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MANAGING RESEARCH FOR GAME-CHANGING ADVANCES

Abstract

A typical challenge of any research project is to decide how best to disburse limited resources to the variety of competing options. When it comes to seeking 'game-changing' advances, the situation is even more challenging. First, research aimed at revolutionary advancements is different from the more common work of improving technology. Balancing the vision required to extend beyond along with the rigor to make genuine progress presents challenges that are different than just the technical issues. Additionally, research proposals can span multiple disciplines and different levels of progress and applicability. To use a colloquial expression, this presents the challenge of comparing apples to oranges. This difficulty is compounded by the fact that not all of the important questions are yet represented by proposed approaches. There are likely to be unaddressed issues that are more important than the approaches proposed. And lastly, on topics that appear so far from fruition, the available resources are minimal. To address these challenges and provide guidelines for managing research projects aimed at 'game-changing' advance, lessons from the NASA Breakthrough Propulsion Physics project and other historic literature is compiled, and covers:

- Recommendations Deduced from Historical Perspectives
- Summary of Recommendations on Combining Vision and Rigor
- Revolutionary Research Operating Principles
- Devising Prioritization Criteria
- Project Metrics of Performance
- Mitigating Revolutionary Research Risks