Towards a fully automated Blue Team at Locked Shields

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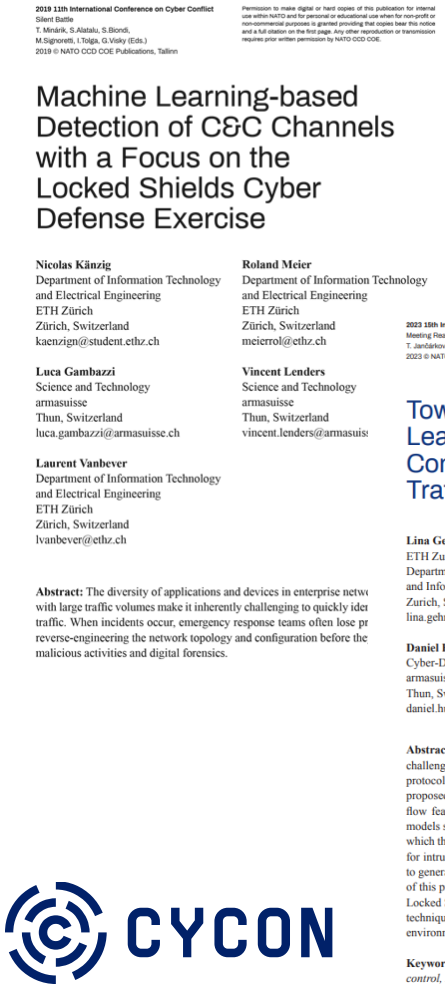
The history



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Silent Battle
T. Minárik, S.Alatalu, S.Biondi,
M.Signoretti, I.Tolga, G.Visky (Eds.)
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Machine Learning-based Detection of C&C Channels with a Focus on the Locked Shields Cyber Defense Exercise

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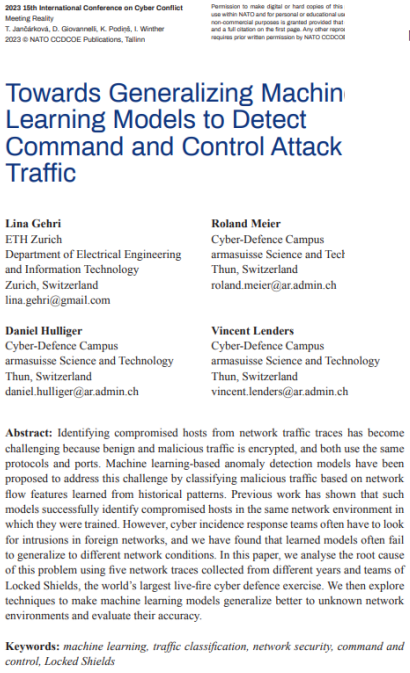
Abstract: The diversity of applications and devices in enterprise netwo with large traffic volumes make it inherently challenging to quickly ider traffic. When incidents occur, emergency response teams often lose pr reverse-engineering the network topology and configuration before the malicious activities and digital forensics.



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Meeting Reality
T. Jančárková, D. Giovannelli, K. Podiņš, I. Winther
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Towards Generalizing Machin Learning Models to Detect Command and Control Attack Traffic

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Abstract: Identifying compromised hosts from network traffic traces has become challenging because benign and malicious traffic is encrypted, and both use the same protocols and ports. Machine learning-based anomaly detection models have been proposed to address this challenge by classifying malicious traffic based on network flow features learned from historical patterns. Previous work has shown that such models successfully identify compromised hosts in the same network environment in which they were trained. However, cyber incidence response teams often have to look for intrusions in foreign networks, and we have found that learned models often fail to generalize to different network conditions. In this paper, we analyse the root cause of this problem using five network traces collected from different years and teams of Locked Shields, the world's largest live-fire cyber defence exercise. We then explore techniques to make machine learning models generalize better to unknown network environments and evaluate their accuracy.

Keywords: *machine learning, traffic classification, network security, command and control, Locked Shields*

TAL TECH

DOCTORAL THESIS

Automating Defences against Cyber Operations in Computer Networks

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TALLINN 2021

Towards an Active, Autonomous and Intelligent Cyber Defense of Military Systems: the NATO AICA Reference Architecture

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***Abstract*—Within the future complex massively interconnecte vehicles, sensors and effectors, an demanding extremely low failure r operators cannot have an easy a enough reactions to cyber-attacks, and intelligent cyber defense. Mu Defense may provide an answer to presents the concept and archi Intelligent Cyber defense Agent (rationale of the AICA concept. methodology and purpose that dri Reference Architecture (AICARA) and Technology Group. Thirdly, features and challenges of Multi defense Agent (MAICA). Fourth assumed AICA Reference Architec our preliminary research issues, a we present the future lines of resea test the AICA / MAICA concept.**

Keywords—intelligent agent, a security

I. RATIONALE FOR TE

Today, five broad types of syste Air operations:

- Office and information includes web service information managemen human resource manag

This paper is based on NATO "Intelligent, Autonomous and and Resilience."

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Towards an AI-powered Player in Cyber Defence Exercises

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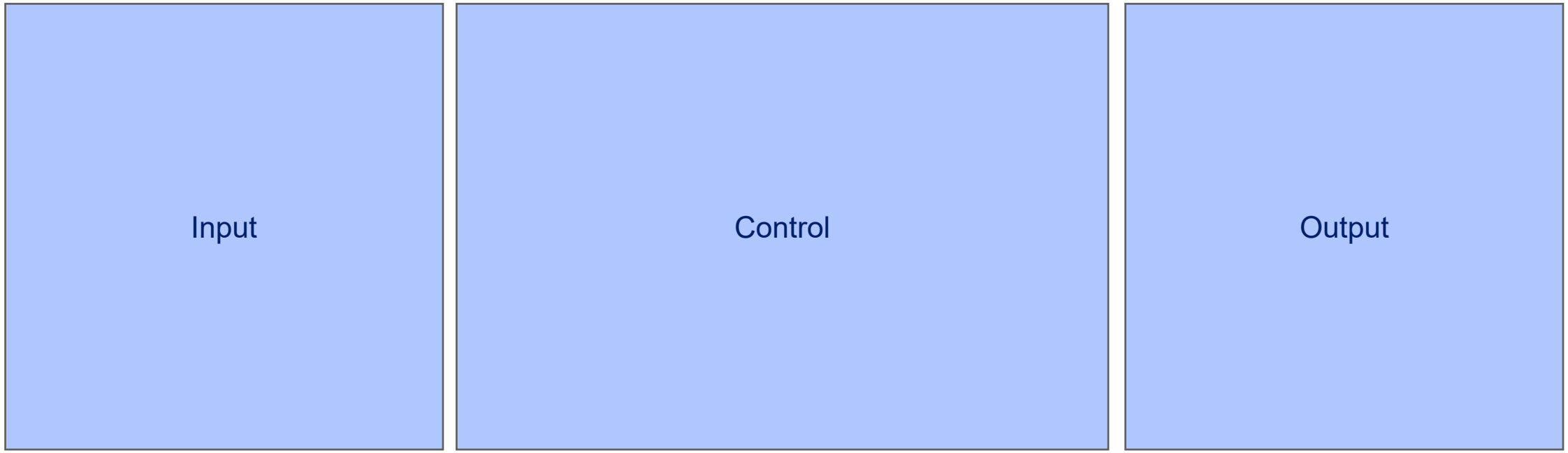
Automated Blue Team framework overview



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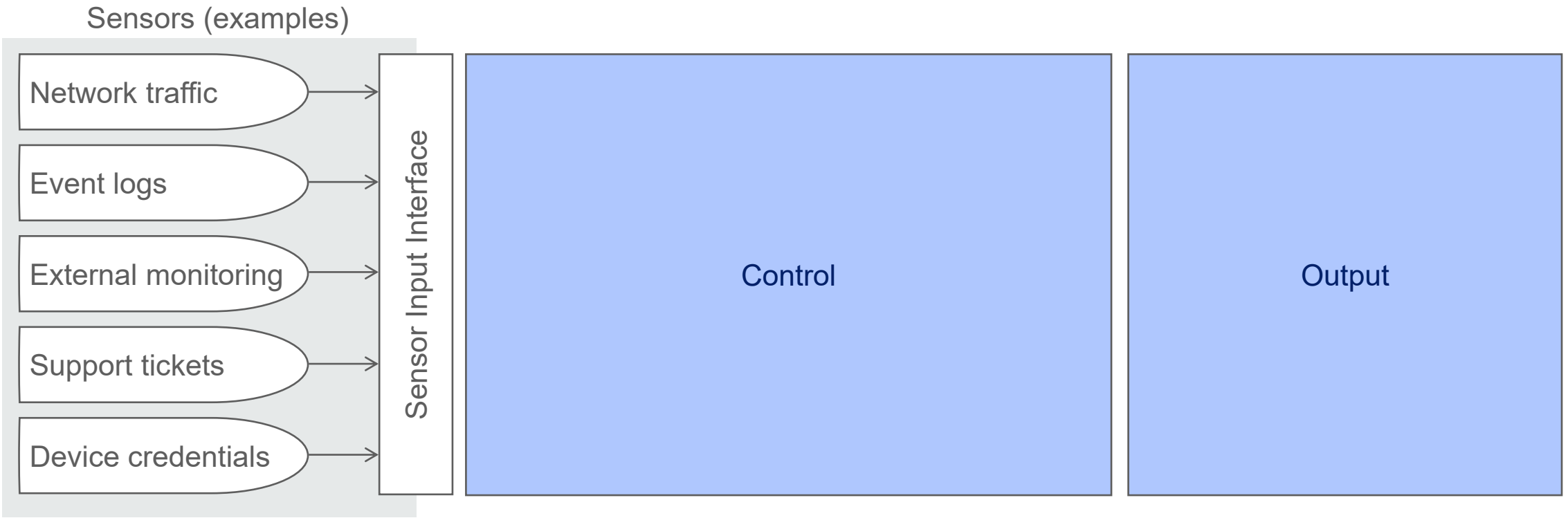
Automated Blue Team framework overview



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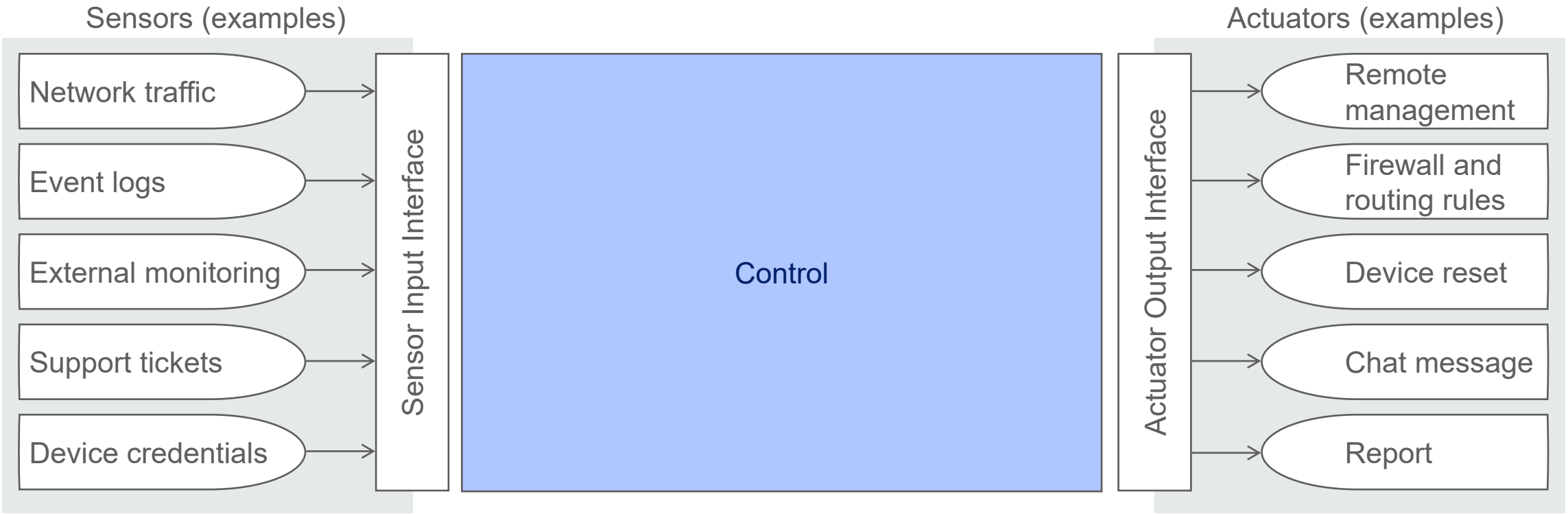
Automated Blue Team framework overview



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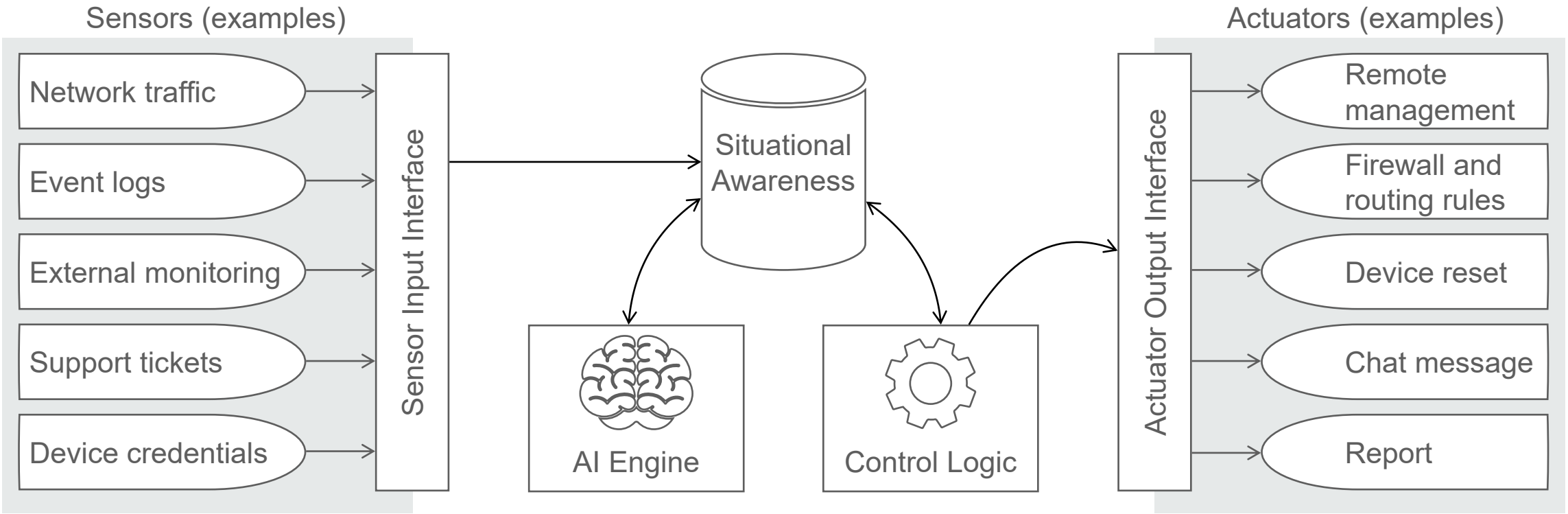
Automated Blue Team framework overview



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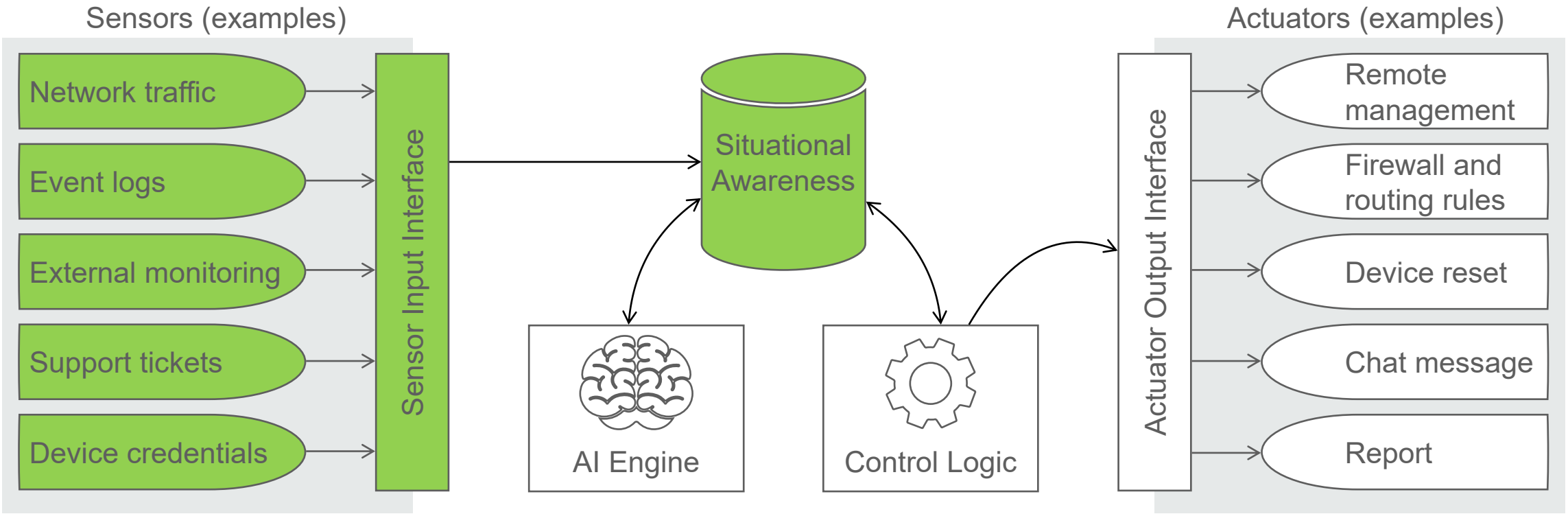
Automated Blue Team framework overview



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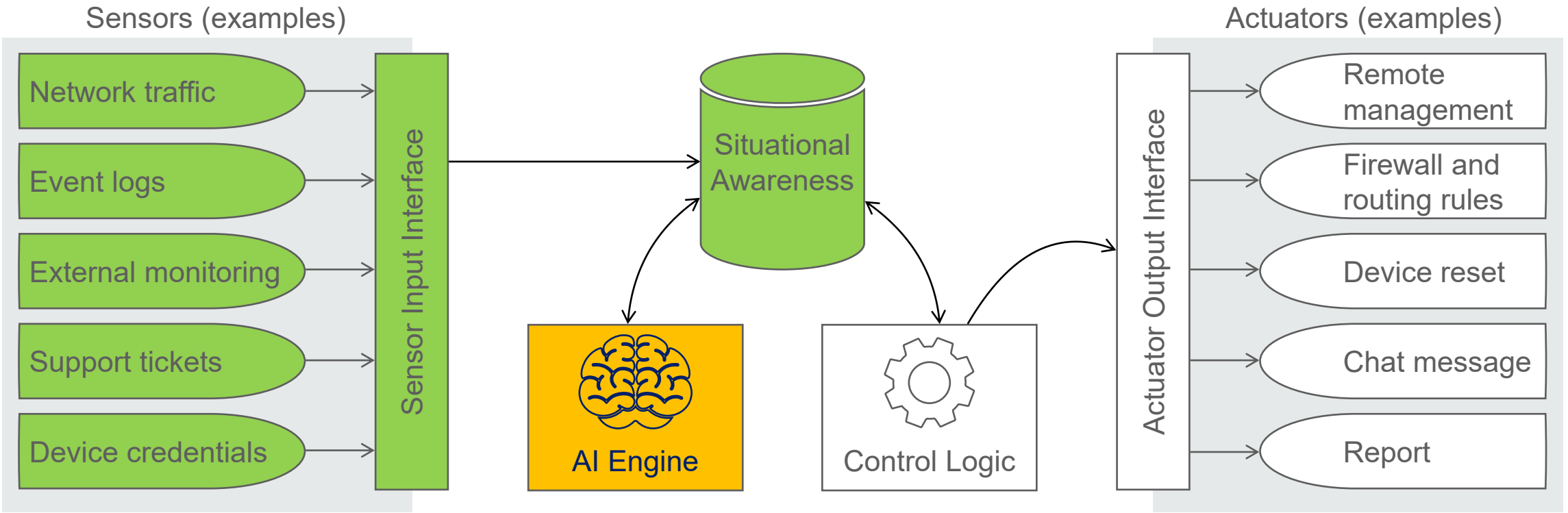
Automated Blue Team framework overview



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Four levels of AI

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Four levels of AI

Level 0: Reactive narrow AI

Signature-based decisions

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Four levels of AI

Level 1: Limited-memory narrow AI	“Machine learning” today
Level 0: Reactive narrow AI	Signature-based decisions

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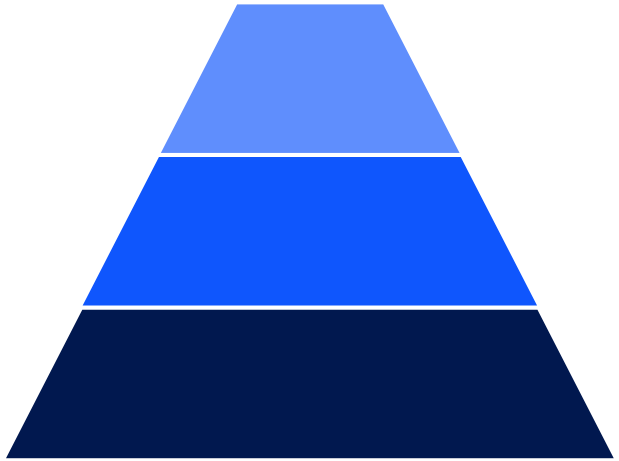
Four levels of AI



Level 2: General AI	Mimics human intelligence
Level 1: Limited-memory narrow AI	“Machine learning” today
Level 0: Reactive narrow AI	Signature-based decisions

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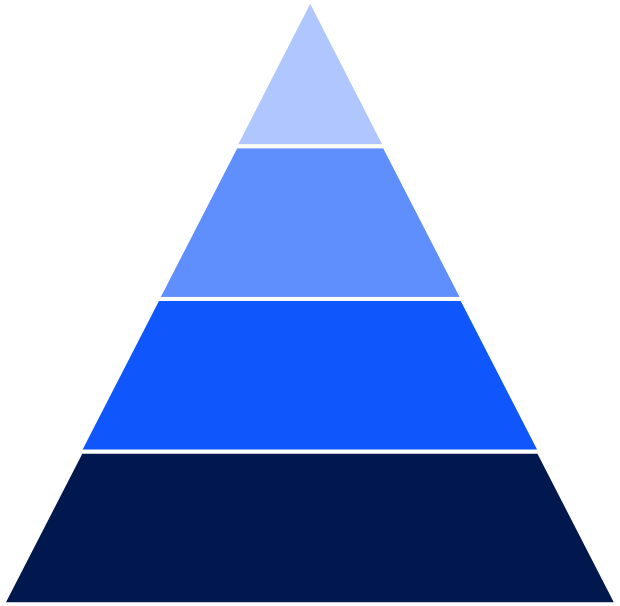
Four levels of AI



Level 3: Super AI	Surpasses human intelligence
Level 2: General AI	Mimics human intelligence
Level 1: Limited-memory narrow AI	“Machine learning” today
Level 0: Reactive narrow AI	Signature-based decisions

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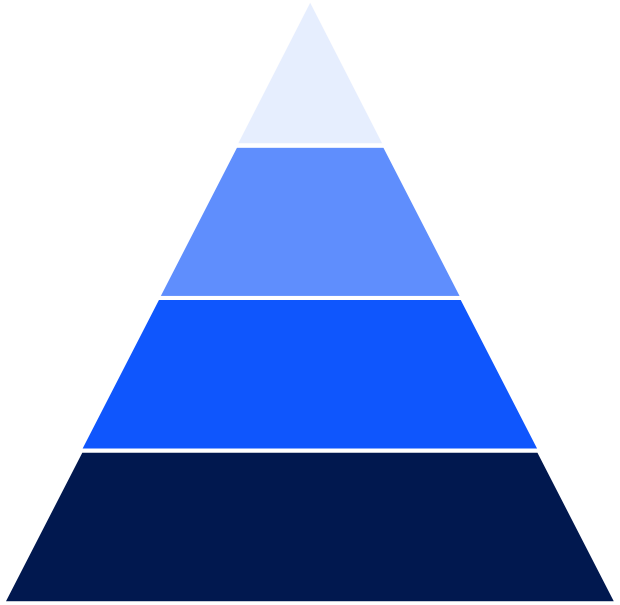
~~Only level 0 and level 1 exist today~~

Levels 0 – 2 exist today



Level 3: Super AI	Surpasses human intelligence
Level 2: General AI	Mimics human intelligence
Level 1: Limited-memory narrow AI	“Machine learning” today
Level 0: Reactive narrow AI	Signature-based decisions

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Five tasks for AI

Identification / classification	What is it?
Categorisation	What belongs together?
Assessment	What is important?
Recommendation	What should be done?
Prediction	What will happen?

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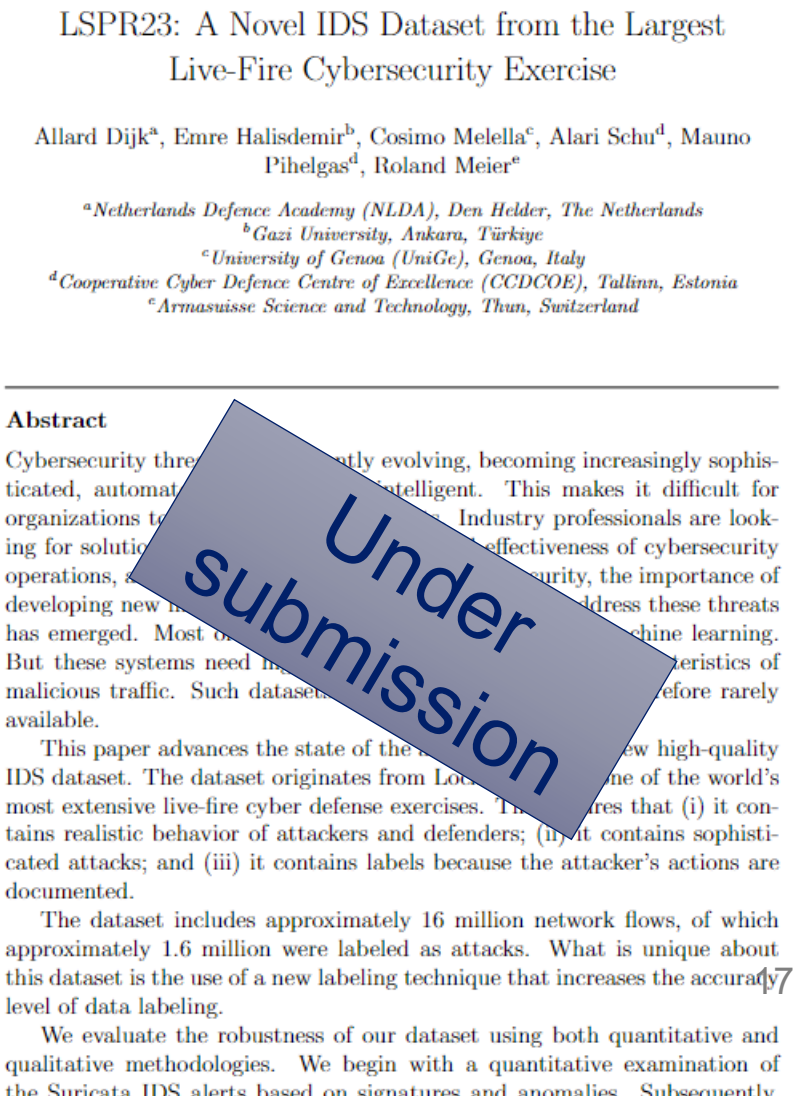
Locked Shields 2023 and 2024: Data collection during the partners run

- We participated as a blue team during the partners run
- Blue team was passive
- Goal: Collect data for future developments
- Result: Paper with public dataset



LSPR23: A Novel IDS Dataset from the Largest Live-Fire Cybersecurity Exercise

Allard Dijk[a], Emre Halisdemir[b], Cosimo Melella[c], Alari Schu[d], Mauno Pihelgas[d], Roland Meier[e]

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Abstract

Cybersecurity thre…tly evolving, becoming increasingly sophisticated, automat…telligent. This makes it difficult for organizations t… Industry professionals are looking for solutio… effectiveness of cybersecurity operations, …urity, the importance of developing new …ddress these threats has emerged. Most o…chine learning. But these systems need h…teristics of malicious traffic. Such dataset…efore rarely available.

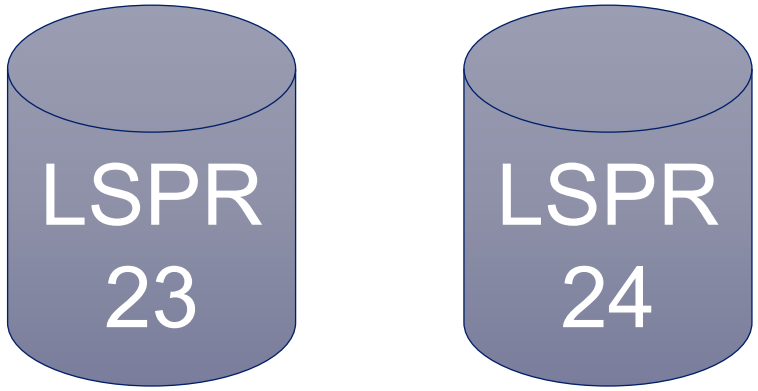
This paper advances the state of the …ew high-quality IDS dataset. The dataset originates from Loc…ne of the world's most extensive live-fire cyber defense exercises. Th…res that (i) it contains realistic behavior of attackers and defenders; (ii) it contains sophisticated attacks; and (iii) it contains labels because the attacker's actions are documented.

The dataset includes approximately 16 million network flows, of which approximately 1.6 million were labeled as attacks. What is unique about this dataset is the use of a new labeling technique that increases the accuracy level of data labeling.

We evaluate the robustness of our dataset using both quantitative and qualitative methodologies. We begin with a quantitative examination of

Under submission

And after the Locked Shields 2024?



- Automated detection and response to some types of attacks (Cobalt Strike)
- Evaluation in a simulated environment during the next 12 months
- Evaluation in LS 2025 with other Blue Teams

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Towards a fully automated Blue Team at Locked Shields

Thanks for your attention!

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