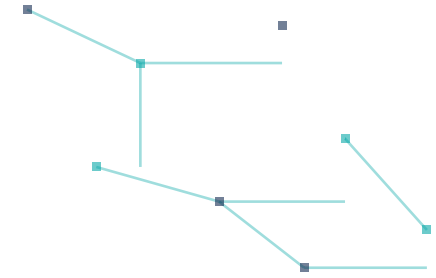


Swarm-Engineered Ontologies for Systems Engineering: A Multi-Agent Pipeline Across SE Knowledge-Engineering Projects



Paul Wach, PhD, PMP (presenter)

University of Arizona, Systems & Industrial Engineering

WySE AI Labs

Joe Gregory, PhD

University of Arizona, Systems & Industrial Engineering

David Kamien, PhD

[Mind-Alliance](#)

NATO Neuro-Symbolic AI task lead

Brad Philipbar

[PALLC](#)

Uh Oh, You said the “O” Word



Why do we need/want ontologies?

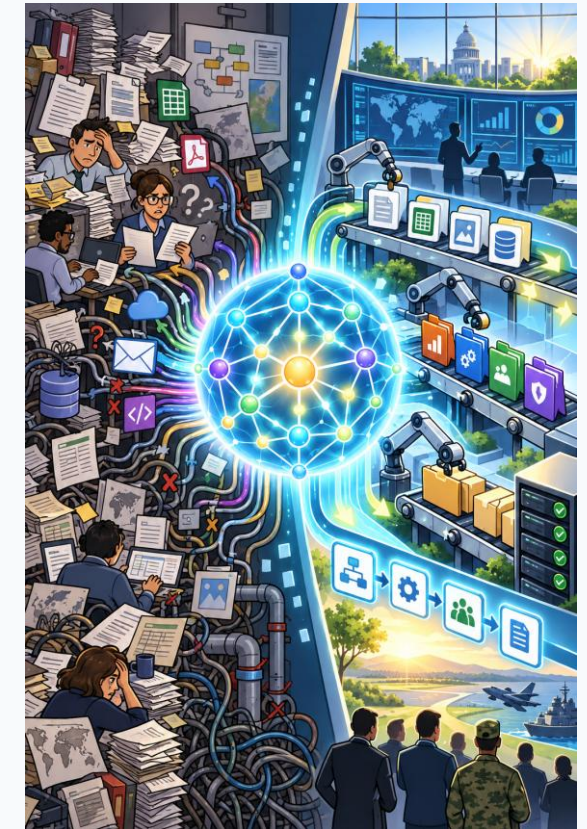
Coherence



Reasoning



Automation/Streamlining



Ontology is Important Now, Perhaps More Than Ever



Generative Intelligence - Joining Ontological Engineering

(GI-JOE) **Probably the most important AI in my portfolio*

Equipped with/to:

- Automate/streamline inspection/assessment of existing ontologies
- Automate/streamline creation of ontologies from scratch
- Automate/streamline mapping between existing ontologies
- Automate/streamline reasoning

Examples:

- Reverse engineered the System Definition Language (SDL)
- Fixed issued in a mission thread authoring ontology



Our Practical Applications

Mission Thread: Detecting Drones Approaching a Civilian Airport

Objective: Detect, identify, and alert stakeholders about unauthorized drones before they create a safety hazard.



Our Practical Applications



Dr. Paul Wach
University of Arizona

Brad M. Philipbar
Philipbar Analytics LLC



AI4SE & SE4AI

RESEARCH AND APPLICATION WORKSHOP

Swarm-Engineered Ontologies for Systems Engineering

A Multi-Agent Pipeline Across SE Knowledge-Engineering Projects

📅 September 22-23, 2026

📍 Washington, DC

Our Practical Applications

IGNITE26

MQ-99 Berserker

DTE&A Independent Assessment

Arc

- Arc 0: DE Ecosystem
- Arc 1: DTE&A
- Arc 2: Conway's Law
- Arc 3: 4D Assessment
- UAOS Live Queries

Team: UoIA + Violet Labs + RTSync

Track: DTE&A Independent Assessment

Theme: Continuous Mission-Linked Analytics

Framework: IDSK (DoDI 5000.89)

Arc 2 — Conway's Law: Enterprise Decision Simulation

Arc 1 shows the IDSK working perfectly for a single program with full data access. What happens when you scale to enterprise with real organizational constraints?

1. Scenario Configuration

Enterprise Context

- NNSA
- DoD

The IDSK (Integrated Decision Support Key, DoDI 5000.89) structures T&E around five questions. It assumes all stakeholders can access the data. Conway's Law

Minimal sharing. Each M&O contractor share intellectual property. This is the current NNSA scenario.

Data Sharing Scenario

- Siloed Operations

Contractor-to-Contractor sharing15

Contractor-to-Government sharing20

Government-to-Government sharing30

Classification Overhead

- Secret

☐ AI-Assisted Information Extraction

2. IDSK Impact Analysis

How each IDSK question is affected by the current scenario. The IDSK assumes full data access; Conway's Law constrains it.

Q1. What do we already know?	Coverage	11%	11%
Only 11% of existing knowledge is accessible. 74% is locked in organizational silos.			
-74%			
Q2. What don't we already know?	Coverage	10%	10%
Unknown unknowns grow to 70% of the knowledge space. Cannot detect gaps you cannot see across silos.			
-70%			
Q3. What do we need to know?	Coverage	12%	12%
Same information needs, but only 12% of required data is obtainable. 78% blocked by organizational barriers.			

IGNITE26

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Interactive Assessment Builder

Add a Capability

Capability Name

Layer

- SE Capabilities

Criticality

- mission_critical

D1 — Evidence Quality

Evidence Category

3

D2 — System Readiness (GRL per thread)

Technology4

Production4

Integration4

Human Systems4

Organizational4

Knowledge4

D3 — Governance Compliance

Info Security (1-4)1

Quality Assurance (1-4)1

Regulatory (0-2)1

D4 — Product/Process Quality (ISO 25010)

Functional Suitability5

Reliability5

Maintainability5

Performance5

Security5

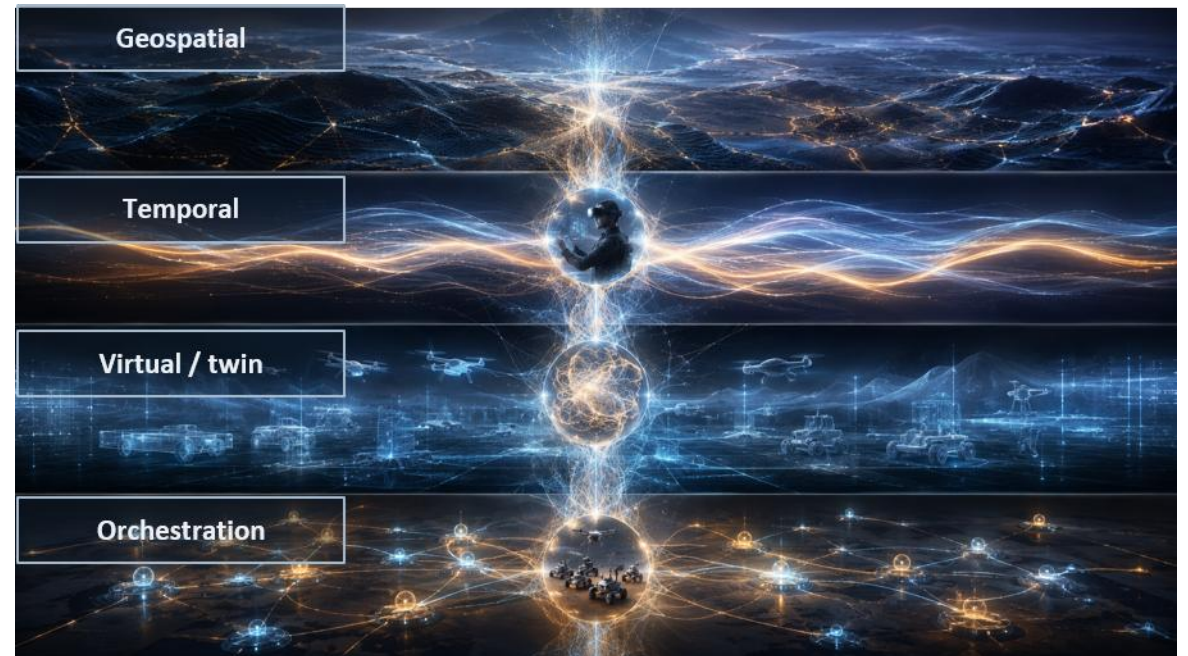
Usability5

Add Capability

AI4SE & SE4AI WORKSHOP 2026

Closing Words

- Still need humans
- We have an increasingly large ontology stack
- Mission Ontology of Analysis for Cyber Risk Assessment (MOACRA)
 - **Tom Tenorio**, Transformation and Training Command (T2COM), T2COM Futures and Concepts Command (FCC), Transformation Decision Analysis Center (TDAC), Computer Scientist, Cyber Experimentation & Analysis Division (CEAD)





Thank you. Questions?

Paul Wach, PhD, PMP

Researcher, AI & Systems Engineering

paulwach@arizona.edu



WySE AI Labs