Department of the Air Force

One Team, One Fight!

ICAMS AI Workshop #1
USAF Weather Perspective

AI/ML for Earth System observations, data assimilation, predictions and services
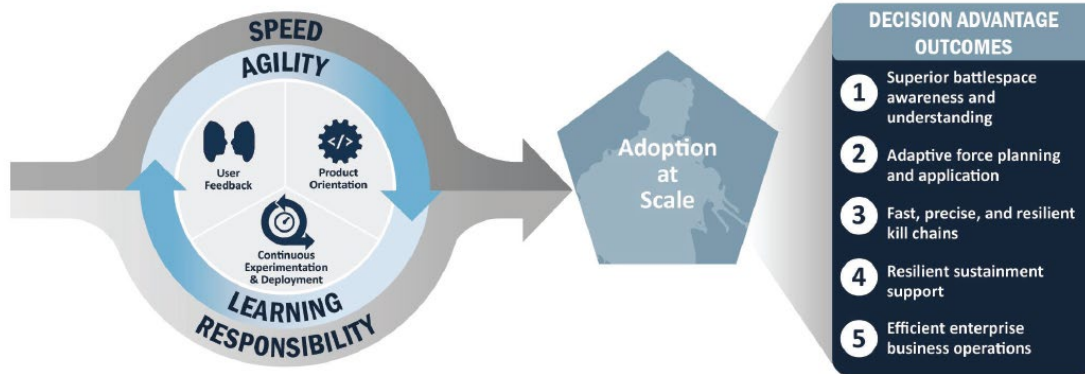
Lt Col Michael Greene
Chief, Weather Prediction & Artificial Intelligence Strategy
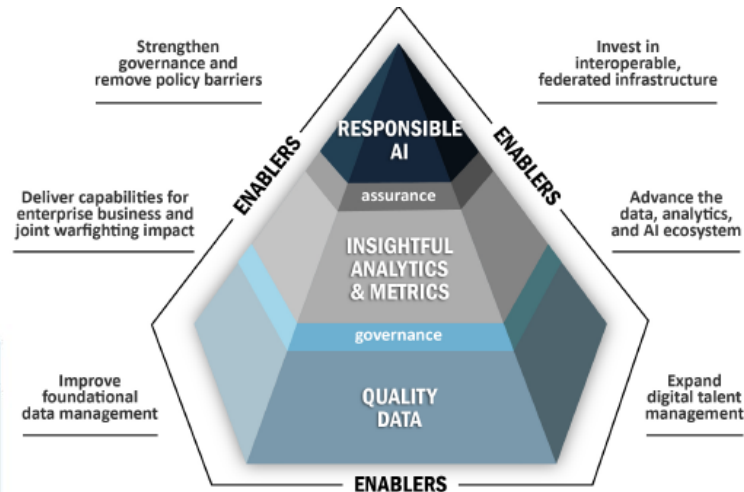**HQ AF Directorate of Weather, Strategy Division**
4 Nov 2024

Air Force Weather (AFW) AI/ML Overview

- **DoD focused on Data, Analytics, & AI/ML to garner *decision advantage***

- **AFW is an inherently data-driven and derived service, requiring heavy use of model and simulations to affect the battlespace, data quality paramount**

- **AI adoption is still in its infancy, but shown promise**

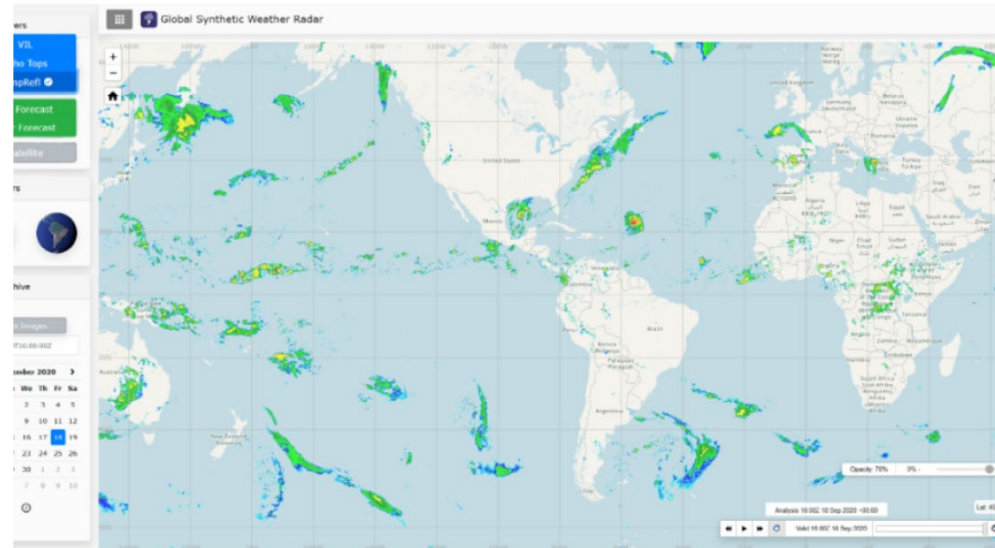(Source 1)   *Figure 1: Employing an Agile Approach to Adoption to Scale Decision Advantage Outcomes*

(Source 1)   *Figure 2: Strategic Goals and the AI Hierarchy of Needs*

Initial AF AI/ML Successes

- **Primary inroads made in three aspects of AI/ML development:**
  - **Data interpretation (Global Synthetic Weather Radar for example)**
  - **Edge Node Computing**
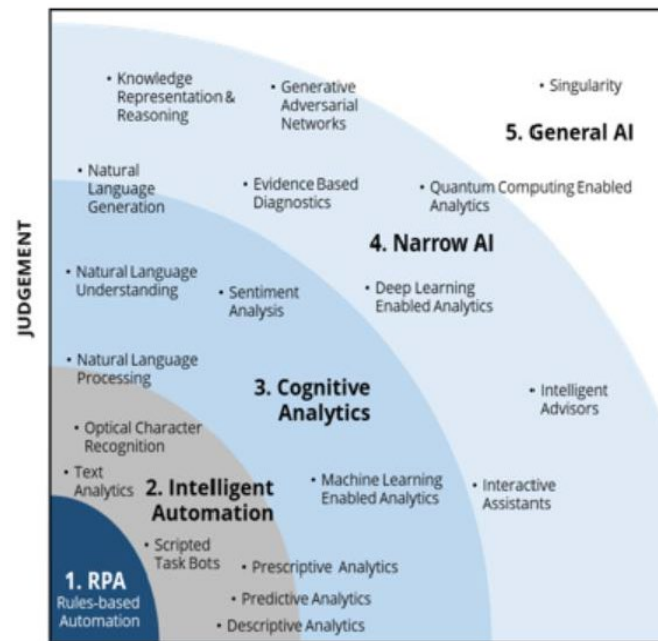 - **Applying Machine Learning to Forecasting challenges**

(Source 2) The prototype GSWR user interface shows global analysis of data indicating precipitation amount. Users select radar products to view—radar composite reflectivity, storm height, or precipitation intensity—and a satellite image layer to see cloud coverage.

Top Challenges in utilizing AI/ML

- **Software development synched with operational requirements (Need for AI/ML vs. other solutions)**

- **Personnel/experience shortfalls**

- **Secure environment/restricted use**

- **Doctrine/guidance void with new technology**

- **Trust/responsible use issues**

- **Data & bias management**

ILLUSTRATIVE AI DOMAINS

JUDGEMENT

- Knowledge Representation & Reasoning
- Generative Adversarial Networks
- Singularity

5. General AI

- Natural Language Generation
- Evidence Based Diagnostics
- Quantum Computing Enabled Analytics

4. Narrow AI

- Natural Language Understanding
- Sentiment Analysis
- Deep Learning Enabled Analytics

- Natural Language Processing

3. Cognitive Analytics

- Intelligent Advisors

- Optical Character Recognition
- Text Analytics

2. Intelligent Automation

- Machine Learning Enabled Analytics
- Interactive Assistants

- Scripted Task Bots
- Prescriptive Analytics

1. RPA Rules-based Automation

- Predictive Analytics
- Descriptive Analytics

TASK COMPLEXITY

(Source 3)

Top Areas for X-Collaboration

- **AI/ML Development Spearheaded through civilian partnerships (MIT Lincoln Labs/Contracted Agencies, Academia)**

- **Contracted Partnerships with civilian companies offer chance for several USG agencies to work together and build solutions to shared problems, particularly in compute-intensive areas (like numerical weather modelling)**

- **Meteorology is ripe with opportunity for data refinement & exploitation that can benefit both DoD, USG, and commercial applications**

- **AFW has several international agreements with allied nations for data sharing that can help build trusted source repositories for AI/ML development/training data**

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Questions?

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Figure Sources

- **Source 1) Department of Defense Data, Analytics, and Artificial Intelligence Adoption Strategy – Accelerating Decision Advantage – June 27, 2023**

- **Source 2) Global Synthetic Weather Radar,** https://www.ll.mit.edu/r-d/projects/global-synthetic-weather-radar

- **Source 3) AI Transforming Naval Operations, USN AI Strategic Design**