

BIG IDEA CHALLENGE



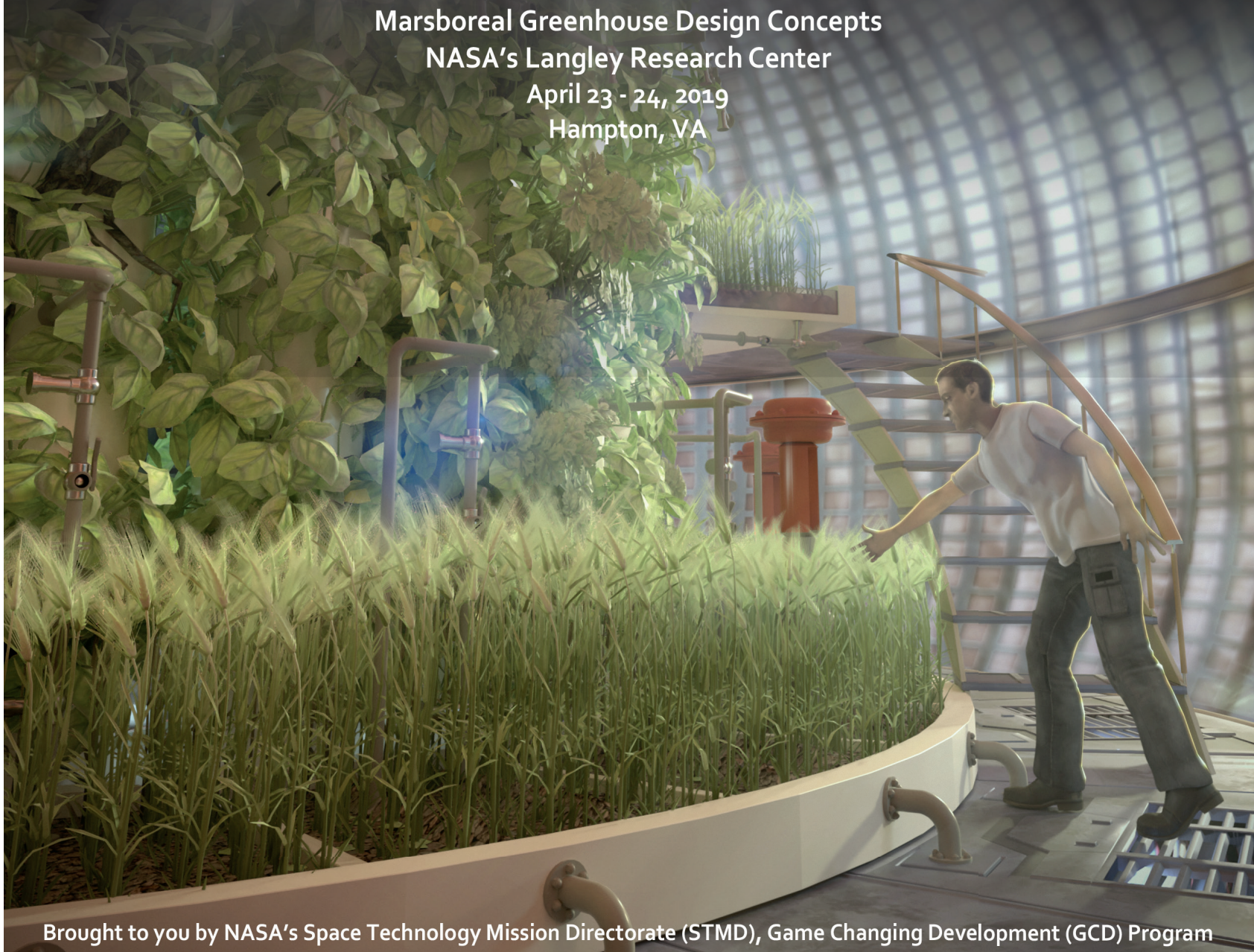
2019 **B**reakthrough, **I**nnovative & **G**ame-changing (BIG) Idea Forum
Engaging Universities in NASA's Mission to Develop Space Exploration Technologies for the Moon to Mars

Marsboreal Greenhouse Design Concepts

NASA's Langley Research Center

April 23 - 24, 2019

Hampton, VA



Brought to you by NASA's Space Technology Mission Directorate (STMD), Game Changing Development (GCD) Program

On behalf of NASA, I am pleased to welcome you to the 4th annual Breakthrough, Innovative, and Game-changing (BIG) Idea Forum! NASA's Game Changing Development Program believes in engaging the best and brightest students from across the nation to help solve the technical challenges NASA is facing today. The unique ideas you have applied to Marsboreal Greenhouse designs are a crucial part of the exciting advancements the Agency is working on to further explore the moon and Mars. We are pleased with the innovative concepts proposed by each of the finalist teams. Congratulations on being selected and best of luck!

- **Drew Hope, Program Manager for NASA's Game Changing Development Program**



2019 Competing Teams

Dartmouth College

DEMETER (Deployable Enclosed Martian Environment for Technology, Eating, and Recreation)

Advisors: Dr. Benoit Cushman-Roisin, Dr. Laura Ray, Dr. John Collier, and Dr. Lee Lynd



Massachusetts Institute of Technology

Biosphere Engineered Architecture for Viable Extraterrestrial Residence (BEAVER)

Advisors: Dr. Jeffrey Hoffman, Dr. Sara Seager, Dr. Matt Silver, Dr. Vladimir Aerapetian, and Dr. Velentina Sumini



University of California - Davis

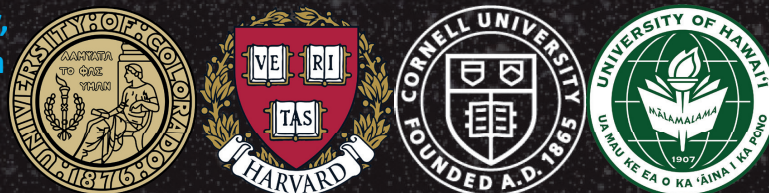
Martian Agriculture and Plan Sciences (MAPS)
Advisor: Dr. Stephen Robinson



University of Colorado - Boulder with Harvard University, Cornell University, and the University of Hawaii - Manoa

SIRONA - Sustainable Integration of Regenerative Outer-space Nature & Agriculture

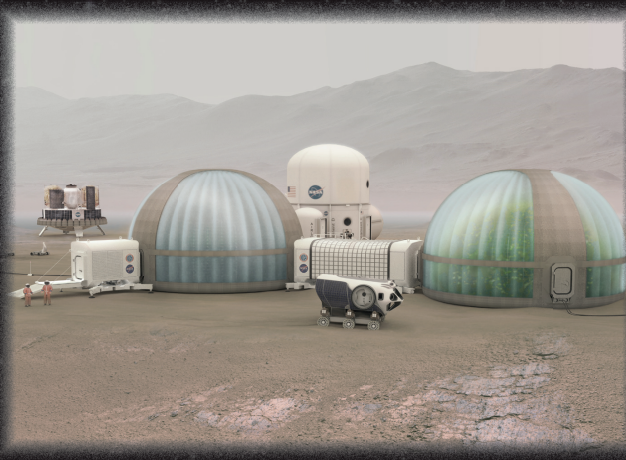
Advisors: Dr. Kyri Baker and Dr. Andy Kaufman



University of Michigan with Pennsylvania State University, Purdue University, Michigan State University, and the University of Wisconsin - Platteville

GAIA - Greenhouse Attachment for the Ice home Architecture

Advisor: Dr. Nilton Renno



Shelley Spears
National Institute of Aerospace
Director of Education & Outreach
404-229-6118

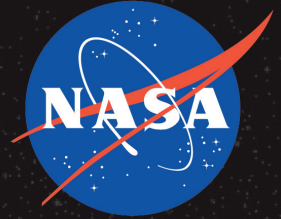


Stacy Dees
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Victoria O'Leary
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BIG Idea Program Coordinator
540-836-8518

Tuesday, April 23rd



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|------------------|--|
| 8:00 – 8:50 AM | Judges' Meeting (Building 2102, Room 101) |
| 9:00 – 4:00 PM | Presentations (Building 2102, Reid 2 and 3) |
| 9:00 – 9:05 AM | Welcome and Introductions Shelley Spears, National Institute of Aerospace |
| 9:05 – 9:10 AM | NASA's Langley Research Center Welcome |
| 9:10 – 9:30 AM | Game Changing Development Program Overview Drew Hope, NASA's Langley Research Center |
| 9:30 – 10:00 AM | Plants and Bioregenerative Life Support Research at NASA Dr. Ray Wheeler, NASA's Kennedy Space Center |
| 10:00 – 10:15 AM | Break |

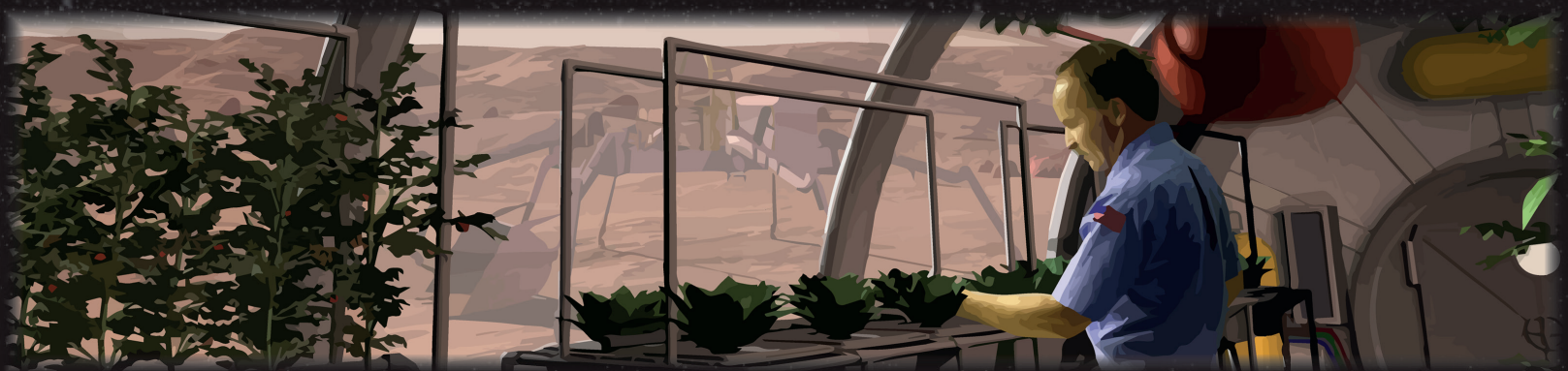
Watch the 2019 BIG Idea Presentations via Livestream: <https://livestream.com/viewnow/bigideachallenge>

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| 10:15 – 11:05 AM | Dartmouth College |
| 11:05 – 11:55 AM | Massachusetts Institute of Technology |
| 11:55 – 1:15 PM | Lunch (Building 2102, NACA Room) |
| 1:15 – 2:05 PM | University of California - Davis |
| 2:05 – 2:55 PM | University of Colorado - Boulder with Harvard University, Cornell University, and the University of Hawaii - Manoa |
| 2:55 – 3:10 PM | Break |
| 3:10 – 4:00 PM | University of Michigan with Pennsylvania State University, Purdue University, Michigan State University, and the University of Wisconsin - Platteville |
| 4:00 – 4:30 PM | Team Photos |
| 4:05 – 4:45 PM | Judges' Meeting (Building 2102, Room 101) |
| 5:00 – 7:00 PM | Dinner and Networking Event at Corner Bistro 200 Fountain Lane, Poquoson, VA 23662 |

Wednesday, April 24th

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|------------------|---|
| 9:15 AM | Meet at Badge and Pass for photo with NASA's Langley Research Center sign |
| 9:30 – 11:55 AM | LaRC Tour for Teams (Car pool from Badge and Pass) |
| 9:30 – 11:30 AM | Judges' Deliberation (Building 2102, Room 101) |
| 12:00 – 12:15 AM | Group Photo |
| 12:15 – 2:00 PM | Lunch and Awards Ceremony (Reid 2 and 3) |
| 2:00 – 3:00 PM | Judges' Debrief (Building 2102, Room 101) |

White – All attendees | Blue – Teams Only | Green – Judges & Program Staff | Orange – Pre-Paid Registrants



2019 BIG Idea Challenge Judges



Kevin Kempton

NASA's Langley Research Center
BIG Idea Judges' Chairman,
Program Element Manager for GCD



Molly Anderson

NASA HQ/Johnson Space Center
Deputy System Capability Lead for ECLSS



Dr. Dan Barta

NASA's Johnson Space Center
SBIR Subtopic Manager, Habitation Systems



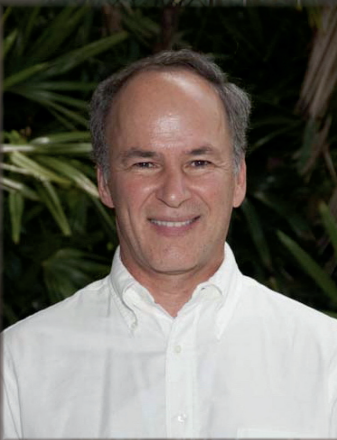
Christina Ciardullo

SEArch+
Co-founder and Architect



Dr. Robert "Bob" Moses

NASA's Langley Research Center
SBIR Subtopic Lead for ISRU



Dr. Ray Wheeler

NASA's Kennedy Space Center
Plant Physiologist



Melodie Yashar

SEArch+
Co-founder and Research Lead

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INSTITUTE OF
AEROSPACE



The BIG Idea Challenge is sponsored by NASA's Space Technology Mission Directorate (Game Changing Development Program) and managed by the National Institute of Aerospace
<http://BIGIdea.nianet.org>