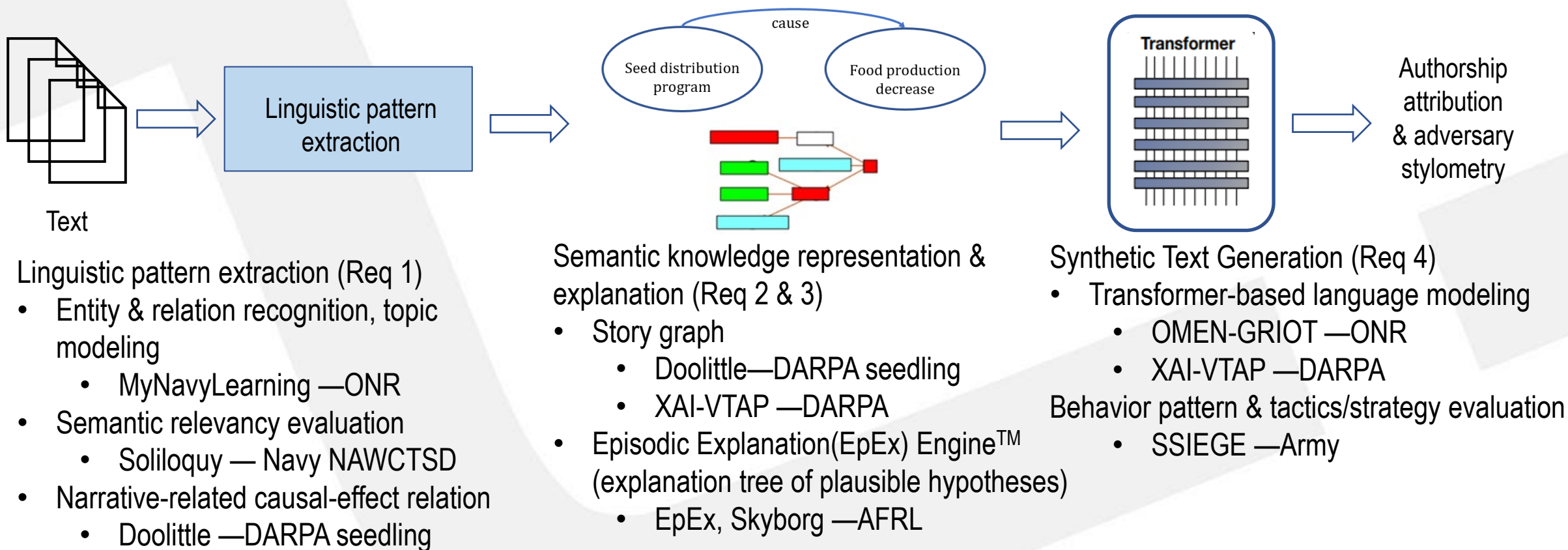# IARPA HIATUS
Lightning Talk

Ming Qian
SoarTech

SoarTech's capability slide

- A leader in AI research and R&D in support of DoD domains, providing critical and cutting-edge capabilities to Warfighters
- Develop intelligent software that *reasons like humans* (constantly learning, getting smarter, and adapting to new situations) to automate complex tasks, simplify *human-machine interactions*, and *model human behaviors*
- Has a team of >100 scientists and engineers—more than 55% advanced degrees and 25+ Ph.D.s in AI related fields
- HIATUS approach
  - "Underlying structure" is not only a textual property but also a cognitive process
  - Develop tools to capture interactions between different textual features AND model situated discourse/context
  - High interpretability/explainability enable accurate authorship attribution and adversary stylometry
  - SoarTech has expertises on cognitive and situatedness modeling, and explainable AI

Towards HIATUS Program Requirements

HIATUS Requirements	
1	Extract author-level Linguistic Fingerprint
2	Generate novel representation to capture author-level linguistic variation
3	Build human-interpretable algorithms
4	Adversary stylometry (remove/re-generate author-identifying content)

Text

Linguistic pattern extraction (Req 1)
- Entity & relation recognition, topic modeling
  - MyNavyLearning —ONR
- Semantic relevancy evaluation
  - Soliloquy — Navy NAWCTSD
- Narrative-related causal-effect relation
  - Doolittle —DARPA seedling

Semantic knowledge representation & explanation (Req 2 & 3)
- Story graph
  - Doolittle—DARPA seedling
  - XAI-VTAP —DARPA
- Episodic Explanation(EpEx) Engine™ (explanation tree of plausible hypotheses)
  - EpEx, Skyborg —AFRL

Synthetic Text Generation (Req 4)
- Transformer-based language modeling
  - OMEN-GRIOT —ONR
  - XAI-VTAP —DARPA

Behavior pattern & tactics/strategy evaluation
  - SSIEGE —Army

SoarTech PIs' experience related to HIATUS

SoarTech PIs' Research Interests	Sample Publications relevant to HIATUS
Dr. Ming Qian • Cross-culture differences on narrative structures • Automatic text generating & textual encoding using transformer-based language modeling (MLM, BERT, GPT-3) • Human-machine understanding for multilingual texts	• **Qian, M**., Zhu, E. (2022). Re-mapping narrative text structure elements between languages using self-supervised and active learning, International Conference on Artificial Intelligence in Human-Computer Interaction (AI-HCI). • **Ming Qian**, "Human-machine Symbiosis to Enhance Overall Understanding", the International Symposium on Translation and Interpreting as Social Interaction: Affect, Behaviour and Cognition, University College London, London, 2021. • **Ming Qian**, Jaye Laguardia, "Morality Beyond the Lines: Detecting Moral Sentiment using AI-generated Synthetic Context", 2 nd International Conference on Artificial Intelligence in HCI (AI-HCI), Part of HCI International Conference, Washington DC, 2021. • **Ming Qian,** et al., "Human versus Machine and Human-Machine Teaming on Masked Language Modeling Tasks", 1st International Conference on Artificial Intelligence in HCI (AI-HCI), Part of HCI International Conference, Copenhagen, 2020. • Wang, E and **Qian, M** (2021). *Determining structure from a language block* (U.S. Patent No. US20210248320A1). https://patents.google.com/patent/US20210248320A1/en
Dr. Kay Michel • Ontologies/Semantic Models to help determine human characteristics or a person's unique signature	• **K. Michel**, M. Smith, B. Brown, M. King, G. Dozier, "A Study of Social Network Messages During the COVID-19 Infodemic: Salient Features and the Propagation of Information Types", *IEEE SoutheastCon Conference*, 2021. • **K. Michel**, M. King, "The Future of Cyber Analytics: Identity Classification for Systematic and Predictive Insight", In Proceedings of IEEE International Conferenceon Cyber Science, Situational Awareness, DataAnalytics,and Assessment (CyberSA), Oxford University, UK, 2019.