Blake Shepard, Ph.D.

Senior Ontology Engineer

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20+ years of experience developing and deploying ontology-based semantic solutions for diverse stakeholders, improving and leveraging taxonomies, ontologies, databases, symbolic reasoning systems, natural language processing technologies, and ML and GenAI technology.

SKILLS

- Semantic Modeling
- Taxonomies, Ontologies
- RDF, OWL, SPARQL, SHACL
- Protege, Blazegraph
- Software Project Management
- Standards: SNOMED-CT, ICD-10
- Application Design
- LLMs, NLP, ETL
- Python (RDFLib)

PROFESSIONAL EXPERIENCE

Director of Ontological Engineering, Cycorp Inc. (2017–Present)

- Directed program of 20-25 PhD-level developers – distributed across multiple sub-teams – to consistently extend broad and deep taxonomy and ontology (1.5+ million concepts, 20+ million logical axioms) for machine reasoning AI platform, integrating external standard taxonomies and ontologies, supporting a wide range of deployed commercial products.

- Co-architected and directed engineering to integrate symbolic reasoning systems with LLMs to autonomously expand taxonomy, ontology, and knowledge base, to validate LLM output in real-time, and to automatically translate free-text English into formal logic. Exported validated knowledge and logic patterns to improve LLM performance on key benchmarks.

Ontologist and Technical Project Manager, Cycorp Inc. (1999–Present)

- Led extensive effort to map ICD-10 and SNOMED-CT taxonomies to rich concepts in the Cyc ontology, leveraging both automated and manual ontology alignment techniques.

- Developed ontology-based system for the Cleveland Clinic to semi-automatically translate English cohort-based cardiac surgery research queries into SPARQL queries, reducing cohort identification time by over 90%.

- Consulted with and developed large taxonomies and ontologies for multiple Fortune 50 and U.S. Government clients, covering myriad domains including cardiac surgery, prescription drug use, cellular biology, mathematics, manufacturing, and rocket launch facilities and processes.

EDUCATION

PhD in Philosophy, The University of Texas at Austin.
Bachelor of Arts in Philosophy, magna cum laude, Phi Beta Kappa. Hamilton College.

PUBLICATIONS AND PRESENTATIONS

B. Shepard, G. Marcus, F. Rossi, and M. Witbrock, Doug Lenat, CYC, and Future Directions in Reasoning and Knowledge Representation (panel discussion), AAAI 2024.

D. Lenat, M. Witbrock, D. Baxter, E. Blackstone, C. Deaton, D. Schneider, J. Scott, and B. Shepard, Harnessing Cyc to answer clinical researchers' ad hoc queries, *AI Magazine*, 31, 3, Fall, 2010.

K. Panton, C. Matuszek, D. Lenat, D. Schneider, M. Witbrock, N. Siegel, B. Shepard, Common Sense Reasoning – From Cyc to Intelligent Assistant. In Yang Cai and Julio Abascal (eds.), *Ambient Intelligence in Everyday Life*, pp. 1-31, LNAI 3864, Springer, 2006.

B. Shepard, C. Matuszek, et al. A Knowledge-Based Approach to Network Security: Applying Cyc in the Domain of Network Risk Assessment. In *Proceedings of the Seventeenth Innovative Applications of Artificial Intelligence Conference,* Pittsburgh, Pennsylvania, July 2005.

D. Baxter, B. Shepard, et al. Interactive Natural Language Explanations of Cyc Inferences. 2005 ExACt AAAI Symposium.

N. Siegel, B. Shepard, et al. Hypothesis Generation and Evidence Assembly for Intelligence Analysis: Cycorp's Nooscape Application. In *Proceedings of the 2005 International Conference on Intelligence Analysis,* McLean, Virginia, May 2005.

PATENTS AND PROVISIONAL PATENTS

K. B. Shepard, K. Goolsbey, D. Felder, J. Curtis, C. Deaton, D. Schneider. "Automated Concept Learner". US Patent application # 63/611,760. *A technology to automatically extend and validate formal knowledge representations leveraging analogical reasoning and automated skeptical conversations with LLMs.*

K. B. Shepard, K. Goolsbey, D. Felder, D. Schneider. "Natural Languages to Logic via Stages". US Patent application # 63/553,934. *A technology to automatically formally encode knowledge from NL free text documents, leveraging embeddings, skeptical conversations with LLMs, and logical WF-checking.*

M. Witbrock, L. Lefkowitz, D. Schneider, K. Shepard, M. Grobelnik, B. Fortuna, D. Mladenic. Identifying and Routing of Documents of Potential Interest to Subscribers Using Interest Determination Rules. Patent US-20100299140-A1. Published 2010-11-25.