



NIAC

NASA Innovative Advanced Concepts

www.nasa.gov/niac



NASA INNOVATIVE ADVANCED CONCEPTS

NASA Innovative Advanced Concepts

Space Technology Mission Directorate
NASA Headquarters, Washington, DC

Jason Derleth, NIAC Program Executive
Alvin Yew, NIAC Program Manager
Ronald Turner, Senior Science Advisor
Katherine Reilly, Strategic Partnerships Manager





What is **NIAC** ?

NASA Innovative Advanced Concepts

*NASA Innovative
Advanced Concepts*

A program to support
early studies of
innovative, yet
credible, visionary
concepts
that could one day
“change the possible”
in aerospace.





Space Technology Portfolio



Transformative & Crosscutting Technology Breakthroughs

Pioneering Concepts/Developing Innovation Community

Creating Markets & Growing Innovation Economy

Technology Demonstration Missions

bridges the gap between early proof-of-concept tests and the final infusion of cost-effective, revolutionary technologies into successful NASA, government and commercial space missions.



NASA Innovative Advanced Concepts (NIAC) nurtures visionary ideas that could transform future NASA missions with the creation of breakthroughs—radically better or entirely new aerospace concepts—while engaging America’s innovators and entrepreneurs as partners in the journey.



Centennial Challenges

directly engages nontraditional sources advancing technologies of value to NASA’s missions and to the aerospace community. The program offers challenges set up as competitions that award prize money to the individuals or teams that achieve a specified technology challenge.



Small Spacecraft Technology Program

develops and demonstrates new capabilities employing the unique features of small spacecraft for science, exploration and space operations.



Space Technology Research Grants

seek to accelerate the development of “push” technologies to support future space science and exploration needs through innovative efforts with high risk/high payoff while developing the next generation of innovators through grants and fellowships.



Flight Opportunities

facilitates the progress of space technologies toward flight readiness status through testing in space-relevant environments. The program fosters development of the commercial reusable suborbital transportation industry.

Game Changing Development

seeks to identify and rapidly mature innovative/high impact capabilities and technologies that may lead to entirely new approaches for the Agency’s broad array of future space missions.



Center Innovation Fund

stimulates and encourages creativity and innovation within the NASA Centers by addressing the technology needs of the Agency and the Nation. Funds are invested to each NASA Center to support emerging technologies and creative initiatives that leverage Center talent and capabilities.



Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR)

Programs provide an opportunity for small, high technology companies and research institutions to develop key technologies addressing the Agency’s needs and developing the Nation’s innovation economy.



NIAC Program Personnel



A “Renaissance Team” with diverse backgrounds

- **Jason Derleth**
Program Executive
- **Dr. Alvin Yew**
Program Manager
- **Dr. Ron Turner**
Senior Science Advisor
- **Kathy Reilly**
Strategic Partnerships Manager
- **Barbara Mader**
NIAC Budget Analyst



Senior Scientific Advisory Team

- **Dr. Laurence Young**– **NEC Chair**
Apollo Prof. of Astronautics & HST, MIT
- **Dr. Penny Boston**
Prof. of Cave & Karst Science, New Mexico Tech
- **Dr. David Brin**
Scientist, speaker, well-known author, futurist
- **Dr. John Cramer**
Prof. of Physics, Univ. of Washington, and author
- **Dr. Frank Drake**
Astronomer, Astrophysicist, father of SETI
- **Dr. Louis Friedman**
Co-Founder, The Planetary Society
- **Ms. Ariel Waldman**
Founder of SpaceHack.org and Science Hack Day
- **Dr. Michael Yarymovych**
President, Sarasota Space Association,
former USAF Chief Scientist



NIAC is Unique!

- NIAC is more than a research grant opportunity
- Yes, we give out funds to pursue innovative concepts, but we are also a “Fellowship” encouraging sharing and interactions
- The Public loves NIAC, and the Press seeks out our Fellows to report on their concepts and their enthusiasm
- Additional opportunities to share include publication of full Final Report, posted on web for all to see, and presentations of progress, also publically available, at the Annual Meeting

THE GREATER NIAC COMMUNITY



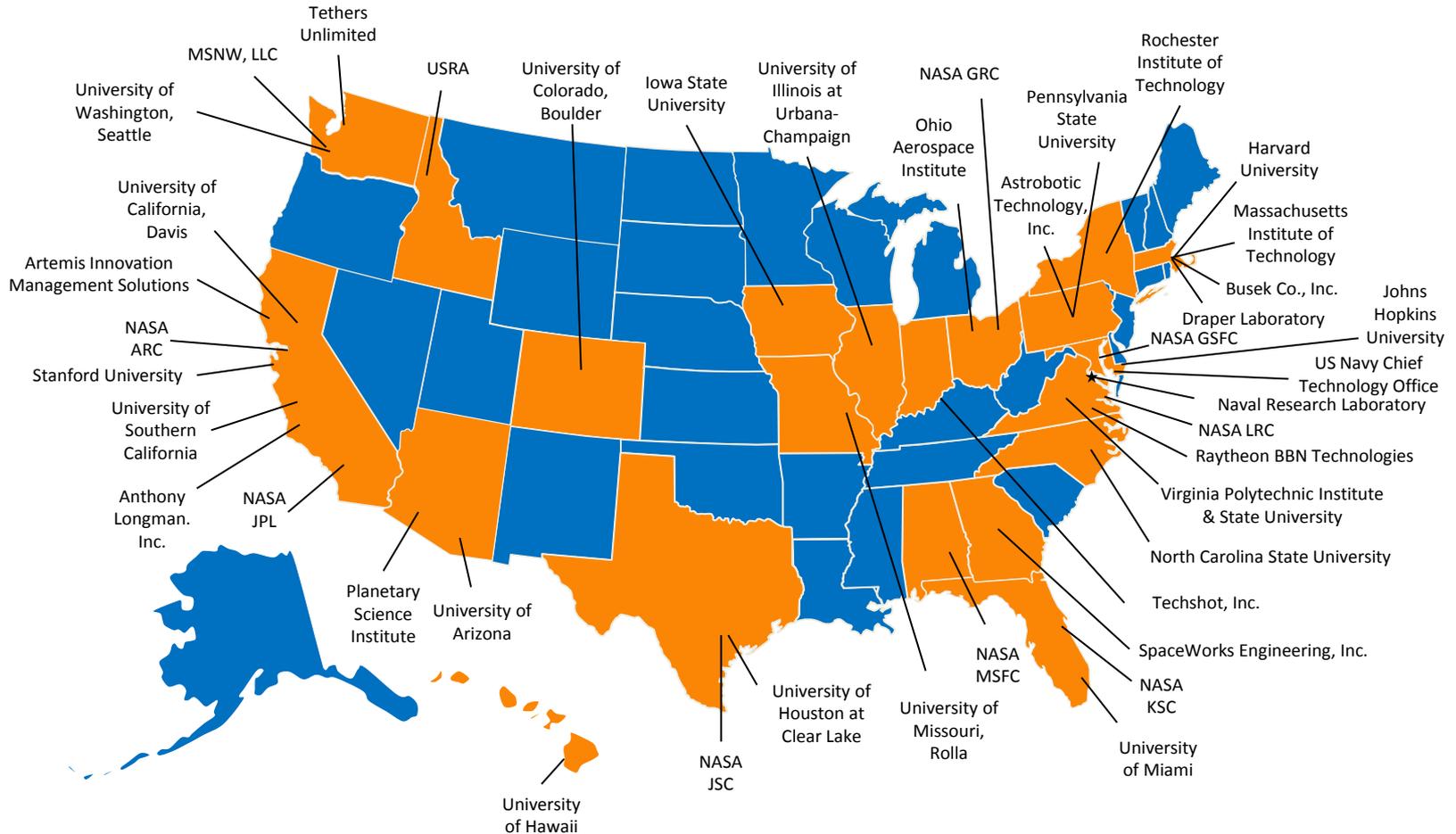
THE GREATER NIAC COMMUNITY



BOAT ROCKERS, REBELS, RISK TAKERS, DEVIATORS
FROM THE NORM, INNOVATORS, CHAMPIONS,
REVOLUTIONARIES, MOVERS & SHAKERS,
INVENTORS, RABBLE ROUSERS, FLY IN THE FACERS,
REFORMERS, WAVE MAKERS, BOUNDARY PUSHERS &
OUT-OF-THE-BOX THINKERS...



NIAC: Funding Innovation across the Nation



NIAC: Funding Innovation across the Nation



Universities



National
Labs



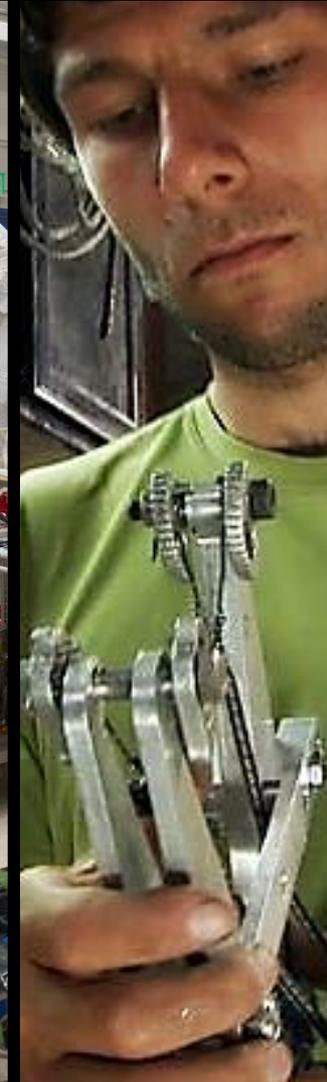
Industry



Small
Businesses



NASA
Researchers



Individuals &
Garage Inventors

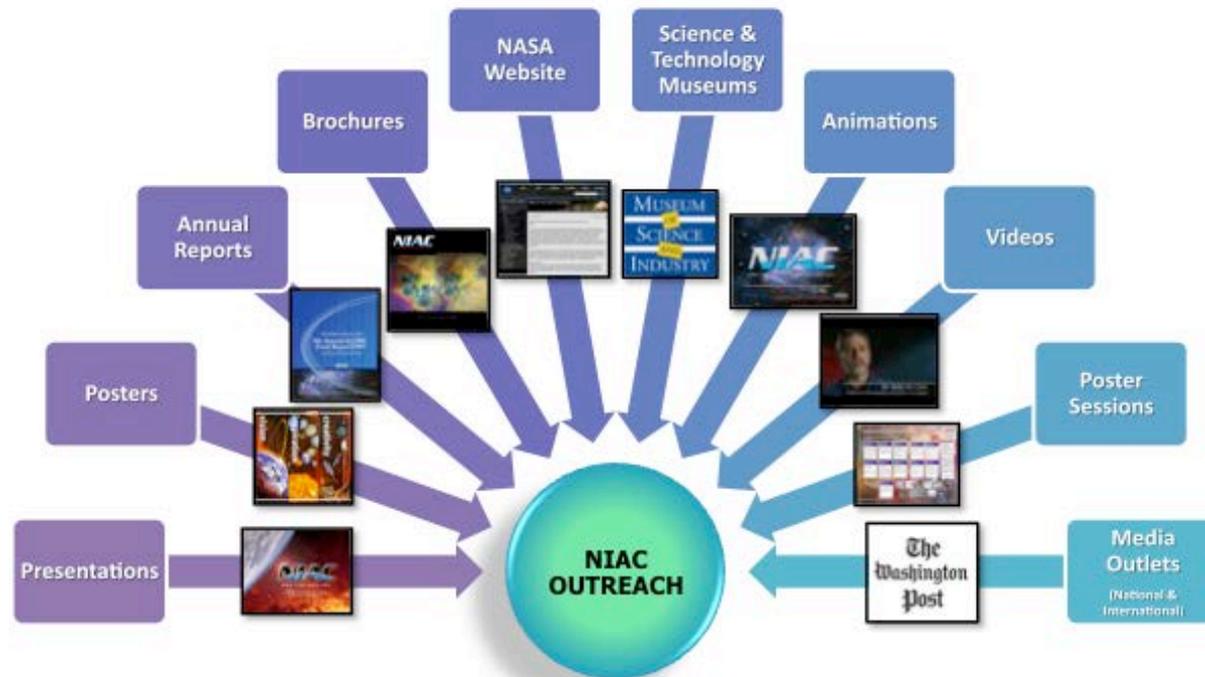
We encourage communication and sharing

Between Fellows and with NASA, public, press, and other orgs

Fellow's Symposium presentations and Final Reports are *public*

Posted in pdf format on the NIAC website

Sensitive information can be protected (e.g., separate appendix)



NIAC In The News

Coverage In Hundreds of Media Outlets



The Washington Post
June 12, 2014

"If you thought Elon Musk was the only person coming up with innovative ideas for the exploration of outer space, you'd be wrong....

*...Ultimately, that's the beauty of the NASA Innovative Advanced Concepts program – it lets people dream big, commits only a relatively small amount of seed money up-front before the next round of funding, and is **capable of generating a 10X or 100X return on the initial investment. That's just the way it works in Silicon Valley...**"*

Inspiring Wider Benefits: NIAC's Benefits to the NATION



3D PRINTING THE HABITAT OF THE FUTURE

Emergency construction for natural disasters, eradicate slums in developing countries



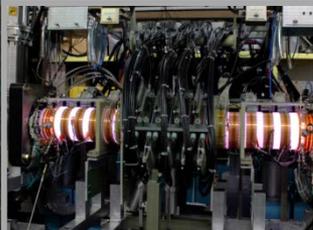
IMPROVING HEALTH WITH SPACESUIT TECHNOLOGY

Medical rehabilitation and physical therapy for those affected by stroke, spinal cord injuries, brain injuries, and the elderly



BACTERIAL BATTERIES

Novel Energy Source: Bacterial microbes to power microbots



ALTERNATIVE ENERGY SOURCES

Novel energy source research in collaboration with the U.S. Department of Energy



NAVIGATION

Gravitational waves on the atomic level may lead to technology for better steering of military submarines or aircraft



UNDERWATER RESEARCH

Novel technology research in collaboration with the U.S. Naval Chief Technology Office



ROBOTICS

Autonomous robots with radar, lasers and other advanced sensors serving as scouts for rescuers responding to underground mine disasters



PLANETARY DEFENSE

Muonography to help planetary defense experts analyze NEO's or to assess volcanic activity and volatility on Earth



NIAC = Early Stage Research & Cutting Edge Technologies

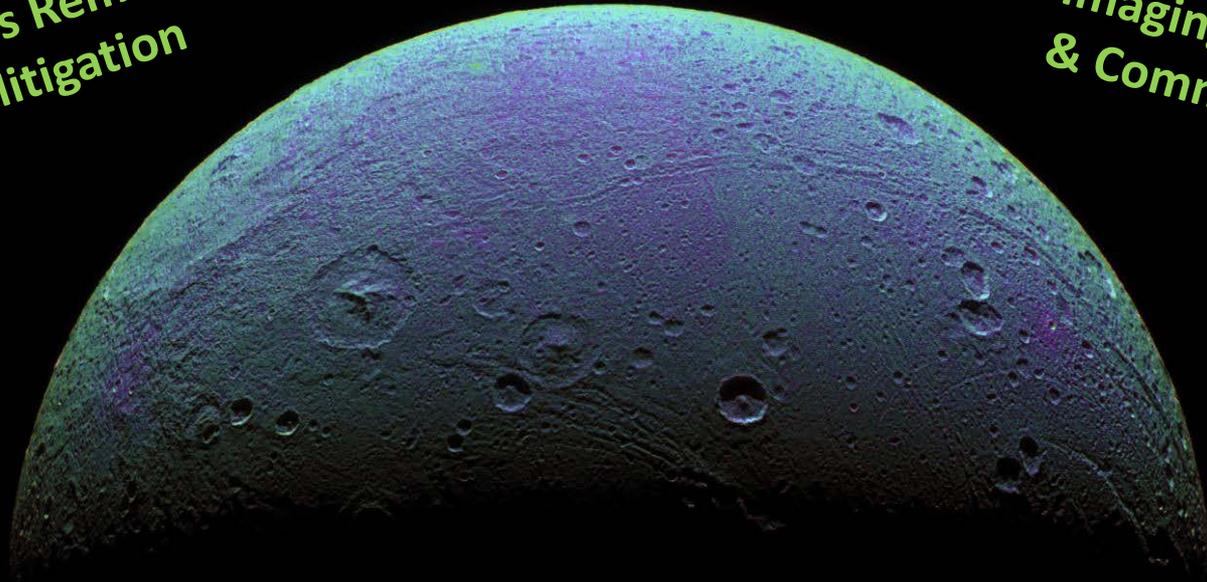
Humans in Space

Propulsion & Power

Robotics &
Space Probes

Space Debris Removal
& NEO Mitigation

Imaging, Sampling,
& Communications



Phase I and Phase II Research

PHASE I Research

Call opens: Fall

- Up to **\$100K**
- ~ **9 MONTHS** for concept definition and initial analysis in a mission context



PHASE II Research

Call opens: Spring

- Up to **\$500K**
- ~ **2 YEARS** for further development of most promising Phase I concepts, comparative mission analysis, pathways forward, spin off technologies

The NIAC Phase I Process: A two-step call



Selected Studies are awarded **\$100K for a 9-month Study**, and also earn the Principal Investigator the title, "NIAC Fellow"

It's EASY! Just follow these simple steps:



Think up an **Innovative Concept** that will change the way NASA does business



Watch for the **Release** of the NIAC call for Proposals



Expect the Release to be ~ **September/October**



Pay attention to the **Proposal Preparation Instructions**



Put your concept into an Aerospace **Architecture, Mission or System** context

Tell us **WHY** it is:
Exciting
Unexplored
Credible



Yes! The NRA has a list of studies that NIAC doesn't fund.

It is very important to pay attention to this list.

Failure to do so may mean your proposal **WILL NOT BE INVITED to STEP B.**

TOP 10 REASONS a proposal **WILL NOT BE INVITED** to STEP B

Reason # 10 (1.4%): No Aerospace focus

Fails to sufficiently address NASA goals or potential space or aeronautics benefits.

Reason # 9 (3.4%): Unclear Concept

Fails to present a specific innovative concept.

Reason # 8 (3.8%): Not Programmatically Credible

No reasonable path to implementation, without acknowledging the barriers (e.g., requiring unrealistic budgets or policy changes) and offering a sufficiently plausible approach.

Reason # 7 (4.8%): Tool or Process

Primary focus appears to be development of tools or processes to improve design, decisions, or technical capabilities. NIAC studies must focus on developing specific aerospace concepts.

TOP 10 REASONS a proposal **WILL NOT BE INVITED** to STEP B

Reason # 6 (6.3%): Not Technically Credible

Conflicts with established physics or engineering principles, without acknowledging this and offering a sufficiently plausible defense.

Reason # 5 (8.7%): Experiment or Research

Primary focus appears to be experimentation or analysis, not concept development. Tests, derivations, characterization of properties, and algorithm development are common examples. NIAC studies often involve some such efforts, but they must not overshadow the study goal to establish concept feasibility in a mission context.

Reason # 4 (12.0%): Previously Studied

Revisits a previously studied concept, without identifying a new factor that substantially differentiates the proposal from prior efforts.

TOP 10 REASONS a proposal **WILL NOT BE INVITED** to STEP B



Reason # 3 (12.5%): Narrowly Focused Technology

Too narrowly focused on technology, subsystems, or investigations of smaller scope (e.g., components, instruments, materials). Some focused analysis may be appropriate to establish the credibility of the underlying innovation, but it must not overshadow the study goal to establish concept feasibility in a mission context.

Reason # 2 (21.2%): Incremental

Proposes typical next steps or aims at only modest improvement, rather than investigating far-term or high-risk “breakthrough” concepts.

Reason # 1 (26.0%): Unclear Mission Application

Fails to identify or propose to study at least one application for which the proposed concept might be used.

The NASA Innovative Advanced Concepts Program:

- Pioneering concepts
- Developing innovations to help mankind on Earth and in Space
- Early studies of visionary aerospace architecture, mission, and system concepts

Peter Rubin '13

The 2015 FALL NIAC SYMPOSIUM will be held in:



SEATTLE, WASHINGTON

October 27-29, 2015

EMP Museum - Hundreds of tech businesses in region

The 2016 NIAC SYMPOSIUM will be held in:



RESEARCH TRIANGLE PARK, NC

Target Date: Fall 2016

Duke - UNC - NC State - Hundreds of tech businesses in region

Upcoming NIAC Opportunities



Phase I Solicitation

Open to everyone (US)

Date: September/October 2015



Phase II Solicitation

Eligible upon Phase I completion

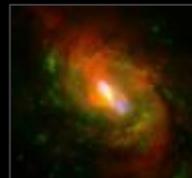
Date: Spring 2016



NIAC Orientation Meeting

Closed Meeting in DC

Date: July 2015



NIAC Fall Symposium

Open to everyone

Date: October 27-29, 2015

Seattle, WA

The Future Possibilities Depend on YOU

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

This exciting program is open to anyone in the US
(international researchers may team, but no exchange of funds)



NIAC

Technology
Drives
Exploration



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QUESTIONS?



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