Configuration Security (ConSec)

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Proposers Day

November 17, 2017

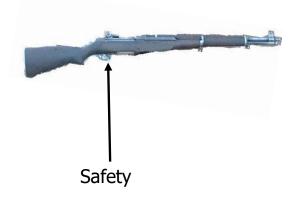


DISTRIBUTION A. Approved for public release: distribution unlimited.



Develop a system to automatically generate, deploy, and enforce secure configurations of components and subsystems for use in military platforms



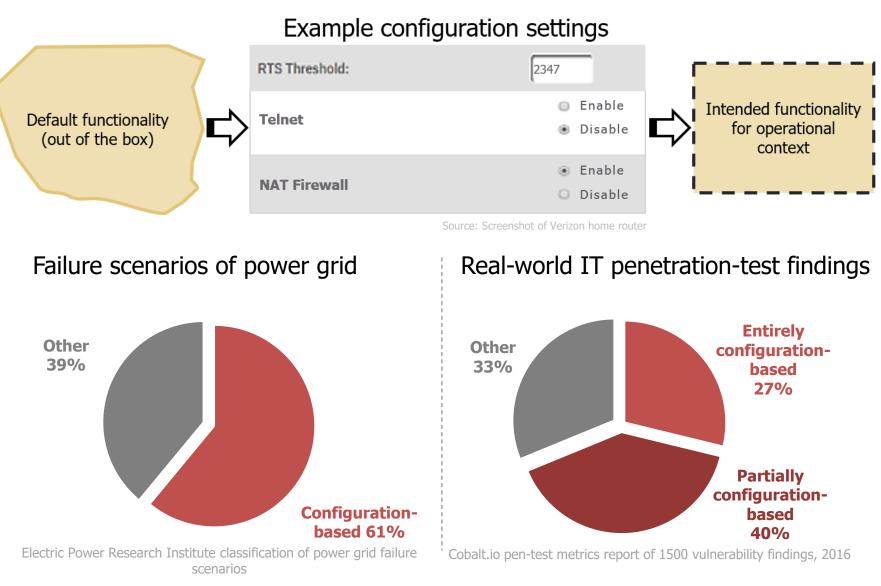


M1 Garand



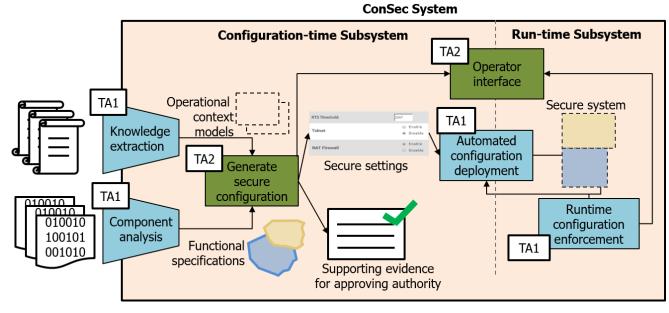
Partial representation of weapons platform network





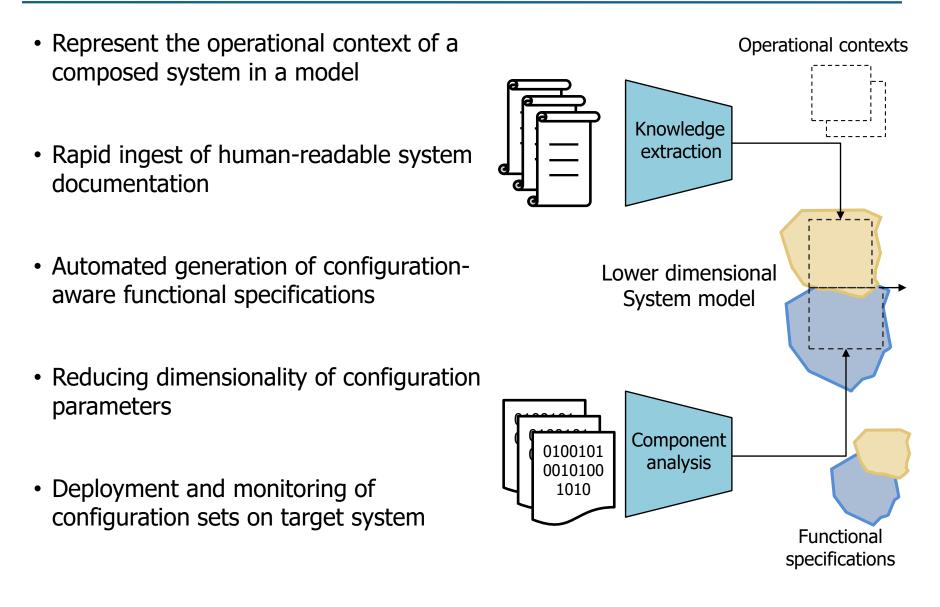


- Develop a system to
 - Explore configuration state space, deploy secured settings, and monitor for deviation
- TA1: Understand composed system
 - Build model of functionality and operational contexts
- TA2: Generate secure configuration optimized for operational contexts



- TA3: Voice of the offense
 - Challenge TA1/TA2 system with configuration and composition vulnerabilities
- TA4: Evaluation and integration
 - Target platform provider and integrator

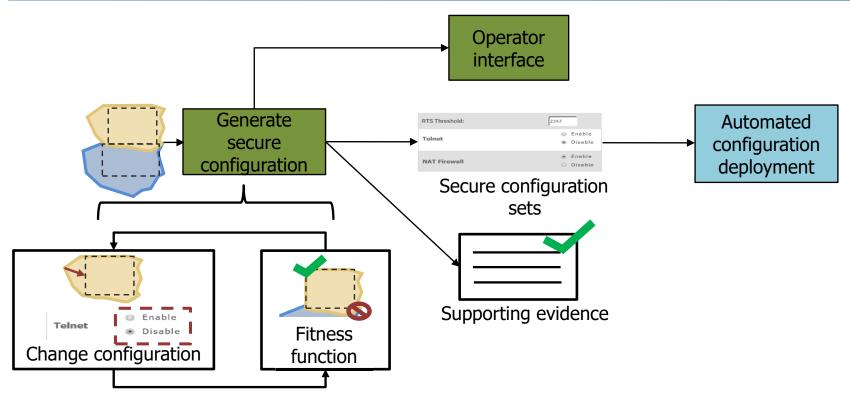






- Semantic extraction to produce a model of configuration parameter functionality relative to system behavior
- Principled reduction of the configuration space for each component
- Semi-automated modeling of operational context(s) of the target system from human-readable documentation
- Automatically generate a specification of each component's functionality based on its software, firmware and configuration parameters
- Develop a vendor-agnostic representation for communicating these models and specifications to the TA2 system
- Develop a capability to access and modify the configuration parameters on diverse devices





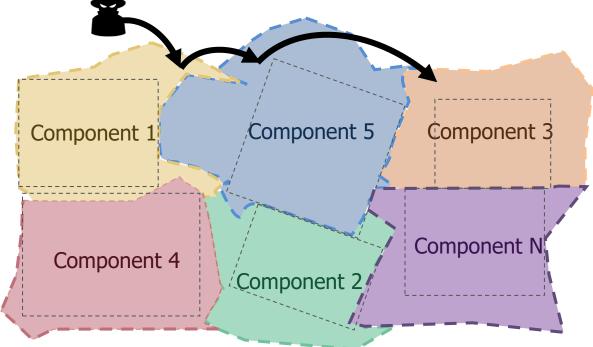
- Rapidly generate mission-optimized configurations
- Support authority-to-operate approval of configuration sets with formalized arguments
- Enable large scale context-sensitive reasoning with incomplete specifications
- Discover hidden behaviors in composed systems



- Performing compositional analysis of the TA1-provided system models and specifications to determine an optimal configuration set for the target in each operational context
- Automatically generating human-readable evidence supporting the selected configuration set in order to allow authorization approval
- Communicating the configuration state of the system with the TA1developed monitoring subsystem to detect indicators of compromise or assist in changing between operational contexts



 Challenge TA1/TA2 system with configuration and composition vulnerabilities



- TA3 proposals should address the following challenges
 - Develop tools, techniques, and procedures to exploit composed systems solely via configuration- or composition-enabled vulnerabilities
 - Use TA1-provided models and specifications to guide the generate of attack paths, minimizing human-in-the-loop effort



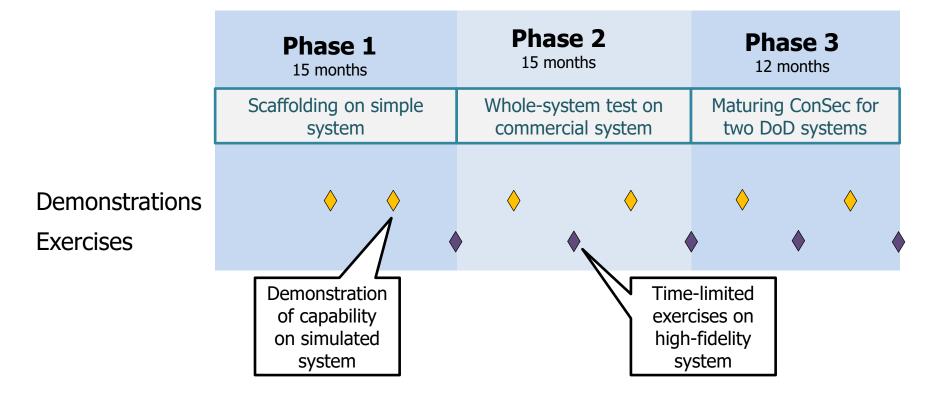
DARPA TA4: Evaluation and integration

- Technical progress assessment
 - Conduct functional, regression, performance, and scalability testing
 - Provide specific, constructive feedback to all performers developing code
- Evaluations
 - Develop relevant test cases for integrated TA1/TA2 systems and measure performance against system-specific metrics
 - Conduct evaluations in advance of PI meetings to inform the technical discussion
- Exercises
 - Plan, develop and coordinate program exercises
 - Exercises will increase in complexity and duration over the period of performance
- TA4 proposals should address the following challenges
 - Facilitation of common data formats between TA1 and TA2
 - Coordination of exercises on limited physical target systems
 - Metrics evaluation and novel metrics to measure the progress and success of the ConSec system



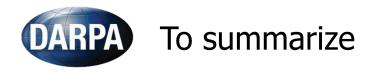
	Phase 1 (scaffolding)	Phase 2 (initial deployment)	Phase 3 (Highly-complex system)
TA1: Model Fidelity	80% of static space	80% of static space	90% of static
TA1: Documentation Ingest	10x manual, 60% accuracy	10x manual, 70% accuracy	10x manual, 80% accuracy
TA1: Deployment time	1.5x faster than manual	5x faster than manual	15x faster than manual
TA2: Configuration- space coverage	60% coverage	60% coverage	75% coverage
TA2: Risk reduction	85% reduction	85% reduction	85% reduction
TA2: Correctness guarantee	None	Basic	Formal







- Total program funding available for award is \$45m over 3 1/2 years
- Proposals may address only one Technical Area
- Organizations can submit proposals to all Technical Areas
 - Which to consider for award is at the discretion of the Government
 - TA-4 performer may perform on other TAs subject to an acceptable OCI Mitigation Plan



- Read the BAA, carefully and more than once
 - "Specifically excluded is research that primarily results in evolutionary improvements..."
 - DARPA does not acquire commercial products
- The goal of ConSec is to automatically generate, deploy, and enforce secure configurations of embedded COTS/GOTS devices for use in military platforms

