

Prospectus for an SAB Artificial Intelligence Executive Team NOAA Science Advisory Board

March 2024

Background

In February 2020, NOAA published *NOAA Artificial Intelligence Strategy, Analytics for Next-Generation Earth Science*. This document was followed by *NOAA Artificial Intelligence, Analytics for Next-Generation Earth Science, Strategic Plan 2021 – 2025*, which describes more detailed objectives and timelines to achieve the objectives¹. The documents are consistent in terms of vision, purpose, and goals:

- **Vision:** Through NOAA Artificial Intelligence (AI) Strategy, expansion of AI is accelerated across the entire agency to make transformative improvements in NOAA mission performance and cost effectiveness
- **Purpose:** Improve understanding, coordination, awareness, and application of AI across NOAA to:
 - More rapidly transition research
 - Strengthen and expand partnerships
 - Deliberately develop AI proficiency across the NOAA workforce
- **Goals**
 - Establish an efficient organizational structure and processes to advance AI across NOAA
 - Advance AI research and innovation in support of NOAA's mission
 - Accelerate the transition of AI research to applications
 - Strengthen and expand AI partnerships
 - Promote AI proficiency in the workforce

NOAA's overarching strategy is to employ AI "to make transformative improvements in mission performance and cost effectiveness." AI technologies have developed at a breakneck pace in recent years, with significant advances in many fields. However, a thorough understanding of applications has yet to mature. This uncertainty makes it essential for NOAA to pursue a strategy which safeguards agility and resiliency. Despite these uncertainties, the potential value of AI is large, demanding NOAA aggressively pursue development and applications of AI, particularly for critical uses such as deep learning, numerical weather and climate prediction to which other organizations are committing significant resources with encouraging results. With the rapid rate of change in AI development for science and research, urgent attention by NOAA, including focus on crosscutting resources necessary for success, is critical.

At the NOAA Science Advisory Board (SAB) meeting on November 15, 2023, the SAB discussed the importance of NOAA action on AI and decided to convene a meeting of the SAB Working Group (WG)² co-chairs to recommend a coordinated SAB approach. On January 26, 2024, WG co-chairs and several SAB members met. The group agreed to form an AI Scoping Team to draft a short prospectus, which would be reviewed by the SAB at the March 2024 meeting. The AI Scoping Team held a kickoff meeting on February 20, 2024. They subsequently discussed alternative approaches, pros and cons, and developed for consideration by the SAB this draft Prospectus for an AI Executive Team. Members of the Scoping Team were:

¹ The NOAA AI Strategy and Action Plan are [available here](#).

² The SAB has five standing working groups. Working Group membership and terms of reference are [available here](#).

- John Kreider, SAB Chair
- Jon Allan, SAB ESMWG Liaison
- Thomas Hamill, EISWG
- Cecilia Blitz, co-chair CWG
- Ilene Carpenter, SAB DAARWG Liaison
- James Sims, co-chair DAARWG
- Zhaoxia Pu, SAB EISWG Liaison
- SAB Staff support - Joe Fillingham, SAB Alt DFO
- Corina Allen, co-chair TSTAP

SAB AI Executive Team Purpose

- The purpose of an SAB AI Executive Team is to establish an effective, ongoing framework to guide and coordinate multiple SAB AI studies, which may be performed by the SAB and/or SAB Working Groups (WG). The overarching purpose is to provide to NOAA leadership sound recommendations for strategies to help NOAA integrate AI technology in an agile, risk managed approach, increasing effectiveness of NOAA's efforts to develop and apply AI to science in support of NOAA missions.
- This effort is both important and urgent because we believe AI will have a significant impact on future research and application of science to operations, information services, and impact based decision support tools. Comprehensive NOAA strategies to develop and apply AI are essential to ensure effective and efficient use of AI enabling efficiency of human capital across NOAA's broad mission and goals to understand and predict changes in earth's environment.

Scope and Strategic Framework

- The SAB will form an AI Executive Team to coordinate AI studies by the SAB and its WGs as well as provide a focused touch point for interface with NOAA on AI matters. Scope may include encouraging specific AI studies by the SAB and/or WGs in coordination with NOAA, and acting as a resource to help initiatives brought forward by the WGs.
- Formation of the SAB AI Executive Team is not intended to create an additional approval hurdle for WGs to initiate and undertake an AI Study. The team will serve to support and help coordinate WG efforts.
- **Urgency/Call to Action**
 - Market is demanding state-of-the-science data and applications for AI model development
 - Market has already developed AI solutions
 - For example, publications demonstrate that at least in several metrics, AI models can produce guidance as skillful as or more skillful than conventional Numerical Weather Prediction (NWP) systems that require a fraction of the computational time and expense. Thus, AI models could potentially serve as a future revolutionary core capacity for NOAA's operational NWP, although much work remains to validate these tools and assess risks.
 - Risks exist, and risk management is key. However, the risk not to aggressively pursue AI is greater. Not engaging will make NOAA less relevant, with private companies potentially taking the lead in NOAA mission areas potentially limiting access to critical information.
- Provide to NOAA leadership sound recommendations for AI strategies across full spectrum of NOAA activities
 - Data Collection and Analysis
 - Data sets needed to facilitate cross-enterprise R&D on AI.

- Data collection strategies
 - Models & Forecasts
 - Numerical weather and climate prediction and projection, including coupled earth system modeling.
 - Information Delivery
 - AI-ready data and accessibility
 - Forecasts
 - Alert messaging
 - Social media communication
 - Graphics, maps, and text
 - Availability in multiple languages
- The SAB AI Executive Team will establish an effective, ongoing framework to guide, coordinate, and improve commonality of SAB AI studies, which may be performed by the SAB and/or SAB WGs. Example relevant questions include:
 - How is AI currently being used or developed by NOAA in your WG's area of study (e.g., climate, ecological systems, weather, tsunamis)?
 - What are the opportunities and obstacles to using AI to advance this area of study?
 - Approaches to maintain awareness of advances by others and retain agility within your area of study
 - AI systems to add to the agility of NOAA
 - Key obstacles
 - Are risks of AI well understood and effectively managed within your area of study?
 - Risk to systems
 - Risk of communicating bad results to public
 - Trustworthiness of data produced by AI systems
 - Are data recorded by or developed by NOAA in your area of study easily accessible and findable for use in AI?
 - Streamline/increase efforts to make AI ready and accessible to others
 - Employing NCAI guidelines for AI-ready data
 - Emphasis to not only archive data, but to make accessible
 - What are other researchers/institutions doing in your area of study that NOAA AI can learn from and are there successful partnerships?
 - Awareness of research by others
 - Identification of organizations with large research efforts in your area of study
 - Learning from, harvesting, and applying work of others
 - Partnerships – initiation, management, results
 - What is status of building cross-cutting, foundational elements for AI in your area of study? What are key obstacles?
 - Computing – portfolio of computational resources required, particularly specialized systems for AI
 - Enterprise Partnerships – other agencies, academia, industry, philanthropic
 - Implications to Workforce – education, training, next generation

Objectives, and Boundaries

- Objectives of AI Executive Team
 - Assess information on current NOAA AI priorities, strategies, efforts, obstacles, and results.

- Propose recommendations to NOAA leadership through the SAB regarding strategies for AI development, application, and partnerships, which will improve agility and risk management.
- Provide feedback and recommendations to SAB WGs to guide, coordinate, and improve commonality of AI studies done by SAB and WG study teams.
- Provide a focused touch point for interface between NOAA and SAB on AI matters.
- **Boundaries**
 - Focus on NOAA investments, with awareness of what other federal agencies, private sector, and academia can provide. In particular, because of significantly larger investments in AI by others, the Executive Team should encourage NOAA to take advantage of and harvest developments of others.
 - Formation of the SAB AI Executive Team is not intended to create an additional approval hurdle for WGs to initiate and undertake an AI Study.

SAB AI Executive Team Structure and Support

- The SAB AI Executive Team will act as a resource in support of SAB and WG AI study teams.
- **Membership**
 - Chair – SAB member with AI expertise
 - 1 representative from each of 5 WGs
 - 1 – 3 other members with domain expertise
- **NOAA Interface**
 - NOAA AI Executive Committee (NAIEC)
- **SAB Interface**
 - SAB Chair
- **NOAA SAB Staff Interface**
 - SAB DFO or the SAB Alternate DFO