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Move fast and prove things.

Joseph Kiniry on using AI to accelerate defense software engineering without giving up assurance.

SWIPE →

THE THESIS

AI doesn't lower the assurance bar. It moves the bottleneck.

AI already accelerates software development and exploit generation. Critical systems still require evidence, certification, and recertification.

The current state of affairs still gives adversaries the speed advantage.

WHY ASSURANCE COST SO MUCH

Rigorous engineering depended on scarce expert labor.

01 Writing precise models and specifications

02 Linking requirements, models, code, and evidence

03 Creating and maintaining proofs

04 Translating between levels of abstraction

Every step took substantial expert time.

AI can now assist with all four.

THE NEW CONSTRAINT

Producing artifacts gets cheaper. Preserving intent does not.

AI can draft models, specifications, proofs, and translations faster than people can review them. The challenge is **keeping every layer consistent and justified.**

CONNECTED ASSURANCE

Assurance depends on how these disciplines connect.

Formal methods

Engineering evidence

Technical architecture

Model-based techniques

Modern languages

They carry engineering intent into models, specifications, code, and evidence.

NINJA is the methodology that connects them.

EVIDENCE FROM PRACTICE

CASE 01

Fifteen verified cryptography examples.

From basic ciphers to post-quantum algorithms. The Cryptol integration in our HOARDE agent platform has required **no defect fixes** since day one.

CASE 02

A verified Commodore 64 model.

One evidence chain links the formal model, Rust simulator, and silicon design. **It boots KERNAL and runs Zork.**

THE RECURRING COST

Every significant change can trigger re-assurance.

Specifications, proofs, code, and evidence must all be checked again. Our HOARDE agent platform regenerates them together.

Weeks → Minutes

THE SECURITY CONSEQUENCE

Attackers are accelerating too.

AI can speed up exploit discovery and generation. Defenders need to update critical systems quickly without abandoning evidence or review.

Sigil Logic

AI-augmented rigorous engineering with formal methods.