

# TASK # AN004. TECHNICAL TRAINING KNOWLEDGE ARCHITECTURE

## PROJECT AT-A-GLANCE

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- INDUSTRY PARTNER: Google

## RELEVANCE TO TECHNICAL TRAINING AND HUMAN PERFORMANCE

- Technical Training is dealing with a consistently increasing volume of information.
- Improved knowledge architecture and search engine results can better help manage information and better support the effective communication of knowledge.

## STATEMENT OF WORK

- Understand the needs of FAA on building knowledge search engine and the types of carriers of technical training information
- Understand the state of the art to extract information from the information carrier that FAA uses for technical training (e.g., PDF documents, web pages, scanned images)
- Understand the state of the art to discover knowledge from data, especially from text
- Understand the state of the art to represent knowledge and infer on them, using both data driven and symbolic approaches
- Understand the state of the art to build knowledge search engine, including using user feedback to improve.

Examples of existing AI approaches to construct knowledge and use it to find answers: Left - NLP approach for knowledge extraction; Right – Intelligent search for relationship identification

S1: Here's the question: Which object is the best conductor of electricity? (A) a wax crayon (B) a plastic spoon (C) a rubber eraser (D) an iron nail. I'm not sure of the answer. What do you think the answer is?  
U1: iron nail  
S2: Why do you think the answer is (D) an iron nail?  
U2: electricity goes through metal  
S3: I know "metals are shiny and good conductors of electricity and heat," does that mean that the answer is (D) an iron nail?  
U3: yeah  
S4: Okay, great. What's the relationship between 'electricity' and 'iron', if any?  
U4: iron conducts electricity because its metal  
S5: Okay, great, I get it! The answer is (D) an iron nail

to conduct — metal — iron  
ELECTRICITY GOES THROUGH METAL  
IRON ... BECAUSE ITS METAL  
iron conducts electricity because its metal

Q: In **New York State**, the **longest period of daylight** occurs during which **month**?

Subdivision	Country	Orbital Event	Day Duration	Night Duration
New York State	USA	Summer Solstice	Long	Short
California	USA	Winter Solstice	Short	Long
Rio de Janeiro	Brazil	---	---	---

Country	Hemisphere	Orbital Event	Month	
United States	Northern	North	Summer Solstice Winter Solstice	June December
Canada	Northern	North	Summer Solstice Winter Solstice	June December
Brazil	Southern	South	Summer Solstice Winter Solstice	December June

(A) December  
(B) June  
(C) March  
(D) September

Semi-structured Knowledge

## STATUS

- Understand FAA's need – 85% complete
- Information Extraction – state of Art – 65% complete
- Knowledge Discovery, state of the art – 25% complete
- Knowledge Representation and Reasoning, state of the art – 25% complete
- Search result generation and ranking, state of the art – 10% complete

## FUTURE WORK

- Assist the vendor selection process using multi-criteria decision making models
- Implement the recommended system that provides world-class search engine results and enables information sharing and feedback mechanism

# Publications, Presentations & Awards

- Publications: N/A
- Presentations:
  - Technical Training Knowledge Architecture Overview. FAA COE CLIMB Team Kickoff Meeting, Norman, OK, September 22, 2016.
  - Technical Training Knowledge Architecture Overview. FAA COE First Quarter Meeting, Norman, OK, October 31, 2016.
  - Technical Training Knowledge Architecture Project Update. FAA COE Second Quarter Meeting, Daytona Beach, FL, March 1, 2017
  - Technical Training Knowledge Architecture Poster Presentation. FAA COE Third Quarter Meeting, Washington, DC, June 14, 2017.
- Awards: N/A