

Evaluation of the National Cancer Institute's Physical Sciences-Oncology Centers Program via Web-Based Survey of Investigators and Trainees

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PHYSICAL SCIENCES
in ONCOLOGY

Abstract

The Physical Sciences-Oncology Centers (PS-OC) program was founded by the National Cancer Institute within the Office of Physical Sciences-Oncology (OPSO) to **unite the fields of physical sciences and cancer biology by creating cross-disciplinary teams** and supporting infrastructure. Ultimately, the success of the program will be measured by the **generation of new knowledge and new fields of study to better understand the physical and chemical forces that shape and govern the emergence and behavior of cancer at all levels.** The twelve funded PS-OC bring together **expert teams from the fields of physics, mathematics, chemistry, and engineering, in conjunction with researchers in cancer biology and clinical oncology.** To support a prospective program evaluation, PS-OC program staff have implemented a comprehensive bi-annual progress report, and are currently developing a data model, database, and reporting user interface to mine these data. The bi-annual progress report collects information on a number of activities, including curriculum development, training, research methods, collaborations, scientific progress, new projects, and publications. In addition to this reporting system, at the midpoint of the program OPSO conducted 8 web-based surveys consisting of 7-32 questions directed to 8 specific respondent populations. Particular focus for this presentation is on Principal and Senior Scientific Investigators (PI/SIs), Project Leads and Investigators, Trainees, Administrators, Education Unit, Outreach Unit, Advocates, and External Scientists. Out of 919 potential respondents, 262 (28.5%) completed the survey.

Physical Sciences – Oncology Center Program

Program Initiative:

- Generate **new knowledge** and catalyze **new fields of study** in cancer research by utilizing physical sciences/engineering principles.
- Enable a better understanding of cancer and its behavior at **ALL** scales.
- Develop new perspectives and approaches to do **paradigm-shifting** science
- Build **trans-disciplinary teams** and infrastructure to better understand and control cancer through the convergence of physical sciences and cancer biology.

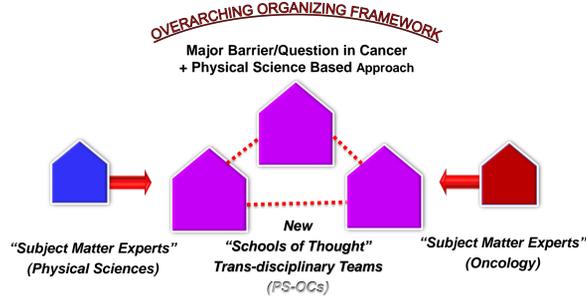


Figure 1. The PS-OC program initiative is to form a **collaborative Network** consisting of virtual Centers (teams) that focus their individual efforts around a unique theme. Schematic of the Physical Sciences – Oncology Centers (PS-OCs) Network. The PS-OC program aims to build a Network of centers focused on a new perspective on cancer research.

Physical Sciences – Oncology Centers:

- Twelve Centers were funded by NCI in September 2009 through U54 mechanism.
- Each Center is composed of physical scientists and cancer biologists.

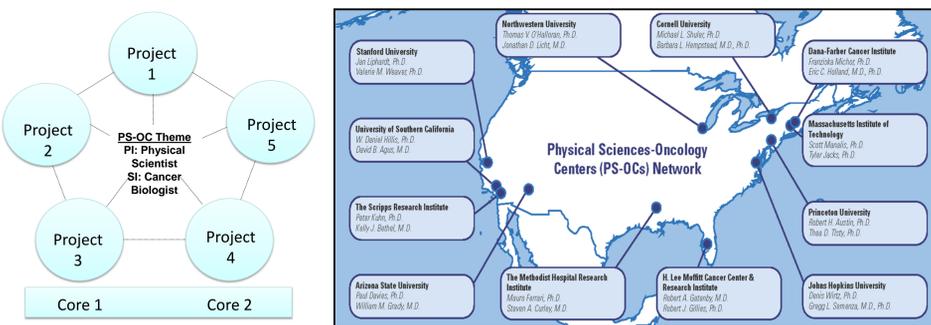


Figure 2. Structure and location of the twelve Physical Sciences – Oncology Centers (PS-OCs) funded by NCI. Each PS-OC has a principal investigator (PI) that is a physical scientist and a senior investigator (SI) that is a cancer biologist. Each PS-OC consist of three to five interactive Projects and a minimum of two collaborative Cores. Each PS-OC averages 10-12 investigators. The PS-OCs are located at Arizona State University, Cornell University, Dana-Farber Cancer Institute, H. Lee Moffitt Cancer Center, Johns Hopkins University, Massachusetts Institute of Technology, Northwestern University, Princeton University, The Methodist Hospital Research Institute, Stanford University, and University of Southern California.

SURVEY DESIGN and METHODS

OPSO conducted 8 anonymous, web-based surveys via Key Survey (WorldAPP, Braintree, MA) consisting of 7-32 questions directed to 8 specific respondent populations: Principal and Senior Scientific Investigators (PI/SIs), Project Leads and Investigators, Trainees, Administrators, Education Unit, Outreach Unit, Advocates, and External Scientists. Out of 919 potential respondents, 262 (28.5%) completed the survey.

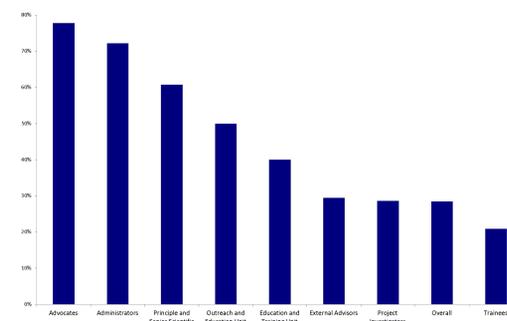


Figure 3. Survey completion rates by group: All 8 respondent categories are represented, organized by percentage of completed surveys as of the deadline given (30 days). Groups with higher survey completion percentages tend to be smaller groups, and represent the completion of each group as it relates to itself, not the entire target population of that subgroup or the overall respondent population of this survey.

Question formats:

- Select all that apply, multiple choice, rating scale, and open-ended questions.
- Open-ended examples: "Please describe one brief example of something you know now that you didn't know before because of your involvement with the PS-OC program"; "...please give an example of a successful cross-disciplinary collaboration ...in which you have been involved as part of the PS-OC program."
- Most questions required an answer – only a few had the option to skip.

RESULTS

- Up to 40% of the respondents indicated that 4-7 researchers were involved in the collaboration they identified (Figure 4).
- Collaborations increased from <100 collaborations primarily within each center to >500 within each center, within the PS-OC Network, and outside of the PS-OC Network (Figure 5).

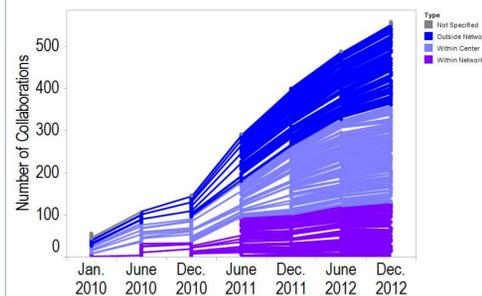


Figure 5. Number of collaborations reported via bi-annual progress reports

- The most commonly selected roles were: performing data analysis, organizing team meetings, and/or providing strategic direction (Figure 6).

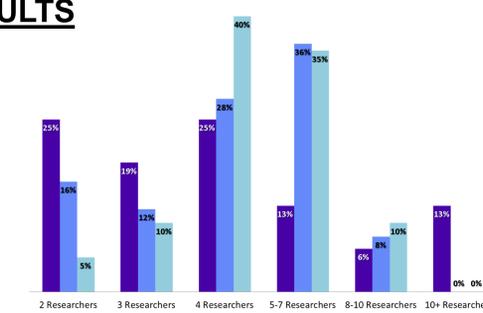


Figure 4. Respondents were asked to identify the size of the team from their most successful collaboration.

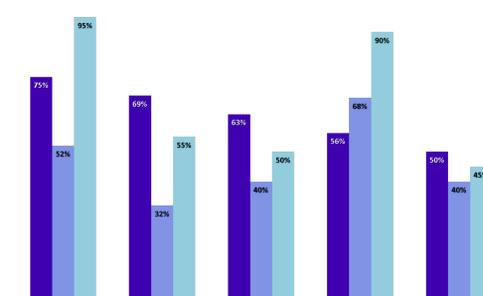


Figure 6. Respondents were asked to identify the roles they performed in the collaboration they identified ("select all that apply")

	Physical Scientists	Cancer Researchers
New knowledge or skills	89%	77%
Collaboration is still in progress	81%	86%
Publications	70%	49%
Presentations or invited talks	70%	37%
Pursue new aspects of the project as an extension of this work	59%	49%
Trans-Network project funds	37%	20%
Will form new collaborations	33%	37%
Pilot project funds	33%	17%
NIH or NSF grant funds	15%	9%
Outreach project funds	15%	6%

Figure 7. Collaboration Outputs as selected by investigator respondents as a heat map, with more prevalent outputs in red, orange, and yellow, a less prevalent outputs in green and blue.

- Lack of funds; members prioritizing their personal goals before the overall team goal; responsibilities, roles, and expectations were not clear; and difficulties in communication across scientific disciplines were the most commonly selected difficulties/barriers with the highest severity ratings (Figure 8).

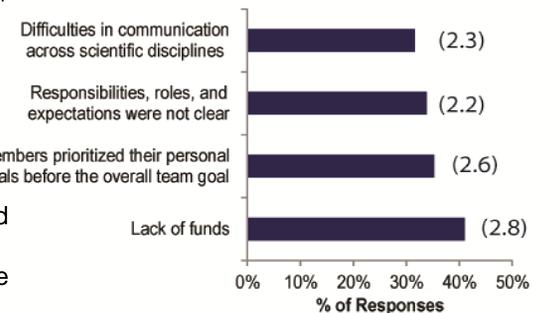


Figure 8. Respondents indicated the barriers they faced and ranked the level of severity of each item (Scale: 1–5, 5 is most severe).

DISCUSSION

- Anonymity was a major priority with this survey as respondents were asked to be as open and honest as possible.
- Cross-disciplinary team size is an important consideration when considering desired outputs (from individual enrichment to bibliometric data).
- Lack of funds and individual goal prioritization is a common concern in both individual and team research; clear communication in general and between disciplines was found to be a concern across investigator type and discipline, which may indicate a communication barrier between disparate fields in general.
 - Program officials are investigating ways to address the barriers highlighted above on a programmatic level.
- Results are being compared to an ongoing quantitative analysis being performed by Discovery Logic (Discovery Logic, a Thomson Reuters company, Rockville, MD).
- Incorporating similar surveys within a prospective evaluation are important steps toward identifying specific, sometimes personal barriers to collaborations during the Program and provide information to make positive adjustments as needed.

For more information on the evaluation of the PS-OC Program and the relevant bibliometrics involved, please see posters C-13 and F-19

