

**Guide to “Class E” Software Release to Users and Partners for DEVELOP Projects**

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**Document Scope**

This document is intended to help teams of DEVELOP participants to release software to project partners, end users, and the general public. The need for such a project was recognized during completion and delivery of software products to project partners for two pilot projects: Chile Water Resources releasing the Modified Snowmelt Runoff Model (M-SRM), and the Coastal Mid-Atlantic Water Resources releasing of the METRIC model.

The lessons learned, general procedure, and some DEVELOP specific information is recorded here. Future readers are highly encouraged to append their name to the authorship and update this document to reflect the most recent procedures and requirements at NASA if inaccuracies or discontinuities are found.

**Applicability**

NASA DEVELOP is headquartered at NASA Langley Research Center, so the procedures for software release observed at Langley must be observed by all DEVELOP participants. The instructions outlined within are applicable to all participants at all centers within the United States.

**Overview Checklist**

The process of software release is not particularly difficult, but it does include many steps. A checklist of all items is provided below, with more elaborate descriptions and specific information provided later. Please CC Jeff Ely on all correspondence relating to software release with contacts outside of the DEVELOP Program.

1. Attachments:

These are optional, but any written instructions or help documents that are intended for distribution with the software must be included.

1. Software Definition Document:

This document should be a meaty but not overly detailed description of the software. For teams working a 10 week term with planned software release at the end, a working draft of this item should be considered tandem with the project summary.

1. Safety Assurance Classification Report:

Generated by submission of (item 2) to ***Leslie Johnson*** ([leslie.j.johnson@nasa.gov](mailto:leslie.j.johnson@nasa.gov)) in the Safety and Mission Assurance Branch.

1. Software Plan:

For more typical NASA projects that take years to complete, this document is theoretically created before any software work begins. The simplest thing to do for DEVELOP teams is to create this before submitting (item 7), and write the software plan to precisely match what actually occurred during the term. This saves us work on the compliance matrix.

1. Compliance Matrix:

The compliance matrix is filled out to document any deviations from item 4. DEVELOP teams should have no deviations, so this task should be trivial.

1. New Technology Report:

This is a report of moderate length filed online through the innovation process. Sign in to this website (<https://invention.nasa.gov/login.php>) and complete the forms. Ten week teams should work their NTR in parallel with the software definition document and project summary.

1. Software Release Form (LF-7):

This form requires all subsequent items (1 through 6) to be completed and attached with it. Before submitting to ***Stuart Pendleton*** (<stuart.e.pendleton@nasa.gov>).

1. Export Control Approval:

This step is required for all materials to be distributed outside the United States, which includes open source software to be put online. It is relatively informal and involves sending an email to ***Marissa Tons*** (<marissa.n.tons@nasa.gov>) in export control, with some specific information for review.

1. Wait:

Once export control approval has been granted, and rest of the items are received by Stuart Pendleton, he sends it through OCC and a couple other offices before approval can be granted. They will be checking for [Section 508](http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) compliance among other things (see section on 508 compliance). This can take up to two full weeks, so teams should have all previous steps completed by the end of week 8 of the term if they wish to participate in a software handoff.

1. **Attachments**

Attachments are not required to abide by any formal structure, but should be professionally written, well formatted instructional documents directly related to the software and processes used during the term.

1. **Software Definition Document**

The software definition document contains information that partially overlaps with the project summary. It contains, in the following order:

1. **Introduction:** What motivated the creation of this software, what problem does it address?
2. **Applications and Scope:** Where will this software be used?
3. **Capabilities:** what can it do better than what was previously available.
4. **Interfaces:** How is one expected to use the software?
5. **Assumptions, limitations, & Errors:** What areas that the software could be improved upon in the future?
6. **Additional Information:** This section is copy/pasted from NPR 7150.2 and 7150.6. Consult the example reports and copy them exactly.

Remember that the introduction is about the software, not about the project in general. Some of this information will be useful in the NTR as well. This item can be completed soon after the team realizes they are likely to release software to a project partner and is required to obtain (item 3) and to submit (item 7).

1. **Safety Assurance Classification Report**

As one can imagine, NASA releases software that ends up in navigation and guidance systems, flight control systems, life support systems, and any number of other places where failure of the software could result in loss of human life. The DEVELOP program does not plan to start writing software for mission critical systems, at least for the foreseeable future. This is an easy item to complete, and takes only a few days to get once an email with the following information has been sent to ***Leslie Johnson*** ([leslie.j.johnson@nasa.gov](mailto:leslie.j.johnson@nasa.gov)) in the Safety and Mission Assurance Branch.

“The attached document [item2] describes the software effort titled “[your title here]” for “[5 word description of purpose]”. This software is under development by the DEVELOP program in org code E3. This software is assessed to be Class E software and we request your verification.

[lead software developer] is the lead software developer and should be able to provide additional information as needed.”

This item can be completed soon after (item 2) is finished and should be saved for attachment to (item 7).

1. **Software Plan**

Long term projects write a software plan and submit it for approval within their individual branches before software development is started. The DEVLEOP model doesn’t quite work this way, so the software plan should be among the last items to complete before submission of (item 7). Its components are as follows.

1. **Software Classification and Safety Criticality:** This short section should look exactly like the examples provided.

“This project has been classified as Class E software per the document titled ‘[Safety assurance classification report file name]’. The software activity is in full compliance with LPR 7150.2 and LMS-CP-7150.6 for Class E software.”

1. **Schedule and Resources:** provide information relating to the project timeline, when was it started and when was it finished? Provide information about the number of man hours it took in units of ‘work year equivalents’ (WYE). One WYE is equal to 2000 hours of work, which is one person working 40 hours a week for 50 weeks out of the year. Add up the total hours of all team members worked for the term and divide it by 2000 to get an estimate of the WYE. Also provide some estimate of how much time and effort will be put into future updates and maintenance of the software.
2. **Compliance Matrix:** Reference the attached compliance matrix.
3. **Testing:** Discuss validation techniques and testing used to build confidence in the software.
4. **Data management:** This is commonly broken up into a couple categories, version control and software release strategy. This will vary from project to project, so talk with your center leads and project coordinators about this.

The software plan does not need to be lengthy. Many sections can be entirely satisfied with one or two succinct sentences.

1. **Compliance Matrix**

The compliance matrix is for tracking deviations from the software plan and evaluating the risks involved. DEVELOP teams are not likely to deviate. Users can open the provided example compliance matrices and change the project title, approval date, and the names involved for planned implementation and complete this requirement to a satisfactory level.

1. **New Technology Report (NF 1679)**

The NTR is one of the first things that should be filed. It is completed entirely within an online form found at the following address (<https://invention.nasa.gov/login.php>). The purpose of the NTR is to document all individuals responsible for the innovation and manage rights. Once the creator of the document has submitted it, each individual listed as an “innovator” will receive a verification email that they must respond to before the document can be submitted for NASA approval. It is important for multi-term projects to get current email addresses for past contributors so the document doesn’t stall at that stage.

Users are warned that at the time of writing this document, the NTR process repeatedly prompts messages asking if you “would like to submit this NTR?” If the user is not immediately aware of the message, and hits the enter button before hitting “cancel”, the NTR will be submitted for review, unfinished with no further edits allowed. It is advisable to type paragraphs outside of your browser and paste them in when you are ready to minimize the possibility of this mishap.

Below is some information that is not common knowledge for all DEVLEOP participants to help complete the NTR. Users should skip any blocks that they do not know the answers to if they are unrequired.

Funding Mission Directorate: Science

Information pertinent to all innovators who are DEVELOP participants through **SSAI**:

Employer: Science Systems and Applications Incorporated

Work location: Your center location, for example: [NASA Langley Research Center, DEVELOP National Program, Building 647, Hampton, VA, 23681]

Employer address: 1 Enterprise Parkway, Suite 200, Hampton, VA, 23666

Contract Number: NNL11AA00B

Contract Type: Prime contract

Employer status: SB-small business

Information pertinent to all innovators who are DEVELOP participants through **Wise County**:

Employer: Science Systems and Applications Incorporated

Work location: Your center location, for example: [NASA Langley Research Center, DEVELOP National Program, Building 647, Hampton, VA, 23681]

Employer address: 1 Enterprise Parkway, Suite 200, Hampton, VA, 23666

Contract Number: NNX14AB60A

Contract Type: Prime contract

Employer status: SB-small business

Additional information can be found on the NASA invention link listed above. Take note of the “Case number” associated with the document (LAR-#####-#), as this will be used from this point forward to identify your software release.

1. **Software Release form (LF-7)**

This is the primary culminating form for all preceding items. Three primary points of contact must be included in the LF-7. The technical POC is the DEVELOP participant most directly involved with the software development and familiar with the code. The Government POC must be a government employee or civil servant (preferably of NASA), and will likely be a node science advisor or the national science advisor. The last POC is with the program office, presently ***Lindsay Rogers***. Each of these individuals will need to sign a copy of the form before submission.

1. **Export Control Approval**

Export control approval is automatically initiated after submission of (item 7), but DEVELOP projects with international partners or end users should reach out to the export control office a little earlier in the process. Email ***Marissa Tons*** (<marissa.n.tons@nasa.gov>) in export control with a general description of the project and an expressed desire to get a jump start on the export control process.

Include the following items:

1. Attachments and user manuals
2. Software Definition Document
3. Description of software handoff method
4. Draft version of the LF-7 (item 7). It need not be signed at this point.

In addition to these items, Marissa Tons will let you know if there are any other potential issues that need to be addressed.

1. **Wait**

After form LF-7 is submitted, Stuart Pendleton must send the package of documents through a few other approval processes that can take a couple of weeks. It is wise to ping him once a week to check the status of your request.

1. **Section 508 Compliance**

Users can read more about section 508 compliance here [<http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards>].

The most relevant sections DEVELOP teams are likely to fall under are 1194.21 and 1194.22. In summary, these requirements ensure that accessibility software can properly interface with any software you distribute. Teams who are strictly distributing code or Arcmap toolboxes are unlikely to encounter any issues with section 508 compliance.

Teams who have built custom graphical user interfaces must pay special attention to section 1194.21, particularly the following:

(a) When software is designed to run on a system that has a keyboard, product functions shall be executable from a keyboard where the function itself or the result of performing a function can be discerned textually.

(c) A well-defined on-screen indication of the current focus shall be provided that moves among interactive interface elements as the input focus changes.  The focus shall be programmatically exposed so that assistive technology can track focus and focus changes.

(d) Sufficient information about a user interface element including the identity, operation and state of the element shall be available to assistive technology.  When an image represents a program element, the information conveyed by the image must also be available in text.

(e) When bitmap images are used to identify controls, status indicators, or other programmatic elements, the meaning assigned to those images shall be consistent throughout an application’s performance.

(f) Textual information shall be provided through operating system functions for displaying text.  The minimum information that shall be made available is text content, text input caret location, and text attributes.

(i) Color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.