

SUDOKN: Supply and Demand Open Knowledge Network

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Use case description and societal challenge being addressed

More than 75% of manufacturing in the U.S. is carried out by small and medium-sized manufacturers (SMM) with less than 30 employees. Despite their critical role in the US economy, SMMs are especially challenged with sustaining operations due to a lack of visibility and limited access to accurate data and analytical capabilities. Currently, these small manufacturers rely on human network relationships to find new business, which in this digital era limits access to diversified clients. This project aims to leverage the power of open knowledge networks to enable the search and discovery of these small manufacturing firms and better connect them with prospective supply chain partners. In this project, we will prototype and deploy the Supply and Demand Open Knowledge Network (SUDOKN), which can serve as a dynamic network of supply and demand en es in various industries, including defense, semiconductor, aerospace, automotive, and biomanufacturing.

SUDOKN is composed of several open and interconnected knowledge graphs, aligned with formal ontologies, that collectively represent various types of supply and demand data in selected industry sectors. We will use the Industrial Ontologies Foundry (IOF) reference ontologies that are based on Basic Formal Ontology (BFO) as the top-level ontology. We will combine public data sources (such as company website data) and datasets provided by our federal and industrial collaborators to create a national Manufacturing Capability Network (MCN) as the core component of SUDOKN. SUDOKN enables bidirectional visibility in supply and demand. It provides manufacturers with visibility into market pa erns and customer needs to anticipate and respond to changing demands accurately. It also provides the customers of manufacturing services with the knowledge of available manufacturing capacities and capabilities so that they can optimize their supply chain, reduce risks, and reduce their dependencies on critical suppliers.

Knowledge graph source datasets

Dataset	Source	Public or Private	Type
Supplier capability narratives	Company website	Public	Unstructured (text)
Profiles of semiconductor SMMs	NIST MEP	Private/Public	Structured
Profiles of bio-industrial SMMs	Capacitor website	Public	Structured
Directory of manufacturing facilities	Homeland Infrastructure Foundation-level Data (HIFLD)	Public	Structured
Pilot and scale-up facility info	BioMADE	Private	Structured
Manufacturing Workforce statistics	US Bureau of Labor Statistics	Public	Structured/unstructured

User queries / competency queries for the use case

- Which suppliers in southern California can provide precision machining services for aerospace grade material?
- What are the gaps in this area [selected on the map] in terms of Additive Manufacturing capabilities?
- What are the gaps in this area [selected on the map] in terms of skilled TIG (Tungsten Inert Gas) welders?
- What are the existing supply chains for this particular product (with this UPC/GTIN)?