NOAA FORM 58-5 (4-04)

	National Oceanic and Atmospheric Administration	NOAA Administrative Order 216-105A	
	NOAA ADMINISTRATIVE ORDER SERIES	DATE OF ISSUANCE 12/3/2015	EFFECTIVE DATE 12/3/2015
	SUBJECT POLICY ON RESEARCH AND DEVELOPMENT TRANSITIONS		

SECTION 1. PURPOSE AND SCOPE

.01 NOAA is a science-based service agency. NOAA's ability to meet its mission through the delivery of continually improving products and services depends on the conversion of the best available research and development (R&D) into operations, applications, commercialization and other uses. NOAA therefore requires an integrated transition enterprise linking research, development, demonstration, and deployment that is efficient and effective in identifying and using significant new R&D products to meet NOAA's mission needs.

.02 This Order establishes the process for identifying and transitioning R&D output to operations, applications, commercialization and other uses. This Order outlines the roles and responsibilities of various officials, including Line Office Transition Managers, associated with the transition of R&D. Additionally, this Order identifies those entities with the authority to implement this policy and those who are accountable for transitioning R&D.

.03 This Order applies to all NOAA R&D activities, including those funded by NOAA but conducted by non-NOAA entities.

.04 This Order defines the transition of R&D to any operation, application, commercialization or other use and includes products like 24 hours/7days weather forecasts (typically referred to as research to operations), information products used in resource management (research to application), commercially available in-situ sensors (research to commercialization), or government policies, regulations, synthesis of research, public education and outreach (research to other uses).

.05 This Order does not replace any directive, policy, statute, or other guidance that applies to the prosecution of patents by NOAA or its employees for inventions made in the course of research, the licensing of government owned inventions in the custody of NOAA, or Cooperative Research and Development Agreements and Small Business Innovative Research grants. Such activities are addressed by NAO 201-103: Cooperative Research and Development and Invention Licensing Agreements Under the Federal Technology Transfer Act of 1986 (Public Law 99-502) and other applicable laws, regulations, and related policies. However, this NAO does apply to the identification of potential or realized uses of NOAA's R&D.

.06 Transition projects for which funding or R&D originate outside of NOAA are included in this policy at the discretion of the respective Line Office Transition Managers.

.07 This Order recognizes that transitions can be either incremental improvements to existing products or applications or entirely new products or applications.

SECTION 2. DEFINITIONS.

.01 **Application:** The use of NOAA R&D output as a system, process, product, service or tool. Applications in NOAA include information products, assessments and tools used in decision-making and resource management.

.02 **Commercialization:** The process of introducing a NOAA product (e.g. invention) into the commercial market.

.03 **Construction Projects:** The development, construction, or installation of equipment/asset that is not real property; or the development or modification to software, which will be used internally. The project must equal $200,000 or more; the service life is estimated to be 2 years or more; the project will provide a long-term future economic benefit to the NOAA organization which maintains or obtains control; and it is not intended for sale.

.04 **Demonstration:** Activities that are part of R&D and are intended to prove or to test whether a technology or method does, in fact, work.

.05 **Deployment:** The sustained operation, maintenance and use of the product of R&D.

.06 **Development:** The systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes (OECD, 2015).

.07 **Line Office Transition Manager (LOTM):** An individual appointed by each Assistant Administrator and the Director of the Office of Marine and Aviation Operations (OMAO) who is responsible for managing the Line Office transition portfolio (collection of transition projects).

.08 **NOAA Invention:** A new, useful process, machine, manufacture or composition of matter, or any new and useful improvement to a process, machine, manufacture or composition of matter, developed by NOAA (see 35 USC § 101).

.09 **Operations:** Sustained, systematic, reliable, and robust mission activities with an institutional commitment to deliver specified products and services. (Examples of operations in NOAA include weather and climate forecast models run on a routine basis to provide forecast guidance or seasonal outlooks, stock assessments conducted to determine changes in the abundance of fishery stocks, and sustained observations for public services and for Earth-System research in the public interest (NSTC 2014)).

.10 **Proving Ground:** A framework for NOAA to conduct testing of advanced operations, services and science and technology capabilities that address the needs of both internal and external users. Successful testing demonstrates readiness to implement into operations. Capabilities to be tested in operational proving grounds have already passed developmental testing. Such capabilities include advanced observing systems, better use of data in forecasts,

improved forecast model, and applications for improved services and information with demonstrated economic/public safety benefits.[1]

.11 **Readiness Levels (RLs):** A systematic project metric/measurement system that supports assessments of the maturity of R&D projects from research to operation, application, commercial product or service, or other use and allows the consistent comparison of maturity between different types of R&D projects. (Note: NOAA's RL's are similar to Technology Readiness Levels developed by NASA (Mankins, 1995) and embody the same concept for quantifying the maturity of research). A project achieves a readiness level once it has accomplished all elements described within a readiness level. A program may include projects at different RLs depending on the goals of each project. Inventions may be generated at any RL. There are nine readiness levels as follows:

a. RL 1: Basic research: experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. Basic research can be oriented or directed towards some broad fields of general interest, with the explicit goal of a range of future applications (OECD, 2015);

b. RL 2: Applied research: original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective. Applied research is undertaken either to determine possible uses for the findings of basic research or to determine new methods or ways of achieving specific and predetermined objectives (OECD, 2015).

c. RL 3: Proof-of-concept for system, process, product, service or tool; this can be considered an early phase of experimental development; feasibility studies may be included;

d. RL 4: Successful evaluation of system, subsystem, process, product, service or tool in laboratory or other experimental environment; this can be considered an intermediate phase of development;

e. RL 5: Successful evaluation of system, subsystem process, product, service or tool in relevant environment through testing and prototyping; this can be considered the final stage of development before demonstration begins;

f. RL 6: Demonstration of prototype system, subsystem, process, product, service or tool in relevant or test environment (potential demonstrated);

g. RL 7: Prototype system, process, product, service or tool demonstrated in an operational or other relevant environment (functionality demonstrated in near-real world environment; subsystem components fully integrated into system).

h. RL 8: Finalized system, process, product, service or tool tested, and shown to operate or function as expected within user's environment; user training and documentation completed; operator or user approval given;

[1] For definitions and guidance concerning NOAA Testbeds and Proving Grounds, see http://www.testbeds.noaa.gov

i. RL 9: System, process, product, service or tool deployed and used routinely.

.12 **Research:** Research can be classified as basic research or applied research.

a. Basic Research: Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. Basic research can be oriented or directed towards some broad fields of general interest, with the explicit goal of a range of future applications (OECD, 2015).

b. Applied Research: Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective. Applied research is undertaken either to determine possible uses for the findings of basic research or to determine new methods or ways of achieving specific and predetermined objectives (OECD, 2015).

.13 **Testbed:** A NOAA testbed is a working relationship for developmental testing, in a quasi-operational framework among researchers and operational scientists/experts (such as measurement specialists, forecasters, IT specialists) including partners in academia, the private sector and government agencies, aimed at solving operational problems or enhancing operations, in the context of user needs. A successful testbed involves physical assets as well as substantial commitments and partnerships.[2]

.14 **Transition:** The transfer of an R&D output to an operation, application, commercial product or service, or other use.

.15 **Transition Plan:** A document that represents an agreement between clearly identified researchers and potential recipients, organizations, or other users of the product resulting from the transition of an R&D output.

.16 **Transition Project:** A collective set of activities necessary to transfer R&D output to an operation, application, commercial product or service, or other use.

.17 **Transition Project Lead(s):** Individual(s) responsible and accountable for ensuring that the transition project is planned, programmed, budgeted, and executed per the Transition Plan.

SECTION 3. POLICY.

.01 To meet mission needs, NOAA will optimize the timely use of R&D, including, but not limited to, that conducted by and funded by NOAA. To fulfill this goal, NOAA shall maintain:

a. A mission-oriented enterprise capable of quickly identifying and applying demonstrated R&D outputs to provide new and improved products, services, or more efficient operations while continuing to maintain reliable, cost-effective services for users;

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[2] For definitions and guidance concerning NOAA Testbeds and Proving Grounds, see http://www.testbeds.noaa.gov

b. An R&D enterprise that routinely provides proven R&D outputs to serve NOAA's mission while adapting its portfolio to address new research frontiers; and,

c. Project management, planning, and oversight processes that include routine identification of new opportunities/needs for research, development of Transition Plans, status reporting, and test and evaluation procedures.

.02 Transition Plans are an essential tool for describing and facilitating the transition of R&D to potential end use, and represent an agreement between researchers, operators and/or users to carry out the transition according to a common plan. Transition Plans are required for projects that seek to progress beyond RL4. Transition Plans shall incorporate the following:

a. A description of the activities necessary to transfer an R&D output;

b. Clearly defined goals for the new/revised product or service, milestones, schedule, and transition success/acceptance criteria;

c. To best estimate, the amount and source of funds needed to cover the costs associated with the transition, as well as the cost of future operations as necessary, including relevant requirements for equipment, upgrades, staff training, and maintenance of redundant application capabilities during the transition period;

d. A clear designation of potential researcher(s), operational entity(ies) and/or end user(s), and a description of how they will engage as early as possible and as often as necessary to ensure all parties are fully invested in the R&D transition process;

e. A mechanism for providing clear communication among all participants concerning the transition, including routine engagement of the management chain in the affected Line Office(s) and partner organizations; and

f. A mechanism for updating the plan as necessary to reflect changes in the plan warranted by results of the transition process or unforeseen events (e.g., updated budgets).

.03 Transition Plans shall be approved by the Assistant Administrator(s), or their designees, from the affected Line Office(s).

.04 Transition Planning integrated into Agency Planning: Line Office Transition Managers shall work towards ensuring the inclusion of transition projects in appropriate NOAA planning documents, including NOAA strategic plans and Line Office Annual Operating Plans.

.05 Transition Budgeting integrated into Agency Budgeting: Line Office Transition Managers shall work towards ensuring that the resources needed to transition R&D outputs to sustainable applications, operations, construction projects, commercialization or other uses are appropriately addressed and included in the Line Office submissions in the appropriate NOAA budget processes.

.06 Evaluation: All Transition Projects shall be reviewed on a periodic basis using the evaluation criteria identified in respective Transition Plans following 3.02b to ensure progress towards readiness levels, goals and milestones.

.07 Reporting: Line Office Transition Managers will work with Transition Project Leads to report on execution status of transition projects on a regular basis.

.08 This Order follows the guidelines established in NOAA Administrative Order 216-115, Strengthening NOAA's Research and Development Enterprise.

.09 This Order supports the policies and procedures contained in the Paperwork Reduction Act, the Government Paperwork Elimination Act, the Federal Technology Transfer Act, the Bayh-Dole Act, Office of Management and Budget Circular No. A-130, Management of Federal Information Resources, the NOAA Information Quality Guidelines, and other relevant laws, regulations, and policies. These authoritative requirements apply government resources to activities in support of the agency's mission, outline procedures to ensure and maximize the quality, utility, and integrity of resultant information, and seek to maximize the benefits of resultant information and intellectual property to society.

.10 NOAA shall be cognizant of and observe the valid rights of patent holders and owners of other intellectual property.

.11 NOAA Invention Disclosure: Prior to any public disclosure (including but not limited to presentations at a public meeting, or publication on a public-facing webpage or in the scientific literature) a NOAA invention shall be reported to the NOAA Technology Partnerships Office for:

a. Rights determination;

b. Evaluation of patentability and commercial potential; and

c. Inclusion in the NOAA technology and innovation portfolio.

SECTION 4. GOVERNANCE AND RESPONSIBILITIES.

.01 The Under Secretary of Commerce for Oceans and Atmosphere (NOAA Administrator), the Deputy Under Secretary/Operations, and the NOAA Chief Scientist shall provide top management support for implementation of this policy and the development and implementation of associated procedures.

.02 The Assistant Administrators, the OMAO Director and appropriate NOAA Staff Offices support the implementation of this policy through their roles in the NOAA Organizational Handbook.

.03 Line Office Assistant Administrators and the Director, Office of Marine and Aviation Operations, are responsible for the following:

a. Promoting the goals and implementing the requirements of this policy;

b. Appointing Line Office Transition Managers;

c. Approving, or delegating approval of, Transition Plans;

d. Ensuring that Transition Teams are appropriately resourced to carry out their responsibilities;

e. Providing or delegating oversight for all transition projects in their Line Office;

f. Ensuring Line Office Transition Project reviews are conducted as appropriate; and,

g. Reporting on the execution status of transition projects per instructions provided by the Deputy Under Secretary for Oceans and Atmosphere.

.04 The Line Office Transition Managers (LOTMs) include representatives of the Line Office Assistant Administrators (AAs) and the Director, Office of Marine and Aviation Operations (OMAO), appointed by the respective AAs and the OMAO Director. The LOTMs are responsible for the following:

a. Collectively monitoring the NOAA transition portfolio (collection of transition projects);

b. Incorporating applicable Line Office transition projects into NOAA's planning, budget, execution, and evaluation processes;

c. Tracking and providing timely reports to the NOAA Research Council on the status of the portfolio (collection of transition projects);

d. Ensuring the development of appropriate Transition Plans; and,

e. Evaluating transition projects with respect to Transition Plans.

The collective LOTMs form a standing committee of the NOAA Research Council. As such, they are expected to report to the Council at least annually on the status of NOAA's transition activities and:

f. Inform the Council on issues of concern related to the transition of research; and

g. Respond to guidance and direction from the Council.

.05 The Director of NOAA Technology Partnerships Office (TPO) is responsible for:

a. Providing the LOTM committee with updates on TPO activities;

b. Maintaining a database of transitions occurring under TPO purview;

c. Informing the LOTMs of transition opportunities to NOAA application; and,

d. Informing the LOTMs of potential intellectual property issues pertaining to specific technology projects.

.06 Transition Project Leads are responsible for managing the transition projects and all associated activities. For transition projects that include construction projects (as defined in 2.03), Transition Project Leads are responsible for providing planning and budgeting documents to a designated Line Office Construction Work-In-Progress Project Manager, who will follow

the process and procedures for constructed projects detailed in the NOAA CWIP Policy (http://www.corporateservices.noaa.gov/~finance/docs/CWIP/CWIPPolicy--June2015FINAL.pdf).

.07 Transition Teams should include representatives from the research and operations or user communities. Transition Teams are responsible for the following:

a. Conducting transition activities; and

b. Identifying, reporting, and responding to significant deviations in the execution of the Transition Plan.

.08 The NOAA Research Council is responsible for the following:

a. Overseeing the LOTM committee;

b. Providing guidance and advice to the NOAA Chief Scientist as pertains to research transition policy, process and practice; and

c. Establishing or overseeing the establishment of policies and processes to foster effective transitions.

.09 Other applicable Councils, such as the NOAA Observing Systems Council and the NOAA Ocean and Coastal Council, are responsible for participating in the NOAA's planning, budget, execution, and evaluation processes and providing comments regarding the identification and readiness of projects for transition and the relative priority of these projects.

SECTION 5. REFERENCES.

.01 Working through the LOTM Committee, the Research Council will develop and disseminate written procedures, plans, and reports as necessary to implement this Order, including but not limited to:

a. Procedural Handbook covering, but not limited to, the following topics:

   i. Use and interpretation of readiness levels in NOAA; and

   ii. Guidance for developing effective Transition Plans.

.02 Existing documents referenced in this policy are as follows:

a. Mankins, John C. (6 April 1995). "Technology Readiness Levels: A White Paper" (PDF). NASA, Office of Space Access and Technology, Advanced Concepts Office. http://www.hq.nasa.gov/office/codeq/trl/trl.pdf

b. NSTC (2014). "National Plan for Civil Earth Observations", https://www.whitehouse.gov/sites/default/files/microsites/ostp/NSTC/national_plan_for_civil_earth_observations_-_july_2014.pdf

c. NOAA Invention Disclosure and Rights Questionnaire Instructions,

http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_201/201-103-appendix-b.html

d. NOAA Invention Disclosure and Rights Questionnaire
http://ocio.os.doc.gov/s/groups/public/@doc/@os/@ocio/@oitpp/documents/content/dev01_002431.pdf

e. OECD (2015), *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development*, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris.
DOI: http://dx.doi.org/10.1787/9789264239012-en

SECTION 6. EFFECT ON OTHER ISSUANCES.

.01 This Order supersedes NOAA Administrative Order (NAO) 216-105, Policy on Transition of Research to Application issued July 31, 2008.

.02 The Under Secretary of Commerce for Oceans and Atmosphere signs because the matter has not been delegated.

An electronic copy of this Order will be posted on the NOAA Office of the Chief Administrative Officer website under the NOAA Administrative Issuances Section.

Under Secretary of Commerce
for Oceans and Atmosphere

Office of Primary Interest:
Office of Oceanic and Atmospheric Research (OAR)