

# SMD Implementation Plan for the Internal Scientist Funding Model

Michael H. New, PhD  
Deputy Associate Administrator for Research  
Science Mission Directorate

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## Section I: Background

NASA's Internal Scientist Funding Model (ISFM) was created as a result of an internal study performed by the Agency Competition Team, created by the Associate Administrator, Mr. Robert Lightfoot. The Team reported to the Associate Administrator and the Mission Support Council in June of 2015. The Mission Support Council (MSC) found that:

- Approximately 350 of the 1000 Agency scientists are partially funded through competitively won Research and Analysis (R&A) grants (the total funding from R&A is ~150 FTE);
- Unlike Other Government Agencies (OGAs), internal (NASA CS) and external scientists (*e.g.*, university researchers) compete for the same funding;
- NASA spends significant resources competing for our own research funding dollars;
- Early Career scientists have a hard time competing with older, more established researchers, and face a system that doesn't nurture them;
- Scientists spend too much time writing proposals that only cover a small fraction (0.1 FTE) of their time, forcing them to write many proposals; and,
- There is currently no strategic hiring of scientists. Hiring decisions are made at Centers without HQ consultation and, therefore, without any NASA-wide planning.

The MSC gave an action to the Chief Scientist to:

- Propose a revised model to fund and review more of the activities of internal scientists, with a more directed budgeting approach.
- Provide specific options for early career scientists to more rapidly apply their skills to NASA's needs.
- Finally, identify a revised approach for hiring scientists in the NASA civil service.

Following an extensive series of meetings with Center Science Directors and HQ stakeholders, the current approach of the ISFM was developed. The approach, and a notional implementation plan, was accepted by the MSC in October, 2016, with a three-year period of implementation after which a review by OCS will occur.

## Section II: Basic Principles

1. It is in the National interest that the many activities performed by Civil Servant (CS) scientists be conducted and supported in a way that optimizes the NASA workforce's productivity and realizes its leadership potential.
2. Work to be performed through Directed Work Packages (DWPs) should be strategic, forward-leaning, and distinctive — it should be work that is best lead by or performed at a NASA Center or provides value to the broader scientific community.

3. Work that could be competed should be unless there were to be substantial value to the scientific community in the leadership of NASA Civil Servant scientists at NASA Centers.
4. NASA HQ recognizes that in many cases, the work of Civil Servant scientists involves substantial effort by on-site contractors and off-site collaborators.
5. External peer review should be used to improve directed work.
6. The Centers won't be greedy and NASA HQ won't be miserly.

### **Section III: Implementation**

A key aspect of any implementation of ISFM must be the close coordination between SMD Science Divisions and Center science management. The coordination should be based on regular, substantive interactions between HQ and the Centers regarding research interests and NASA priorities.

To start the process through which new Directed Work Packages will be selected, initial discussions between Center Research Directors, or their designee who will serve as the primary interface with an SMD division, and SMD Science Division R&A Leads or (ISFM Leads if a separate ISFM Lead has been chosen) should start. Initial discussions may be verbal but short whitepapers (3-5 pages) are preferred. The whitepapers should focus on:

- a. the goals and objectives of the proposed research,
- b. the relationships between the proposed research and SMD goals,
- c. how the research meets the ISFM goal of being substantive, strategic and forward-looking,
- d. how it relates to historically and/or currently funded work at the center(s), and
- e. how the research fits in with the existing capabilities of the Center(s).

Rolling up existing awards into a larger work package will only be accepted if it is demonstrated that the combined package exceeds the sum of its parts, especially in providing benefit to the broad scientific community.

Working with relevant SMD Program Officers and each other, SMD Division R&A Leads should provide feedback (ideally within 2 months) to the Centers consisting of which DWP concepts will be entertained by SMD. The SMD Division R&A Leads then negotiate the details of the DWPs with the appropriate Center representatives (Lab/Branch Chiefs, Senior Scientists, *etc.*).

Once negotiations are complete and DWPs have been agreed to, in principle, Centers should then submit DWP descriptions (typically 5-10 pages but longer submissions may be required for larger work packages) focusing on:

- a. current capability, methodology to be applied,
- b. key scientific questions being addressed,
- c. the relationship between the proposed DWP and any related work being carried out by others, and
- d. a set of milestones and measures of success.

These descriptions will then be subjected to external reviews by the SMD Science Divisions. In general, three or more written, individual reviews is to be preferred but each Division is free to develop its own process – as long as that process is consistent with the generally accepted practices of peer review in SMD. The reviews are to focus on improving the described methodologies (in the spirit of reviewing a research paper) and/or providing constructive guidance about areas most appropriate for emphasis as part of the DWP. In some cases, it may be that the HQ division will coordinate with the Center(s) on a review process so that there is no duplication of review efforts between those organized by HQ and those that may be organized the Center(s) (*e.g.*, by an external visiting committee). These reviews are not to be part of a fund/don't-fund decision.

After the reviews have been received, SMD Divisional R&A Leads shall send signed DWP award letters and external reviews to the appropriate Center representatives. These letters are official records and shall be retained by SMD Divisional R&A Leads.

DWP award letters shall contain, at a minimum:

- a. The title of the DWP.
- b. The Lead of the DWP or the primary Point of Contact.
- c. A short description of the DWP.
- d. A list of agreed upon milestones and success measures for the DWP.
- e. A detailed budget for agreed upon lifetime of the DWP. If more than one Division is funding the DWP, then there must be separate budget items for each Division.
- f. A table of the named individuals participating in the DWP and their associated FTEs and WYEs for each year of the DWP. For those roles that do not require named individuals (*e.g.*, scientific programmer), especially those that are considered to be high-turnover positions, specific names are not required.

It is anticipated that DWP lifetimes will mostly range from 3 to 5 years. Shorter and longer DWPs may be created at the discretion of the relevant SMD Division R&A Lead(s) but are discouraged.

This process places the authority to define the scope of DWPs with the appropriate Center and HQ managers. The broader, external science community is asked to provide scientific review but only to improve the research, including providing constructive feedback as to the areas where it is felt that the proposing team can make the most effective contribution to the Division's research and/or applications communities — the final decision on which DWPs will be funded is determined by Center and HQ staff.

*Reporting and External Reviews:*

At the end of each fiscal year, each DWP shall submit a progress report. The progress report shall include the standard information contained in a grant progress report:

- a. The title of the DWP.
- b. The Lead of the DWP or the primary Point of Contact.
- c. A short description of the DWP.
- d. A description of progress to date.
- e. A discussion of any changes required or problems encountered.
- f. An analysis of progress against the agreed upon milestones and measures of success.
- g. An analysis of budget performance (funding received, funding obligated, funding costed, funding carried-over).
- h. A list of papers submitted or published that were enabled by the support<sup>1</sup> of the DWP.
- i. A list of abstracts published enabled by the support of the DWP.
- j. A list of talks given enabled by the support of the DWP.
- k. A list of proposals written by the scientists associated with the DWP for work that might be considered as relevant to the DWP, and the relationship of those proposals to the DWP.

At the midpoint of each DWP, a more extensive review of its progress shall be held. The process shall make use of knowledgeable reviewers independent of the DWP and the Center(s) involved in its conduct, no more than half of whom shall come from NASA Centers or JPL. Each division is free to determine the details of these midpoint reviews within these constraints. For large (>\$1M) DWPs, a site visit is encouraged. Where appropriate, a mid-term review could be coordinated with a review activity carried out by the Center(s) (*e.g.*, visiting committee) in lieu of separate review processes from both HQ and the Center(s). Where there are separate but related DWPs at two or more Centers, HQ may facilitate combined reviews.

Comments from the reviews will be collected and distributed to the Centers and relevant SMD Program Officers. As necessary, Centers will update their DWP descriptions to take into account these comments. It is the responsibility of the SMD Division R&A Leads and their Program Officers to ensure the updated DWP descriptions are responsive to the reviews.

After the mid-point review, HQ Divisional R&A Leads send signed DWP continuation letters to Centers for those DWPs deemed worthy of continuation. Any modifications to the DWP in response to the mid-point review shall be included in the continuation letter. Letters shall also be sent to Centers for those DWPs to be discontinued, including an explanation of why they are being discontinued. These letters are official records and shall be retained by HQ Divisional R&A Leads or a designated administrative support person within the division who is charged with the retention of other documentation.

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<sup>1</sup> Preferred acknowledgement for papers, abstracts and talks enabled by a DWP is "Support for this research was provided by NASA's <<Division Name>> Research Program."

*Constraints on DWP Content*

DWPs may contain funding for procurements as well as support of on-site contractors and support scientists (*i.e.*, those under cooperative agreements) but must include Civil Servant leadership. Support of essential off-site collaborators is allowed.

DWPs may fund the development of technology if there is evidence presented by the Center and by the NASA HQ Division that the technology is enabling of high-priority NASA goals and cannot be developed more efficiently and cost-effectively through a competitive solicitation (*e.g.*, ROSES).

The Jet Propulsion Laboratory (JPL) is, for the purposes of the ISFM, considered a contractor and is not eligible to request DWPs. JPL employees may be included in Centers' DWPs subject to the same rules as all non-NASA scientists. Work can also, of course, be directed to JPL through its task-order contract subject to the terms of that contract.

*Schedule*

The basic cycle is shown in Figure 1. New calls for DWP whitepapers may occur each year; however, if a Division has awarded all the funds it has allocated to DWPs, it may abstain from issuing a new call for DWP whitepapers. The centers shall be informed, though, of this decision.

In all cases, Division Directors, R&A Leads, ISFM Leads, and relevant Program Officers shall be involved in internal reviews of DWP whitepapers and descriptions. The Division Director is the final Selecting Officer for all DWPs entirely funded by their division. The Division Director may delegate this authority. The delegation shall be recorded in a memorandum for the record.

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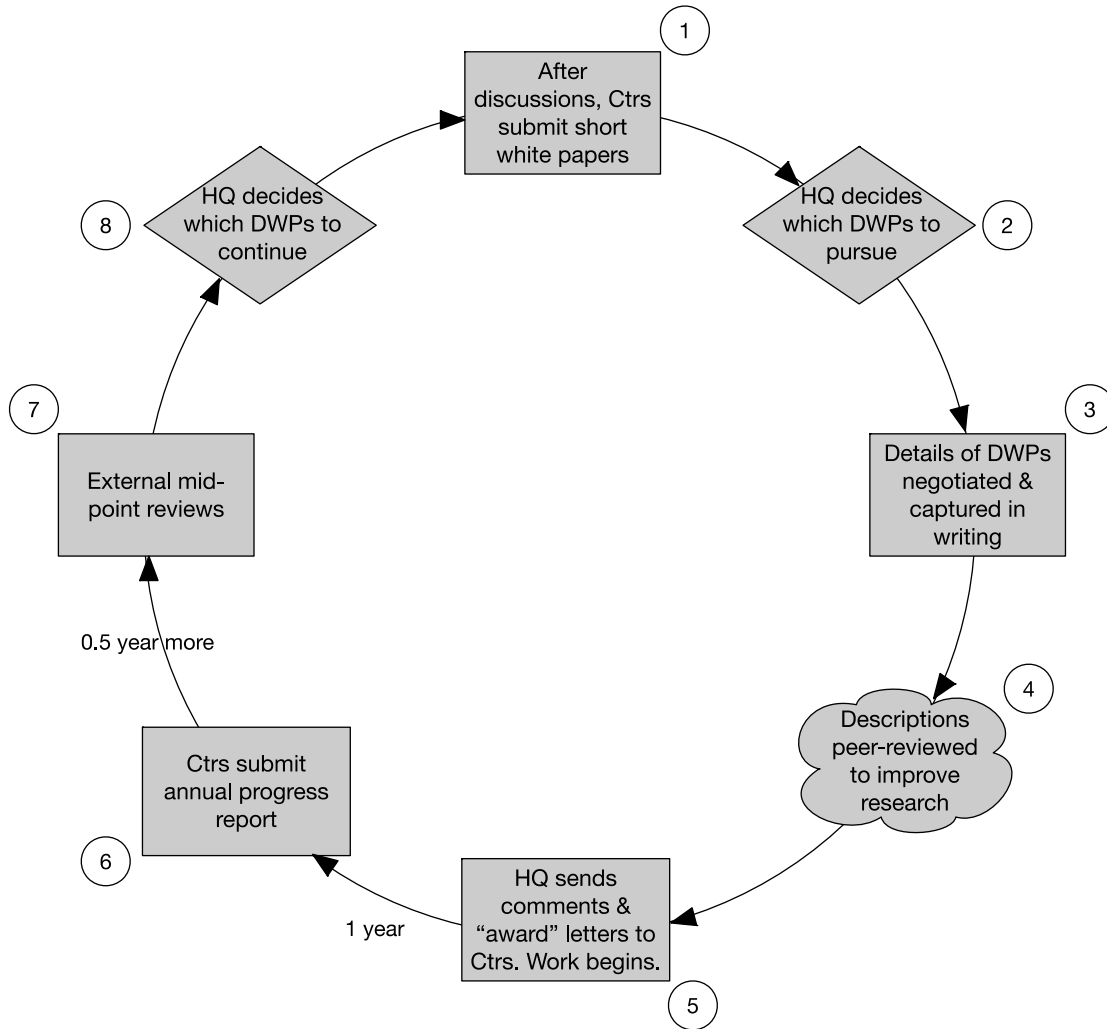


Figure 1: The major steps in the life cycle of a DWP. Total duration of the DWP is assumed here to be three years.

In detail, the schedule under which SMD will execute the ISFM is:

FISCAL YEAR	QUARTERS	CALENDAR YEAR	QUARTERS	MONTH	ISFM Event (for 1 generation of DWPs)
FY (N-1)	FY Q1	CY (N-2)	CY Q4	OCT	White papers due. #1 in Fig. 1.
				NOV	
				DEC	
	FY Q2	CY (N-1)	CY Q1	JAN	1. HQ negotiates with Centers. #2 and 3 in Fig. 1. 2. FY (N) funding adjustments made during PPBE(N+1). 3. DWP descriptions submitted to external review. #4 in Fig. 1. 4. DAAR certifies funding balance. 5. Funding memo/award letters sent to Centers. #5 in Fig. 1.
				FEB	
FY Q3	CY (N-1)	CY Q2	MAR		
			APR		
			MAY		

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FISCAL YEAR	QUARTERS	CALENDAR YEAR	QUARTERS	MONTH	ISFM Event (for 1 generation of DWPs)	
	FY Q4		CY Q3	JUN		
				JUL		
				AUG		
				SEP		
FY (N)	FY Q1		CY Q4	OCT	DWPs start first year.	
				NOV		
				DEC		
	FY Q2	CY (N)	CY Q1	JAN		
				FEB		
				MAR		
	FY Q3	CY (N)	CY Q2	APR		
				MAY		
				JUN		
	FY Q4	CY (N)	CY Q3	JUL		
				AUG		
				SEP		Annual Progress Reports due. #6 in Fig. 1.
FY (N+1)	FY Q1		CY Q4	OCT		DWPs start second year.
				NOV		
				DEC		
	FY Q2	CY (N+1)	CY Q1	JAN		
				FEB		
				MAR		External mid-point Review. #7 in Fig. 1.
	FY Q3	CY (N+1)	CY Q2	APR		
				MAY		Go/No-go/Tweak decisions made & communicated. #8 in Fig. 1.
				JUN		
	FY Q4	CY (N+1)	CY Q3	JUL		
				AUG		1. Annual Progress Reports due. 2. Final Reports from terminated DWPs due.
				SEP		
FY (N+2)	FY Q1		CY Q4	OCT		DWPs start third year.
				NOV		
				DEC		
	FY Q2	CY (N+2)	CY Q1	JAN		
				FEB		
				MAR		
	FY Q3	CY (N+2)	CY Q2	APR		

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FISCAL YEAR	QUARTERS	CALENDAR YEAR	QUARTERS	MONTH	ISFM Event (for 1 generation of DWPs)
	FY Q4			MAY	
				JUN	
			CY Q3	JUL	
				AUG	
				SEP	
			FY (N+3)	FY Q1	
NOV					
DEC					

For clarity,

Q1 (Fall) = Oct-Dec, Q2 (Winter) = Jan-Mar, Q3 (Spring) = Apr-Jun, Q4 (Summer) = Jul-Sep

*Cross-divisional Work Packages*

Cross-divisional work packages shall follow the same rules and processes described above modified to accommodate the involvement of two or more NASA HQ Divisions. Review of whitepapers and descriptions shall be performed by the Division Directors, R&A Leads, ISFM Leads, and relevant Program Officers from all relevant decisions. The Division Directors shall serve as co-Selecting Officials.

Centers planning on submitting cross-divisional work package whitepapers are strongly encouraged to contact the appropriate Division managers prior to submission.

*Further Considerations*

Before DWPs may be awarded, the Deputy Associate Administrator for Research (DAAR) or a designee shall review each Division’s portfolio of DWPs. He/she/they will certify to the SMD Associate Administrator that each portfolio does not alter the balance of funding between internal NASA researchers and external researchers overall (although the balance between Centers or between external organizations may change). If the DAAR finds that a portfolio of DWPs alters the balance between internal and external researchers, then he/she/they will work with the appropriate Division Director(s) to rebalance the DWPs.

Additionally, the DAAR will report annually to the SMD Associate Administrator on the involvement of Division Directors in Center hiring. As both a part of the Capability Leadership Model as well as the ISFM decision memo, Center management should coordinate CS scientist hiring with HQ science capability leadership. The DAAR is responsible for certifying that this coordination is, in fact, occurring.



#### **Section IV: Evaluation of the ISFM Concept and Implementation**

The ISFM is currently considered to be a pilot study whose success is to be evaluated within approximately three years after inception. Since the first DWPs started in FY18, that means that the evaluation of the effectiveness of the program will be evaluated in FY21 or FY22. For the most part, the Office of the Chief Scientist (OCS) has been given the responsibility to evaluate the effectiveness of the ISFM in achieving eight outcomes:

1. More research work is directed to the centers rather than competed.
  - a. GOAL: Reduce CS FTE in competed R&A by 25%
2. Fewer R&A proposals are submitted, scientists can focus more time on research activities geared toward NASA goals.
  - a. GOAL: Reduce proposals submitted with CS PI's or CS Co-I's.
3. HQ and science capability leads are involved in strategic hiring decisions.
  - a. GOAL: Hiring areas at Centers approved by HQ.
4. Positive feedback (via survey) of HQ program managers and center managers, and scientists.
  - a. GOAL: Improve satisfaction rating on questions 18 and 19 of survey.
5. [Civil Servant] Scientists are able to participate in more review panels without conflict-of-interest issues.
  - a. GOAL: Reduce the percentage of survey respondents who have not served on a peer review panel in the previous three years.
6. NASA scientists continue to publish research in the peer-reviewed literature.
  - a. GOAL: Number of peer-reviewed papers should remain constant.
7. External review panels continue to rate the quality of NASA science as high, initially on a three year review cycle.
  - a. GOAL: Maintain current quality assessments based on advisory committee GPRAMA ratings as well as external reviews of DWPs.
8. The balance of research funding support to the external [non-NASA Civil Servant] community is maintained.
  - a. GOAL: Maintain the 70%-30% NASA-external/NASA internal funding division.

The survey mentioned in Outcome #4 and #5 has been developed by the OCS in coordination with the group responsible for the Federal Employee Viewpoint Survey (for the questions on the survey, please see Appendix A). Evaluation of metrics for each of the outcomes will be done in collaboration with SMD.

## Appendix A: Satisfaction Survey Questions

1. In the past three years, have you submitted any proposals to a Research Opportunities in Space and Earth Sciences (ROSES) call?
2. To the best of your knowledge, when was the last time you participated in a ROSES panel as a reviewer?
3. Which of the following funding sources provided procurement dollars or FTE to you in the past year?
4. Which best describes your awareness of changes to the civil servant scientist funding model for SMD?
5. Which mission directorate(s) do you support?
6. Approximately how many ROSES R&A proposals did you submit as a PI within the last year?
7. Approximately how many ROSES R&A proposals did you submit as a Co-I within the last year?
8. Approximately how much time did you spend preparing ROSES R&A submissions (in total) within the last year?
9. Approximately how much time did you spend preparing other (non-R&A) funding proposal submissions within the last year (such as guest-observer, IRAD, CIF, etc.)?
10. The following questions refer to the procedures used to allocate competed R&A funding. To what extent...
  - a. Have competed R&A funding decisions been applied consistently?
  - b. Have competed R&A funding decisions been based on accurate information?
  - c. Have you been able to appeal the outcome arrived at by competed R&A funding decisions?
11. The following questions refer to competed R&A funding decisions for your proposals. To what extent...
  - a. Do competed R&A funding decisions result in fair outcomes?
  - b. Do competed R&A funding decisions reflect agency research goals and priorities?
  - c. Do the projects funded via competed R&A advance NASA's research goals?
12. During the competed R&A funding process, to what extent...
  - a. Have you been treated in a polite manner?
  - b. Have you been treated with respect?
  - c. Have authority figures refrained from improper remarks or comments?
13. The following questions refer to the competed R&A funding process. To what extent...
  - a. Were the procedures explained thoroughly?
  - b. Were explanations regarding the procedures reasonable?
14. The following questions refer to the procedures used to allocate directed R&A funding. To what extent...
  - a. Have directed R&A funding decisions been applied consistently?
  - b. Have directed R&A funding decisions been based on accurate information?
  - c. Have you been able to appeal the outcome arrived at by directed R&A funding decisions?
15. The following questions refer to directed R&A funding decisions for your proposals. To what extent...
  - a. Do directed R&A funding decisions result in fair outcomes?

- b. Do directed R&A funding decisions reflect agency research goals and priorities?
  - c. Do the projects funded via directed R&A advance NASA's research goals?
16. During the directed R&A funding process, to what extent...
- a. Have you been treated in a polite manner?
  - b. Have you been treated with respect?
  - c. Have authority figures refrained from improper remarks or comments?
17. The following questions refer to the competed R&A funding process. To what extent...
- a. Were the procedures explained thoroughly?
  - b. Were explanations regarding the procedures reasonable?
18. Considering everything, how satisfied are you with your job?<sup>2</sup>
19. Considering everything, how satisfied are you with your organization?<sup>3</sup>
20. Considering everything, how satisfied are you with your ability to secure research funding?
21. To what extent are you under pressure to submit R&A proposals?
22. What is the primary ROSES appendix to which you propose?
23. Any other comments?

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<sup>2</sup> This question is also regularly asked on the Federal Employees Viewpoint Survey.

<sup>3</sup> This question is also regularly asked on the Federal Employees Viewpoint Survey.