

**Investigating the Career Paths of New Frontiers and Discovery Program Proposal PIs.** A. Chu<sup>1</sup> and C. S. Niebur<sup>2</sup>, <sup>1</sup>Thomas S. Wootton High School (pikachuac1212@gmail.com), <sup>2</sup>NASA Headquarters (300 Hidden Figures Way SW Washington D.C, 20546-0001; curt.niebur@nasa.gov).

**Introduction:** Serving as the Principal Investigator (PI) of a NASA mission is often viewed as one of the ultimate achievements in a scientist's career. A long-held perception is that this position is only earned after decades of accumulated and varied experience on multiple missions. Indeed, NASA uses the experience of a candidate PI as an explicit evaluation criterion in the proposal evaluation process. For a time, the expectation was that a future PI would advance along a highly specific career path (co-investigator (Co-I) to investigation lead to instrument provider to deputy PI and finally to PI) in order to gain the experience needed to oversee a project costing hundreds of millions of dollars. This idealized career trajectory was debunked in [1], which examined the career paths of PIs of Discovery missions up to that time. The current project expands upon that work, taking a deeper look into the career paths of scientists who proposed to the New Frontiers and Discovery programs to assess their level of experience at the time of proposal submission. This research looks at 81 mission proposal PIs (16 selected and 65 non-selected). These proposal PIs are from announcements of opportunity for the Discovery program in 2005, 2011, 2014, and 2019 and from the New Frontiers program in 2002, 2011, and 2017. Four selected Discovery PIs prior to 2006 were also included.

This research aimed to accomplish three objectives: discover how much experience the proposal PIs had before applying to be PI, determine the career path trends of previous New Frontiers and Discovery proposal PIs, and determine the career path trends of selected Discovery and New Frontiers mission PIs.

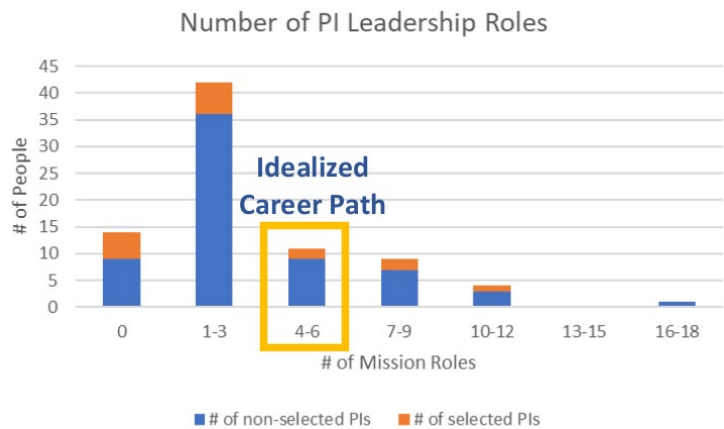
**Methodology:** Career path information was gathered for each of the 81 proposal PIs from CVs found in either past mission proposals or online. After reviewing the CVs nine common leadership roles were defined. Each PI's career path was then recast and simplified in terms of these nine roles. If a PI held a certain role more than once it was only listed a single time in their path. Each path ended when the person submitted their first mission proposal as PI, and the order of the career paths prior to mission proposal PI wasn't considered. All of these simplifications were made in order to make PI career paths more comparable against each other.

**Findings:** Similar to previous research [1], PIs don't follow the idealized career path and work their way up

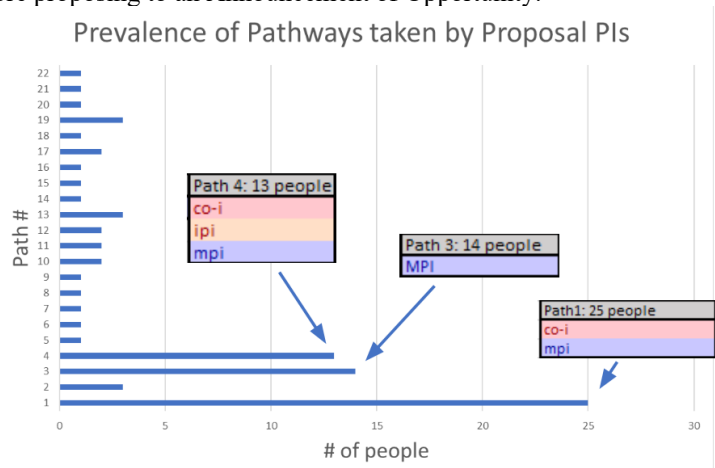
each rung of the experiential ladder before proposing. In fact, the 89 PIs examined have less experience than commonly believed. More than half (69%) of proposal PIs don't have the four roles of experience that were suggested in the idealized pathway (Figure 1). When considering the type of roles, 67% of PIs' experience is only as Co-I. Note that this role is the least intensive among the nine defined common leadership roles (the "bottom" rung of the experiential ladder, so to speak). When analyzing the paths of the PIs, neither a single common path nor a small number of common paths emerged. Instead, a total of 22 "common" career paths were identified from the 81 proposal PIs. Even with the extensive simplifications used in the methodology there appeared to be numerous paths and no idealized career path. Taking a deeper look into the specific career paths reveals a noteworthy observation: the most commonly followed career path to proposing as a PI was becoming proposal PI with experience as only a Co-I (31%). Becoming a proposal PI without any experience with the nine identified leadership roles was the second most common pathway (175). The story is similar for selected PIs; 31% had no past mission experience.

**Discussion:** Data shows no proposal PIs followed the idealized pathway, reinforcing the result from [1], but more importantly that many PIs propose with very limited experience in the nine identified leadership positions. NASA must stop relying on past mission experience to organically and passively grow experienced PIs as they "climb the ladder" and instead take a more proactive role training scientists to serve as a mission PI.

**Future work:** Serving in the nine identified mission leadership roles are not the only ways to acquire the experience and skills needed to become a mission PI. Future work should analyze a proposal PI's experience from non-mission roles, for example, committees they've participated on, research collaborations, etc. Most importantly, if current PIs are not gaining sufficient experience from missions then NASA must provide other ways for them to gain it.



**Figure 1.** Number of leadership roles held by a PI before proposing to an Announcement of Opportunity.



**Figure 2.** Number of PIs following each of the 22 identified pathways.

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**References:** [1] S. Niebur, LCPM #9, 2011