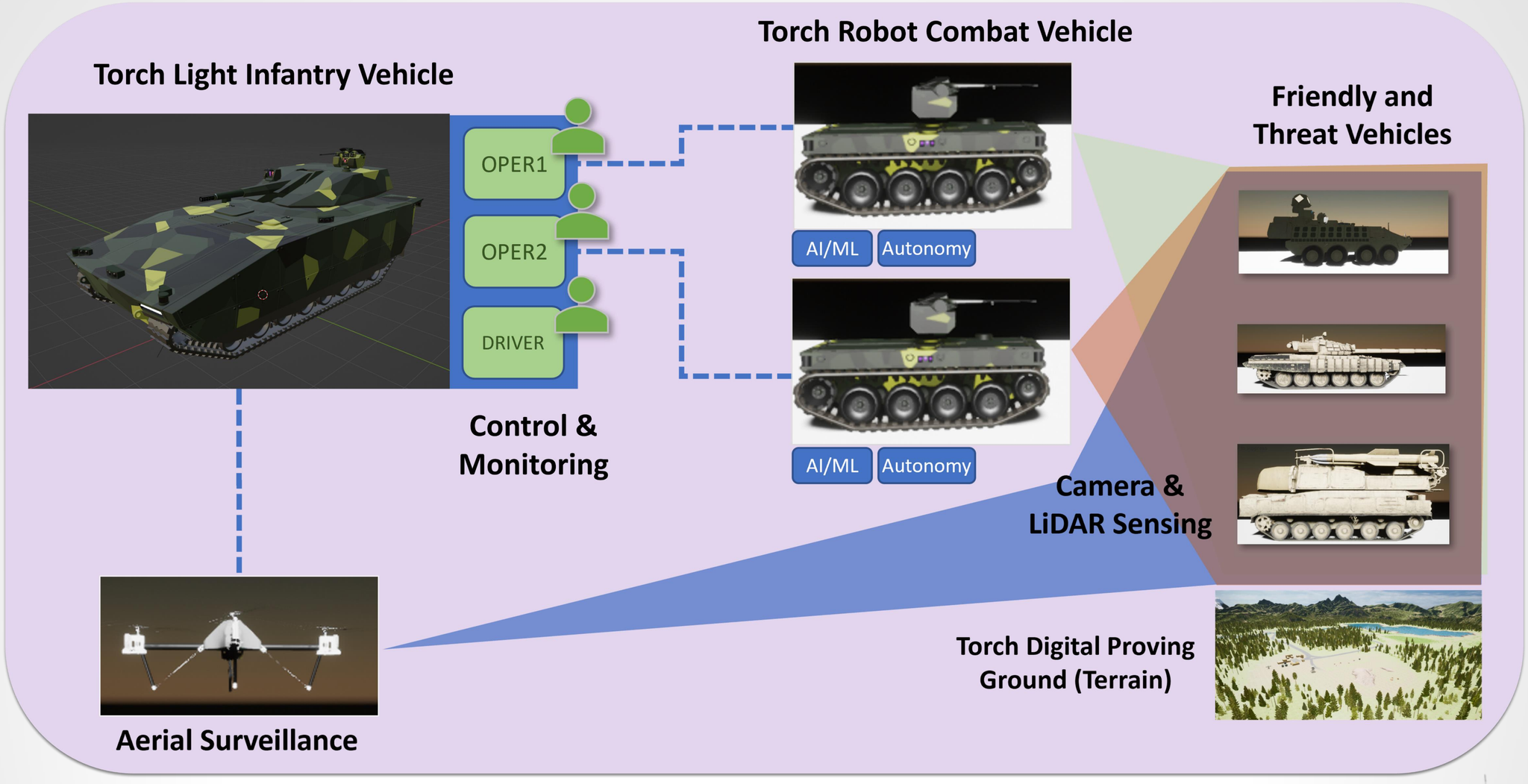

Modular and Scalable Design

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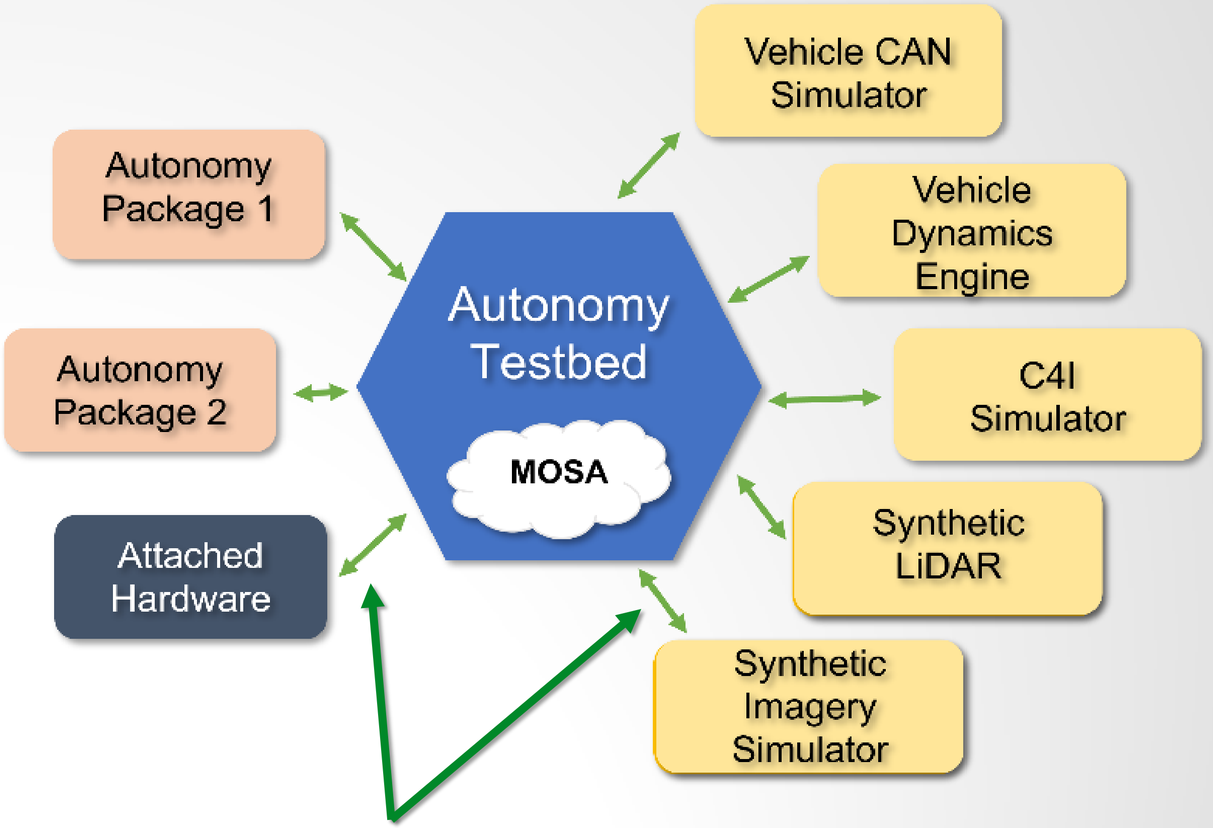
- MOSA node-based design with a standardized data transportation protocol.
- Interoperability independent of the technology employed.
- Reduces the scope of development.
- Results in a plug-in-play environment.



Universal protocol for node-to-node data transportation

Modular and Scalable Design

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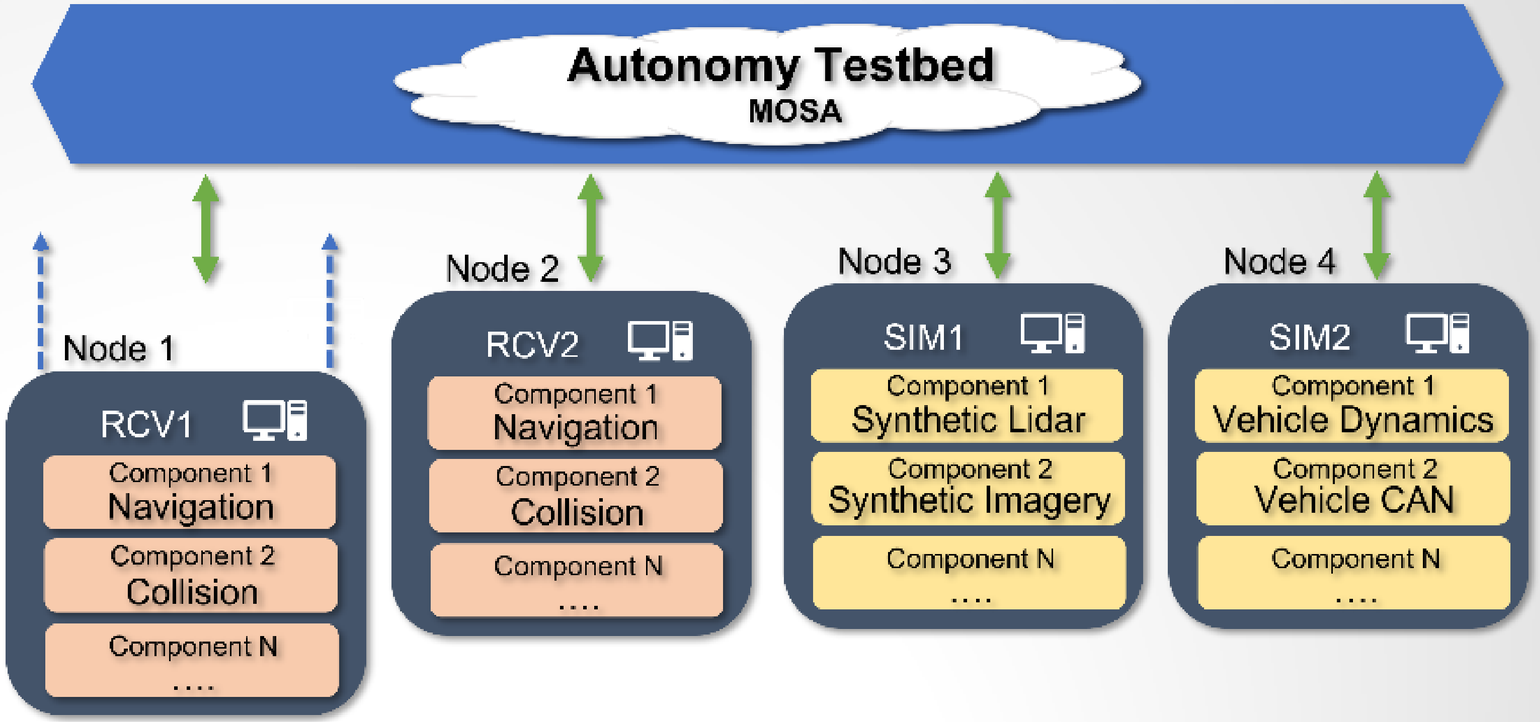
- Distributed testbed utilizing standardized data protocol.
- Rapid reconfiguring of testbed for differing mission scenarios.
- Reusable and cost saving.



Scalable distributed testbed infrastructure.

Torch Autonomy Testbed Example

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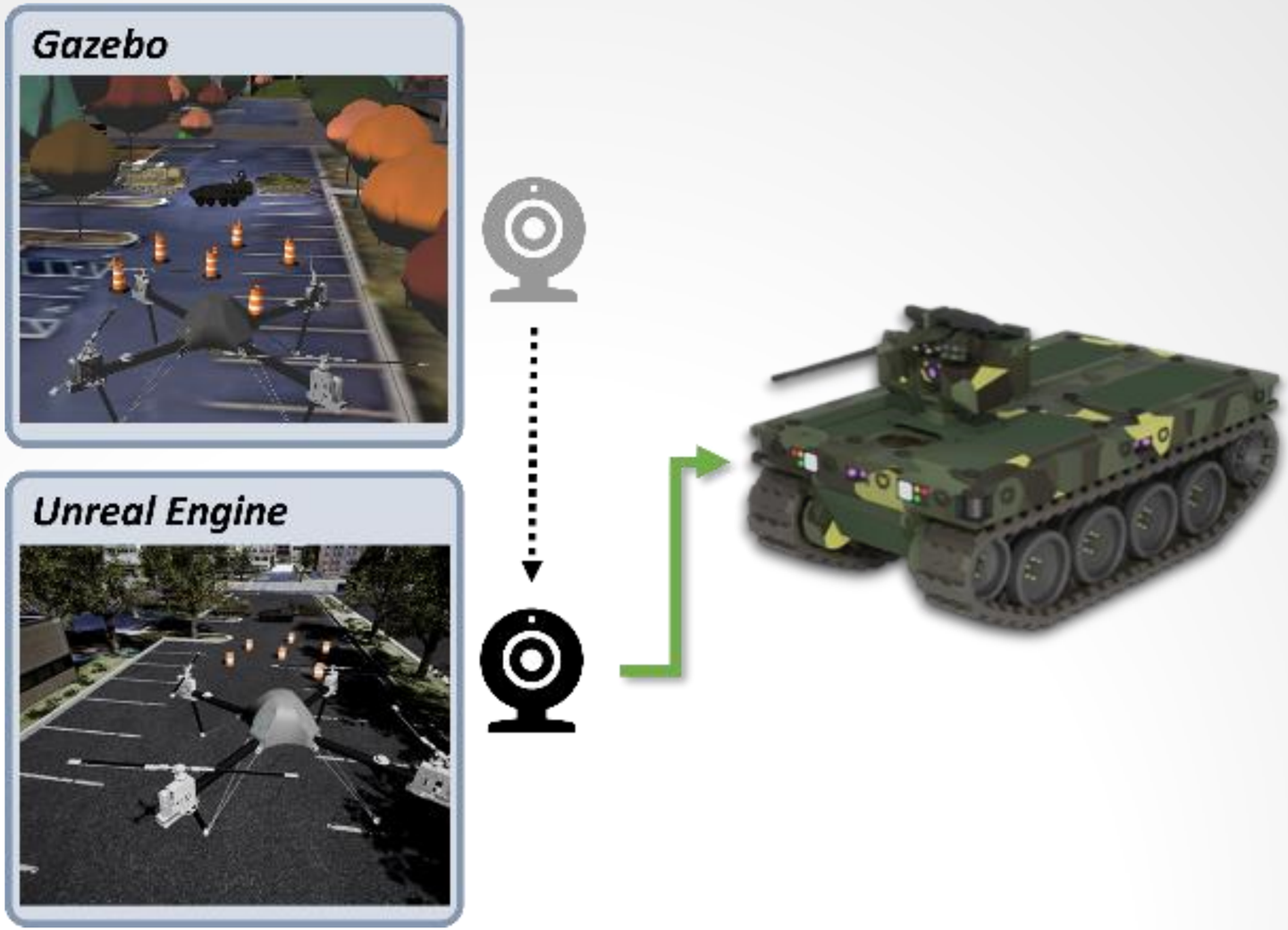
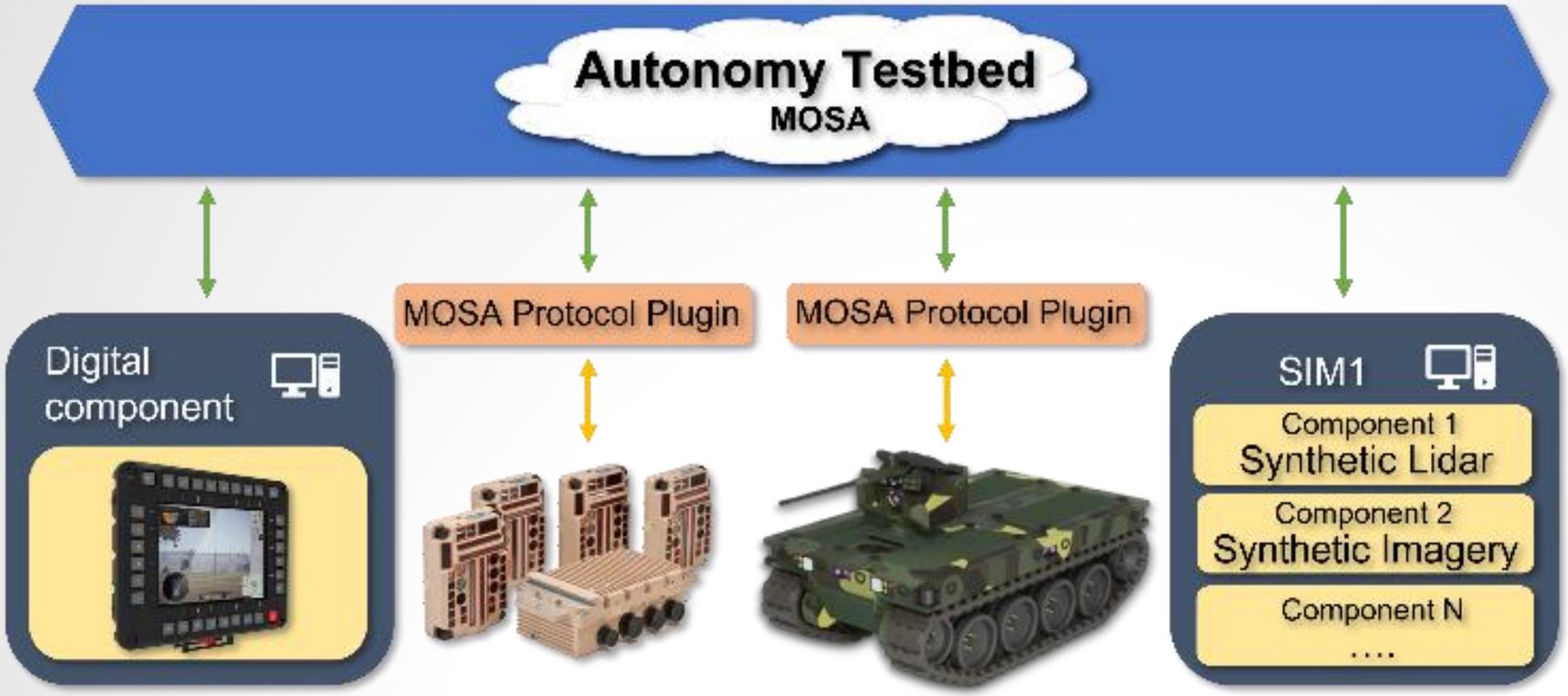


MOSA Hardware and Software in the Loop



Combination of software and plugin enabled hardware in one test scenario.

HWIL components interfaced with the ATB.

MOSA Network Characterization

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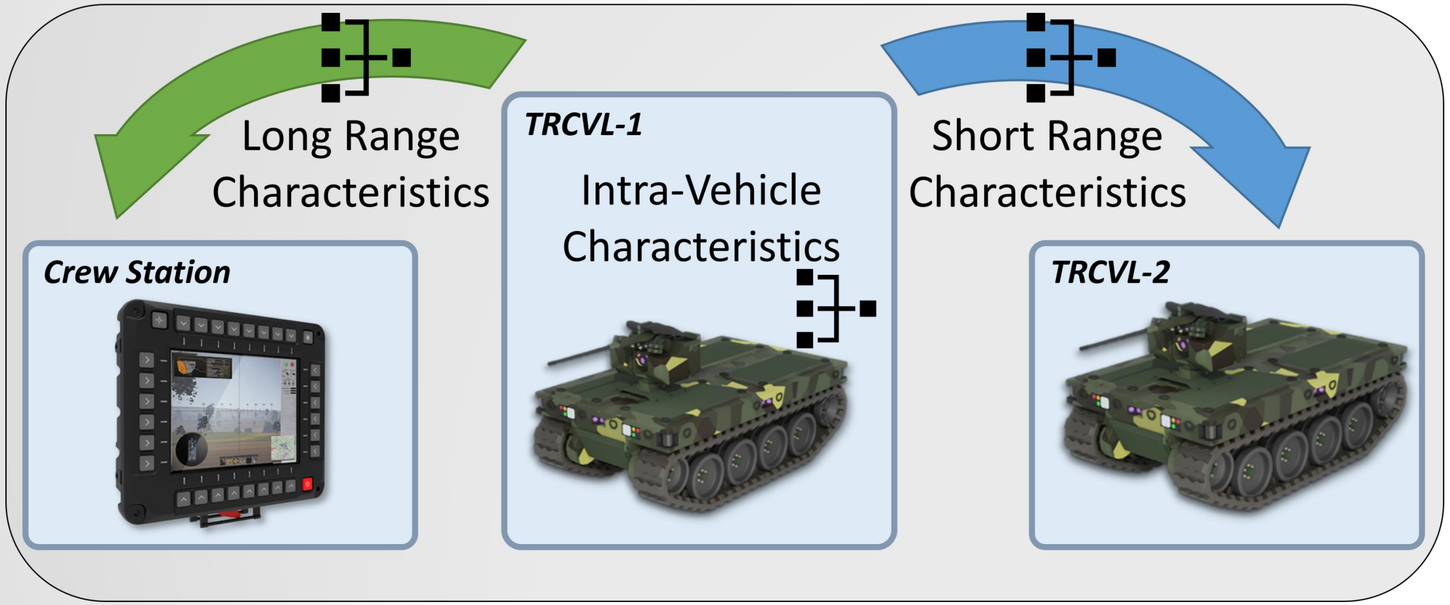
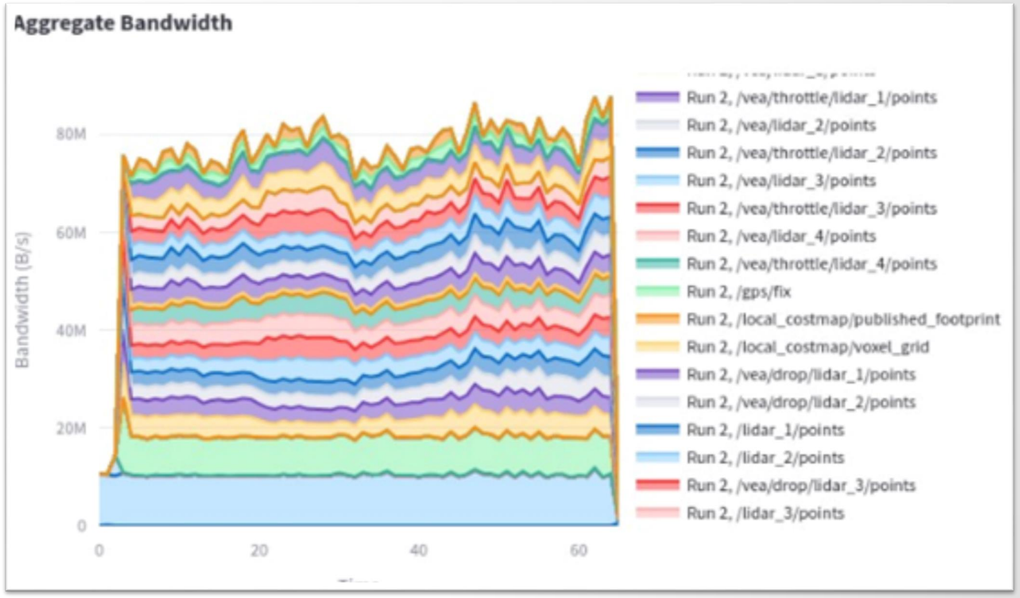
- Communication characterization built into the universal messaging protocol.
- Simulate a vehicles real network constraints to evaluate how it performs under various conditions.
- Built in electronic and network analysis tools to visualizing normally invisible data.
- Understandable insight that can impact vehicles performance.





MOSA Enabled Touchpoints

Immersion provides an environment where the operator can believe they are in control of the complete physical system and will exert that control according to that belief.

Conduit for formulating feedback with respect to:

- System Operation
- Interaction with HMI-F/MUM-T
- Requirement design and validation

MOSA Value Points

- Doesn’t require complete system to obtain accurate feedback
- Flexibility to be all digital or hardware in the loop mixed reality
- Cost effective reuse of node-based components
- Cost effective due availability in early design phase

Torch Autonomy Testbed
Example MOSA Enabled Touchpoint

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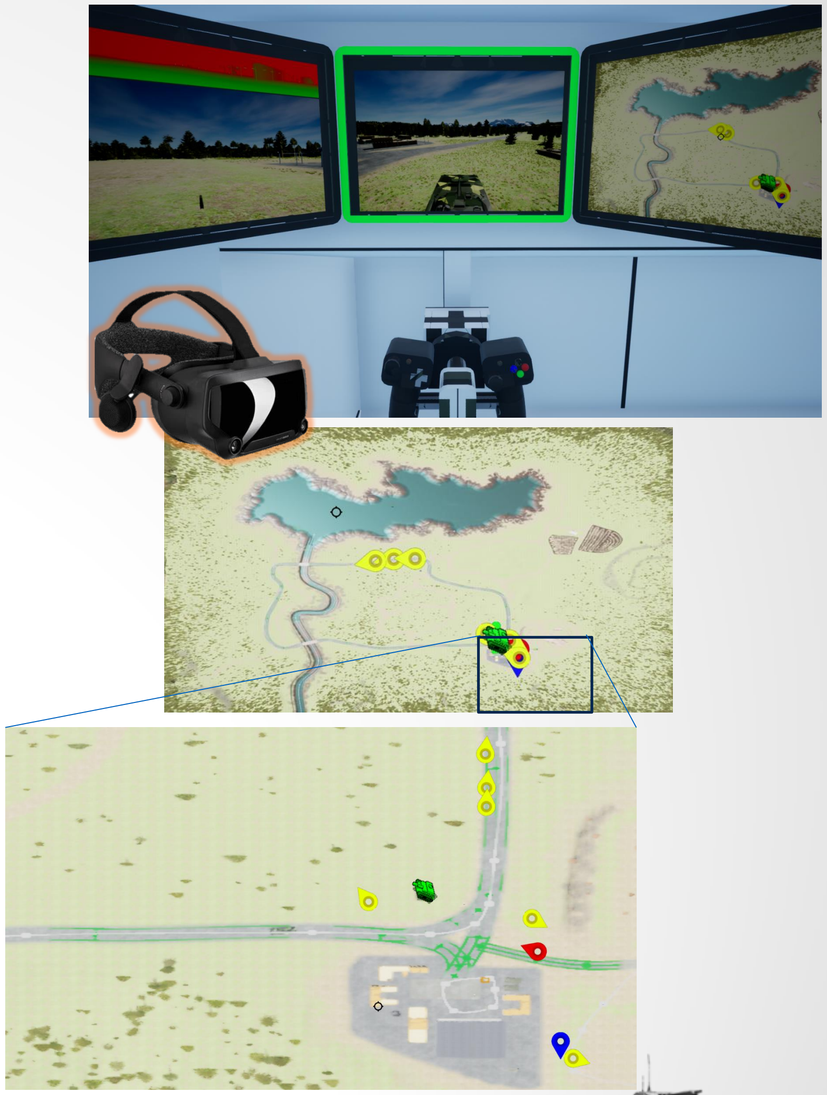
- MOSA for the ATB enabled
  - Desktop and VR common implementation
  - Immersive VR for improved feedback
  - Multiple operators to coordinate actions

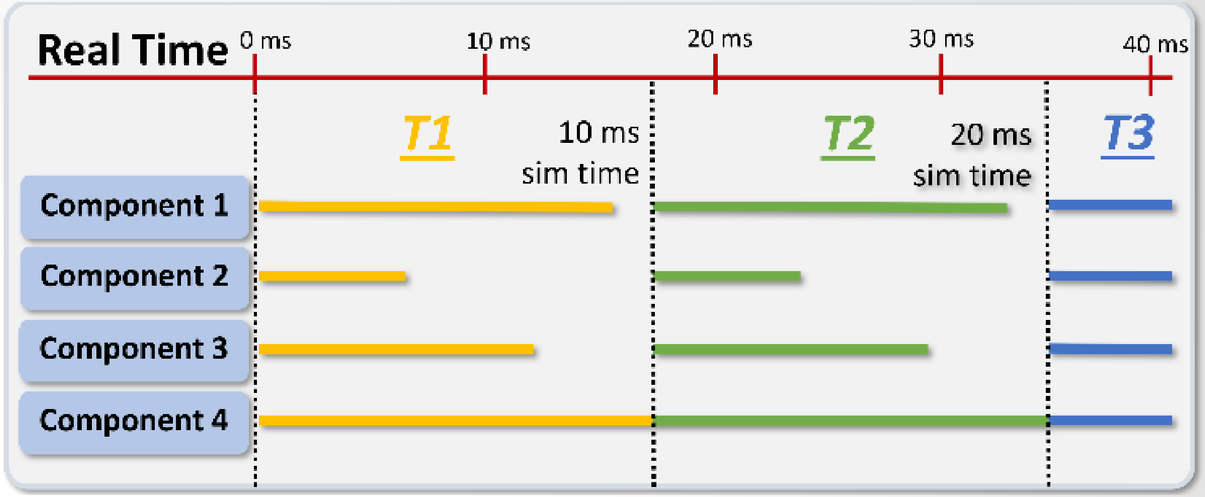
Human Machine Interface (HMI)

- Situational awareness & sensor navigation
- Sensors display from UAV to drive TLIV
- Sensors annotated with AI/ML target classification
- Map Interface to command TRCVL waypoints



Non-Real-Time Execution

- Executing a test scenario or a set of scenario, either faster than real time, or slower than real time.
- Slower than real time enables higher fidelity simulation on less expensive hardware.
- Faster than real-timer enables more iterations to be evaluated in a shorter amount of time.



Conclusion

This is an ongoing research effort and is continuously being innovated.

Please stop by our booth (217) for a demonstration of the current capabilities of the Torch Autonomy Testbed and other projects we are showcasing.

We are interested in your input!

QUESTIONS?