

## NASA SOYA Processes and Instructions

NOTE: These are for 2007 but in principle are useful for 2008

- Purpose: Document the NASA Software of the Year (SOY) selection procedure.
- Scope: These procedures outline the process that will be used to select the winner of the SOY competition and define the responsibilities of all those involved in the process. Those involved include:
- The NASA Chief Information Officer (CIO) or designee,
  - The NASA Chief Engineer, Office of the Chief Engineer (OCE), or designee, and a member of the Inventions and Contributions Board (ICB) technical staff,
  - The NASA Chief Safety and Mission Assurance Officer, Office of Safety and Mission Assurance (OSMA) or designee,
  - SOY Advisory Panel,
  - Centers and Facilities which sponsor applicants for the award,
  - Facility where the SOY Advisory Panel meeting and software demonstrations are held,
  - Applicants for the award, and
  - Presenters of software to the SOY Advisory Panel.
- Process: In June, the SOY Advisory Panel, OSMA representative, NASA CIO or designee, OCE designee, and ICB technical staff person shall meet to select a winner of the NASA Software of the year competition. To qualify for the SOY competition, the software must meet the following 7 basic criteria:
1. NASA must have an intellectual property interest in the software, including:
    - the determination by Patent Counsel that the software is or may be a licensable invention (i.e., suitable for patenting); or
    - assignment of associated copyrights to NASA for the software; or
    - a registered NASA trademark for the software;
  2. The software must have been supported, adopted, sponsored, or used by NASA;
  3. The software must be significant to the NASA mission; and,
  4. The software must have been tested and documented. Software must be documented as to its form and function and verified that it performs the functions claimed on the platform(s) for which it is designed without harm to the systems or the data contained therein. This is interpreted to mean that the software has a *current Technology Readiness Level (TRL) of 7 or higher*.
  5. The software must have been released, or approved for release, in accordance with NPR 2210.1
  6. It is highly recommended that the NASA Safety and Mission Assurance organization's software assurance personnel review and provide a report on the candidate software, its release status, and the author(s) compliance with applicable requirements and standards.

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7. The software must comply with the latest version of NPR 2810.1, "Security of Information Technology," Revalidated 8/12/04.

The following guidelines and procedures will govern the competition process:

### A. Responsibilities:

#### 1. Applicants for NASA SOY Competition

By mid-April all interested applicants must submit to their Center Awards Liaison Officer (ALO) the following software application package (in electronic format):

- a. A NASA Form 1329 (ICB Space Act Award application) in its current and standard format. The current version of NASA Form 1329 will be made available on the SOY web page (URL: <http://icb.nasa.gov/>).
- b. A Summary Evaluation Document specifically focusing on the SOY Advisory Panel's evaluation criteria. This Summary Evaluation Document will be available on the SOY web page, and the completed form shall not exceed six (6) pages. The purpose of this page restriction is to encourage focused and concise answers to the questions. The answers provided should be short and relevant to the specific SOY competition criteria.
- c. Letters of endorsement for the software being nominated.

#### Notes on documentation:

- The SOY Advisory Panel will only be given the following documents for consideration in selecting the winner(s) of the competition: Form 1329, Summary Evaluation Document, and letters of endorsement. The panel will be advised to disregard all other material (documents or web sites) provided or referenced.
- The evaluation of the software will be based heavily on the content of the Summary Evaluation Document. Therefore, all acronyms must be defined in the text of the Summary Evaluation Document.
- Presenters will not be allowed to give the SOY Advisory Panel any documents or listings during their presentation to the panel. However, the presenters are encouraged to provide the panel members with a copy of their presentation.

#### 2. NASA Centers (including Authorized Facilities and JPL)

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- a. Each NASA Center (or Facility that has a submittal) will appoint a representative to the SOY Advisory Panel and forward their names to the ICB Office by mid-April. Except for the representative from JPL, all Center representatives shall be government employees.
- b. By mid-April, each Center will coordinate their SOY competition activities through their respective Center ALO and will establish a Center review panel to evaluate all Center SOY applications received.
- c. No later than mid-May, each Center Director shall nominate a maximum of one software application and forward the software package (in electronic format) for the nominated software application to the ICB office for further consideration by the SOY Advisory Panel. A Center may forward a second software application package only if they obtain prior approval for an exception to the SOY rules from OSMA, the NASA CIO and NASA Chief Engineer. Any NASA Facility may submit one case each under the same guideline.

### 3. SOY Advisory Panel Members:

- a. The NASA CIO representative, the OCE designee, and the OSMA representative shall co-chair the SOY Advisory Panel evaluation and voting meetings. However, the co-chairs will not vote.

In addition to possibly chairing the SOY Advisory Panel meetings, the NASA CIO, OCE, and OSMA representatives shall assist in the coordination and facilitation of the SOY process throughout the year and during the SOY Advisory Panel's meeting. The NASA CIO, OCE, and OSMA representatives will be non-voting members of the SOY Advisory Panel.

- b. The NASA representative from the staff of the ICB, will be a non-voting member of the SOY Advisory Panel and shall lead the facilitation process.
- c. There shall be one voting panel member representing each Center and one from each authorized Facility that submits a nominated software package.
- d. Panel members may not have been involved in the development of any of the software being considered for award.
- e. Panel members shall have substantial knowledge and experience in science

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and engineering, software development software engineering, management, and the technology transfer and commercialization of software.

- f. Panel members shall not be presenters and shall not vote for software nominated by their Center or Facility.
- g. Panel members shall not advocate for or in anyway try to promote the software package nominated by their Center or Facility.
- h. The panel member from the Center or Facility that nominated the software will:
  - Record panel member questions about the software during the Panel’s discussion session on Day 1,
  - Print and issue a copy of the questions to the Panel members and to the software presenter, and
  - Brief the presenter of the software on the concerns of the SOY Advisory Panel in advance of their presentation session.
- i. Panel members shall treat the SOY evaluation proceedings as privileged communications, not to be shared with anyone at any time during or after the event. The SOY evaluators’ discussions are never to become public information, nor are they to be shared with the management of the respective organizations of the Panel members.

#### 4. Presenters to the SOY Advisory Panel:

- a. Each presenter will be an expert in the software they are presenting and/or demonstrating, and they will have sufficient knowledge of the nominated software development process to understand and answer technical questions from the Advisory Panel. During presentations and/or demonstrations, conference calls with developers will be allowed for the purpose of answering questions. Videotapes or DVDs are acceptable to assist in the demonstrations.
- b. By mid-May, all presenters should submit to the ICB Staff all hardware requirements for software demonstration, candidate software, and electronic copies of presentation. Hardware required for a software demonstration but not available from the software demonstration facility must be provided by the presenter.
- c. On the evening before the presentation obtain a list of SOY Advisory Panel member questions and get a briefing on the panel’s issues from their

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Center's SOY Advisory Panel member.

- d. During your software presentation to the SOY Advisory Panel answer the list of questions you receive from the SOY Advisory Panel.
- e. Software presentations to the SOY Advisory Panel should follow the sequence of information contained in the Summary Evaluation Document. Furthermore, presenters may not present any documentation to the SOY Advisory Panel during their presentations. The panel members will disregard all such documentation that is offered. However, the presenters are encouraged to provide the panel members with a copy of their presentation.
- f. Non-panel members shall not be present during presentations and/or demonstrations of other software being considered.

### 5. ICB Staff

- a. The Director of the ICB shall provide a SOY Advisory Panel facilitator whose role is to:
  - Clarify and/or provide additional information to the SOY Advisory Panel voting members in response to their questions about the nominated software;
  - Facilitate the SOY Advisory Panel schedule and sessions with the co-sponsor representatives;
  - Maintain an unbiased status with respect to all software products being evaluated.
  - Be a non-voting member of the SOY Advisory Panel.
- b. At least five months prior to the SOY Advisory Panel evaluation and voting meeting:
  - The ICB Staff will coordinate with the OSMA, OCE, and NASA CIO to establish submission dates and competition criteria, and draft the SOY competition call letter.
  - The NASA Chief Engineer, OSMA, and NASA CIO will jointly issue the SOY competition call letter with a copy of the selection procedures and Software Evaluation Sheet enclosed.
- c. The ICB technical staff shall coordinate all logistics with the director of the facility where the software presentations and/or demonstrations take place

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(such as the NASA IV&V Facility) and record the proceedings.

- d. After compiling the list of SOY Advisory Panel members, and at least two months prior to the competition, the ICB Staff shall forward a copy of the SOY selection procedures, software rating forms and the ICB evaluation sheet to each panel member.
- e. At least one month prior to the SOY Advisory Panel evaluation and voting meeting, the ICB Staff shall notify the demonstration facility of the computing and telecommunications hardware and software requirement for the software demonstrations.
- f. At least two weeks prior to the SOY Advisory Panel evaluation and voting meeting, the ICB Staff will:
  - Compile all NASA Form 1329s, Summary Evaluation Documents, and letters of endorsement for each software application package being considered and send electronic copies to the SOY Advisory Panel members for review.
  - Send out a final SOY Advisory Panel meeting agenda to the SOY Advisory Panel members.
- g. On the first day of the SOY evaluation and voting meeting the ICB Staff, OSMA, OCE, and the CIO representatives will explain the current SOY competition rules to the SOY Advisory Panel members.
- h. No later than one month after the SOY Advisory Panel evaluation and voting meeting:
  - The ICB Staff will draft letters to the Centers and JPL to be signed by the NASA Chief Engineer, OSMA, and CIO announcing the SOY award winner(s).
  - The ICB Staff will post the approved SOY winner(s) on the SOY Web page within one day of the award approval.
- i. No later than two months after the SOY Advisory Panel evaluation and voting meeting, the ICB Staff, winning Center(s) ALO(s), NASA CIO, OSMA, and NASA Chief Engineer will coordinate awards presentations and present awards.

#### 6. SOY Advisory Panel meeting and Software Demonstration Facility

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(These meetings have been held at a neutral facility such as the NASA IV & V Facility in Fairmont, WV)

- a. The demonstration facility will provide audiovisual equipment, clerical supplies, and other material needed for presentations and SOY Panel activity.
- b. The demonstration facility will provide and assist in the use of computer hardware and software required for the presentations and demonstrations.
- c. On the day before the SOY Advisory Panel evaluation and voting meeting, the demonstration facility will work with the presenters to prepare the hardware and software for the software presentations and demonstrations.

B. The daily sessions shall be organized as follows:

(Note: The NASA CIO or representative, the OCE designee, and the OSMA representative will co-chair all SOY Advisory Panel meetings. Furthermore, to allow for travel time, Day 1 of the evaluation will not be the first workday after a weekend or holiday.)

Day 1: Morning (8:00 – 9:45): Introductions; review of evaluation procedure, rules, definitions, and scoring methodology by the ICB Staff facilitator and the OSMA, OCE, and CIO Representatives; questions and answers; and discussions among SOY Advisory Panel members.  
Morning (10:00 – 12:00) and Afternoon (1:00 – 4:00): 45-minute discussion periods for each software packages nominated. During each period the SOY Advisory Panel members will discuss and evaluate the software application package. This discussion and evaluation will be based solely on the documentation presented for each software application package. The SOY Advisory Panel will vote at the end of this session (using the preliminary evaluation score sheet) to determine if the group of nominated software packages can be reduced to a set of finalists. Panel member questions will be recorded and given to the software presenters. The software presenters will be expected to answer the questions during their presentation to the SOY Advisory Panel on Day 2.

Day 2: Morning (8:00 AM – Noon): If needed, up to four 65-minute software presentation sessions to the SOY Advisory Panel. Each session will consist of:

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- A 15-minute setup period for the software to be presented,
- A 30-minute software presentation and demonstration,
- A 10-minute question and answer period,
- A 5-minute period for the software presenter to pack-up and leave the room, and
- A 5-minute panel discussion period (with presenters and panel member from Center nominating the software not present).

Afternoon (1:00 – 5:00 PM): If needed, up to four more 60-minute software presentation sessions to the SOY Advisory Panel.

Within one hour of the conclusion of the last software presentation each panel member will turn in their scoring (using the Software Evaluation Sheet) of each software package to the Panel Chair.

7 PM Dinner This dinner will be at a local restaurant, and all panel members and presenters are invited to attend.

Day 3: Morning (9:00 – 11:00 AM): Final scoring (using the ICB Monetary Award Evaluation Sheet) and discussion of the software application packages by the SOY Advisory Panel voting members only. Once the scoring is completed, the SOY voting members will then rank the software applications and make their recommendations to the sponsors.

Note: The final agenda for the SOY Advisory Panel meeting will be published by the ICB two weeks prior to the meeting.

### C. Scoring

1. The panel members shall not provide a Software Evaluation Sheet or an ICB Evaluation Sheet for their respective Center SOY application package(s). For all other SOY application packages, each voting member of the SOY Advisory Panel shall turn in a completed evaluation sheets to the Panel Co-Chairs.
2. Within one hour of the conclusion of the last software presentation to the SOY Advisory Panel the panel members will turn in their Software Evaluation Sheets to the Panel Co-Chairs.
3. The totals from all SOY Advisory Panel members Software Evaluation Sheets will be averaged together by the Panel Co-Chairs and the averaged scores provided to the panel members.
4. The panel members will discuss the averaged scores, resolve any issues, make final adjustments to the scores if necessary, and rank the software packages

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evaluated. The averaged scores will be used to rank the software packages, and the application package(s) with the highest average score(s) will be the winner(s) of the competition.

5. Within one hour of ranking the software packages the SOY Advisory Panel members shall complete the ICB Evaluation Sheet for each software package and turn in the sheets to the ICB technical staff.
6. The panel members will discuss the ICB Evaluation Sheet scores, resolve any issues, and make final adjustments to the scores if necessary.
7. The SOY Advisory Panel members' ICB Evaluation Sheet scores will be used by the ICB Technical Staff to recommend cash awards for each software package to the Inventions and Contributions Board. Medallions will also be used to recognize contributors to award winning software development efforts.

**Evaluation Scoresheet for Preliminary Judging**

Center	ARC	DFRC	GSFC	GRC	JPL	JSC	KSC	LaRC	MSFC	Fac1	Fac2
<b>Case 1</b>											
<b>Impact</b>	<40%>										
<b>Innovation</b>	<40%>										
<b>Usability</b>	<20%>										
<b>Case 2</b>											
<b>Impact</b>											
<b>Innovation</b>											
<b>Usability</b>											
<b>Case 3 etc.</b>											

**Note: Each case will be scored by all but the proposing Center's panel members, but only as a rank order relative to all the cases being evaluated. The rank ordering for "Impact" will be weighted at 40%, for "Innovation" at 40% and for "Usability" at 20%. The combined score will be compared to cull down the field to finalists, and the finalists will be allowed to present their cases to the panel on the following day. This procedure will allow the finalists to have more time to make their case.**

**How to rank order: Score each case with a 1 to 10 score (10 being the best score) for each of the 3 categories (impact, innovation, and usability) then multiply the score in each category by the weighting factor, and finally add the three weighted scores.**

**NASA SOFTWARE OF THE YEAR SELECTION PROCEDURE  
SOFTWARE EVALUATION SHEET**

**NASA INVENTIONS AND CONTRIBUTIONS BOARD  
MONETARY AWARD ANALYSIS  
NASA CASE NO.**

<b>Title:</b>			
Software Class:			
<b>Contributor(s)</b>			
<b>Employer(s)</b>			
<b>Staff Recommendation</b>		<b>Board Recommendation:</b>	
<b>Patent Applied for Date:</b>		<b>Patent number / issue date:</b>	

**SIGNIFICANCE**

Area	None	Modest	Average	Major	Maximum	x Weighting	Points
Aerospace	0	1	3	6	12	120	
Science/Tech	0	1	3	6	12	120	
Humanitarian	0	1	3	6	12	120	
<b>SUBTOTAL</b>							<b>0</b>

**DEVELOPMENT**

Concept	Simulated	Tested	Developed	Operational	xWeighting	Points
1	2	3	7	10	60	

**ASSESSMENT OF USE**

Category	None	Low	Moderate	Widespread	x Weighting	Points
NASA/Gov't Present	0	1-2	4-6-8	10-15-20	40	
NASA/Gov't Potential	0	1-2	4-6-8	10-15-20	20	
Industry Present	0	1-2	4-6-8	10-15-20	80	
Industry Potential	0	1-2	4-6-8	10-15-20	40	
<b>SUBTOTAL</b>						<b>0</b>

**CREATIVITY**

None	Low	Modest	Average	High	Very High	Factor
0	1-2	3-4	5-6	7-8	9-10	

**AWARD SUMMARY**

(Significance	+ Development	+ Utilization)	Creativity	=Points
				0
Inventor of the Year (NASA)		+ Nat'l Nominee		
Previous Awards or Non-SWA Royalties:				
<b>GRAND TOTAL:</b>				<b>0</b>

**EVALUATION SUMMARY**

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### Definition of Terms

**Advances the State-of-the-Art:** Software that significantly improves or updates currently existing concepts, operating environments, development tools, languages or new processes.

**Assessment of Use:** An evaluation of the extent of present use of the software and of potential use/marketability of the software. Levels of use or potential use are defined as follows: Low levels of use are estimated between one and three million dollars of total value or impact. Moderate levels are \$3 million to \$10 million, and Widespread are \$10 million to \$100 million in value or impact.

**Copyright:** A government issued grant of exclusive right to an author for an original work that is fixed in a tangible medium of expression, such as software. This right includes the right to exclude others from copying, distributing, and from developing other software derived from the copyright protected software.

**COTS (Commercial Off The Shelf) Equivalent SW Available on Market:** Are there any software products on the market that are equivalent in functionality and capability to the nominated software product?

**Creativity:** See innovation. Components used to evaluate software creativity on the software evaluation sheet are:

- The usability of the software (approximately 10 % of the creativity score)
- The quality of the software package (approximately 40% of the creativity score)
- The efforts made to commercialize the software (approximately 10% of the creativity score), and
- Innovation produced in the development of the software (approximately 30% of the creativity score).

**Development Status:** The current Technology Readiness Level (TRL) of the software package. If the software is rated between 1 and 6, it is automatically disqualified from further SOY competition. The definitions of the TRL levels are found in this list of definitions under Technical Readiness Level.

**Documentation Quality:** The degree to which published operating procedures, system functional descriptions, and technical specifications are understandable and useful.

**Ease of Use:** The end user's perspective of how effortless the system is to interact with and understand. This includes several user-related issues such as:

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- User system interface (e.g., a graphical user interface (GUI)) and the mechanisms (menus, icons and buttons) by which the user exercises the system functions,
- User support provided, and
- Flexibility in changing the content and format of system outputs (reports, displays, and other output).

**Efforts to Transfer/Commercialize Software:** These efforts include:

- A clear intent and strategy to transfer and/or commercialize software,
- the assessment and assertion of Intellectual Property (IP)\* interests,
- the assessment of commercial potential,
- the authorized release of software, and
- the execution of IP licenses and partnership agreements.

\* Intellectual Property (IP) interests include, patent council determination that the software may be licensable, patents, copyrighted material, trade secrets, inventions, trademarks and other knowledge that is a basis for commercializing the software.

**Function:** How closely the system processes match the end user's requirements. Also, refers to verification of the software program with regard to its correctness in meeting the requirements or specifications.

**Ground Breaking/Original:** Software applications whose functionality never existed before. This item refers to the development of new software technologies such as new languages, methods, techniques and processes.

**Government Potential Use:** The likelihood that the currently operational NASA software may be utilized by or in support of other government agencies (federal, state, or local).

**Government Present Use:** The extent of current federal, state, and/or local government utilization of the currently operational NASA software.

**Horizontal Technology:** A technology in one technology area of application that is adapted to a different area of application.

**Impact:** The effect of the software on the program, and/or project. Examples of impact include: cost and time savings, increased productivity, reduced risk, and increased security and safety.

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**Improvement/Non-Trivial Modification:** New software or any pre-existing software modified by more than a trivial variation or improvement. A trivial variation or improvement includes minor code improvements that do not materially alter the software's operation.

**Innovation:** Producing meaningful new ideas, forms, methods, techniques, processes, systems, and interpretations or analogies. Also, using new knowledge, ideas, and/or inventions to create new products or services. Components used to evaluate software creativity on the software evaluation sheet are:

- Whether there is equivalent COTS software available,
- Improvement/non-trivial modification of previously existing software,
- Advances in the state-of-the-art, and
- Groundbreaking/original effort.

**Invention:** Any new idea, concept, technique, device, or process that has not yet been commercialized.

**Justification for selecting technology and/or approach chosen:** This justification is concerned with use of effective architecture(s), languages and tools. What efforts were made to select an architecture that would assure the optimal technological approach? For example:

- What was the architecture (Object-oriented, Function-based, etc) chosen and why?
- What language(s) (such as 4GLs or specialized languages) was chosen and why?

**Maintainability:** The ease and cost-effectiveness of system trouble-shooting, fixes, upgrades, and enhancements to meet changing system requirements.

**NASA Case No:** The number used in Form 1329 and is assigned by the Center Patent Attorney during processing of the New Technology Disclosure Form 1679.

**Non-Government Potential Use:** The likelihood that the currently operational NASA software may be utilized in the support of commercial, industry, external research, and/or non-profit sectors.

**Non-Government Present Use:** The extent of current utilization by commercial, industry, external research, and/or non-profit sectors of the currently operational NASA software.

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**Other Science and Technologies:** Horizontal or crosscutting technology areas (e.g., Biotechnology, Communications, Construction, Education, Environment, Information Technology, Manufacturing, Materials, Medicine, etc) and secondary uses of the technology:

- Where the user(s) is not necessarily part of the clientele group for whom the application was originally developed.
- Whose application extends outside of NASA's mission support.

**Patent:** A government grant issued to an inventor or applicant for an invention that gives the inventor or applicant the right to exclude others from making, using, selling, or importing the patented invention.

**Performance:** The efficiency and effectiveness of the software system operation, in terms of responsiveness, throughput, cost and other technical performance measures. Response is a measure of how quickly and effectively the system reacts to a user's interaction with the system. Throughput is a measure of the computational work (based on workload characterization) accomplished by the system (software and hardware) within a specified time. The technical performance measures vary from system to system.

**Portability:** The extent of compatibility of the software with different operating system environments.

**Quality:** The extent of the superiority or excellence of the software measured by factors such as: how correctly the software performs the functions for which it was designed; system performance; system reliability; maintainability; and reuse of design, specifications and code.

**Reliability:** A measure of the probability that a system is operating satisfactorily at a given time.

**Responsible Center:** this is the sponsoring Center of the software nominated for the Software of the Year (SOY) Award.

**Reuse:** The extent to which the design, specifications, and/or source lines of certified software code of the system being considered for the SOY Award has been structured to facilitate adoption into systems to be developed in the future. Also, the extent to which previous designs, specifications, and/or source lines of certified software code have been incorporated into the system being considered for SOY award.

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**Science and Technology Significance:** The extent of impact the software has on NASA’s missions and/or the impact of the software on other science and Technology. See “Other Science and Technology” for further definition in this area.

**Significance:** Why something stands out or is important. Examples include: unique or greatly improved processes or products; functions, analytical tools and models that enable the development of systems or enable the execution of missions; and new and unique product that has a high probability of commercial success.

**Software Class (from NPR 7150.2, NASA Software Engineering Requirements):**

<p>Class A Human Rated Software Systems</p>	<p>Applies to all space flight software subsystems (ground and flight) developed and/or operated by or for NASA to support human activity in space and that interact with NASA human space flight systems. Space flight system design and associated risks to humans are evaluated over the program's life cycle, including design, development, fabrication, processing, maintenance, launch, recovery, and final disposal. Examples of Class A software for human rated space flight include but are not limited to: guidance; navigation and control; life support systems; crew escape; automated rendezvous and docking; failure detection, isolation and recovery; and mission operations.</p>
<p>Class B Non-Human Space Rated Software Systems</p>	<p>Flight and ground software that must perform reliably in order to accomplish primary mission objectives. Examples of Class B software for non-human (robotic) spaceflight include, but are not limited to, propulsion systems; power systems; guidance navigation and control; fault</p>

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	<p>protection; thermal systems; command and control ground systems; planetary surface operations; hazard prevention; primary instruments; or other subsystems that could cause the loss of science return from multiple instruments.</p>
<p>Class C Mission Support Software</p>	<p>Flight or ground software that is necessary for the science return from a single (non-critical) instrument or is used to analyze or process mission data or other software for which a defect could adversely impact attainment of some secondary mission objectives or cause operational problems for which potential work-arounds exist. Examples of Class C software include, but are not limited to, software that supports prelaunch integration and test, mission data processing and analysis, analysis software used in trend analysis and calibration of flight engineering parameters, primary/major science data collection and distribution systems, major Center facilities, data acquisition and control systems, aeronautic applications, or software employed by network operations and control (which is redundant with systems used at tracking complexes). Class C software must be developed carefully, but validation and verification effort is generally less intensive than for Class B.</p>
<p>Class D Analysis and Distribution Software</p>	<p>Non-space flight software. Software developed to perform science data collection, storage, and distribution; or perform engineering and hardware data analysis. A defect in Class D software may</p>

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	<p>cause rework but has no direct impact on mission objectives or system safety. Examples of Class D software include, but are not limited to, software tools; analysis tools, and science data collection and distribution systems.</p>
<p>Class E Development Support Software</p>	<p>Non-space flight software. Software developed to explore a design concept; or support software or hardware development functions such as requirements management, design, test and integration, configuration management, documentation, or perform science analysis. A defect in Class E software may cause rework but has no direct impact on mission objectives or system safety. Examples of Class E software include, but are not limited to, earth science modeling, information only websites (non-business/information technology); science data analysis; and low technical readiness level research software.</p>
<p>Class F General Purpose Computing Software (Multi-Center or Multi-Program/Project)</p>	<p>General purpose computing software used in support of the Agency, multiple Centers, or multiple programs/projects, as described for the General Purpose Infrastructure To-Be Component of the NASA Enterprise Architecture, Volume 5 (To-Be Architecture), and for the following portfolios: voice, wide area network, local area network, video, data centers, application services, messaging and collaboration, and public web. A defect in Class F software is likely to affect the productivity of multiple users across several geographic locations, and may possibly affect mission objectives</p>

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	<p>or system safety. Mission objectives can be cost, schedule, or technical objectives for any work that the Agency performs. Examples of Class F software include, but are not limited to, software in support of the NASA-wide area network; the NASA Web portal; and applications supporting the Agency's Integrated Financial Management Program, such as the time and attendance system, Travel Manager, Business Warehouse, and E-Payroll.</p>
<p>Class G General Purpose Computing Software (Single Center or Project)</p>	<p>General purpose computing software used in support of a single Center or project, as described for locally deployed portions of the General Purpose Infrastructure To-Be Component of the NASA Enterprise Architecture, Volume 5 (To-Be Architecture) and for the following portfolios: voice, local area network, video, data centers, application services, messaging and collaboration, and public web. A defect in Class G software is likely to affect the productivity of multiple users in a single geographic location or workgroup, but is unlikely to affect mission objectives or system safety. Examples of Class G software include, but are not limited to, software for Center custom applications such as Headquarters' Corrective Action Tracking System and Headquarters' ODIN New User Request System.</p>
<p>Class H: General Purpose Desktop Software</p>	<p>General purpose desktop software as described for the General Purpose Infrastructure To-Be Component (Desktop Hardware &amp; Software Portfolio) of the</p>

**NASA SOFTWARE OF THE YEAR SELECTION PROCEDURE**  
**Definition of Terms**

	NASA Enterprise Architecture, Volume 5 (NASA To-Be Architecture). This class includes software for Wintel, Mac, and Unix desktops as well as laptops. A defect in Class H software may affect the productivity of a single user or small group of users but generally will not affect mission objectives or system safety. However, a defect in desktop IT-security related software, e.g., anti-virus software, may lead to loss of functionality and productivity across multiple users and systems. Examples of Class H software include, but are not limited to, desktop applications such as Microsoft Word, Excel, and Power Point, and Adobe Acrobat.
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**Technical Support:** The support available for user assistance, trouble-shooting, fixes, upgrades, enhancements, and documentation.

**Technology Commercialization:** The process of new technology development through partnerships with government and industry with the objective of creating new products, processes, or services with commercial potential.

**Technology Transfer:** The process by which technology developed in one organization, in one area, or for one purpose is applied in another organization, in another area, or for another purpose

**Technology Readiness Levels (TRL):** The level of software system development. There are nine software technology readiness levels, ranging from 1 to 9, associated with the NASA software development life cycle and software having a TRL of 6 or less is automatically disqualified from the Software of the Year competition.

**TRL 9: Actual system “flight proven” through successful mission operations**

Thoroughly debugged software. Fully integrated with operational hardware/software systems. All documentation has been completed and have

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successful operational experience. Sustaining software engineering support in place. Actual system fully demonstrated.

**TRL 8: Actual system completed and “flight qualified” through test and demonstration (Ground or Flight)**

Thoroughly debugged software. Fully integrated with operational hardware and software systems. Most user documentation, training documentation, and maintenance documentation completed. All functionality tested in simulated and operational scenarios. V&V completed.

**TRL 7: System prototype demonstration in a relevant environment**

Most of the software is functionality available for demonstration and test. Well integrated with operational hardware/software systems. Most software bugs removed. Limited documentation available.

**TRL 6: System/subsystem model or prototype demonstration in a relevant environment (Ground or Space)**

Prototype implementations if the software is on full-scale realistic problems. Partially integrated with existing hardware/software systems. Limited documentation available. Engineering feasibility fully demonstrated.

**TRL 5: Component and/or breadboard validation in relevant environment**

Prototype implementations. Experiments with realistic problems. Simulated interfaces to existing systems.

**TRL 4: Component and/or breadboard validation in laboratory environment**

Standalone prototype implementations. Experiments with full-scale problems or data sets.

**TRL 3: Analytical and experimental critical function and/or characteristic proof-of-concept**

Limited functionality implementations. Experiments with small representative data sets. Scientific feasibility fully demonstrated.

**TRL 2: Technology concept and/or application formulated**

Basic principles coded. Experiments with synthetic data. Mostly applied research.

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**TRL 1: Basic principles observed and reported**

Basic properties of algorithms, representations & concepts. Mathematical formulations. Mix of basic and applied research.

**Software Title:** the software title should be the same as that used in Form 1329 (Space Act Award Application).

**Understandability:** The degree to which the end-user can easily grasp the conceptual operation of the software (i.e., the system architecture). For example, can the end-user easily understand the system displays and outputs?

**Usability:** How well the user can apply the system functions to his/her needs. The software system usability attributes include understandability, ease-of-use, availability of technical support, quality end-user documentation, and availability of training.