IPv6 2030 : Les conditions d’un futur de l’internet en IPv6
(ARCEP – IDATE - IPv6 Forum)

Cybelia
Augmented Cybersecurity

IA et Cybersécurité

Protéger les infrastructures à l’ère des réseaux intelligents

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Augmented Cybersecurity, for French Industry

Associated partners

CAMPUS CYBER · PROGRAMME DE transfert AU campus cyber · PEPR CYB3RSECURITE

Cybersecurity Operations

Evolve based on what happened
(Knowledge -> Capitalization)

Understand what's happening
(Information -> Observability)

React to what's happening
(Decision -> Steerability)

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The bitter reality!

Too much time spent on «understanding» meaning slow « reacting »

- Too many alerts, not enough context
  - Incidents start with a suspicious connection from IP X
  - Firs SOC activities, identify asset, owner, impact, etc.
- Too many tools, not enough integration
- Most expensive time for SOC operators is **attribution** and **triage**!

SOC Operation: a never-ending mission!

Why most organizations already struggle to run effective SOC operations.

- Volume → Fatigue
  Overwhelming data sources: logs, alerts, Cyber Threat Information, etc. Dual-stack and partial adoption increase telemetry and edge cases (two stacks, more failure modes).
- Velocity → Fear
  Necessity of rapid decision-making increases stress
- Variety → Friction
  Diverse technologies (Operational/Cyber) and data sources (Internal/External)
- Variability → Fluctuation
  Constant evolution of threat and supervised systems
- Veracity → False positives
  Lake of precision in detection and prioritization of alerts
- Visualisation → Fragmentation
  Poor UI/UX and limited interaction capabilities
- Value → Frustration
  Limited enrichment capabilities reduces insights

IPv6 doesn’t create new problems difficulties!

But it amplifies the existing ones. How?

- Dual-stack doubles network reality (two address families, more flows)
  - **Volume**
- Faster lateral movement in segments you don’t monitor well (IPv6 paths bypassing IPv4-only controls)
  - **Velocity**
- Some tools speak IPv6 well, others badly (firewalls OK, legacy apps/collectors/SIEM parsers not)
  - **Variety**
- Temporary addresses rotate while cloud workloads churn.
  - **Variability**
- « unknown host» explosions when attribution fails
  - **Veracity**
- UIs that don’t render IPv6 well, queries that fail, dashboards built for IPv4 assumptions
  - **Visualisation**
- Weaker attribution turns IPv6 logs into « more noise »
  - **Value**

Motivations

This project is not about **why** AI could be used in SOC Operations

But rather about

where, **when** and **how** AI can augment SOC operators

to enhance the cyber-resilience of Critical Networks and Systems

What SOC Operators are supposed to do?

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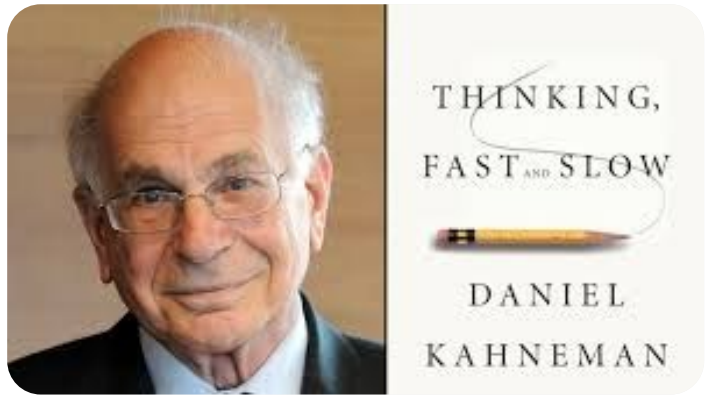
Human dimensions of SOC Operations

Cognitive Models

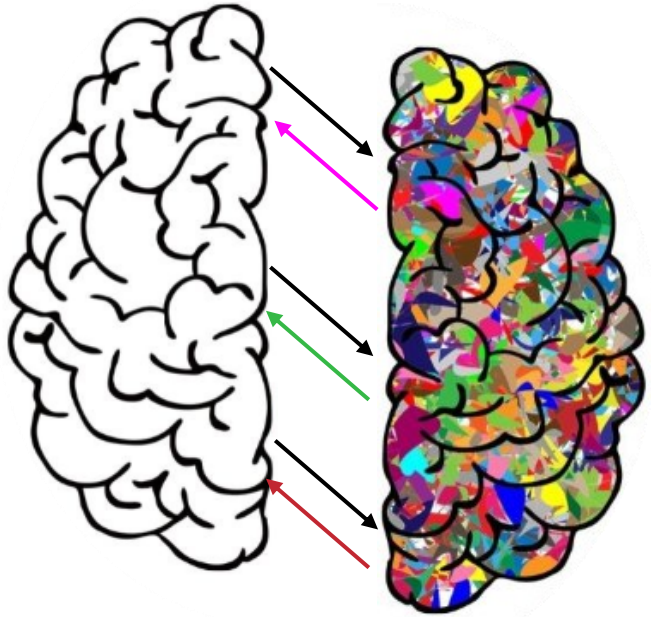
Attention Models

Collaboration Models

How SOC operators think?



System 1 System 2

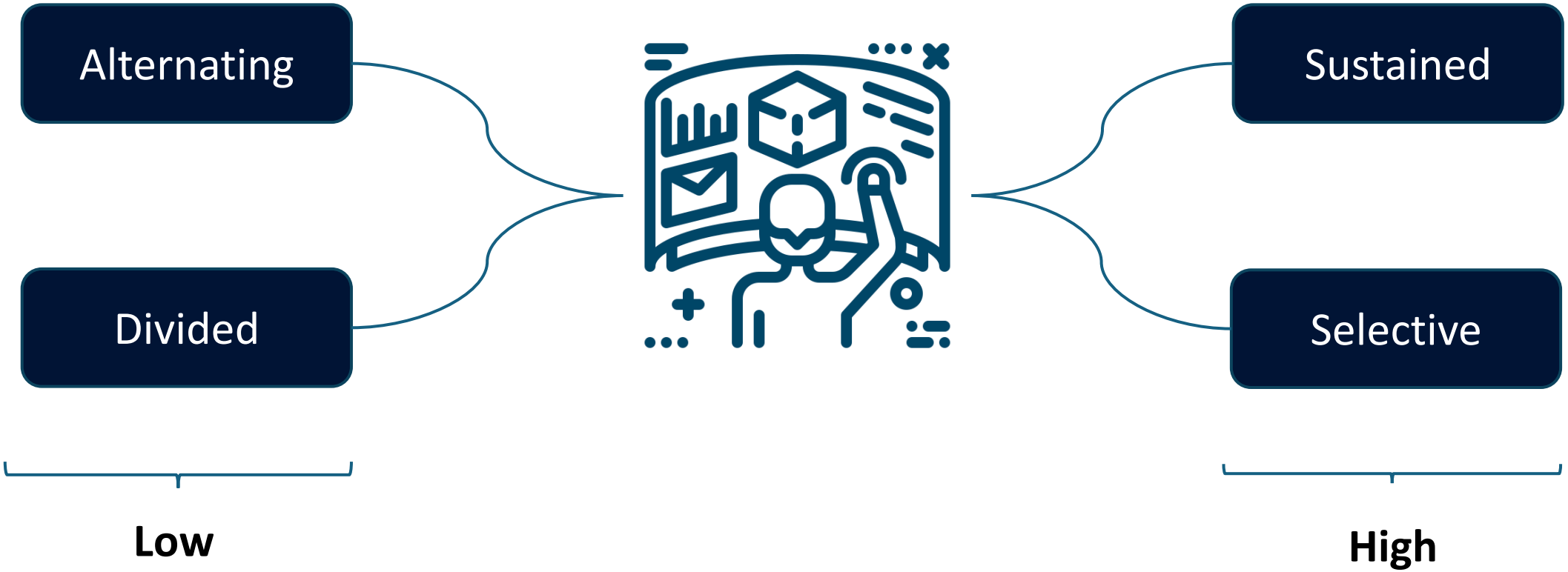


- Rapid
- Automatic
- Limited
- Emotionnal

- Slow
- Controllable
- Open
- Rational

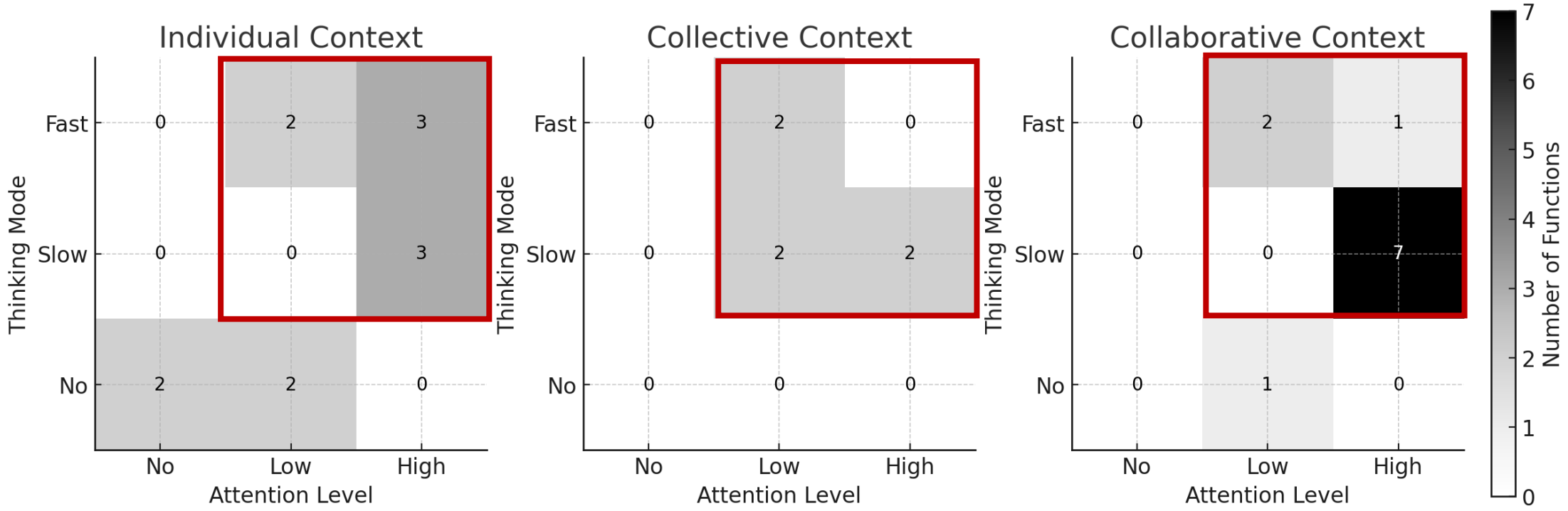
Understands situations → Identifies solutions

How to manage SOC operators Attention?



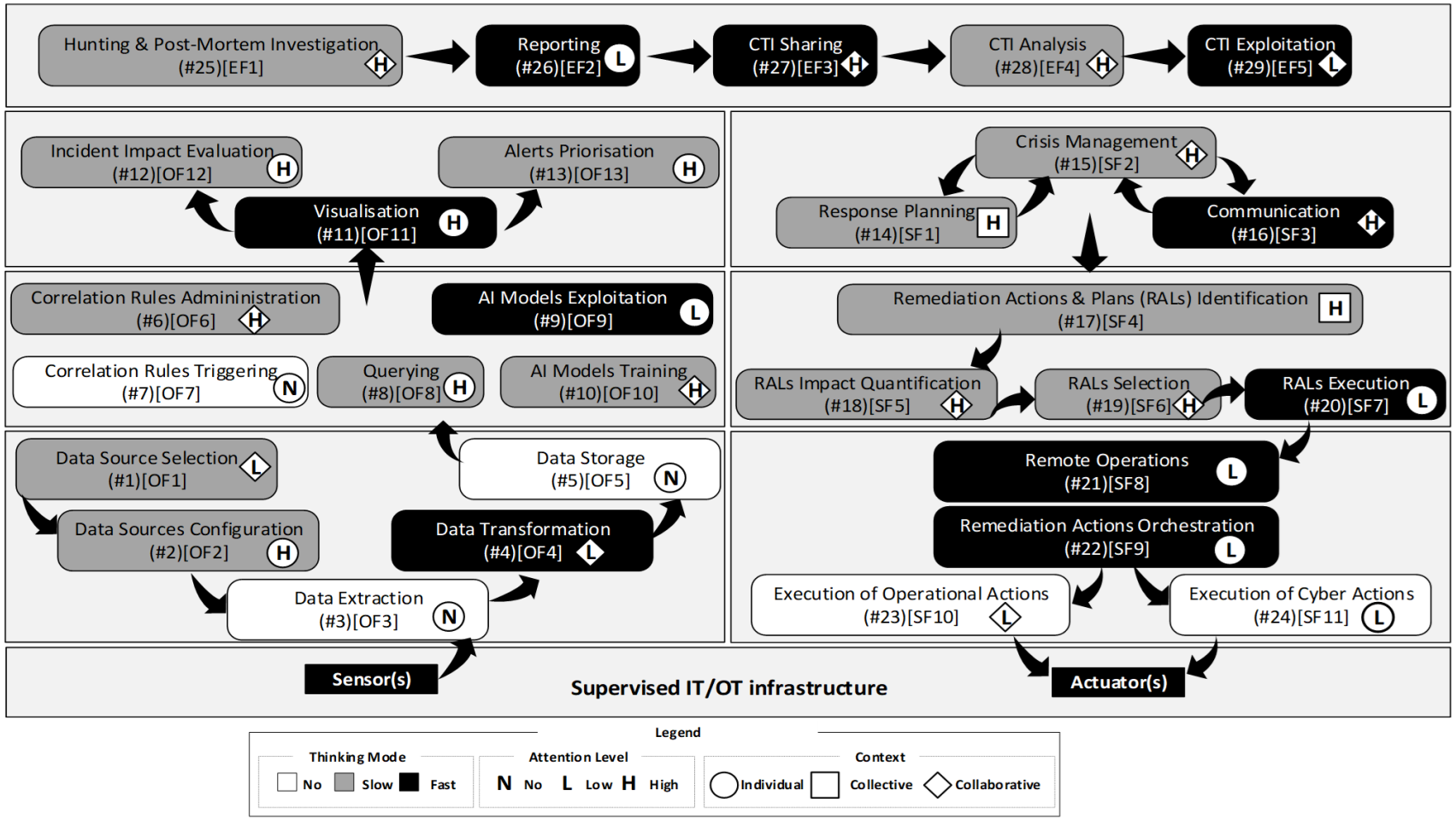
Based on Tremolada, M., Taverna, L., & Bonichini, S. (2019). Which Factors Influence Attentional Functions? *Behavioral Sciences*, *9*(1), 7.

Breaking the “black box” of SOC workflow

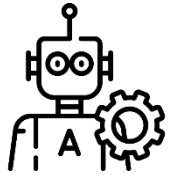


- 80% of SOC activities are cognitively demanding
  - More than 50% of SOC activities require High-Attention
  - Almost 50% of SOC activities are slow thinking (prevalence of System 2)

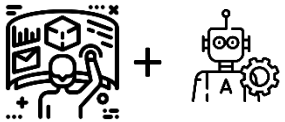
What SOC Operators are supposed to do? (Bis)



CYBER-AI-GO !
Complementarity in Human-AI Collaboration



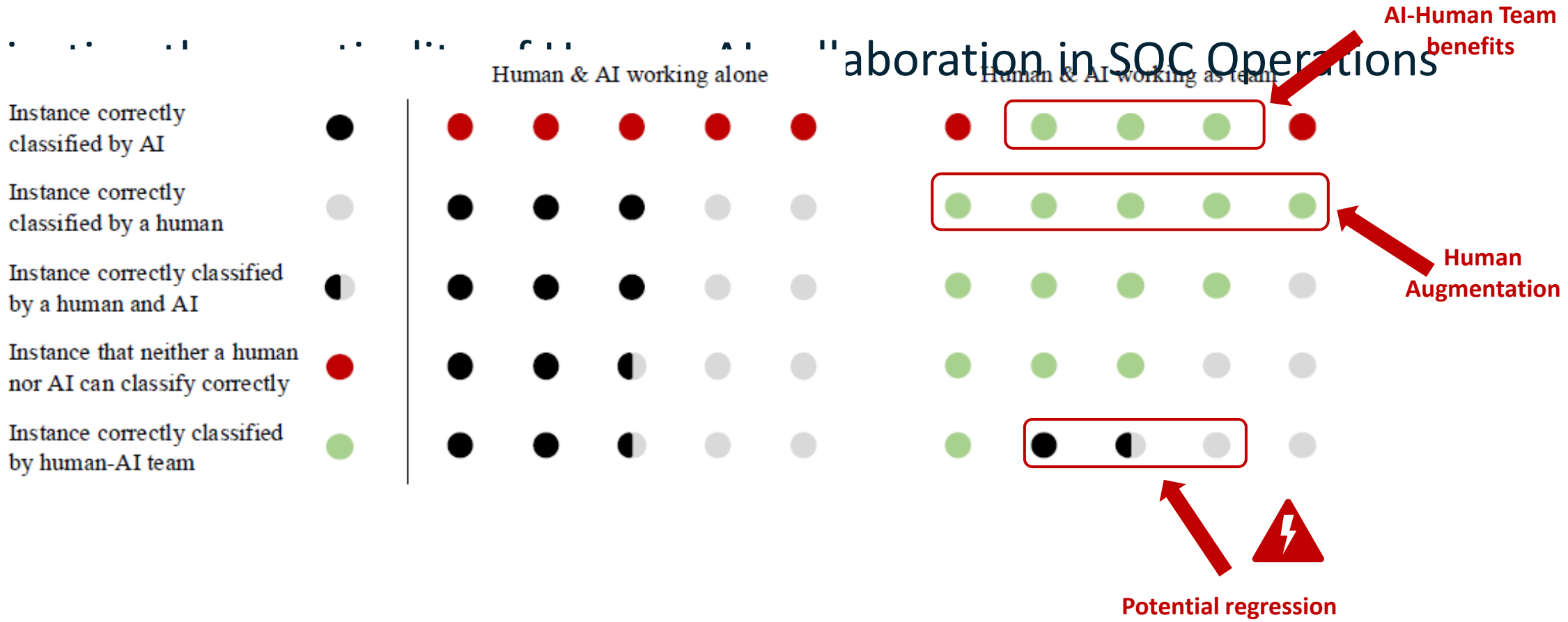
Inputs	**Information (Information / Knowledge)**	Asymmetry	**Information (Data)**
Processing	**Limited Reasoning (Time, pressure, stress, etc)**	Asymmetry	**Limited Contextualisation (Semantic Ambiguity)**
Outputs	**Actions**	Asymmetry	**Decisions**



Co-augmented Decision

Risk / Benefits of Human/AI Collaboration

Inves[illegible]aboration in SOC Operations



arXiv:2404.00029v2 [cs.HC] 25 Nov 2024

Objective: Shifting from "Human is the Loop" to "Human Over the Loop"

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Human **is** the loop

Known

Unknown

Assistant

Human **in** the loop

Understand (✓)
Caracterize (✗)

Auto-Pilot

Human **out of** the loop

Understand (✓)
Caracterize (✓)

F30 Symbiotic Cybersecurity Operations

"Human Over the Loop"

Companion

Human **in** the loop

Understand (✗)
Caracterize (✓)

Operator

Human **out of** the loop

Understand (✗)
Caracterize (✗)

Thank you for your attention!

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