Space Life and Physical Sciences

D. Marshall Porterfield

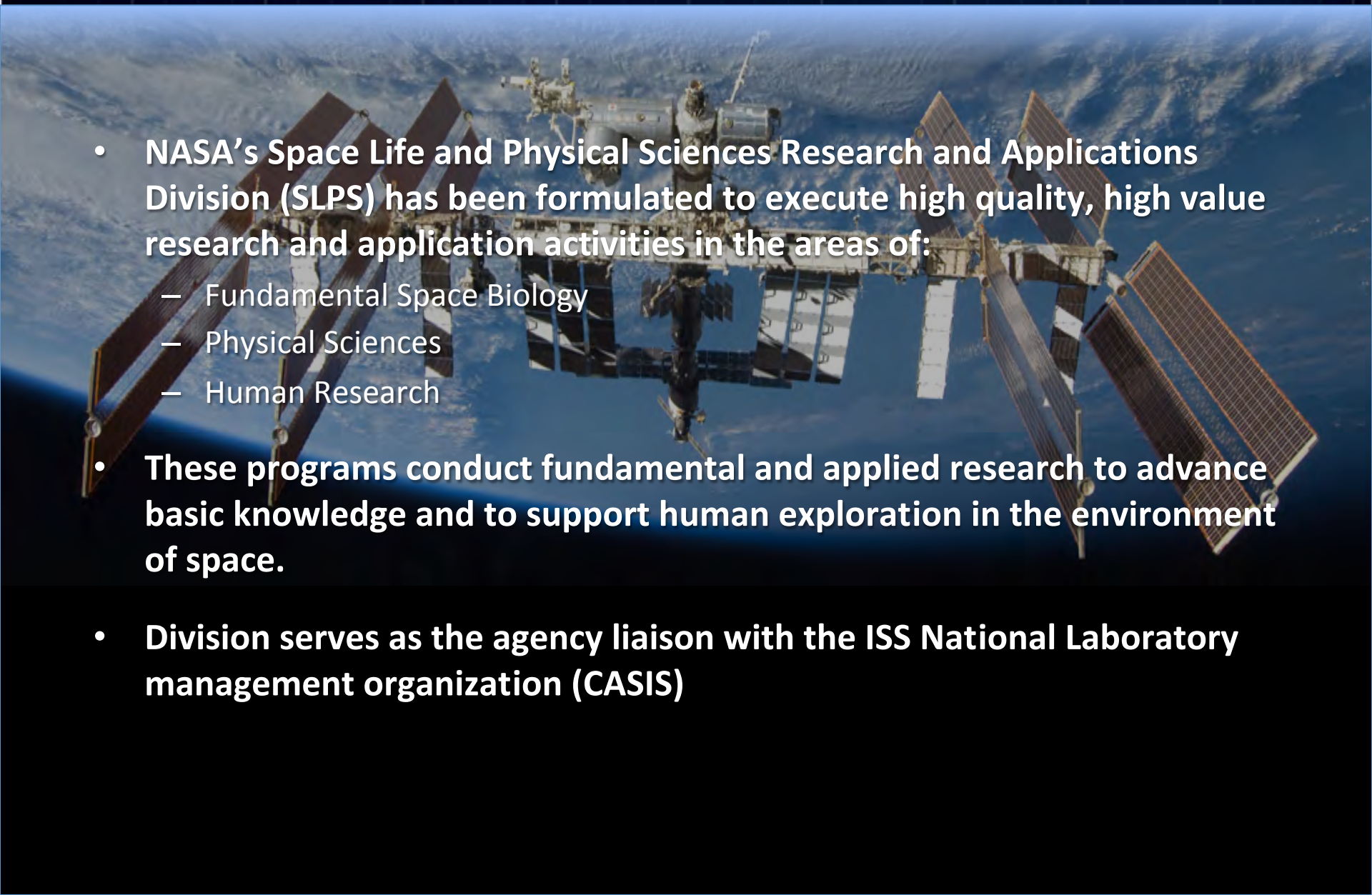
Division Director

Human Exploration & Operations Mission Directorate

HEO NAC Subcommittee Workshop

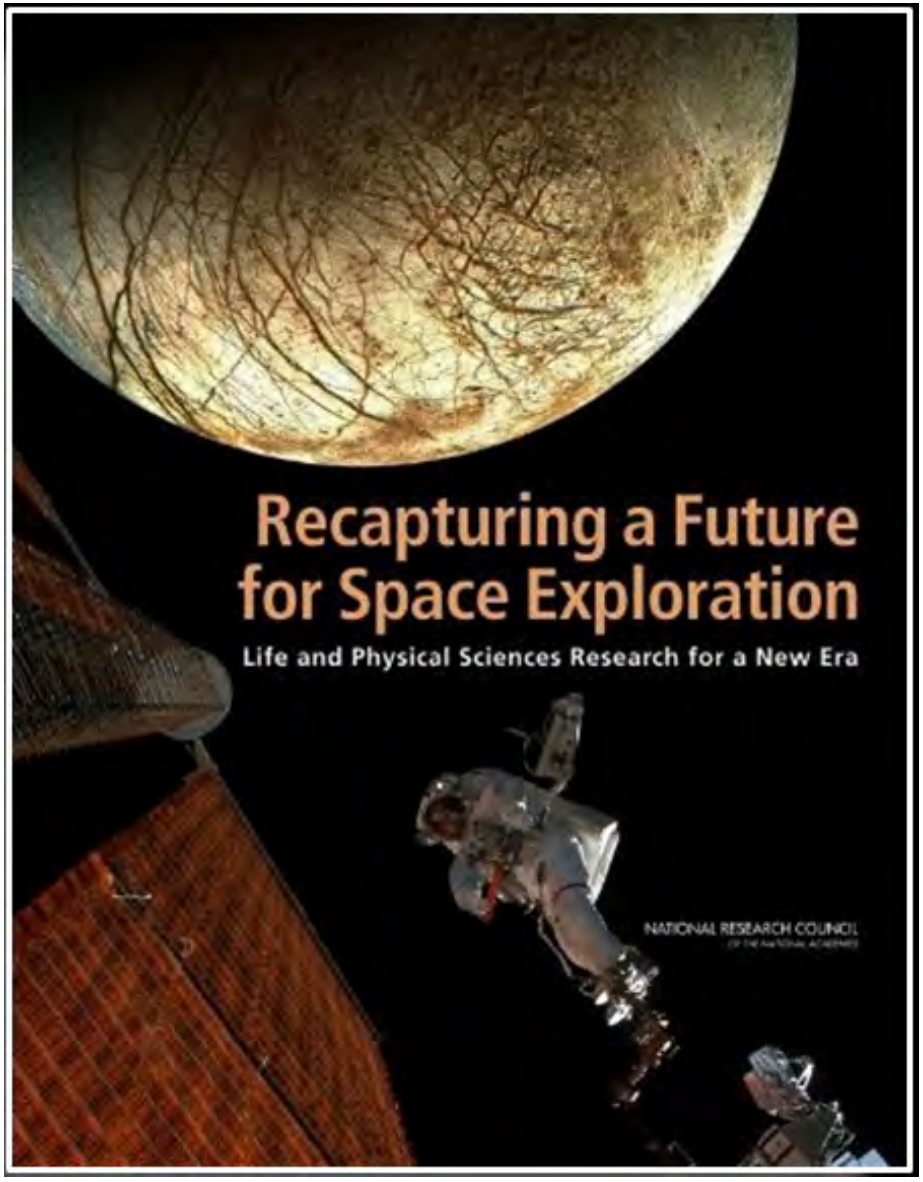
Research for Human Exploration

Space Life and Physical Sciences



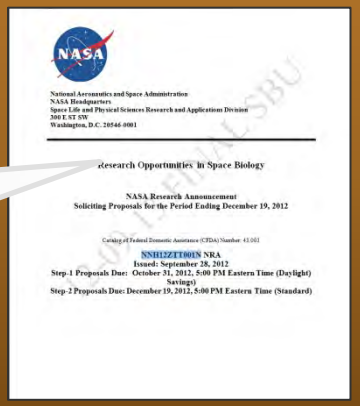
- **NASA's Space Life and Physical Sciences Research and Applications Division (SLPS) has been formulated to execute high quality, high value research and application activities in the areas of:**
  - Fundamental Space Biology
  - Physical Sciences
  - Human Research
- **These programs conduct fundamental and applied research to advance basic knowledge and to support human exploration in the environment of space.**
- **Division serves as the agency liaison with the ISS National Laboratory management organization (CASIS)**

Response to the Decadal Survey



NASA Space Biology 2012 NRA

"Research Opportunities in Space Biology" (NNH12ZTT001N)



National Aeronautics and Space Administration
NASA Headquarters
Space Life and Physical Sciences Research and Application Division
300 E ST SW
Washington, D.C. 20546-0001

Research Opportunities in Space Biology

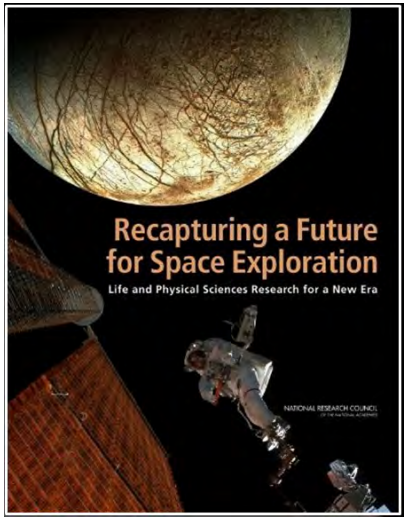
NASA Research Announcement
Soliciting Proposals for the Period Ending December 19, 2012

NNH12ZTT001N NRA
Issued: September 28, 2012
Step-1 Proposals Due: October 31, 2012, 5:00 PM Eastern Time (Daylight Savings)
Step-2 Proposals Due: December 19, 2012, 5:00 PM Eastern Time (Standard)

"It is important that investigators use the most appropriate 21st century biological bioanalytic tools (*e.g.*, genetic, proteomic, metabolomic) to discover and characterize underlying mechanisms of adaptation to the space flight environment (*e.g.*, altered gravity, stress, radiation), and that experiments determine cellular and organismal mechanisms that regulate and sustain growth, metabolism, reproduction and development in space. "

Final proposals were due December 19, 2012. NASA anticipates receiving proposals that support omics research.

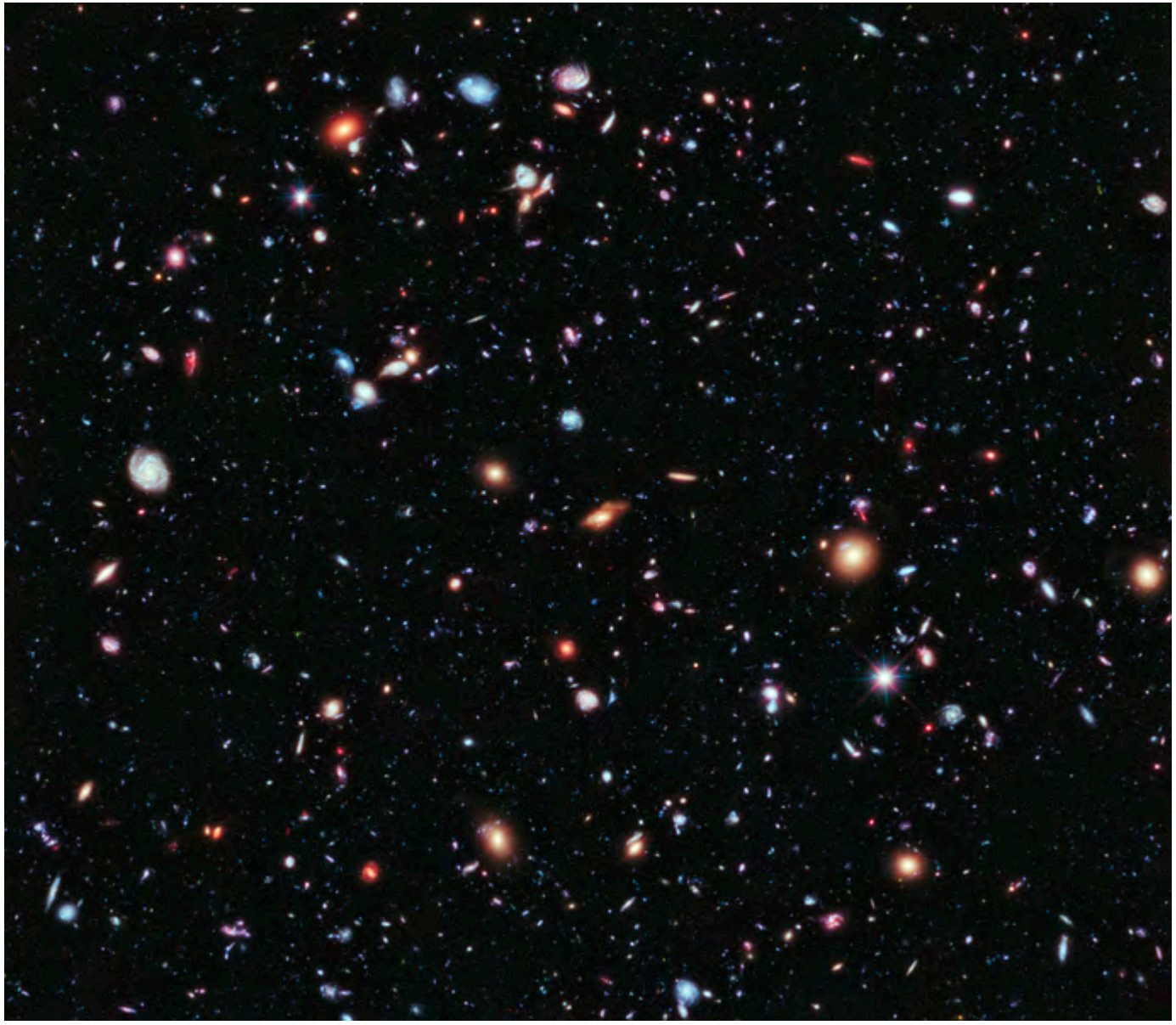
geneLAB is a Response to the Decadal Survey



The geneLAB campaign serves as a "Grand Science Laboratory" with the following aims;

- **Deliver ground-breaking science**
- **Increase visibility to NASA's life science efforts**
- **Promote the value of human space flight**
- **Responds to the demand for expanded multi-investigator collaborations**
- **Takes advantage of new, high-throughput bio-molecular research technologies**

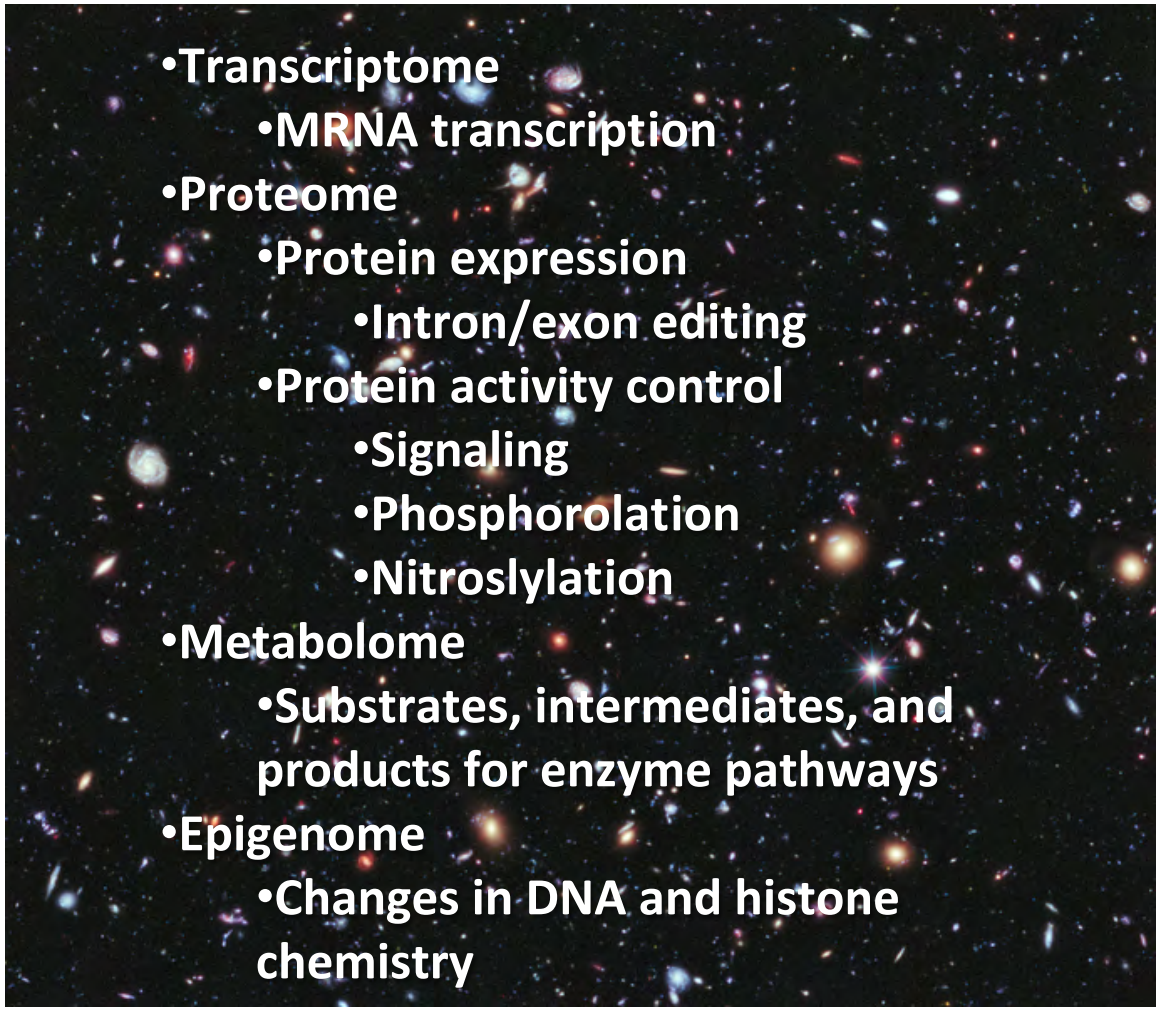
A Telescope Platform to Unite Life Sciences?



Hubble Extreme Deep Field

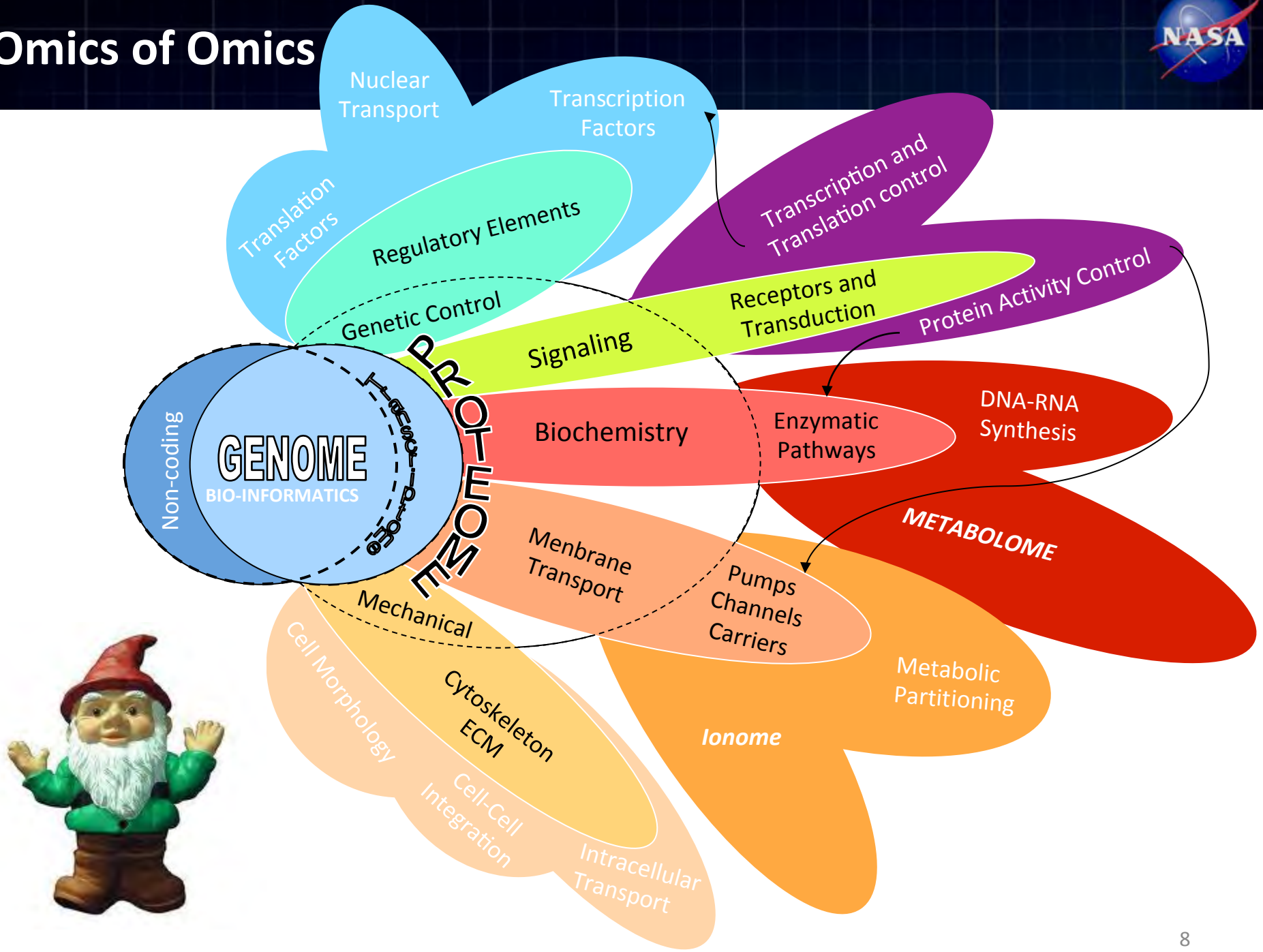
The Expressome as the "Telescope for Life Sciences"

High Content Screening: as platform for high density/ high throughput life science utilization of ISS



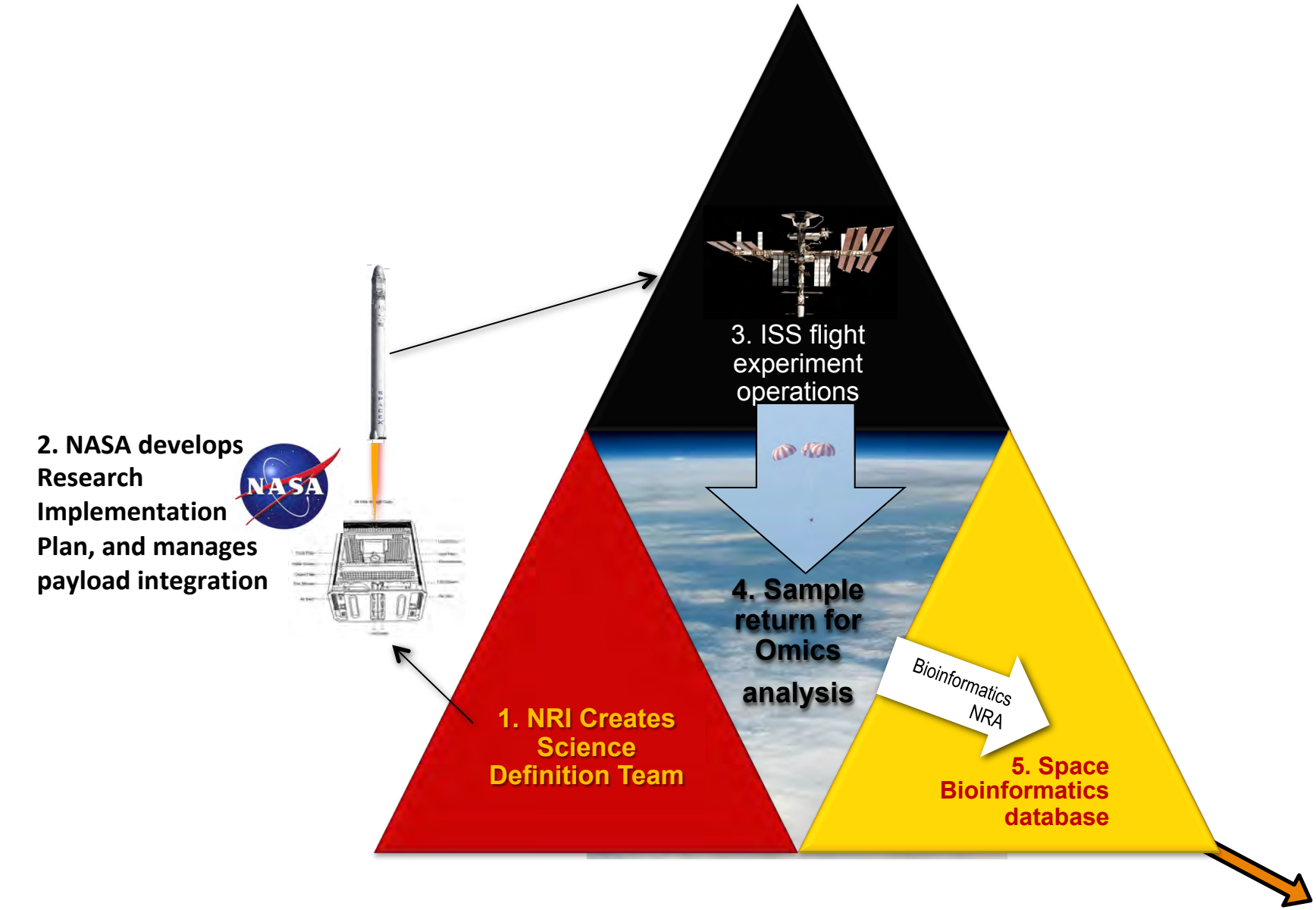
Transcriptome
Proteome
Metabolome
\+ Epigenome
=Expressome

Omics of Omics



geneLAB

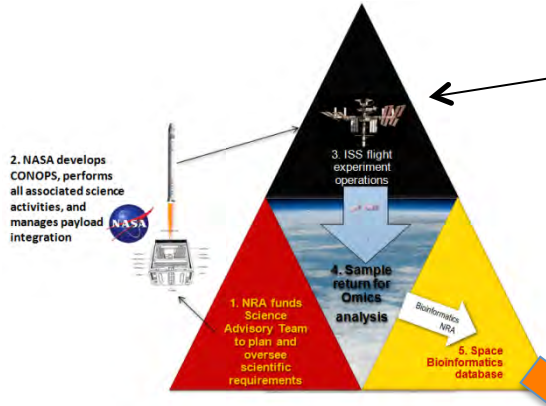
multi-investigator utilization
open source science innovation



geneLAB

multi-investigator utilization
open source science innovation

geneLAB
Expressomics
Bioinformatics



Individual PI Flight experiments

Open innovation approach to doing science

NRA to perform ground research based on data in informatics database

Non-NRA Outside Data users

CASIS

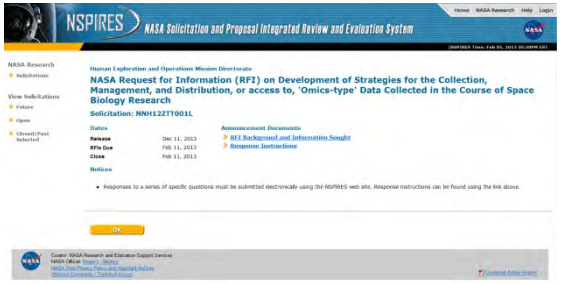
New scientific insight and publications

geneLAB RFI released

geneLAB Campaign Progress

To move forward with the definition of the geneLAB campaign two efforts have been undertaken:

1. NASA Request for Information (RFI) December 11, 2012:



"Development of Strategies for the Collection, Management, and Distribution, or access to, 'Omics-type' Data Collected in the Course of Space Biology Research"
(NNH12ZTT001L)

2. geneLAB Workshop held at NASA Ames Research Center on January 22, 2013.

geneLAB Next Steps

- Define an implementation plan for geneLAB
- Form the Science Definition Team
- Gain participation from the international partners and other US government agencies
- Determine how future NRAs and ILSRAs will encompass geneLAB
- Define the data standards and acquire the data services that are needed to support geneLAB

National Aeronautics and Space Administration

Questions?