



Application of a Consistent Algorithm Change Approach to the NESDIS Ground Systems

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Overview



- Why is an algorithm change so complicated?
- A Common Enterprise Process
- Applications in the GOES-R and JPSS Ground Projects
- Benefits of an Enterprise Approach
- Future Areas of Improvement



Why is an algorithm change so complicated?



- An algorithm change is a modification of the operational software that computes a data product.
 - The Satellite Ground System (GS) must be prepared to collect, approve, test, and implement these changes correctly and efficiently in order to delivery reliable and consistent products to users.
- Many different organizations are involved in finding, investigating, and resolving the issues, and then implementing them in the operational system.
- The different organizations have different motivations
 - Scientists are motivated by data product accuracy
 - System Software Engineers are motivated by operational system stability
- A disciplined approach to change must be used to limit interference to the operational system
 - Changes in the quality or format will affect user applications
 - Changes must not be allowed to impact the operational data processing



A Common Enterprise Process



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 a DAP (Delivered Algorithm Package), test, and approve the change to the baseline
- Implement the solution in the operational system
- Verify solution implemented correctly in operational system



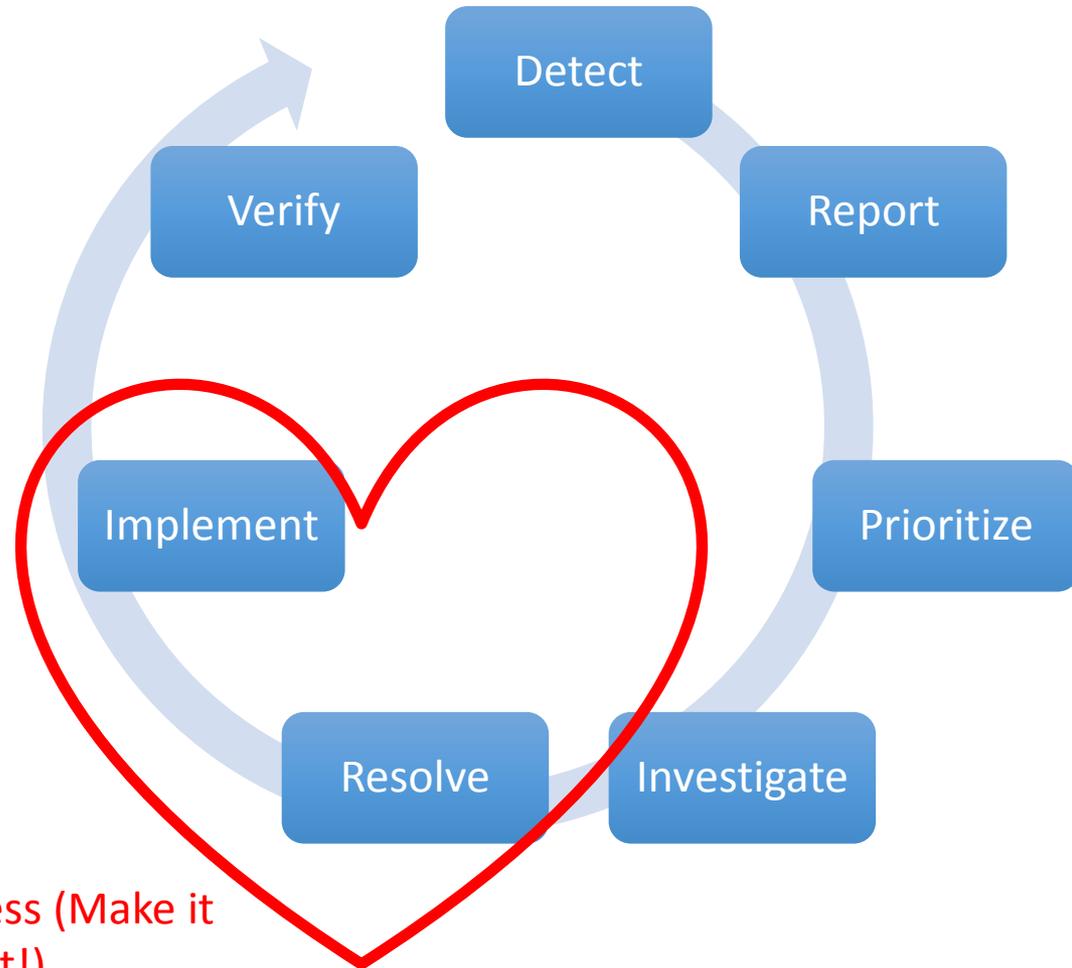


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GOES-R Algorithm Change Process



- Detect
 - Issues with the algorithms are determined pre-launch through analysis of the data products during GS testing and post-launch during the cal/val phase by the instrument vendors and cal/val teams.
 - The cal/val teams are led by NESDIS Center for Satellite Applications and Research (STAR) data product developers
 - Once operational, issues in the data products will be detected by users.
- Report/Prioritize
 - Issues found are reported in the Algorithm Action Tracker, which will transition to the GS ClearQuest and may eventually transition to the OSPO Configuration Management system.
 - The Algorithm Review Team, made up of algorithm stakeholders, meets regularly to prioritize the issues found and assign for resolution.
- Investigate/Resolve
 - The assignee, usually the algorithm developer, diagnoses the problem and develops the fix.
 - A Delivered Algorithm Package (DAP) is created by the assignee or the Algorithm Integration Team and delivered to OSPO or the GS Contractor.
- Implement
 - The change, and any associated documentation, is reviewed and approved by the Algorithm Review Board (ARB).
 - The DAP is integrated by OSPO or the GS contractor.
- Verify
 - The changed algorithm is run in the Development Environment to test the implementation is made correctly before being transitioned to the Operational Environment.



Use of the GOES-R Change Process in Pre-Launch Activities



- New System, new instruments, good to get experience with the new system prior to launch to get experience with the system and the PROCESS before it becomes important during the time crunch of cal/val
- Exercises performed
- Algorithm Issues found and resolved
 - SUVI, EXIS, SEISS, and MAG L1b promoted to operational baseline from frozen baseline.
 - ABI band 7 radiance limit to 400k to support fire algorithm.
- Pre-launch algorithm updates will be implemented this summer and GOES-R cal/val will be ready for launch
- Issues and plan to fix
 - Update to on orbit parameters this summer.
 - ABI radiance limit expansion in DO 04.00.00



Applications in the GOES-R and JPSS Ground Projects



- 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 has followed JPSS and established an Algorithm Review Board (ARB) 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 was 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 DE.
 - GOES-R system ability to update algorithms without full software release may speed implementation of minor algorithms modification.
 - Use of program specific CM systems (CMART for GOES-R)
- STAR Algorithm Integration Team is working consistently across JPSS (IDPS and ESPC) and GOES-R using the same processes and standards to deliver high quality DAPs to the Programs.
- 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: GP Algorithm Integration Team Lead
 - GOES-R: 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.
- As the “enterprise approach” is applied to GOES-R, lessons learned by the Programs and STAR are being used at JPSS



Benefits of an Enterprise Approach



- 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.



Future Areas for Improvement



- Decrease work to implement developer original or changed algorithm in operational system.
- Provide developers with a sandbox area that is as operational-like as possible.
- Strategic way to group adjustments to Level 2 algorithms for Level 1 calibration to eliminate small incremental changes to operations during the early cal/val period is needed.
- Movement to a common Level 2 processing environment should be studied as the community moves to blended products.