



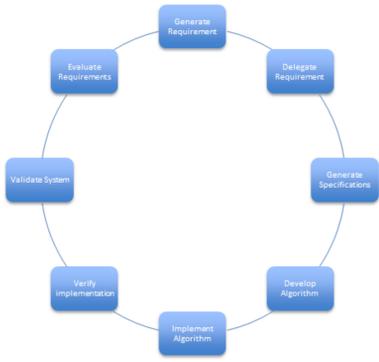
# Enterprise Algorithm Change Process

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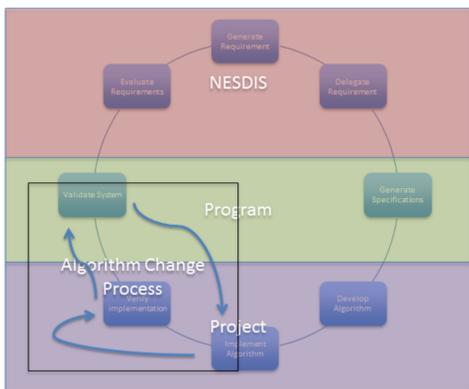
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## Product Lifecycle

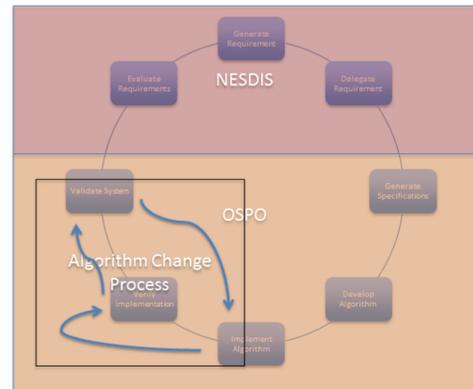


- Product Lifecycle is a NESDIS level process where user needs are determined, requirements generated and delegated to specific programs for execution.
- During a system acquisition, NESDIS retains the requirements definition, whereas the specific programs handle specifications and system validation. Each project within a specific program develops and implements algorithms as well as verify the implementation.
- During operations, the process is executed by NESDIS for requirements and OSPO everything else.
- The algorithm change process is a subset of the product lifecycle.

## Roles & Responsibility During System Acquisition



## Roles & Responsibility During Operations



## What is an Algorithm Change?

- An Algorithm Change is a modification of the operational software that computes a data product.
- Throughout the phases of a satellite mission, reasons to change a data product algorithm arise, some examples are:
  - Pre-Launch: Testing increases knowledge of instrument performance and implementation of science in algorithms
  - Calibration/Validation (Cal/Val): Instrument calibration tweaks and resolution of errors, both software bugs and science application/implementation
  - Operations: Evolution of requirements with changing user needs and science advancement
- The Satellite Ground System (GS) must be prepared to collect, approve, test, and implement these changes correctly and efficiently in order to deliver reliable and consistent data to the users.

## Regardless of system, all changes follow the same path....

- Detect/Identify discrepancy (Algorithm Issue) in operational data product
- Report issue for communication with Project and Team
- Prioritize within Discipline's tasks after evaluation if within scope and resources
- Investigate cause
- Resolve the issue in the code, deliver change package, test, and approve the change to the baseline
- Implement the solution in the operational system
- Verify solution implemented correctly in operational system



## How Do We Accommodate Differences Between Satellite Programs?

- Communication between and amongst participating organizations is key element of success.
- NESDIS organizations (STAR, OSPO, Program personnel and their Ground and Flight Contractors) can work shoulder-to-shoulder to make changes.
  - Types of change determine who does the bulk of the work, but all three groups are involved to some degree in each.
  - Contractual relationships should be structured to allow for technical interchange as needed to support mutual success.
- Algorithm Review Board (ARB) retains review and approval of science changes with the Subject Matter Experts and Organization accountable for Data Product Quality.
  - Provides early communicate of change to all stakeholders to assess impact prior to implementation.
  - Forum of people focused only on data product performance.
- Consistent application of DAP definition eases movement across organizational boundaries.
- JPSS and GOES-R have differing organizational structures, but the need for the Cal/Val Scientists, Users, Program Personnel, and OSPO Personnel to collaborate to resolve issues is identical.
  - GOES-R is following the JPSS lead by establishing an Algorithm Review Board to review and approve all science-related baseline changes.
  - The Delivered Algorithm Package (DAP) for GOES-R will be similar to that used for the initial science algorithm deliveries to the Program, which was tailored for S-NPP/JPSS.

- Tailoring for each Program will be needed to accommodate each separate Ground System.
  - Testing of DAP by Program prior to ARB review eliminated for GOES-R with STAR access to GS Development Environment.
  - GOES-R system ability to update algorithms without full software release may speed implementation of minor algorithms modification.
- Roles in the Process are filled by the appropriate position based on Program Accountability/Responsibility.
  - ARB Chair is the entity accountable for Data Product Quality during the specific phase of the program.
    - JPSS: Data Products and Algorithms Lead/Algorithm Project Lead
    - GOES-R: Program Systems Engineering/Program Scientist
    - Both will transition to OSPO when systems handed over to OSPO.
  - Data Product Lead is the owner of the algorithm and recommends changes to the ARB chair
    - JPSS: STAR personnel lead the Cal/Val teams and transition to Long-Term Monitoring support to OSPO in operations.
    - GOES-R: Instrument vendor responsible for algorithm development/issue resolution during Cal/Val, Program personnel and OSPO will facilitate collaboration between Calibration Working Group (CWG) and instrument vendors.

## How Do We Move Towards a Common Process?

- Cal/Val Teams and Data Users will report, prioritize, resolve, and verify potential changes in the same way.
  - GOES-R is working with OSPO to update the legacy OSPO CM process to a new, consolidated process that will accommodate both new systems.
    - One type of "algorithm trouble ticket" will be used across all systems.
    - Original type of "configuration change request" will be used across all systems.
  - GOES-R is adopting the JPSS prioritization scheme, based on product priority and severity of discrepancy.
- All Programs will move towards a common vocabulary.
- Tools will be used across Programs.
- New Programs will tailor the established Algorithm Change Process for their systems.

## How Do We Benefit from an Enterprise Change Management Process?

- No need to "reinvent the wheel" with every new mission, but tailoring allows individual project needs to be addressed.
- Easier for developers to understand what is needed to transition new science into operations and training minimized across programs.
- Costs for implementing changes are decreased with increased efficiency.
- Common use of vocabulary and tools will ease participation across multiple missions.
- Changes are implemented more quickly, resulting in improved data for user applications.
- Data quality is maintained for the end users.