

NOAA

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NOAA Cloud Strategic Action Plan: The Path Towards Innovation

Response to DAARWG Recommendations





Today's Agenda

- Purpose
- Engaging in New Opportunities
- Forward-Looking Information: Building Upon Innovative Actions Across NOAA
 - Establishing Exploratory Environments
 - Addressing Greater Agility Across NOAA
 - Emphasizing Training for Diverse Constituents
 - Leveraging Unique Cloud Benefits Beyond Infrastructure
 - Collaborating on Data Co-Location
 - Cloud Synergy
- *Informational Slides (Backup)*



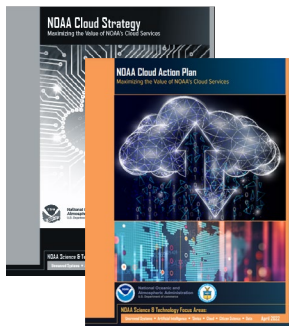
Purpose





To provide a forward-looking perspective on innovation and actions that benefit NOAA cloud implementation.

This content is supported by informational overview ([in this report](#)) on how NOAA responded to the DAARWG Recommendations on the [NOAA Cloud Strategic Action Plan](#) Draft (*submitted in March 2021*).

Engaging in New Opportunities

Our intention is to guide NOAA's adoption and utilization of cloud services, while establishing a unified approach to migrating to the cloud. The Cloud Action Plan has been designed to **promote innovation**, **facilitate migration**, **recognize enterprise opportunities**, **provide governance**, and **develop a cloud-ready workforce** through the:



-  Application of Emerging Science & Technologies to Guide Transformational Advancements Across the Mission;
-  Promotion & Utilization of Cloud Services as we work to become a Climate Ready Nation and Support the New Blue Economy;
-  Empowerment of ALL Other Science & Technology Strategies; and the
-  Equitable Delivery and Development of Data to Address Concerns Regarding Environmental Justice in line with the NOAA Data Equity and Environmental Justice Strategy.



Forward-Looking Information

Building upon innovative actions across NOAA since the 2021 DAARWG review....

Establishing Exploratory
Environments

Leveraging Unique Cloud Benefits
Beyond Infrastructure

Addressing Greater Agility Across
NOAA

Collaborating on Data Co-Location

Emphasizing Training for Diverse
Constituents

*...and more innovative
opportunities on the horizon*

Building Upon Innovative Actions Across NOAA

Establishing Exploratory Environments

Action Underway: NOAA Open Data Dissemination (NODD) is supporting exploratory efforts using Cloud Service Provider (CSP) credits for scientists/partners to develop innovative solutions and format transitions.

Benefit to Build On: *Data* is being made *readily available* on NODD for others to leverage and can be used as guidance or starting point.

Action Underway: Fisheries has established a Google Cloud Platform and Sandbox as an exploratory environment. NESDIS has also launched a sandbox with Amazon Web Services.

Benefit to Build On: Line offices are creating *best practices* to be built upon and offering *opportunities for collaboration across offices* (i.e., NMFS/NWS Translate Project).

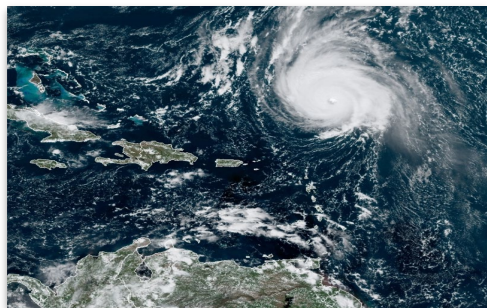
Action Underway: US Integrated Ocean Observing System (IOOS) Program (by NOS) is developing a Cloud Sandbox with funding provided under [Infrastructure Investment and Jobs Act](#). This project will deploy an instance of IOOS Coastal Modeling Cloud Sandbox inside NOAA Cloud Services framework.

Benefit to Build On: Coastal models in cloud are now a case study for utilizing the framework/ governance. This also shows *possibilities for accelerating development in an exploratory environment* (a best practice aiding forecasting).

Establishing Exploratory Environments & Collaborating on Projects

Case Study: Fisheries & Weather Service Use Google Cloud for Translating Products

What: Fisheries established a Google Cloud Platform & Sandbox to collaborate on inter- & intra-agency projects in an exploratory environment. One of our case studies is the development of an enterprise solution for translating NWS text products into Spanish and other languages using Google's AutoML Translator.



Why: Within NWS, only the San Juan Office produced a full suite of Spanish weather products as well as a subset of National Hurricane Center (NHC) products. They have manually translated these products over the years, becoming labor intensive and unsustainable, compounded by limited number of bi-lingual staff members.

How: The project utilizes Google's AutoML translation service to save the time of the San Juan forecasters by providing them a "first guess" attempt at translating a subset of the English NHC text products. The key to success is using earlier, human-made English-Spanish translations to build and train a custom Google translation model. Once the model was trained, a series of scripts were developed to connect the NWS on-premise infrastructure to the Google Cloud for automatic translations.

Impact: The NWS is now providing more timely weather products, especially hurricane forecasts, to Spanish-speaking customers, improving safety of life and property, as well as freeing up NWS staff to focus on other mission-related tasks.

What's Next? The project will complete a comprehensive review of automated translations vs final products the human translators to identify a more rigorous set of training sentences and re-train our custom model for use in future years. The plan is to expand this capability to other offices and products, possibly including other languages to serve the needs of our US and international partners.

Addressing Greater Agility

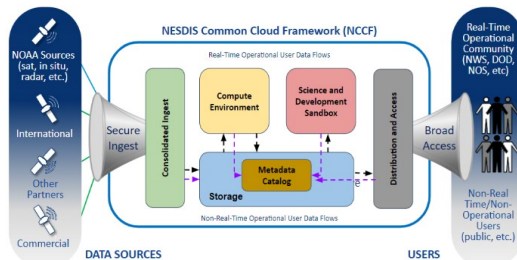
Building Upon Innovative Actions Across NOAA

Recommended Action: Continue adoption of Agile project management practices as an alternative to Waterfall (i.e., Scaled Agile Framework (SAFe)).

Benefit to Build On: Minor course corrections made as projects progress to better enable NOAA to **rapidly adapt its products and services to current events and customer needs**.

Case Study: NESDIS Common Cloud Framework & On Premise Sustainment

What: NESDIS leverages a Scaled Agile Framework (SAFe) for archive/access cloud development & transition to build the NESDIS Common Cloud Framework (NCCF) - the enterprise cloud platform that will include data archiving and access, vice traditional waterfall system engineering processes.



Why: The expectation is to deliver value through faster research to operations and data service delivery with the goal to rapidly adapt products and services to the needs of the community. As such, SAFe is being implemented with NCCF to sustain enterprise archive and access systems, align development/management approaches, and transition archive/access of on-prem work to the Cloud.

How: To take advantage of cloud scalability and agility, NESDIS is moving away from traditional hierarchical management processes via NCCF through the incremental implementation of SAFe. Ahead of the transition, all participants are offered training and welcomed to an internal community of practice to help work through strategic implementation challenges (i.e., workforce planning).

What's Next? The implementation of a new portfolio-level of governance for the NCCF to help multiple teams coordinate their agile backlogs (i.e. tasking) and align any dependencies on the platform itself. As the migration of archive data and access systems begins, the on-premise agile teams will coordinate and transitionfully into the NCCF SAFe framework.

Building Upon Innovative Actions Across NOAA

Emphasizing Training for Diverse Constituents

Action Underway: NODD partners with CSPs & the Earth Science Information Partners Federation to provide NOAA Cloud Pathfinders Program (NCP) cohorts access to specific experts to conduct analyses in the cloud, and understand the administration effort and cost without incurring any.

Benefit to Build On: NCP initiates a proactive, *project-based approach that can be repeated to accelerate learning* so that scientists are poised to harness the power of the cloud, including *skill sharing around cloud-native/optimized systems*. Increase awareness of NOAA Cloud Portal.

Action Underway: Across NOAA, there are many cloud industry training referral programs available.

Benefit to Build On: Many of the programs have *readily available agreements and contracts for agency employees to utilize*. Additionally, the referral programs help students obtain work experience and establish career pathways with participating agencies.

Building Upon Innovative Actions Across NOAA

Leveraging Unique Cloud Benefits Beyond Infrastructure

Action Underway: NODD is working with a variety of partners to optimize formats, provide data use tutorials, educational seminars, and launch AI/ML efforts.

Benefit to Build On: Support of *open science and interoperability challenges*, and also near real-time data for the entire period of record on select datasets. This can be leveraged not just for big data as it has recently added hundreds of Fisheries datasets.

Action Underway: Leverage the External Rotational Assignment Program and adopt innovation holistically via the [Intrapreneurship Program](#).

Benefit to Build On: Easily *share employee talent across the federal government* and *support new pathways to empower NOAA employee engagement* with inspirational ideas that motivate creativity.

Recommended Action: We have to get a wide-variety of data to the cloud in a way that is organized and searchable. The Cloud PMO Center of Excellence can work with data teams on the technical determination of where data resides and cloud accessibility.

Benefit to Build On: Common and/or customized applications ingest data differently and many concentrated efforts across *LOs will be able to leverage the data plan to reduce duplicative efforts*.

Building Upon Innovative Actions Across NOAA

Collaborating on Data Co-Location

Action Underway: NODD is working with DoC to provide Census and other data to solve specific challenges for underserved communities.

Benefit to Build On: NODD can *facilitate discussions with other non-DoC agencies*, as well as with various inter-agency, creating *partnerships*.

Recommended Action: The Cloud PMO role could facilitate discussions with other agencies, along with the NODD Program. GSA also has a cloud community of practice which NOAA should participate more actively in and this could be a topic of interest.

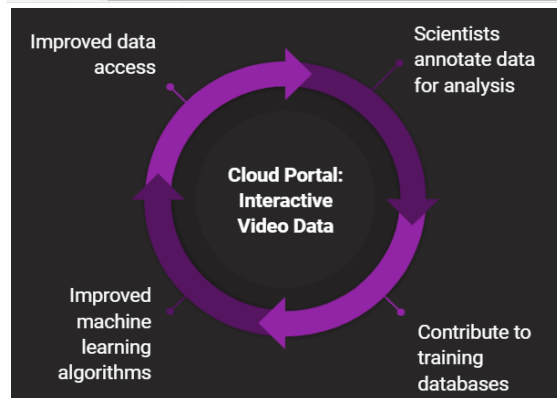
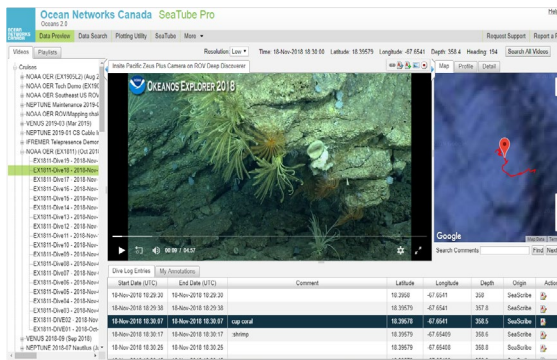
Benefit to Build On: Overcoming cultural barriers will help NOAA *share resources and responsibilities while proactively strengthening our partnerships to create more opportunities*.

NOAA S&T Focus Areas Synergies (Example)



NOAA is in need of an advanced solution in managing video data collected across the Line Offices.

- Data is collected from ROV/HOV, moored and uncrewed systems to monitor ocean and habitat health
- Due to better technology video, data volumes have increased exponentially
- Funded under a NOAA SBIR, Cloud based, open source tool that permits localized annotations and analysis.
- Much-needed training data (e.g., annotated and localized imagery) for developing machine learning algorithms that will enable fast, sophisticated analysis of visual data.
 - *This may be a multi-faceted approach, including student involvement, crowdsourcing, artificial intelligence and machine-learning, and other new annotation solutions*



This project touches on Cloud, AI, Data, UxS, Citizen Science, and 'Omics.



Thank you for your time.

Questions?

Informational Backup Slides

Note:

Backup Slides contain a detailed response to the DAARWG comments and recommendations on how these have been addressed in the latest version of the NOAA Cloud Strategic Action Plan.

All informational context for recommendations and responses, as well as acknowledgement of additional DAARWG commentary, has been vetted through the NOAA Cloud Committee.



Enhance NOAA's diversity, inclusion, and workforce morale by providing equal opportunities in the technology field while enabling data democratization through cloud delivery



Restore science to track the climate crisis with the goal to conserve 30 percent of our lands and waters by 2030

Ensure the high quality of science, technology, and data integrity, and make information readily available for efficient decision-making by promoting transparency

Provide infrastructure and data on the cloud to effectively support remote work and promote a future-ready workforce

Timeline

Reviewing or Approving Body	Status	Date
Environmental Data Management Committee (EDMC)	Approved	April 2021
Chief Information Officer (CIO) Council	Approved	July, 2021
NOAA Science Council (NSC)	Approved	December, 2021
NOAA Executive Panel (NEP)	Concurrent review with the NEC	April, 2022
NOAA Executive Committee (NEC)	Concurrent review with the NEP	April, 2022



Issue/Background

- The [DAARWG's recommendations](#) were provided to the EDMC in March 2021 after reviewing the NOAA Cloud Implementation Plan
- Since this time, the NOAA Cloud Strategic Action Plan writing team have developed and approved the final document, now titled the “[NOAA Cloud Strategic Action Plan](#) ,” after thorough review/approvals from each line office (100+ comments)
- Some of the comments in the SAB DAARWG report may have already been addressed in this latest version (pre-existing comments in this version are in preparation for Dr. Spinrad’s review as some of the comments he made on the Data Plan were also applicable for cloud)

NOAA Coordination & Views

- Coordination with:
 - *Internally: NOAA Cloud Committee (NCC), CIO Council, Line Office representatives, NOAA Science Council, NOAA S&T Synergy Committee, Pending NEP & NEC review*
 - *Others: SAB & DAARWG*
- NOAA has addressed the comments and recommendations from the DAARWG in the updated NOAA Cloud Action Plan and offers to update areas highlighted on the following slides in the final version, as necessary.

DAARWG Recommendations 1-5

#	DAARWG Recommendation	NOAA Response
1	Highlight and prioritize key actions relative to all the other actions of varying importance.	In coordination with the NOAA Cloud Committee (NCC), actions have been re-organized in the latest version of the Action Plan. NCC would like to propose that the Cloud PMO, once established, take on this action in consultation with the NCC and Chief Information Officer Council (CIOC).
2	Consider how to quickly establish an exploratory environment (Action 1.1.4) as soon as possible.	<p>This is now 1.1.1 in the updated plan: <i>In FY22, establish an exploratory environment with appropriate security controls for cloud service tests and trials. Create a sandbox platform where cloud-native tools and NOAA data are available for NOAA scientists and partners to develop innovative solutions. The environment will have a low barrier to entry by addressing security, billing, authentication, and change control.</i></p> <p>Please see background slides for additional information on what is being done across NOAA.</p>
3	Reduce or consolidate the number of actions.	This has been addressed in the updated plan. A great number of actions have been reduced, of the 54 actions many are in progress or completed.
4	Indicate how the plan can be adjusted during execution for greater agility.	Agree. The plan is a living document that can be adjusted as we mature our cloud journey. PMO, NCC and CIOC have the ability to suggest/make required course corrections. CIOC will oversee and guide changes.
5	Provide a greater emphasis on training for diverse constituents. Training is critical. (See see here for context on DAARWG comment regarding training on action 5.1.1)	Overall agree (already being implemented, see see here for current NOAA actions) and has been updated in new version of plan. Action 5.1.1 has since been updated (see see here)

DAARWG Recommendations 6-8

#	DAARWG Recommendation	NOAA Response
6	Include discussion of how NOAA might leverage the more unique benefits of the Cloud beyond mere infrastructure.	We agree and have suggestions for discussion points on see here to be reviewed for recommendation.
7	Indicate whether collaboration on data co-location with other agencies would be desirable and possible.	Agreed, it is happening (see here). Collaboration was considered at a high-level and was added in the updated version of the plan under <i>Objective 2.6: Engage other Federal agencies to identify and leverage best practices for cloud migration and lessons learned applicable to NOAA's use cases for the cloud</i> . As well as, <i>2.6.1: By FY23, identify and engage in relevant cross-agency communities of practice to share cloud knowledge, to provide NOAA with access to other agency cloud subject-matter experts (SMEs), and to promote collaboration across agencies</i> .
8	Indicate what constitutes progress or success for NOAA in its Cloud adoption. It is not clear how the impact and success of this Plan will be measured.	Agreed. The NCC will be tracking Cloud Action Plan milestones in Smartsheets. In addition, the NOAA Office of Data Dissemination (NODD) is developing metrics that will provide accession rates. User feedback should be incorporated to provide evidence of progress or success. NODD encourages users to share their needs and challenges so that we can address them as feasible.