Cost Oversight for Major Facility Projects

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- This discussion focuses on the ongoing considerations and evolution of NSF's No-Cost Overrun Policy (NCOP) for Major Research Equipment and Facilities Construction (MREFC) projects.

- Outline
  - History and performance of NSF cost oversight
  - Evolution of oversight processes over the last decade
  - Issue: Management of unpredictable risk

External Concerns with NCOP

Final Report to the National Science Foundation Business and Operations Advisory Committee on Cost Surveillance Policy and Procedures

5 December 2018

Prepared By:
Cost Surveillance Policy and Procedures Subcommittee

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Mark Davis
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See backup slide for affiliations and background of subcommittee members.

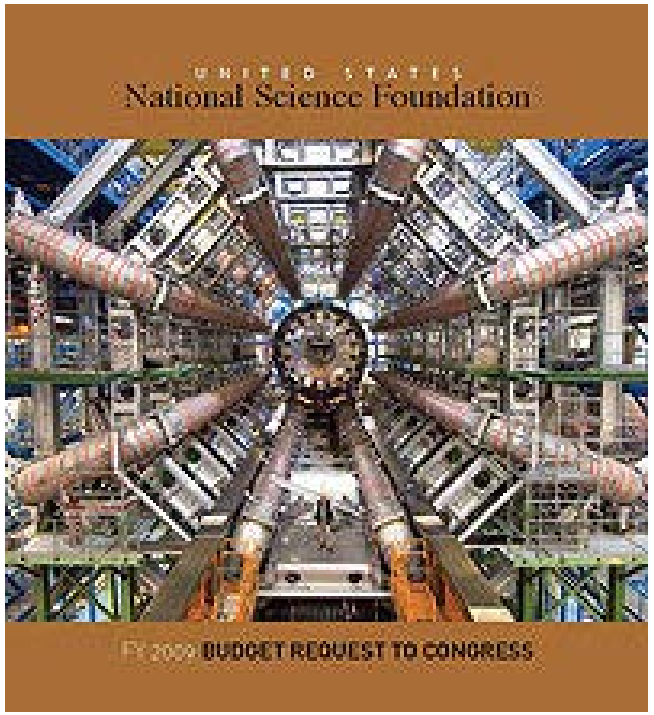
- "Estimating only known risks will lead to underestimating the costs, as there is uncertainty in all complex developmental projects."

- "In summary, this "No Cost Overrun Policy" is misleading, and sends a confusing message both internally to Project Managers and to Stakeholders. If the overall objective is to have Major Facilities Projects which are cost-capped, then a specific process for trading off between science/technical requirements, and programmatic performance should be codified."

Origin of No-Cost Overrun Policy (NCOP)

- Initiated in Congressional Justification of NSF's FY 2009 Budget Request.
  - "NSF senior management is developing procedures to assure that the cost tracking and management processes are robust and that the project management oversight has sufficient authority to meet this [NCOP] objective."

- NCOP is not a result of formal National Science Board action or an NSF policy memo; it is described in NSF budget requests and the Major Facilities Guide. It has evolved slightly over the last 10 years.



GAO 2018 Report on NSF Major Facilities

Cost and Schedule Performance of Large Facilities Projects Covered by NSF's Policy for Managing Cost Overruns, as of December 2017

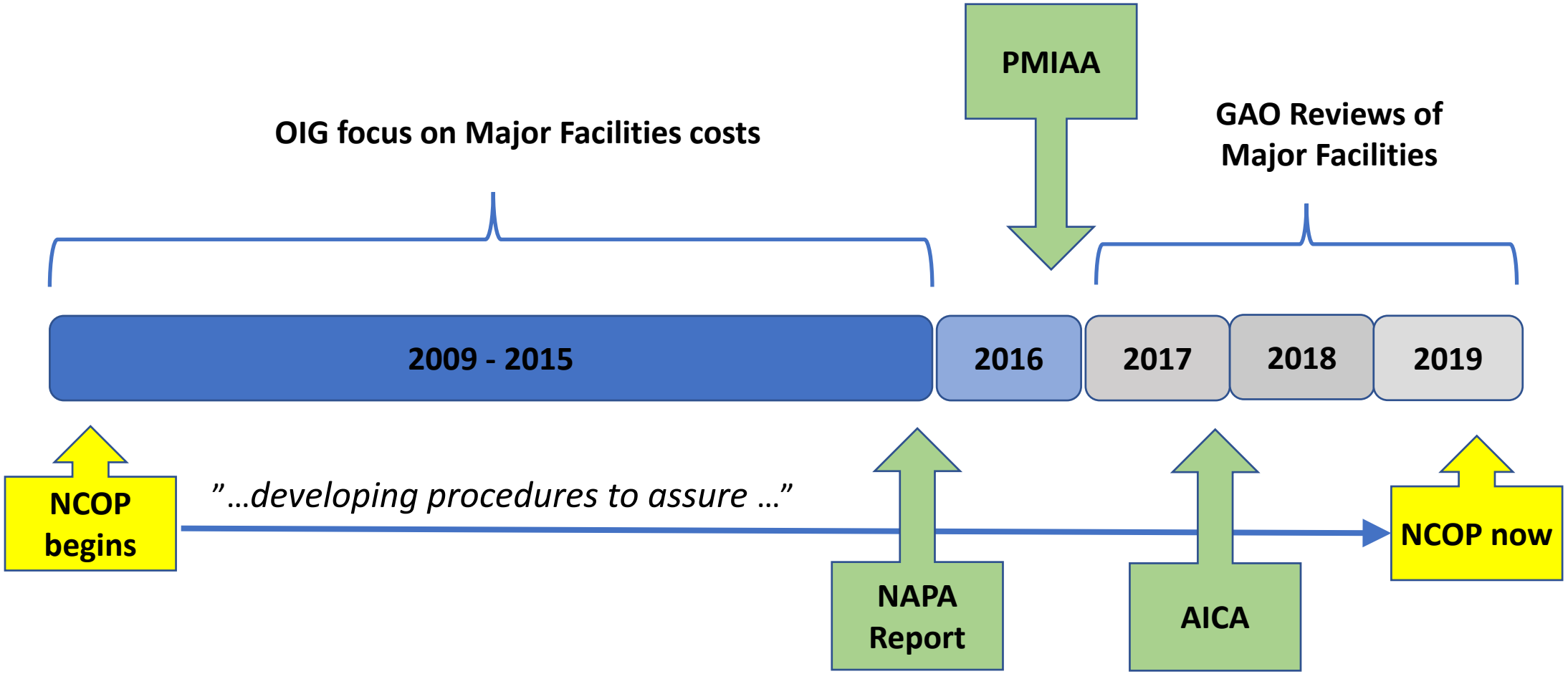
Project name	Percentage complete	Cost change
Alaska Region Research Vessel	100	▼
Ocean Observatories Initiative	100	▼
Advanced Laser Interferometer Gravitational Wave Observatory	99	-
National Ecological Observatory Network	94	▲
Daniel K. Inouye Solar Telescope	81	▲
Large Synoptic Survey Telescope	50	-
Regional Class Research Vessels	4	-

NSF does not have a No-Schedule Overrun Policy. Schedules are sometimes extended in order to provide the best value to the taxpayer (e.g., LIGO computing). If we eliminate the DKIST cost increase due to unpredictable events, 1/5 projects (excluding RCRV) had a cost overrun.

Legend: - = no cost or schedule increase or scope reductions since starting construction; ▼ = cost decreased; ▲ = cost or schedule increased; ✓ = scope reduced.

Source: GAO analysis of National Science Foundation (NSF) documents. | GAO-18-370

Timeline of NSF Oversight Since NCOP Initiation



Decadal Evolution in NSF Cost Oversight Processes

2009	2019	Year	Driver
Stage-gate Design Reviews	Stage-gate Design Reviews	2009	
	Director's Watch List	2015	NEON
Large Facilities Office	Staffed-up Large Facilities Office w/standardized reporting	2016	NAPA
Large Facilities Manual	*Major Facilities Guide* & Internal NSF Procedures	2019	
	Holding of Budget Contingency	2016	NAPA & OIG
	EVMS Verification, Acceptance & Surveillance	2017	OIG
	Cost Estimating Guidance & Standardized Cost Analysis	2018	GAO
	Selection of Independent Cost Estimate Reviews	2019	GAO & AICA
NSF Project Advisory Team	NSF Integrated Project Team w/Required Competencies	2017/18	NAPA & PMIAA
	Chief Officer for Research Facilities (Full Life-cycle)	2017	AICA
MREFC Panel	Facilities Governance Board (Policies & Strategic)	2017	AICA
	Facilities Readiness Panel (Readiness)	2018	AICA
	Accountable Directorate Representatives	2018	

Current NCOP in Practice

- Initial Total Project Cost (TPC) estimate going to Congress (after Preliminary Design Review) must have adequate contingency to cover known risks and a clearly articulated de-scoping plan.

- TPC for NSF oversight is established at time of award (after Final Design Review), with NSB authorization. Includes baseline, contingency, fee, and management reserve (if any), with the following requirements:

  - 70%-90% confidence level considering known risks.
  - Robust Scope Management Plan equating to 10% of baseline.
  - If contingency is inadequate, de-scope options must be exercised first.
  - Sponsoring directorate responsible for first 10% of over-runs.
  - Request Board authorization to increase TPC, if needed.

Components of No Cost Overrun Policy

- Rigorous project cost management and oversight. In place.
- Clear boundaries between cost increases covered by contingency and cost increases not under Project control. In place.
- Agency-level process for trading off the potential scientific impacts of de-scoping against the desire to maintain the original TPC, and agency flexibility to deliver the best science value per dollar. Used for NEON and DKIST. Most relevant for risks out of control of the project (e.g., earthquakes, hurricanes, appropriations uncertainties, legal challenges).

Management of Unpredictable Risk

- Agency continues to hold the risk of unpredictable events.
- Assigning “Management Reserve” for unpredictable risks at the start of a project inflates the TPC, and metrics for agency risk tolerance (often a flat percentage) can appear arbitrary.
- Realization of unpredictable risk will lead to rigorous internal NSF review with Directorates and BFA (LFO), managed by the CORF, with subsequent recommendation to NSF Director.
- Any increase in TPC recommended by the Director will come back to NSB, with rationale.

Summary

- No-Cost Overrun Policy (NCOP) has served NSF well, and NSF has performed well in cost control of MREFC projects.

- BOAC Subcommittee on Cost Surveillance: "Estimating only known risks will lead to underestimating the costs, as there is uncertainty in all complex developmental projects."

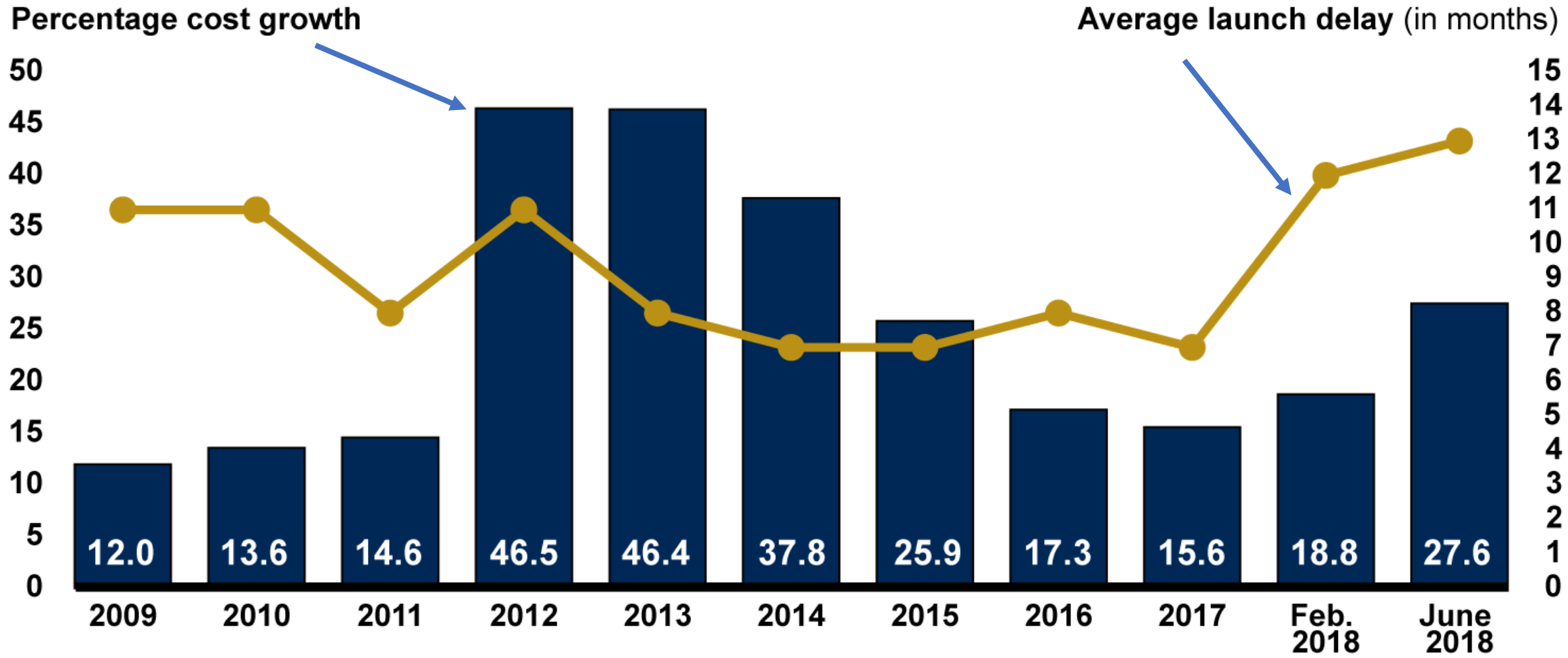
- Unpredictable risks will (continue to) be held by NSF, and realization of such risks for a project will (continue to) lead to rigorous re-evaluation of cost and scope tradeoffs. Minor clarification language will be added to NCOP to make this clear.

Backups Follow

BOAC Subcommittee Members

- Neal Albert: Senior Fellow, Defense Business Board, 2002-2014
- Mark Davis: VP of Higher Education and Academic Medical Centers, Attain LLC
- Debra Emmons: Assistant GM, Aerospace Corporation
- E.J. Holland: Retired Assistant Secretary for Administration, HHS
- Ronald Lutha: Project Director, DOE
- Kim Moreland: Associate Vice Chancellor, U. Wisconsin (grants and contract management)
- William Roets II: Deputy Assistant Administrator for Procurement, NASA

GAO 2019 report on NASA Large Projects



Source: GAO analysis of National Aeronautics and Space Administration data. | GAO-19-262SP

Selected Acronyms

- AICA: American Innovation and Competitiveness Act
- BOAC: Business Operations and Advisory Committee
- DKIST: Daniel K. Inouye Solar Telescope
- GAO: Government Accountability Office
- MREFC: Major Research Equipment and Facilities Construction
- NAPA: National Academy of Public Administration
- NCOP: No-Cost Overrun Policy
- NEON: National Ecological Observatory Network
- OIG: Office of Inspector General
- PMIAA: Program Management Improvement and Accountability Act
- TPC: Total Project Cost