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Connected devices outnumber security engineers roughly a million to one.

Joseph Kiniry on making provably secure systems affordable at machine scale.

SWIPE →

IOT HAS CHANGED

IoT now means cars, pacemakers, and factory equipment.

Failures can cause physical harm.

With millions of deployed devices and too few experts, **testing alone cannot provide assurance.**

WHY ASSURANCE STAYED RARE

Security by design worked. Most products could not afford it.

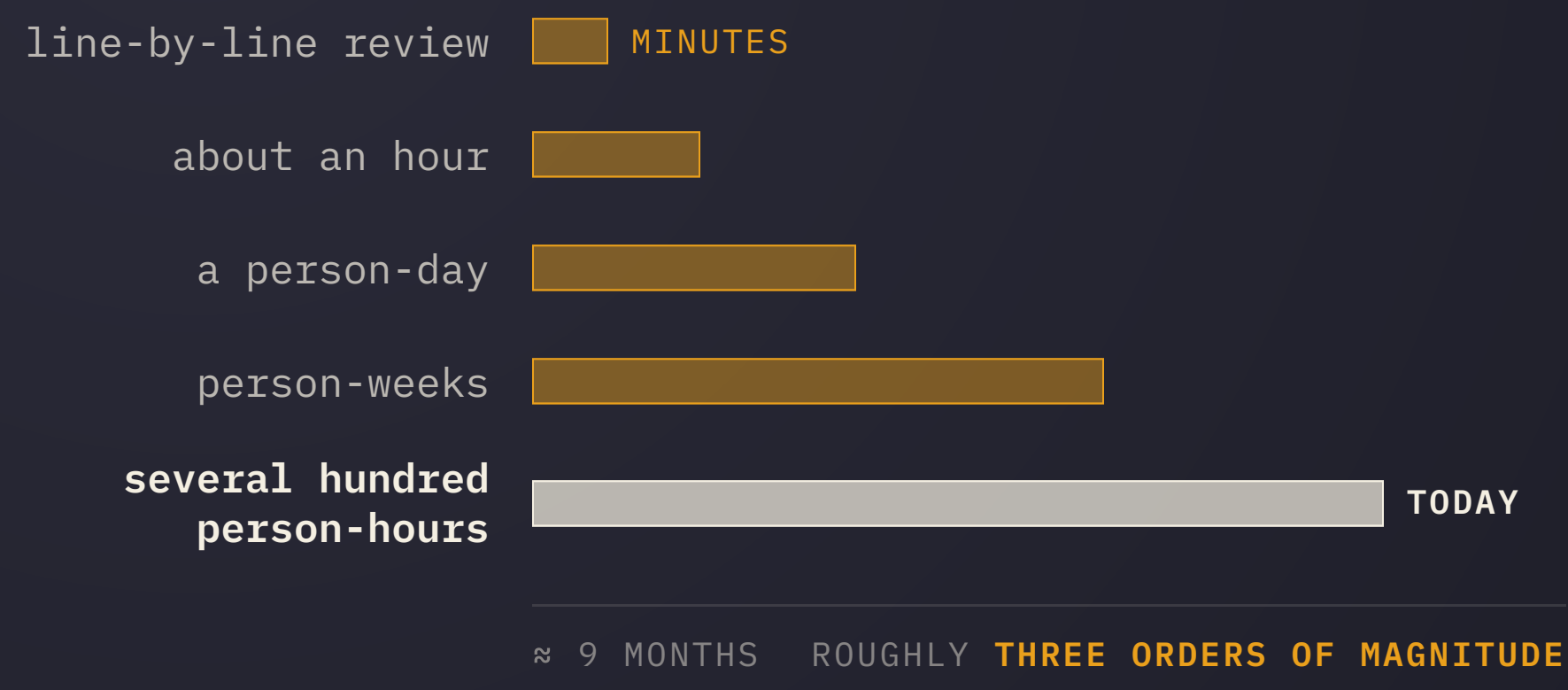
Formal methods have delivered high assurance for decades, but expert labor kept them largely in aerospace and defense.

AI-assisted rigorous engineering can lower that cost.

NINE MONTHS OF EVIDENCE

From line-by-line review to hundreds of hours between check-ins.

Time between human check-ins



HOARDE is our rigorous-engineering agent platform.
The interval grew only after thousands of successful, human-gated actions.

EVIDENCE FROM PRACTICE

CASE 01

Fifteen verified examples across five domains.

From simple ciphers and parsers to post-quantum cryptography. The Cryptol integration has required **no defect fixes** since entering HOARDE.

CASE 02

A mechanized security model of IKEv2.

IKEv2 secures many VPN connections. We linked a symbolic security proof to an executable cryptographic specification; **high-assurance Rust is underway.**

EXISTING DEVICES

New systems are only part of the problem.

Most vulnerable devices are already deployed. HOARDE-class tooling can analyze, retrofit, and update them **even when source code is unavailable.**

VERIFYING THE AI

AI output still needs **independent checks.**

HOARDE agents produce machine-checkable evidence — including proofs and provenance — for their actions. Engineers **review evidence, not model confidence.**

THE PRIORITY

Use AI to secure the systems already deployed.

The installed base includes devices without source code, regular updates, or affordable rigorous engineering. AI can help us **analyze, repair, and verify changes at scale.**

Sigil Logic

AI-augmented rigorous engineering with formal methods.