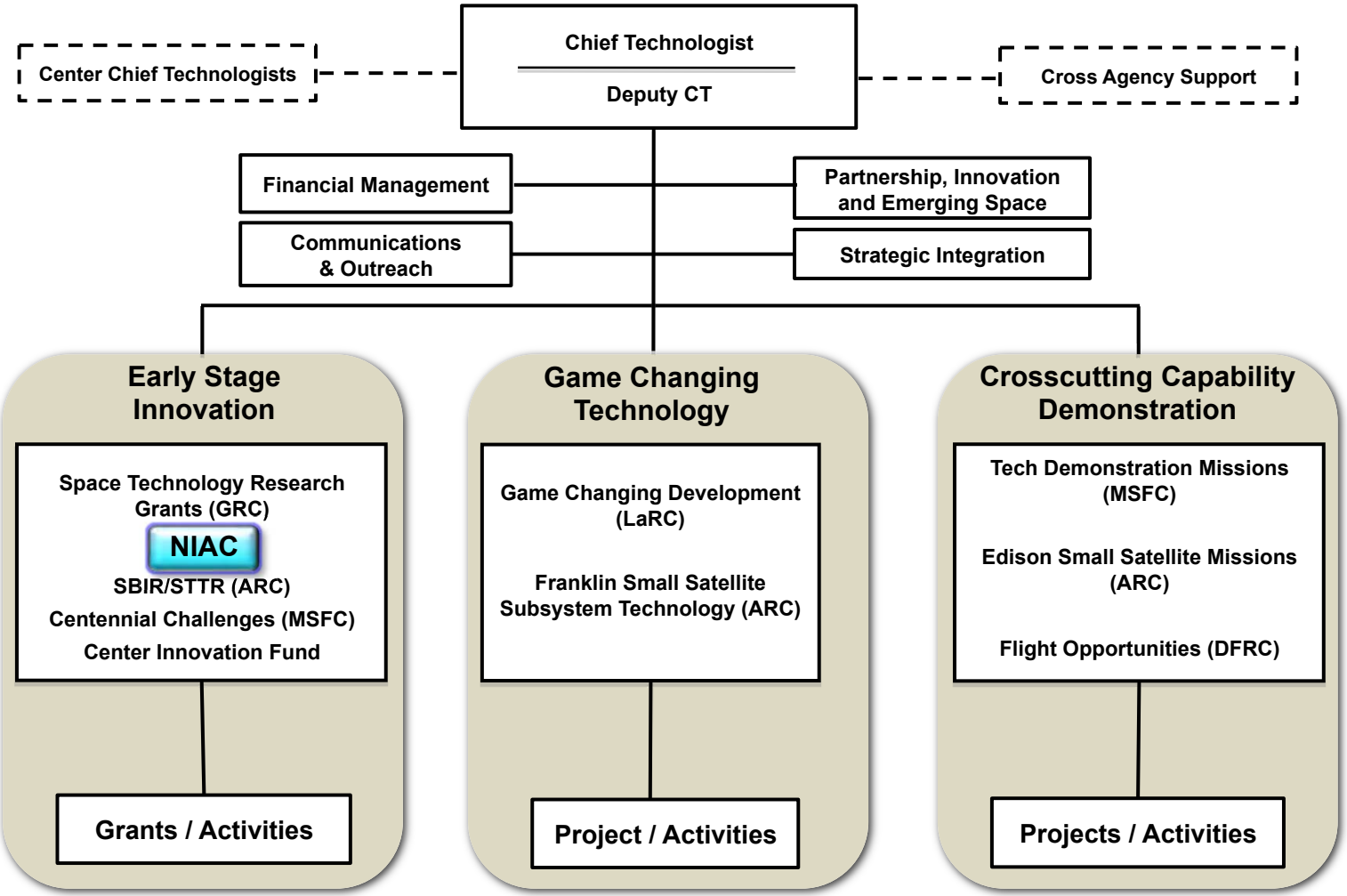
NASA OCT Organization
Office of the Chief Technologist



Original NIAC: 1998 - 2007

"The *NASA Institute for Advanced Concepts* (NIAC) was formed in 1998 to provide an independent source of advanced aeronautical and space concepts that could dramatically impact how NASA develops and conducts its missions. Until the program's termination in August 2007, NIAC provided an independent open forum, a high-level point of entry to NASA for an external community of innovators, and an external capability for analysis and definition of advanced aeronautics and space concepts to complement the advanced concept activities conducted within NASA. Throughout its 9-year existence, NIAC inspired an atmosphere for innovation that stretched the imagination and encouraged creativity."

Committee to Review the NASA Institute for Advanced Concepts, National Research Council of the National Academies

Fostering Visions for the Future: A Review of the NASA Institute for Advanced Concepts

The National Academies Press

ISBN: 0-309-14052-8, 90 pages, 8.5 x 11, (2009)

http://www.nap.edu/catalog/12702.html

What is NIAC?

A program to solicit and support early studies of innovative yet credible advanced concepts that could one day change the possible in aeronautics and space

- There was an original NIAC from 1998-2007

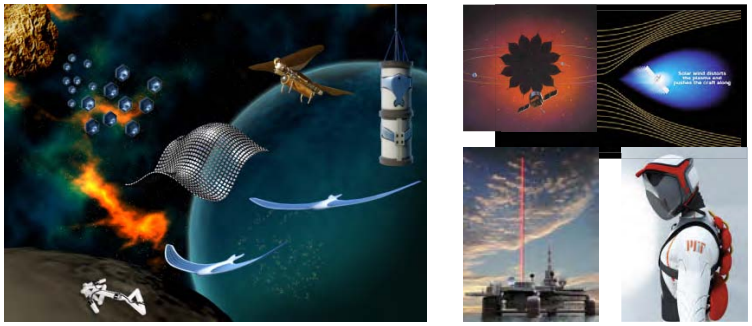
"Don't let your preoccupation with reality stifle your imagination"

- OCT is re-establishing it as the ***NASA Innovative Advanced Concepts*** Program, in the Early Stage Innovation Division of OCT
  - To allow both external and NASA participation, now run from HQ
  - Still called "NIAC" to restore the original intent/spirit, and build on its success

- Focus: early studies of visionary aerospace concepts

NASA Innovative Advanced Concepts (NIAC)

Managed at NASA Headquarters



Studies exploring revolutionary yet credible ways to “change the possible” in aerospace

Objective

Early studies of visionary, long-term concepts

- Aerospace architecture, system, or mission concepts (TRL 1-2 or early 3, 10+ years out)
- OCT is re-establishing this effort as the *NASA Innovative Advanced Concepts* program
  - Guided by NRC findings and recommendations*
  - Run internally from HQ, and allowing internal NASA/JPL participation

*NRC report, *Fostering Visions for the Future: A Review of the NASA Institute for Advanced Concepts*, 2009

Acquisition Strategy

- **Phase 1:** To examine the overall viability of an innovative system or concept; open competition
- **Phase 2:** To further develop the concept and assess key issues such as cost, performance, development time, infusion path, and business case; competitively selected from successful Phase I
- Selections will be based on independent peer review of all qualified proposals; competition of ideas

Awards

- **Phase 1**: Up to 1 year, $100K; 15-20 per year
- **Phase 2**: Up to 2 years, $500K; will ramp up to 3-8 per year

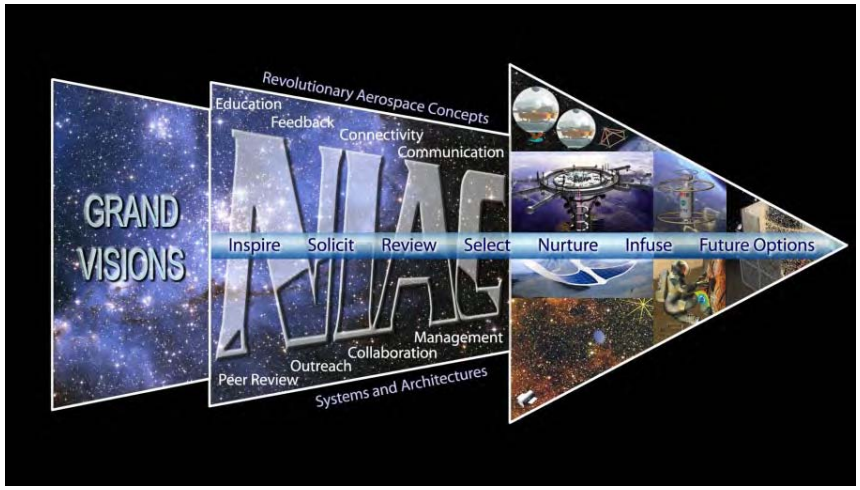
Collaboration

- Proposals welcome from all sources, including academia, industry, all US government agencies (including NASA and JPL), and partnerships.

Preserve the Recognized Strengths

Scope/Vision – revolutionary, creative, controversial, yet credible

Process



Outreach/Publicity

Mitigate the Perceived Weaknesses:

External only → Allow NASA participation and improve infusion

No support beyond Phase II → Path to GCT and other options

40 years out is too remote → New focus is 10+ years out

NIAC Proposal Evaluation Criteria

For consideration, proposals must be…

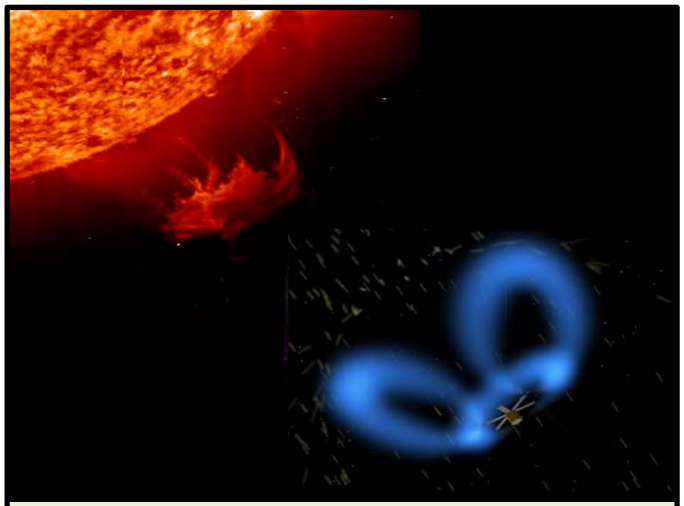
Aerospace Architecture, System, or Mission Concepts	***Not narrowly focused***
Innovative & Visionary	***Not incremental***
Technically Substantiated (with scientific principles)	***Not science fiction***
Very early development (TRL 1-2, 10+ years from application)	***Not already mature***

For selection, proposals will be compared in terms of…

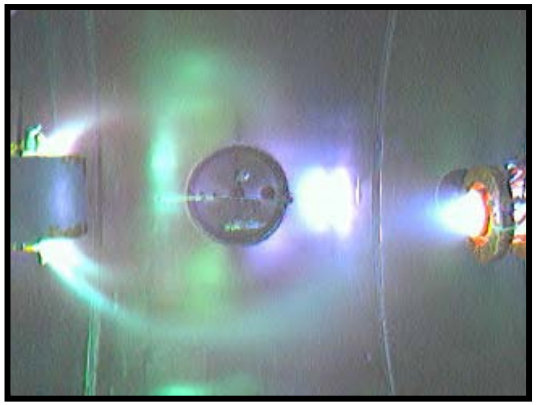
- **Potential Impact (Value)**
  - Innovation
  - Comparative benefit
  - Maturation (Planned outcome & development path)
- **Technical Merit & Work Plan**
  - Description of the underlying scientific principles
  - Technical approach
  - Feasibility, planning, and schedule
- **Suitability of Team & Cost Estimate**

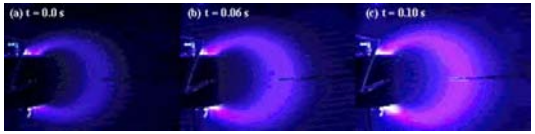
Mini-Magnetospheric Plasma Propulsion (M2P2)

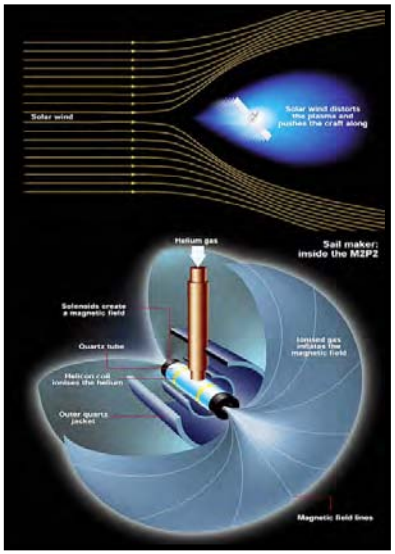
PI: Prof. Robert Winglee
Univ. of Washington, Seattle



M2P2: The Mini-Magnetospheric Plasma Propulsion (M2P2) Prototype seeks the creation of a magnetic wall or bubble attached to a spacecraft that will intercept the solar wind and provide a high-speed propulsion system with high propellant efficiency and high specific impulse. In order to get a sufficiently large interaction region, plasma is injected onto the magnetic field lines and the plasma pressure causes both the plasma and the magnetic field that is frozen into the plasma to expand to several tens of kilometers without the need for deploying any large mechanical structures.







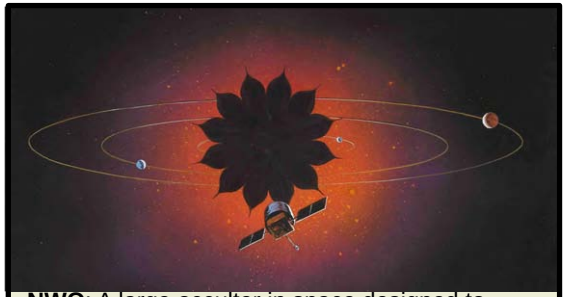
Images: Robert Winglee

- NIAC Phase I Study completed in 1998
- NIAC Phase II Study completed in 2000
- Received NASA funding for testing at MSFC vacuum chamber
- 2001-2002 informed NASA Decadal Planning Team and NASA Exploration Team
- Further development with JSC VASIMIR until 2002

Mini-Magnetospheric Plasma Propulsion (M2P2) is an advanced plasma propulsion system that will enable spacecraft to attain unprecedented speeds for minimal energy and mass requirements.

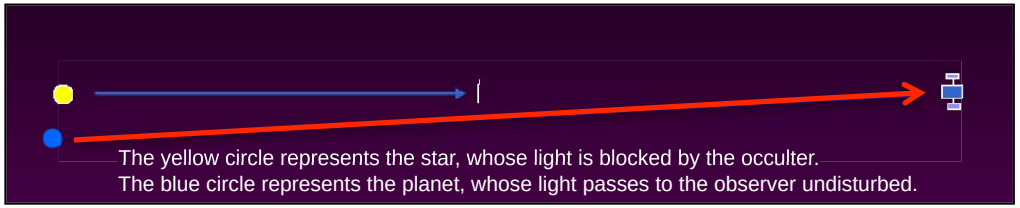
New Worlds Observer (NWO)

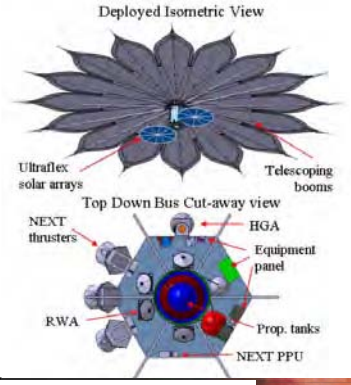
PI: Prof. Webster Cash
Univ. of Colorado, Boulder

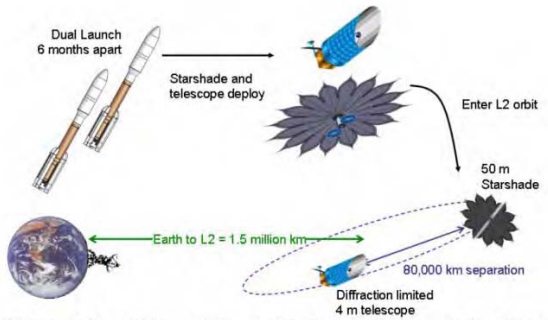


NWO: A large occulter in space designed to block the light of nearby stars in order to observe their orbiting planets. The observations could be taken with an existing space telescope, possibly the James Webb Space Telescope when it launches, or a dedicated visible light telescope optimally designed for the task of finding exoplanets.

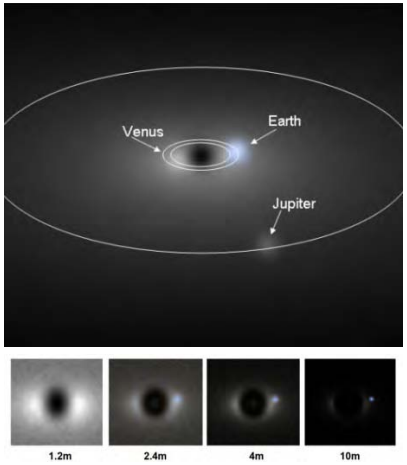
Images: Webster Cash







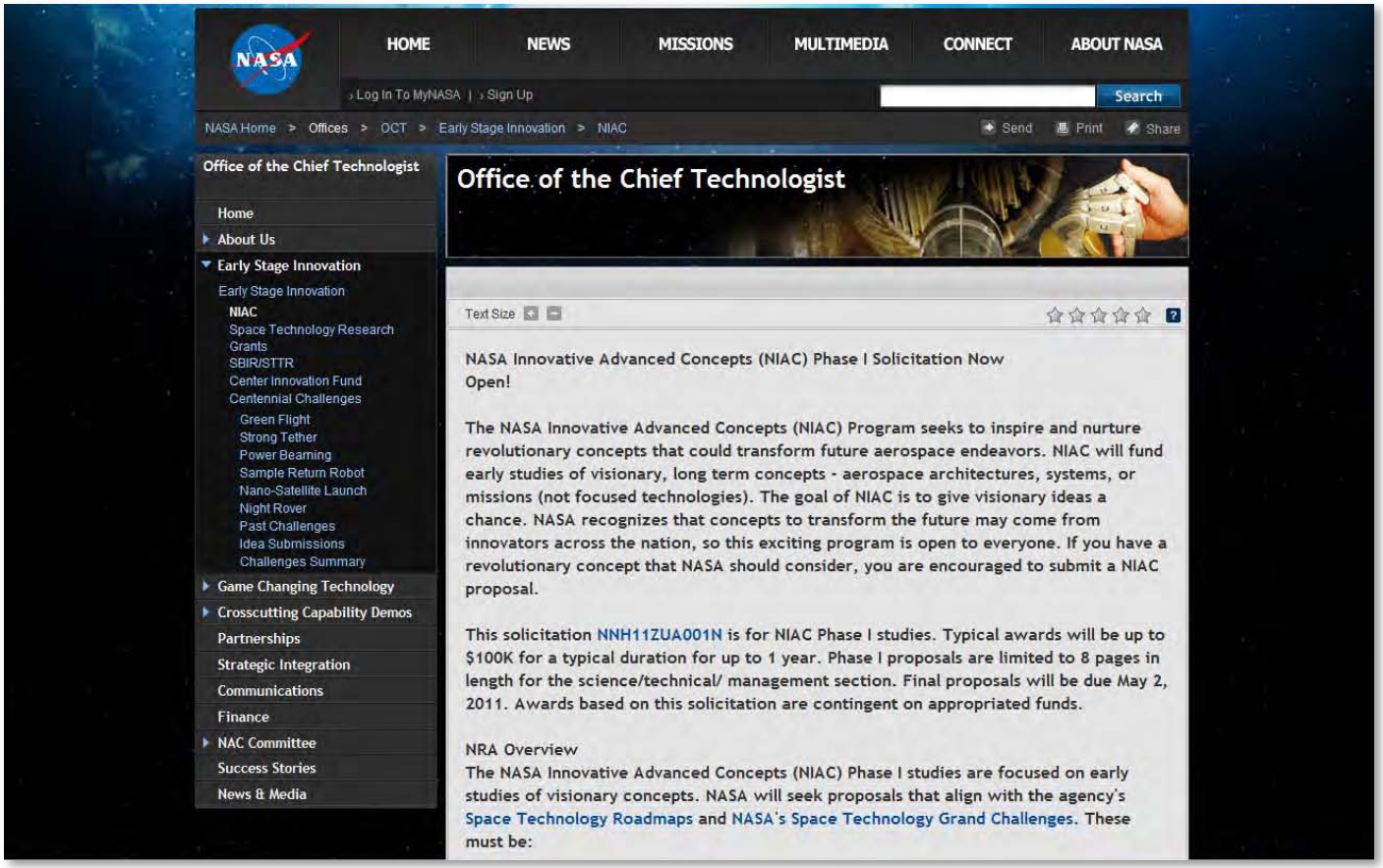
- NIAC Phase I Study completed in 2005
- July 6 2006 *Nature* cover story
- NIAC Phase II Study completed in 2006
- Received NASA follow-on funding for Terrestrial Planet Finder development
- Ball Aerospace and Northrop Grumman added external investments
- Over 40 papers published 2004-2008
- Feb 2008 $1M for NASA Astrophysics Strategic Mission Concepts Study
- 2010 Included in NRC Astronomy and Astrophysics Decadal Survey



NIAC Phase I Solicitation Now Open

March 1 – May 2, 2011

NIAC seeks **revolutionary ideas** to enable **new aerospace capabilities**

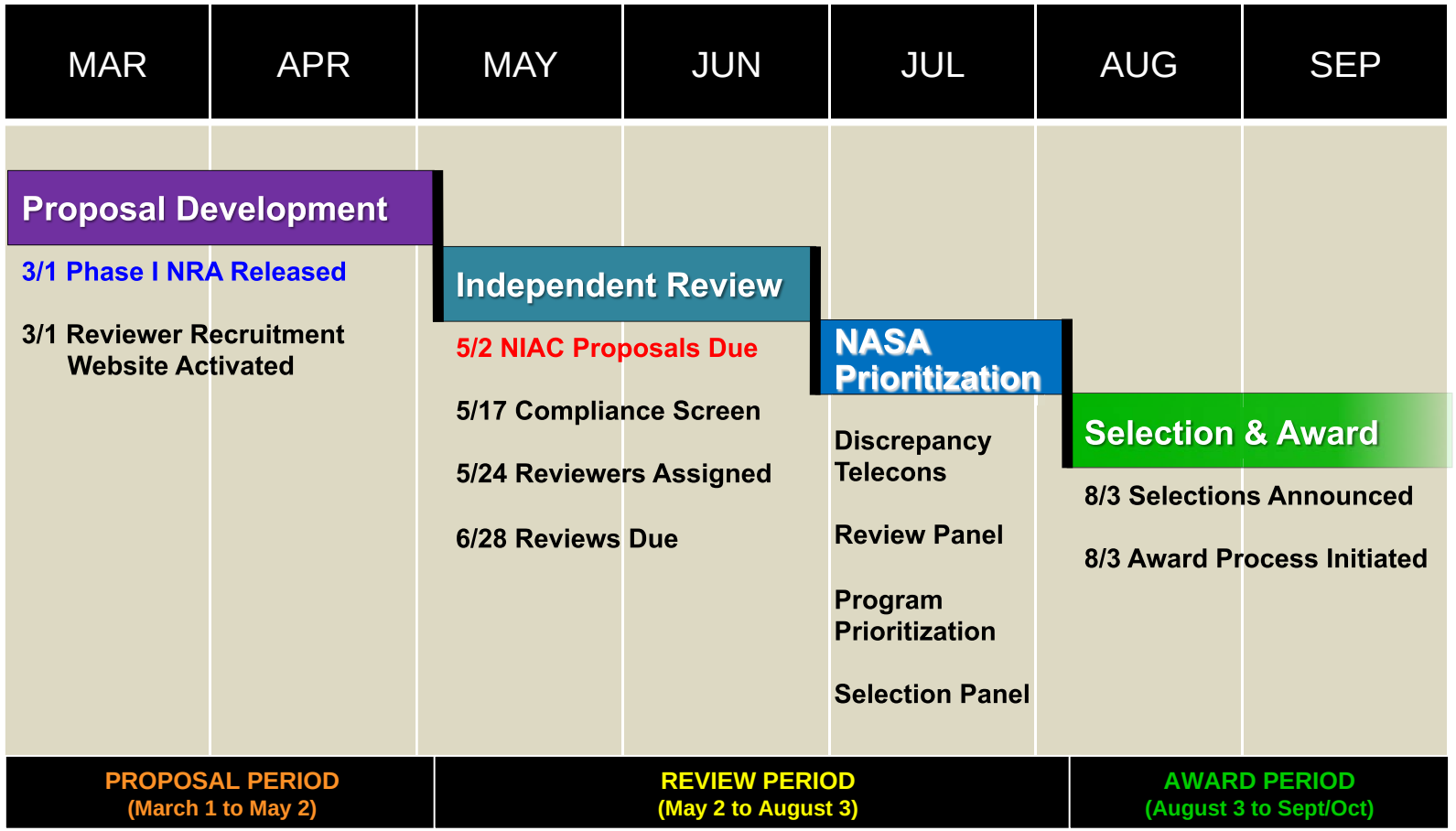


http://www.nasa.gov/offices/oct/early_stage_innovation/niac/niac_solicitations.html

Phase I Proposals are limited to 8 pages for Science / Technical / Management description

NIAC Timeline 2011

NIAC Phase I Proposal Evaluation & Selection



NIAC Timeline 2011-2016

Number of Planned New Studies (Phase I & II) by Year

Fiscal Year	2011	2012	2013	2014	2015	2016
NIAC Phase I Awards (1 yr)	17	16	23	23	26	26
NIAC Phase II Awards (2 yrs)	0	5	9	9	14	14

The Future Possibilities Depend on You

NIAC is the most open-ended and far-reaching of NASA's new technology programs

Program Executive (Acting):

John (Jay) Falker, PhD

Office of the Chief Technologist - NASA Headquarters

jfalker@nasa.gov 202-358-4545