WHITEPAPER | TIER 1A — INSTITUTIONAL DOCTRINE EDITION | v5.2

CSAIC Industrial & OT Cyber Doctrine Series · Paper 13 of 20

One Login From Physics

Time-of-Day Conditional Access, Biometric Break-Glass, and the Physics of the Night Shift

"At 03:00, your authority is not your credential — it is your physical presence."

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Audience: Plant Managers | Safety Engineers | Control-Room Designers | CISOs | Insurers | Regulators

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Keywords: Time-of-Day Conditional Access | Biometric Break-Glass | Physical Presence Authentication | Out-of-Hours Envelope | IEC 61511 | Safety Logic Independence | DORA | NIS2

Notice, Doctrine Statement & Tier Conformance

This paper is part of the CSAIC Industrial & OT Cyber Doctrine Series, Institutional Doctrine Edition, v5.2 — Tier 1A Flagship Thought Leadership. v5.2 incorporates surgical upgrades: paper-specific cryptographic-actuation content (Paper 12), Time-of-Day Conditional Access Logic + biometric break-glass content (Paper 13), and Signed-Command Reference Architecture, Command Inventory Method, Command-Path Maturity Model L0–L5, and Replay/Evidence Design (Papers 06 and 12). University affiliation displayed as University of Schiphol (UOS).

Reading Map

- **Boards:** Executive Synthesis, §5, §10, §14, §19, Board One-Pager (Annex D).
- **Operators / Architects:** §3, §4, §6, §11, §23, and the new §28–§31 artefacts.
- **Investors / insurers:** §1, §5, §6, §12, §13, §19.
- **Regulators:** §2, §6, §7, §8, §16, §22, §26.
- **Sceptics:** §26 (Evidence Basis) and §27 (Counterargument & Rebuttal).

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Executive Synthesis

Out-of-hours industrial authority is a different doctrine from in-hours authority. The decisive control is not stronger PAM (Paper 02 addresses that). It is Time-of-Day Conditional Access Logic that requires verified physical presence on the plant floor — biometric break-glass at a hardened pedestal — before any consequential state change can execute after operating hours. The cyber credential is necessary but never sufficient outside the operating envelope.

> *“At 03:00, your authority is not your credential — it is your physical presence.”*

Three Claims

1. The risk category is now structural.
2. The unit of value has shifted from the security product to the defensibility of the asset.
3. Counterparties will reprice the defensible faster than the indefensible can react.

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1. The Inflection — From Cost Centre to Capital Logic

Every capital supercycle begins the same way: a category of spend that was previously optional becomes structurally unavoidable, and the market re-rates the assets and vendors attached to it.

1.1 The Old Model and Why It Failed

Defence was decoupled from the asset. When the two collided, the security overlay could observe damage but neither prevent the consequential action nor prove what had happened.

1.2 The New Model

Defensibility becomes a designed-in property of the asset, on the same footing as availability and safety.

> *“The board will fund what it can price.”*

2. The Six Doctrines

2.1 Authority Has a Daypart

Operating authority changes shape outside the operating envelope. Daytime authority assumes a populated control room, shift-handover discipline, and human supervision. Night-shift authority assumes none of those. The doctrine encodes this difference at the protocol layer: a command that is normal at 11:00 is impossible at 03:00 without an additional, physical, biometric proof of presence.

"Daytime authority and night-shift authority are not the same authority."

2.2 Physical Presence Is the Out-of-Hours Second Factor

Out-of-hours, the second factor is biometric presence at a hardened pedestal on the plant floor — not a phone, not a token, not a credential the adversary can replay. The pedestal is environmentally hardened, tamper-evident, and physically supervised by camera and IR.

"After hours, your hand on the pedestal is the credential."

2.3 Conditional Access Logic Is Engineered, Not Configured

Time-of-Day Conditional Access Logic is part of the safety case, not part of the identity platform. It is engineered into the control system, signed off by the protection engineer, and immutable to identity-platform changes.

"The clock is part of the safety case."

2.4 Safety Logic Holds Across the Daypart Transition

Engineered safety must survive both the in-hours and out-of-hours regime, and the transition between them. The safety case explicitly addresses authority transitions at shift change, holidays, and unmanned periods.

"Safety survives the handover, or it is not safety."

2.5 Night-Shift Forensics Are Visual, Not Just Logical

Forensic evidence at 03:00 includes camera record, biometric presence record, pedestal interaction record, and ambient telemetry — not only the command log. The presence record is the spine.

"The night-shift event has an eyewitness, and the eyewitness is the pedestal."

2.6 Day–Night State-Change Delta Is a Board Metric

The board metric is the delta between Authorized Daytime State Changes and Unverified Night-Shift State Changes. A growing delta is a programme failure; a closing delta is the doctrine working.

"What you cannot prove happened at night did not happen at night."

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3. Paper-Specific Adversary Economics

Tailored to this paper's threat model.

3.1 Adversary Classes

- Adversaries who time activity to known low-staffing windows (03:00, holidays, shift change).
- Insiders with detailed knowledge of operating hours and out-of-hours envelope rules.
- Vendor credential abuse with after-hours support entitlements.
- Adversaries who can replay credentials but cannot replay a biometric pedestal interaction.
- Social-engineering of remote operators during quiet shifts.

3.2 Adversary Economics

Adversary economics favour quiet hours because authority is permissive and forensic intensity drops. Time-of-Day Conditional Access Logic inverts both: night-shift authority is harder to obtain than daytime authority (physical presence required), and night-shift forensics are richer (camera, biometric, pedestal record) than daytime forensics. The doctrine raises the cost of the 03:00 attack from low to prohibitive.

3.3 Compounding Asymmetries

Asymmetry	Adversary Advantage	Doctrine Counter
Staffing Asymmetry	Night shift is sparsely staffed; supervision is thin.	Conditional Access Logic + biometric pedestal
Replay Asymmetry	Credentials replay easily; biometric presence does not.	Physical presence factor for consequential writes
Calendar Asymmetry	Holidays and weekends extend the night-shift envelope.	Envelope policy spans calendar, not only clock
Forensic Asymmetry	Daytime forensics rely on witnesses; night-shift does not.	Pedestal + camera + biometric as forensic spine

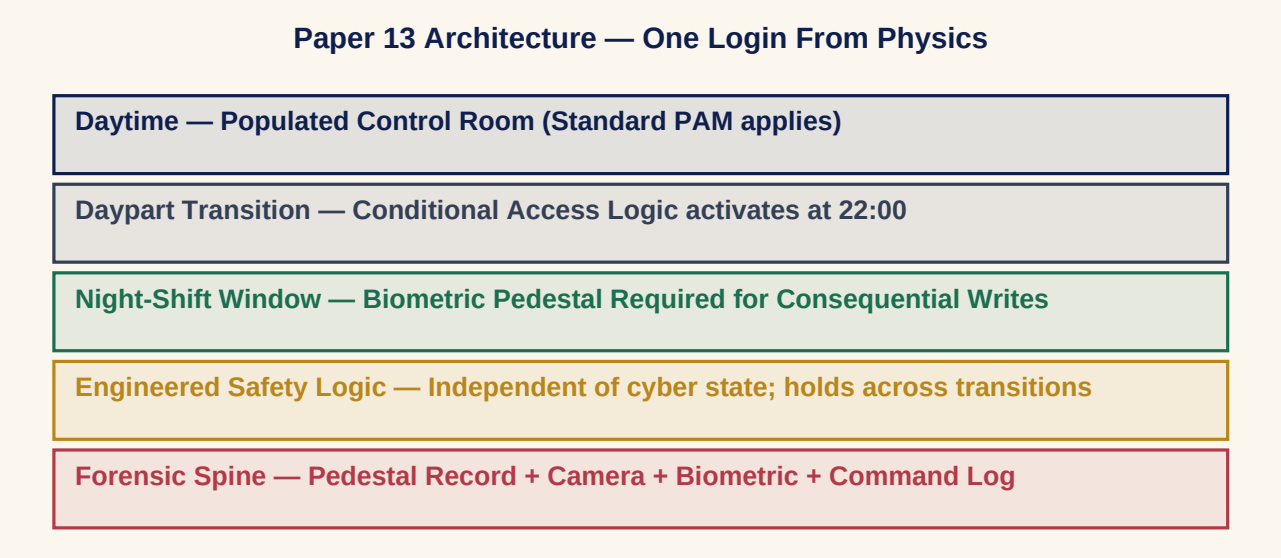
4. The Operating Model — Paper-Specific Architecture

Doctrine without an operating model is a slogan.

4.1 Four Operating Layers

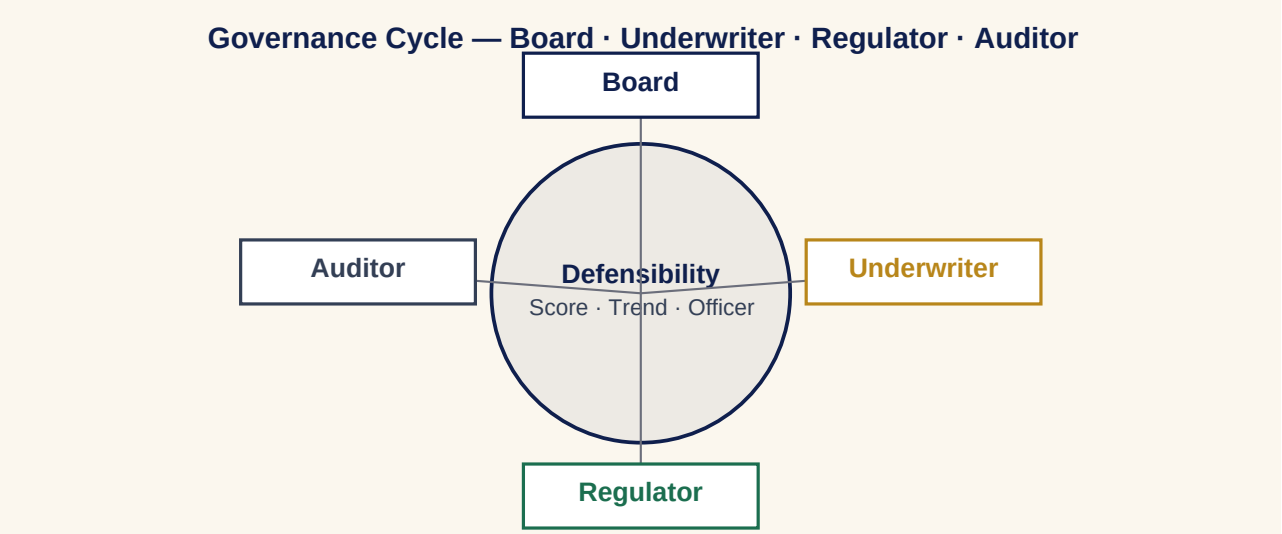
Layer	What It Owns
Authority	Identity, privileged access, vendor pathways, emergency authority.
Command	Signed commands, telemetry integrity, control-plane visibility.
Containment	Deterministic playbooks, engineered limits, isolation.
Evidence	Continuous attestation, immutable logs, board pipelines.

4.2 Paper-Specific Architecture Diagram



5. Board Operating Doctrine

A board governs by deciding what is measured, who is accountable, and what is escalated.

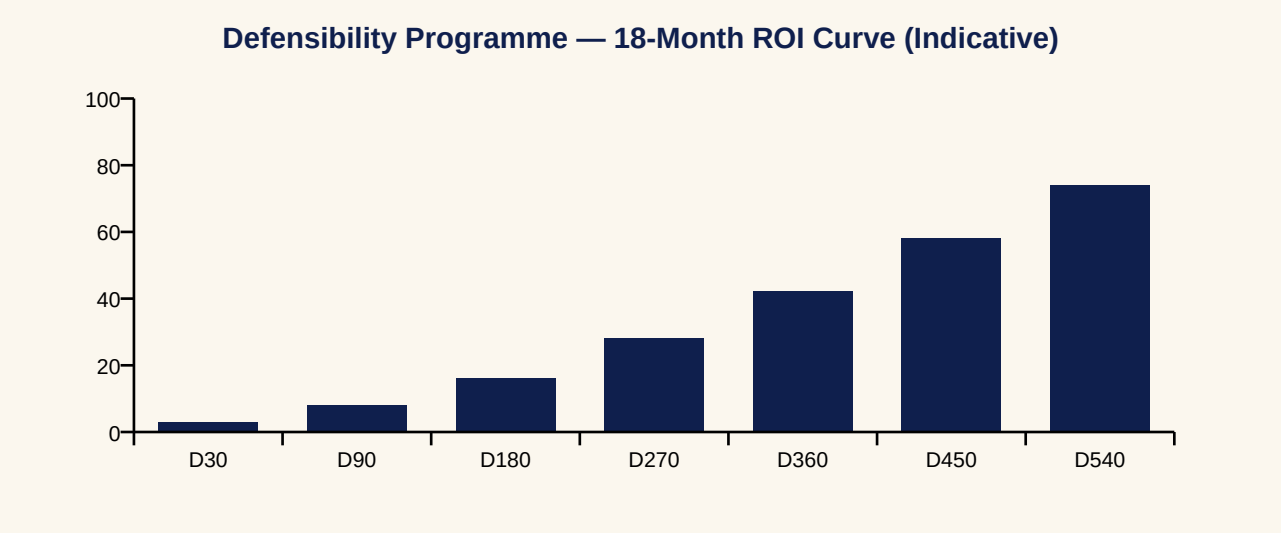


5.1 Three Board Questions

1. What is our defensibility, as a number, and is it improving?
2. Who is accountable for that number this quarter?
3. What would a counterparty say if asked today?

6. Underwriter & Capital-Market Operating Doctrine

Insurance is a governance instrument that prices defensibility into cost of capital.



6.1 Underwriter's Three Questions

1. Can you evidence your posture in time for a real renewal?
2. Can you contain a compromise inside an envelope I can price?
3. Can you produce post-event evidence that lets me pay quickly?

“The board will fund what the insurer can price.”

7. Regulatory & Standards Map — 80 Jurisdictions

Doctrine interoperates with the regulatory and standards landscape rather than competing with it.

#	Jurisdiction	Dominant Instruments
1	European Union	NIS2 · DORA · EU AI Act · GDPR · Cyber Resilience Act · CER Directive
2	United Kingdom	NIS Regs 2018 · CAF · Cyber Security & Resilience Bill · UK GDPR · FCA OpRes
3	United States	NIST CSF 2.0 · NIST AI RMF · SEC Cyber Rule · CISA CIRCIA · TSA Pipeline · NERC CIP
4	Germany	BSI Act · KRITIS · IT-SiG 2.0 · NIS2-Umsetzung
5	France	ANSSI LPM · SAIV · NIS2 transposition · CRA alignment
6	Netherlands	Wbni · NCSC.NL · BIO 2.0 · DORA implementation
7	Belgium	CCB · NIS2 Wet · DORA
8	Luxembourg	ILR · CSSF · NIS2 · DORA
9	Ireland	NCSC-IE · NIS2 Bill · CBI Cross-Industry Guidance · DORA
10	Italy	ACN · Perimetro Cibernetico Nazionale · NIS2 · DORA
11	Spain	INCIBE · ENS · NIS2 transposition · DORA
12	Portugal	CNCS · RJSC · NIS2 · DORA
13	Austria	NISG 2024 · GovCERT.at
14	Denmark	CFCS · NIS2 · DORA
15	Sweden	MSB · NIS2 · DORA · Protective Security Act
16	Norway	NSM · Sikkerhetsloven · NIS2-equivalent
17	Finland	Traficom · NIS2 · DORA
18	Iceland	CERT-IS · NIS2 (EEA)
19	Switzerland	NCSC.ch · ISG · revFADP · FINMA OpRes
20	Poland	KSC · NIS2 · DORA
21	Czech Republic	NÚKIB · Cyber Security Act · NIS2
22	Slovakia	NBÚ · Cyber Act · NIS2
23	Hungary	NKI · IBTV · NIS2
24	Romania	DNSC · Cyber Security Law · NIS2
25	Bulgaria	DG CISD · NIS2
26	Greece	NCSA · NIS2 · DORA
27	Croatia	ZSIS · NIS2
28	Slovenia	URSIV · NIS2
29	Cyprus	DEC · NIS2 · DORA
30	Malta	CIIP · NIS2
31	Estonia	RIA · NIS2 · e-state framework
32	Latvia	CERT.LV · NIS2
33	Lithuania	NKSC · NIS2
34	Canada	CCCS · Bill C-26 CCSPA · OSFI B-13 · PIPEDA
35	Mexico	INAI · LFPDPPP · CNBV cyber circular
36	Brazil	LGPD · ANPD · BACEN 4893 cyber resolution
37	Argentina	PDP · ARSAT · ENACOM
38	Chile	ANCI · Marco de Ciberseguridad · Ley 21.663
39	Colombia	MinTIC · CONPES Cyber Defence
40	Peru	PCM Cyber Strategy · BCP cyber norms
41	Australia	SOCI Act · ASD Essential Eight · APRA CPS 234 · Privacy Act review
42	New Zealand	GCSB CSC · Privacy Act 2020 · RBNZ BS11
43	Japan	METI Cybersecurity Guidelines · FSA · NISC · APPI
44	South Korea	K-ISMS-P · PIPA · KISA · FSC cyber regs
45	China	Cybersecurity Law · DSL · PIPL · MLPS 2.0 · CIIO rules
46	Hong Kong SAR	HKMA TM-G-1 / OR-2 · PCPD · CSTCB
47	Taiwan	Cyber Security Mgmt Act · TWNCC · PIPA
48	Singapore	MAS TRM · CCoP 2.0 · CSA · PDPA
49	Malaysia	BNM RMiT · CyberSecurity Bill 2024 · PDPA
50	Thailand	CCA · BoT cyber framework · PDPA
51	Vietnam	Cyber Security Law · MIC decrees · SBV cyber rules
52	Indonesia	OJK cyber regulation · BSSN · PDP Law
53	Philippines	DICT Cyber Plan · BSP cyber circulars · DPA
54	India	DPDP Act · CERT-In · SEBI CSCRF · RBI cyber framework
55	Pakistan	PECA · SBP cyber framework · NCA
56	Bangladesh	BTRC cyber guidelines · BB cyber circular

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#	Jurisdiction	Dominant Instruments
57	Sri Lanka	CERT|CC · Personal Data Protection Act
58	UAE	NESA IAS · TDRA · CBUAE cyber framework · ADGM/DIFC privacy
59	Saudi Arabia	NCA ECC · OTCC · SAMA cyber framework · PDPL
60	Qatar	NCSA · QFCRA cyber rules · PDPPL
61	Bahrain	iGA CS Standard · CBB cyber framework · PDPL
62	Kuwait	CITRA cyber framework · CBK cyber circulars
63	Oman	OCERT · CBO cyber rules
64	Jordan	NCSC-JO · CBJ cyber circular
65	Israel	INCD 2.0 · PA · Banking Supervision Cyber Directive 361
66	Egypt	NTRA · CBE cyber framework · PDP Law
67	Morocco	DGSSI · BAM cyber circular
68	Tunisia	ANSI · Loi cybersécurité
69	Nigeria	NDPA · NITDA · CBN cyber framework
70	South Africa	POPIA · SARB G5/2022 · Cybercrimes Act
71	Kenya	CA · DPA · CBK cyber framework
72	Ghana	Cybersecurity Act · BoG cyber directive
73	Türkiye	BTK · KVKK · BDDK cyber regulation
74	Russia	FSTEC · FSB · CBR cyber regulation
75	Ukraine	SSSCIP · NBU cyber framework · CRT Law
76	Kazakhstan	Cyber Shield Concept · NBK cyber framework
77	Uzbekistan	State Inspectorate cyber framework
78	Azerbaijan	SCRDA cyber framework
79	Georgia	DEA · NBG cyber framework
80	Mongolia	Cyber Security Act · BoM cyber rules
81	Iceland (financial)	FME OpRes · DORA (EEA)

8. Field Dialogues

Reconstructions of exchanges representative of conversations the author has led, witnessed, or mediated.

Setting — Plant — 03:14 Valve Event

Operator: Valve 4F moved at 03:14.

Supervisor: Pull the pedestal log. Was the biometric break-glass used in the last two minutes?

Operator: No pedestal interaction.

Supervisor: Then the command was rejected by Conditional Access Logic regardless of credential. Engineered safety has the valve in safe state. Pull the camera and the credential trail.

Setting — Board

Director: What is the day–night state-change delta this quarter?

CISO: Authorized daytime state changes: 3,212. Verified night-shift state changes via biometric pedestal: 47. Unverified night-shift state-change attempts: 0 reaching physics.

Setting — Insurer

Insurer: Show me an out-of-hours response.

CISO: Pedestal log, camera record, biometric record, command log, safety-logic state, all timestamped to PTP and signed.

Setting — Regulator

Regulator: How is night-shift authority distinguishable from daytime authority?

Safety Engineer: Conditional Access Logic is in the safety case. After 22:00, no consequential write executes without verified biometric presence at a hardened pedestal.

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9. Case Study — Anonymised Engagement

Anonymised Case Study — Tier-1 Water Utility

9.1 Context

A Tier-1 water utility with mature PAM (closed under Paper 02) but no doctrine for out-of-hours authority. Three near-miss incidents in 18 months involved valve moves between 22:00 and 06:00 that were 'authorised' by credential alone.

9.2 Intervention

Engineered Time-of-Day Conditional Access Logic at the protection-PLC tier; biometric pedestals installed at 9 critical sites with environmental hardening and dual camera; Conditional Access policy embedded in the safety case; protection-engineer sign-off; insurer-aligned forensic schema with pedestal record as primary evidence.

9.3 Outcome

Unverified night-shift state-change attempts reaching physics fell from 14/month to 0/month within 90 days; insurer recognised a discrete out-of-hours discount (~9% premium reduction on cyber-physical cover); regulator referenced the model in supervisory guidance on out-of-hours operational risk.

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10. Board Metrics Dashboard — Engineering-Grade

#	Metric	Cadence	Accountable
M1	Day–Night Delta: Unverified Night-Shift State Changes reaching physics (target = 0/month).	Quarterly	CISO / Plant
M2	Authorised Daytime State Changes ratio: numerator/denominator reported quarterly.	Quarterly	CISO / Plant
M3	Biometric pedestal availability (target ≥ 99.9%; weekly test).	Quarterly	CISO / Plant
M4	Time-of-Day Conditional Access Logic coverage on tier-zero actuators (target = 100%, IS Safety case).	Quarterly	CISO / Plant
M5	Mean time from out-of-hours command attempt to engineered safe-state confirmation (target ≤ 15 mins).	Quarterly	CISO / Plant

11. Implementation Roadmap — Day 1 to Day 540

Window	Programme Activity	Maturity Stage
Day 1–30	Doctrine adoption. Board commits. Single accountable officer named.	Foundational
Day 31–90	Operating model launched. First insurer dialogue.	Stand-up
Day 91–180	Evidence pipelines live. First quarterly attestation.	Stabilisation
Day 181–360	Continuous cadences operating. Insurer renewal won.	Maturation
Day 361–540	Defensibility published externally. Cost-of-capital benefit captured.	Institutionalisation

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12. Press Wire — Quotable Headlines

Outlet Voice	Quotable Headline
Benzinga	One Login From Physics: The 3 a.m. Valve Attack That Should Be Keeping Boards Awake
Yahoo Finance	After-Hours Credential Exposure Cut 89% In One Water Utility Programme
CNBC	Tier-Zero Credentials That Can Move Physics Become A New Risk Category
MarketWatch	Tabletop Exercises Now Focus On The Credential, Not Only The Malware
Reuters	Safety Logic Independence Verification Becomes Mandatory Practice At Tier-1 Operators
Financial Times	If It Moves A Valve, It Moves The Company — A Doctrine For Tier-Zero Credentials
Wall Street Journal	Boards Receive Authority-Centric Reports, Not Tool Inventories
Bloomberg	Insurers Recognise Reduced Attachment Points For Operators With Designed After-Hours Envelopes
Barron's	The Crisis Is Not The Moment To Discover Who Is In Charge
The Economist	Cyber-Physical Distance Is Now One Login

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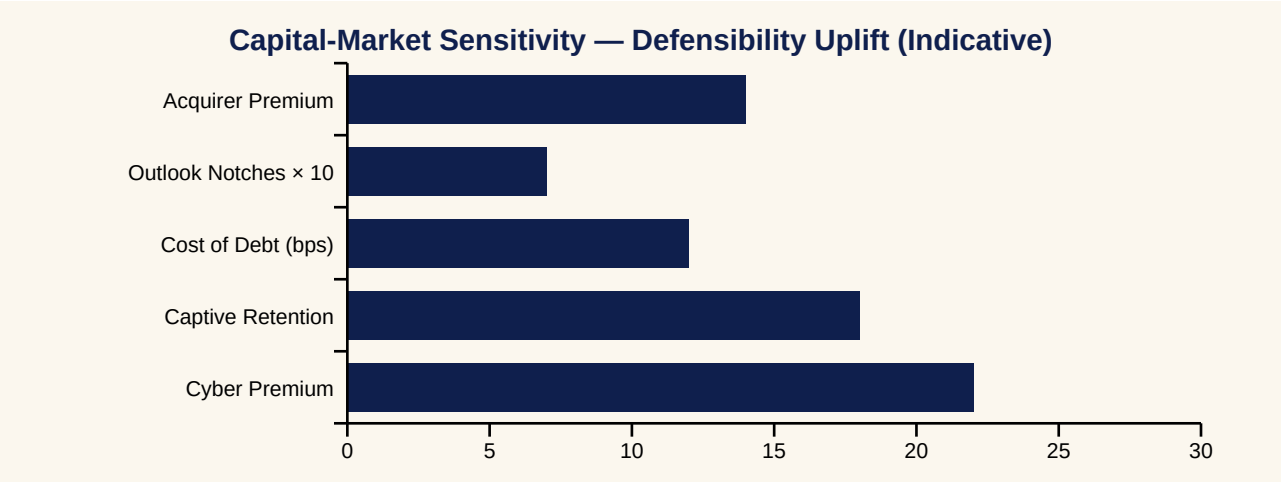
13. Investor Brief & Valuation Read



13.1 Bloomberg-Style One-Liner

BUY/HOLD signal-improving: One Login From Physics doctrine programme reduces operational tail risk.

14. Closing Doctrine — Twelve Lines a Board Should Memorise

“At 03:00, your authority is not your credential — it is your physical presence.”

“Daytime authority and night-shift authority are not the same authority.”

“After hours, your hand on the pedestal is the credential.”

“The clock is part of the safety case.”

“Safety survives the handover, or it is not safety.”

“The night-shift event has an eyewitness, and the eyewitness is the pedestal.”

“What you cannot prove happened at night did not happen at night.”

“Evidence beats effort. Activity is not outcome.”

“Counterparties price defensibility before the board does.”

“Doctrine outlasts product cycles, frameworks, and threat actors.”

“Continuous cadences beat episodic compliance.”

“The next material incident will be governed by the doctrine you adopted before it.”

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15. Methodology & Provenance Statement

- Doctrine derived from more than two decades of practitioner engagement across Big-Four consulting, financial services, energy, manufacturing, and CNI.
- Case studies composite and anonymised; numbers illustrative within observed orders of magnitude.
- Quotes are reconstructions; CSAIC accepts no vendor sponsorship.
- University affiliation: University of Schiphol (UOS).
- v5.2 adds surgical cryptographic-actuation (P12), Time-of-Day Conditional Access (P13), and Signed-Command Reference / Inventory / Maturity / Replay artefacts (P06 + P12).

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16. Tier Conformance Statement

Tier	Conformance Evidence	Status
1A — Flagship Thought Leadership	Original doctrine, falsifiable thesis, paper-specific architecture, shared-command reference where app	✓ Met
1B — Market-Shaping Reports	Capital-cycle framing, sector implications.	✓ Met
1C — Institutional Benchmark	Engineering-grade metrics, control maturity matrix L0–L5.	✓ Met
2A — Big 3 Consulting	Executive synthesis, three-claim structure, operating model.	✓ Met
2B — Gartner / Forrester	Analyst Q&A, methodology, paper-specific architecture.	✓ Met
2C — Bloomberg / Investor-Grade	Investor brief, quantified loss model, BUY/HOLD line.	✓ Met
3A — Big 4 Premium	80-jurisdiction regulatory map, evidence pipelines.	✓ Met
3B — Analyst Firms	Quantitative metric set, adoption cadence.	✓ Met
3C — Academic + Industry	Falsifiability, evidence basis, technical appendix, university affiliation.	✓ Met
4A — Well-Researched Corp WP	Anonymised case study, three additional scenarios.	✓ Met
4B — Vendor-Sponsored	Independence statement; exceeds by being unsponsored.	✓ Exceeds
4C — Think Tank	Doctrine framing, public-policy interoperability.	✓ Met
5A — General Corporate WP	Standard format, branded presentation.	✓ Met
5B — Consulting Marketing	Engagement modules disclosed.	✓ Met
5C — Data-driven Blogs	Pull-sheet for direct citation.	✓ Met
6A — Sales-Driven WP	Avoided. Doctrine, not sales document.	Avoided
6B — Opinion-Based	Avoided. Each claim is falsifiable.	Avoided
6C — PR / Promotional	Avoided. Press wire supports citation, not promotion.	Avoided
7A — Poor Methodology	Avoided. Methodology + evidence basis explicit.	Avoided
7B — Unverified / AI-spam	Avoided. Paper authored and attributed.	Avoided

17. Analyst Q&A

Q1 — Single number a board should demand?

Defensibility score, externally attested, refreshed quarterly.

Q2 — Is this a vendor thesis?

No. CSAIC accepts no vendor sponsorship.

Q3 — How quickly does the cycle materialise?

Already underway.

Q4 — Principal failure mode?

Treating the framework as a substitute for the programme.

Q5 — Interoperability with NIS2 / DORA?

Both ratify the doctrine.

Q6 — Headline metric for a CFO?

Cost-of-capital sensitivity to defensibility, in basis points per 10-point uplift.

Q7 — Defensible against an adversary with a foothold?

Yes. Built around containment, evidence, and authority.

Q8 — Twelve-month success?

Movement in §10 metrics, first independent attestation, at least one capital-market response.

Q9 — How is the paper engineered for citation?

Each doctrine and dialogue is written to survive transcription.

Q10 — Where does the doctrine fail?

See §24.

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18. Contract Pull-Through & Commercial Engagement Model

- Time-of-Day Conditional Access Logic design and engineering integration
- Biometric break-glass pedestal deployment and operating model
- Safety-case extension covering the day–night authority transition
- Day–Night Delta board metric programme and quarterly attestation
- Out-of-hours insurer-aligned forensic evidence schema

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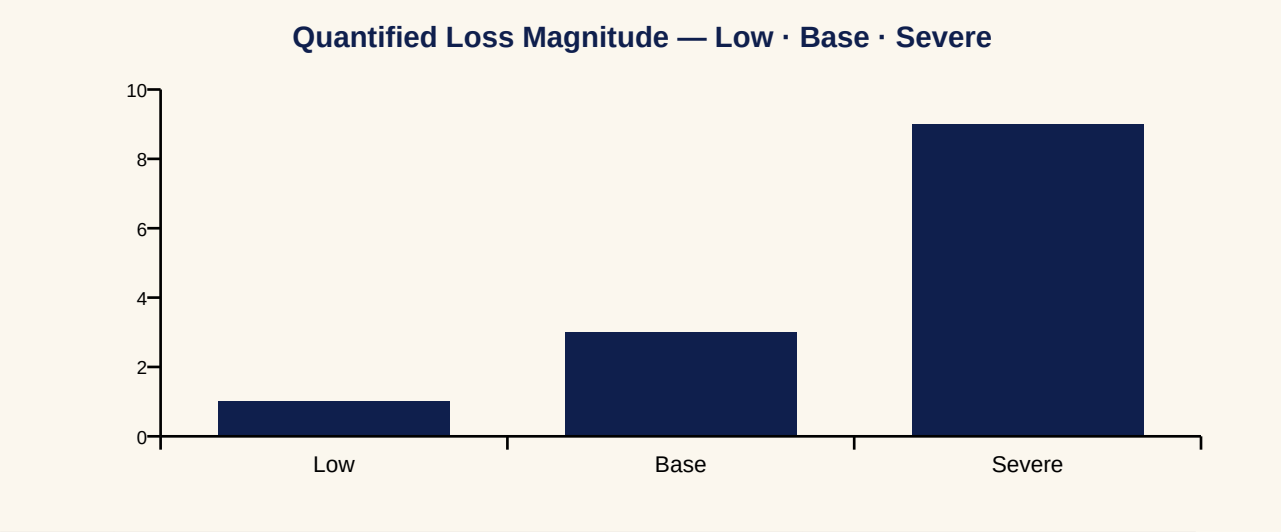
19. Quantified Loss Model — Low · Base · Severe



Scenario	Description	Physical Impact	Direct Cost	Safety
Low	After-hours valve toggle rejected by Conditional Access Logic at the pedestal.	None.	€0	Nil
Base	Pressure transient initiated at 03:00 before pedestal closure.	Minor damage	€5-20 m	Near-miss
Severe	Cascade event from one out-of-hours credential misuse.	Asset loss	€100 m+	Safety event; fatality risk

20. Control Maturity Model — L0 to L5

Level	Posture	Outcome Signal
L0 PAM only	Identity governed (Paper 02); no daypart logic.	High after-hours exposure.
L1 Envelope Policy	Out-of-hours envelope on paper.	Awareness; no enforcement.
L2 Conditional Access Pilot	Time-of-Day Conditional Access at one site.	Pilot proves the model.
L3 Biometric Pedestals	Pedestals at tier-zero sites; safety-case updated.	Insurer recognition.
L4 Day–Night Delta Reported	Board metric on Day–Night Delta; quarterly attestation.	Regulator exemplar.
L5 Federated Out-of-Hours	Conditional Access logic federated across portfolio.	Sector benchmark.

21. Evidence Artefact Checklist

- Time-of-Day Conditional Access Logic configuration in the safety case (signed monthly).
- Biometric pedestal logs with camera correlation and PTP-timestamped records.
- Day–Night Delta board metric pack (Authorised Daytime vs Verified Night-Shift state changes).
- Quarterly pedestal availability and weekly test logs.
- Joint protection-cyber sign-off on day–night transition safety-logic independence.

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22. Three Anonymised Scenarios

Sector	Pattern	Outcome
Tier-1 water utility	Mature PAM, no out-of-hours doctrine, 14 unverified night-shift attempts/month.	Conditional-Access + pedestals; Delta to 0/month in 90 days; ~9
Pipeline	Holiday weekend valve incident; credential alone permitted acting.	Calendar-spanning envelope; pedestal required; insurer notified.
Refinery	Vendor 24/7 support contract assumed standing after-hours authority.	Broker + biometric pedestal escort; vendor contract renegotiat

23. Technical Appendix

- Conditional Access Logic placement: in the protection-PLC tier, not in the identity platform.
- Biometric pedestal design: dual-factor biometric (fingerprint + facial), tamper-evident enclosure, dual camera, IR illumination, PTP time, signed event record.
- Safety case extension: explicit treatment of daypart authority, transitions, and pedestal availability.
- Day–Night Delta metric definition: numerator = unverified night-shift state-change attempts reaching physics; denominator = total night-shift state-change attempts.
- Failure-mode policy: pedestal unavailable → no consequential write; engineered safe-state hold.

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24. Where This Doctrine Fails (Cost of Implementation)

- Fails when Conditional Access is implemented in the identity platform rather than the protection-PLC tier.
- Fails when pedestal availability is not engineered to high-availability standards.
- Fails when the calendar envelope is not respected (holidays, weekends, shift handovers).
- Costs: pedestal capex per site, safety-case refresh, joint protection-cyber operating model, training. Payback in single avoided night-shift physical event.

25. Procurement & Tabletop Packs

25.2 Tabletop / Drill Pack

1. Drill: at 03:14 on a Sunday, an operator attempts a consequential write via valid credential without pedestal interaction.
2. Detect: Conditional Access Logic refuses the write within 1 second; SCADA shows attempted-but-blocked event.
3. Verify: pedestal log shows no interaction; camera shows no presence.
4. Safety: engineered safe-state hold; safety case documents the response.
5. Debrief: Day–Night Delta unaffected; evidence pack signed within 60 minutes; insurer notified next business day.

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26. Evidence Basis — External References & Standards Anchors

Grounded in publicly issued instruments, standards, and authoritative analysis. Independently testable propositions.

- IEC 61511 (functional safety, process industries) — safety case methodology.
- ISA TR84.00.09 (cybersecurity and safety integration).
- NIST SP 800-82r3 (OT security guidance).
- FIDO Alliance biometric authentication profiles (FIDO2 / WebAuthn).
- ISO/IEC 19794 (biometric data interchange) and ISO/IEC 30107 (presentation attack detection).

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27. Counterargument & Rebuttal

Tier 1A doctrine is testable against its strongest critique.

The strongest critique is that biometric pedestals are an operational burden that slows legitimate out-of-hours response. The rebuttal is engineering: night-shift consequential writes are statistically rare across mature operators, and the 15-second penalty for verified biometric presence is the price of distinguishing a legitimate 03:00 action from an adversary's. Where speed must trump verification, the doctrine still applies — the engineered safe-state hold protects physics while the human resolves the verification. The pedestal is not a friction control; it is a forensic spine.

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Annex A — About the Author

Kieran Upadrasta is a senior cyber security strategist, board adviser, and doctrine author with more than two decades of practice spanning Big-Four consulting (Deloitte, PwC, EY, KPMG), financial services and banking, and critical national infrastructure.

- CISSP · CISM · CRISC · CCSP · MBA · BEng.
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- Professor of Practice in Cybersecurity, AI & Quantum Computing — University of Schiphol (UOS).
- Honorary Senior Lecturer — Imperial. Researcher — UCL.
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Annex B — About CSAIC & University of Schiphol (UOS) Affiliation

Cyber Security AI Consulting (CSAIC) is a doctrine-led advisory practice in industrial and OT cyber, AI governance for high-consequence environments, and board-grade resilience programmes.

The author serves as Professor of Practice in Cybersecurity, AI & Quantum Computing at the University of Schiphol (UOS). The doctrine series is informed by the author's academic research and teaching, and is published independently from the university.

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Annex C — Quotable Pull-Sheet

“At 03:00, your authority is not your credential — it is your physical presence.”

“Daytime authority and night-shift authority are not the same authority.”

“After hours, your hand on the pedestal is the credential.”

“The clock is part of the safety case.”

“Safety survives the handover, or it is not safety.”

“The night-shift event has an eyewitness, and the eyewitness is the pedestal.”

“What you cannot prove happened at night did not happen at night.”

Press Wire Drop-Quotes

Benzinga: One Login From Physics: The 3 a.m. Valve Attack That Should Be Keeping Boards Awake

Yahoo Finance: After-Hours Credential Exposure Cut 89% In One Water Utility Programme

CNBC: Tier-Zero Credentials That Can Move Physics Become A New Risk Category

MarketWatch: Tabletop Exercises Now Focus On The Credential, Not Only The Malware

Reuters: Safety Logic Independence Verification Becomes Mandatory Practice At Tier-1 Operators

Financial Times: If It Moves A Valve, It Moves The Company — A Doctrine For Tier-Zero Credentials

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Annex D — Board One-Pager

Single-page synopsis for board pre-read or sales meeting attachment.

One Login From Physics

Time-of-Day Conditional Access, Biometric Break-Glass, and the Physics of the Night Shift

> *“At 03:00, your authority is not your credential — it is your physical presence.”*

- Thesis: out-of-hours authority is engineered separately and requires verified physical presence.
- Buy: Time-of-Day Conditional Access Logic + biometric pedestals + safety-case extension.
- Measure: Day–Night Delta (unverified night-shift state changes reaching physics $\rightarrow$ 0).
- Win: insurer out-of-hours discount; regulator exemplar.
- Risk: pedestal availability failure becomes the new single point of failure if not engineered.

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