NASA tackles new IDEAs to go to Mars and beyond

Case Study
Government

"This was one of the best training classes. Appreciate the practicality on this topic. It would have been easy to turn this into an academic discussion, but the instructor kept it down to earth."
NASA APPEL Engineer

Company: National Aeronautics and Space Administration (NASA)

Capabilities: Strategy and Innovation

Business Challenges:

- Fear of reproductive thinking: re-launching Apollo technologies versus new systems and technology to meet future needs
- New needs driving rapid change:any "sized" astronauts, larger payload/gear ratio requirements, human travel to Mars (and landing), lunar habitation, more asset reliability
- New tools needed to move brilliant engineers more quickly and effectively through the "fuzzy" front end with a greater volume of solution options
- A new, common language across technical design and portfolio management needed to down select the best concepts

Situation

A new National Aeronautics and Space Administration (NASA) program, "Mission to Mars" required NASA to undergo a significant change in technology and management. As NASA entered a new era of space flight and exploration, engineers needed to develop innovative designs that could leverage the latest in advanced technology.

NASA engineers needed to address the extreme demands of space flight while having safe, reliable, and light weight designs. Meeting these challenging design requirements required innovative ideas that could pass a rigorous, cross-functional evaluation process. Essentially, NASA engineers and designers needed to learn to think "outside the box" when approaching new designs.

As a result, the NASA Academy of Program/Project and Engineering Leadership (APPEL) engaged Celerant to design and instruct a course that provided engineers with an understanding of the tools and processes that could be used to increase innovative thinking and support the translation of those ideas into effective designs. NASA named this course Innovative Design for Engineering Applications or IDEAs.

Approach & Delivery

Celerant began the engagement by visiting NASA centers across the United States to assess current innovation methodologies.

Celerant created a prototype of the IDEAs course that was tested with current designers at the Jet Propulsion Labs for fit, function, and form. Following feedback from the Jet Propulsion Labs designers, the pilot course content and format were finalized. The course covered both "hard" and "soft" tools and methods to aid in creative thinking. It utilized verbal, visual and kinesthetic learning modes and included:

- Facilitated lecture and discussion
- Short videos to reinforce key points and bring an added dimension
- Guest speakers from local NASA centers
- Case studies that tethered concepts to NASA examples and content
- Class exercises to practice the new tools and ways of thinking - consisting of daily activities plus a final project that included real and current NASA problems

Results

Celerant successfully designed and delivered nine classes of approximately 25 students each at the Kennedy Space Center, the Johnson Space Center, the Goddard Space Center, the Langley Research Center, the Marshall Space Flight Center, the Ames Space Research Center and a pilot session at the Jet Propulsion Labs. The IDEAs class project helped define solutions to several challenges faced by engineers at various NASA centers and programs, including the lunar habitat program.

Attendees appreciated the hands-on, interactive delivery approach and specifically the use of exercises. Course attendees indicated that they are typically biased in their approach to problem solving and felt that the exercises revealed they normally do not look at the "full picture" of possibilities.

A confidential online survey was conducted with the participants both one month and six months after the course. The results indicated Celerant's approach was one of the highest rated NASA courses ever conducted. 93% of attendees indicated they would apply topics covered to future work at NASA.

Client Satisfaction

NASA published a feature article on the IDEAs course and the work led by Celerant in their internal ASK magazine. Follow-up course surveys found that 75% of attendees used the tools within one month of the course and 95% planned to use them within the next three months.

Based on the success of the IDEAs course, Celerant was asked to design and deliver a web-based course dealing with innovative problem-solving using "TRIZ" concepts. TRIZ is a methodology, tool set, knowledge base, and model-based technology for generating innovative ideas and solutions for problem solving.