

# 24/7 AI Career Cyber-coaching

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# Current Team



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# Overview

Occupational Skills Mapping for 24/7 AI Career Cyber-coaching is a part of the larger Embedded System Security (ESS) / Trusted AI program within the larger SCALE (Scalable Asymmetric Lifecycle Engagement) network.

SCALE is the pre-eminent U.S. program for semiconductor workforce development in the defense sector. SCALE provides unique courses, mentoring, internship matching and targeted research projects for college students interested in microelectronics at Purdue University, Notre Dame University, and Indiana University.

The Trusted AI program addresses the strategic need to for a systematic test and evaluation framework for AI, which is broken down into four hard problems: (1) Human Trust of AI/ML, (2) Measures, Metrics, and Testing, (3) Data Source Bias and Modularity, (4) Cybersecurity & Risk Modeling



# Goals

- Workers, career coaches, and employment agencies need actionable insights on the evolving labor market
  - Global understanding of occupations and skills outlooks, employment risks
  - Local, actionable data and resources
- Develop occupation and skills maps that can be used as part of career counseling services to guide workers in response to regional and national labor market trends, supply chain issues, or pandemics.
- Focus on strategic areas of needs such as
  - Microelectronic and packaging engineering,
  - embedded systems/system on a chip (soc), and
  - supply chains.

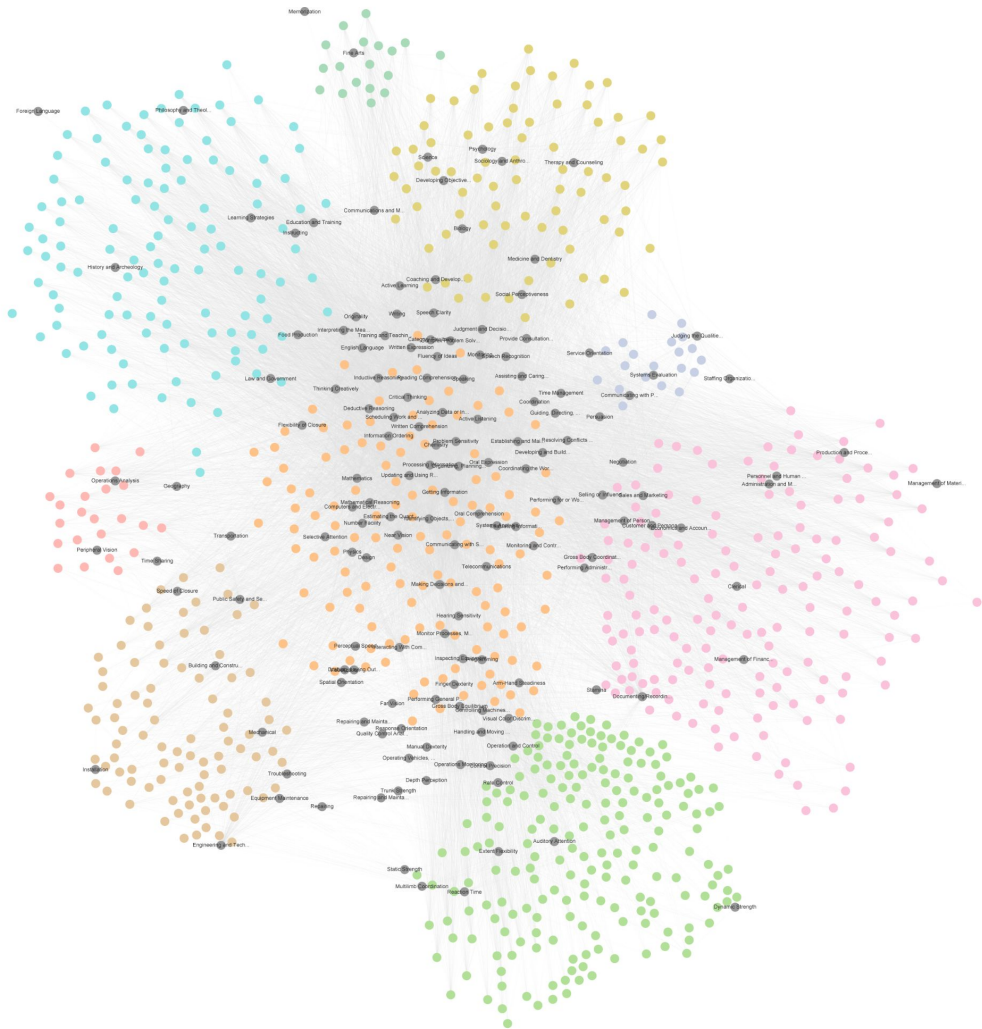


# O\*Net Occupations and Skills Network v3.0

Initial results of our work leverages federal data sources (O\*NET and BLS) to create an occupation and skills network map.

Occupations grouped based on the networks' knowledge-skill subgraph and application of the Blondel Community Detection algorithm.

The map layout was created by applying a force directed algorithm on each community, and locking the position of member occupation nodes. After occupation clusters were set, then skill nodes layout was set to a general location. The iterative process accounts for the overlap in skills requirements across occupation clusters.





# Occupation Skills Map: Knowledge Elements

O\*NETs Knowledge elements are dispersed throughout the network layout.

Knowledge elements are situated nearest/within the Blondel communities near occupations requiring this skill.

Using knowledge as the first level of organization helps analysts and viewers quickly characterize each occupation cluster in the map, and search for their interests.



# Occupation Skills Map: Knowledge Elements

The remaining ONET nodes tend to fall along a central axis within the network, which aligns to the knowledge elements used to organize the overall network.

Spatial positions provided by the Force Atlas algorithm reveal insights about relationship between abilities, skills, and work activities and knowledge clusters.

- Specialization
  - Reasoning and expressing ideas
  - Memorization & peripheral vision
- Cognitive abilities vs. physical abilities

# Future Development (2022 to 2024)

## Y1.Q1 to Y2.Q2

- We will implement a visual analytics **Occupation and Skills Map Dashboard** site,
  - Interactive versions of occupations and skills maps
    - Details on demand, filtering, and overlays
    - Visually represent risk scores, salaries, projections data on maps
  - Occupation profiles in three areas: microelectronics packaging, radiation hardening, and supply chain.
  - Local employment data to help career coaches, hiring managers, and workforce entrants understand job market risks and opportunities.
- We will identify and engage career counselors and students in a user study to evaluate how stakeholders use these occupational skills maps and occupational profiles dashboard tools.





# Future Development (2022 to 2024)

## Y1.Q3 to Y2.Q4

- Collaborate closely with partners at NSWC Crane and ONR Global to develop analytics tools to support program evaluation, recruiting, and auditing.
- Engage with relevant stakeholders to create a Technology Scouting Portal that applies advanced analytics tools to mine and communicate patterns and trends in grant funding and publications data.



# Human-Machine Pairing

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