

Summary of 62nd IAC Cluster Forum

Collaborative Innovation: Strategy to Results

October 4, 2011

Co-sponsored by Wyle, the NASA Johnson Space Center Space Life Sciences Directorate, and the German Aerospace Center DLR

Introduction of Event and Emcee: Elizabeth E. Richard, Senior Strategist, Wyle

Welcomes from Sponsoring Organizations:

Genie Bopp, Vice President, Wyle; Johann-Dietrich Wörner, Chairman of the Executive Board, DLR; William H. Gerstenmaier, Associate Administrator, Human Exploration and Operations Mission Directorate, NASA

Presentations/Participant Discussion on Space Agency Collaboration and Innovation Initiatives

- NASA Innovation
 - William H. Gerstenmaier, Associate Administrator, Human Exploration and Operations Mission Directorate, NASA
- Collaborative education and outreach initiatives
 - Andrea Boese, German Aerospace Center DLR, European Space Policy and Special Affairs
- Model for Collaboration: NASA Human Health and Performance Center
 - Elizabeth E. Richard, Senior Strategist, Wyle
 - *Q: How many personnel are involved with the NHHPC from the administrative side? A: civil servant director and deputy director, plus Wyle team of six to design and manage web site, manage communications, and coordinate events.*
 - *Q: Do you interact with the astrobiology group (at Ames)? A: No but they are welcome to join the membership*
 - *Q: What health problems for Mars will be dealt with via the NHHPC? How will the NHHPC enable flights to Mars? A: By promoting collaborative research and technology development efforts and sharing of data and best practices to address identified gaps in the human spaceflight research and technology development portfolio*
- SLSD Open Innovation Results and Plans
 - Jeffrey R. Davis, Director, Space Life Sciences, NASA
 - *Q: Who is responsible for managing all the initiatives? How do you decide what fits a particular model? A: The Space Life Sciences Directorate manages the initiatives through a NASA/Wyle team; we have established an innovation manager position within NASA who will collect and manage all current and future open innovation initiatives with the NASA/Wyle team. Results and future investments are reviewed and approved by SLSD boards chaired by the director SLSD.*

- *Q: Who is responsible for the strategic framework? Who is meeting on the topic and who is managing the activity? A: The director of SLSD is responsible for developing the strategic framework with a team yet to be identified; the framework once developed will then serve as an overall decision framework for the directorate through its various decision making boards.*
- *Q: How much control do you apply to innovation? A: The SLSD asks subject matter experts to identify gaps and then prioritizes gaps to address through various problem-solving tools. Decisions about possible prize-winning results are evaluated in a 2-step process: 1) the subject matter experts make a technology recommendation and 2) an SLSD panel reviews to determine if the results warrant the investment through the prize award.*
- *Q: How do you make decisions to fund certain projects over others? For example, student competitions over other activities? A: The SLSD attempts to fund development projects in all technical areas as well as student/education projects. The SLSD tries to balance its approach across all areas – high priority tasks are identified within each technical area including student/education projects with the goal to maintain a balanced portfolio of efforts across the directorate.*
- NASA Tournament Lab
 - Jason Crusan, Chief Technologist, Human Exploration and Operations Mission Directorate, NASA

Keynote: More innovation through evolution or through revolution? Johann-Dietrich Wörner, Chairman of the Executive Board, German Aerospace Center DLR

- *Q: How would a research organization like DLR institutionalize Innovation? With a mission focus, how do you decide where to put manpower if it is not mission related? A: It is important to find paths between development and product actualization, linking groups together works but it is too narrow.*

Panel 1: Innovative Problem Solving—Challenges, Moderator: Elizabeth E. Richard, Senior Strategist, Wyle

Panelists

- Jeffrey R. Davis, Director, Space Life Sciences, NASA: portfolio analysis
- Rupert Gerzer, Director, Institute of Aerospace Medicine, German Aerospace Center DLR: :envihab development
- Cynthia M. Rando, Innovation and Strategy Coordinator: SLSD open innovation pilot challenges
- MaGee Johnson, Strategic Projects Manager, Wyle: NASA Space Act Agreement challenges

1. **Q: What needs to be solved? What is the most significant hurdle you had to overcome to be successful?**

- *Davis: developing criteria to analyze specific projects to determine which might be appropriate for open innovation approaches. In this regard, we were fortunate to work with Dr. Gary Pisano at Harvard Business School who has an established portfolio analysis approach and we conducted a workshop using his model with good results to characterize our first set of problem statements to determine which were appropriate for an open innovation approach.*
- *Rando: Lowering the barrier to entry and reducing the risk associated with being an early adopter, allowing the early adopters to seed the culture change at a grass roots level. It was very much a “door-to-door” salesman approach in the beginning.*
- *Johnson: One significant hurdle we had to overcome is the perception that completing agreements with NASA is difficult and too lengthy. With the creation of an internal SLSD website specifically for SAA information and informational lunch sessions, the culture within SLSD is changing and more partnerships are being pursued.*

2. What is the most important issue relative to your topic that still needs to be solved for future success?

- *Davis: Defining your portfolio, then defining the knowledge gaps which are the opportunities for innovation (e.g., portfolio analysis and mapping)*
- *Gerzer: I am a medical doctor who has responsibility for care of the astronauts. Operations sometimes create a challenge to the innovation concept. However, special tools and capabilities developed for astronauts may have applicability for terrestrial medicine as well. The :envihab approach is to network with the space community, hospitals, insurance, facilities. Current problem is that there are maybe too many opportunities to collaborate with industry.*
- *Rando: One of the challenges is that innovation must be approached not only from the perspective of a problem solver, but also as a solution seeker. This is a fundamental paradigm shift and I will pause here to emphasize the point; it goes against everything we were taught to do as professional problem solvers. It doesn't matter where the solution comes from, what is important is to solve the problem. Territorialism is a challenge.*
- *Johnson: How the agreements fit into the directorate. There is still some resistance to a directorate-wide approach, but with education, SAAs can be seen as a vehicle to establish partnerships in a new way.*

3. What is the most significant best practice you can pass along for others to emulate?

- *Davis: The innovation approach requires a change in culture to encourage the use of new tools as a way to facilitate current operations and research problem solving; need buy-in from leadership and subject matter experts.*
- *Gerzer: Need to convince people that this is a good concept. Act! Prepare a proposal that your boss cannot deny and make it seem like his idea.*

- *Rando: Make the barriers to entry lower reducing the risk to participate; we need to make an effort every day to change the culture to embrace innovation by creating an environment that fosters creativity and opportunities for individuals to participate.*
- *Johnson: Provide the tools to make agreements happen as easily as possible; there are 14 different mechanisms for doing business with NASA—choosing the right one for each situation is a challenge; communicate early and often.*

4. Audience Questions:

- *Q: How are we approaching visual acuity issue without damping the enthusiasm for space? What if the answer is negative? A: understand space flight well enough to think this will not stop exploration, we will develop solutions that will enable long duration flight; our task is to develop the countermeasures*
- *Q: Systems resist change, what are we doing internally to address this? A: Promote the results, build it into the reward system and the performance system; be persistent! Keep focused on the issue of keeping astronauts healthy; knock on doors and look for solutions throughout the organization*

Panel 2: Innovative Problem Solving—Results, Moderator: Jeffrey R. Davis, Director, Space Life Sciences

Panelists

- Cynthia M. Rando, Innovation and Strategy Coordinator, Wyle: SLSD open innovation outcomes
- Kathy Laurini, Senior Advisor, NASA Exploration and Space Operations: International Space Exploration Coordination Group (ISECG) Global Exploration Roadmap- enabling human space exploration
- Rüdiger Süß, Senior Project Manager DLR Corporate Strategy: Internal innovative cooperation paves the way for external collaboration
- Jason Crusan, Chief Technologist, Human Exploration and Operations Mission Directorate, NASA: NASA Tournament Lab

1. Talk about the collaborative approach that allowed you to achieve success in your particular endeavor

- *Rando: Involving all team members on the ground floor, particularly legal, procurement and human resource advisors. They will be critical in helping you to pave the path to implement these new tools within the existing organization.*
- *Laurini: building consensus among partners and extending the life of the ISS for utilization, defining a roadmap to guide future work*
- *Süß: managing budgets and personalities to get competing teams to work together, using a house analogy to approach collaboration, building processes independent of business units*
- *Crusan: find early adopters to demonstrate small successes, can apply tournament lab model to other disciplines*

2. What is the most important result you have to date that enables future successes in collaborative innovation?

- *Rando: Although we did have an out-of-the-park success with the radiation challenge we discussed earlier, overall expectations were low at the beginning of the pilot. We did not expect to find anything new with these challenges. However, for every challenge we piloted there was an award given which helped to encourage our confidence with these new models.*
- *Laurini: finding a roadmap was a big hit, people look to NASA to lead, but the best idea carries the day*
- *Süß: How do we control the Innovation process? The process approach is crucial to success to get buy-in from all stakeholders, coordinate research activities through service orientation;*
- *Crusan: What people think their challenge is may not really be the challenge—must decompose the problem to find the right solution*

3. What is the most important hurdle you had to overcome?

- *Rando: The Culture. It is important to find the early adopters, those willing to take risks and experiment with these methodologies, leverage them while also fostering an environment that protects them until results are achieved and a proof of concept exists for others.*
- *Laurini: getting 12 agencies to work globally across time zones, removing constraints to find common incentives/motivations or individual incentives to drive them to participate, building a common understanding of what we trying to do*
- *Süß: cross cultural issues, determining who has the power to make decisions and take responsibility for them, creating synergies when perceived as competitors or as directing funds away from others to achieve goals*
- *Crusan: government procurement processes; not having enough resources to address issues; determining how to best work with people to truly define the problem by deconstructing it to the core pieces; in some cases need a broader definition of question; export control issues.*

4. What is most significant issue remaining to be solved?

- *Rando: addressing the barrier to open contractor participation, removing intellectual property concerns and the rights to results*
- *Laurini: identifying global exploration next steps to proceed; building collaboration to find the best idea to pursue regardless of origin*
- *Süß: certification of management decision making processes*
- *Crusan: scaling up to broaden reach, integrating a strategic framework into new procurement approaches*

5. Audience Questions:

- *Q: What is the difference between a Kaizen and innovation? A: Kaizen is continuous improvement, innovation is a new way of doing things, they are complementary*
- *Q: how do you get 12 agencies to agree when there is no clear leader? A: a path is enabled when critical mass develops, need to build synergies at agency-level collaboration first, find what is technically feasible, and then take to policy/stakeholders and build support*

- *Q: how do you make the innovation process work? A: 1) Open innovation with prizes and challenges is a good way to start, but we need to find a complete end-to-end process that is exportable; 2) need to lower barriers of entry for submitting ideas, e.g., using simple apps on cell phones for data collection, and using different systems/platforms to collect (internet, community driven, etc.); 3) we need solutions for spaceflight challenges, but there is a greater likelihood of success if we show commonality of Earth benefits.*
- *Q: Please elaborate on how the focus could be broadened by universities. A: Universities can have a role if they want to? Could have a devoted university to partnership entity X. The broker should not always look to research to pay, but to industry as well.*
- *Q: Knowledge is accumulated in the heads of people, how do you transfer that or document it? How can you facilitate the transfer of knowledge? A: We try to transfer people to other areas, we are not opposed to competition.*

Interactive Discussion on Innovation Questions posed by Mr. Gerstenmaier: Audience, Panelist and Speaker Responses

- 1. Do we need to include innovation to remain competitive and relevant? Is innovation required or a nice to have?**
 - 2. Can we predict disruptive innovation?**
 - 3. Does innovation conflict with the org desire to maintain the status quo? How do we incentivize the organization to innovate?**
 - 4. Can the cost of not innovating exceed the cost of failing in the intro of an innovation?**
- Do we need to include innovation to remain competitive and relevant? Is innovation required or a nice to have?
 - There is a downturn in the economy, less resources in space, how do you prioritize? In space flight we need to maintain high performance, and needs are already prioritized so there is not a need to adjust, the astronaut will remain the central focus. Can try to attract other customers, and even if you have flat resources you need to look at how to reallocate resources internally; even when this is difficult, you need to look critically at what money you have, and not continue to put money into things that aren't working, e.g. SLSD kicked off its innovation effort because funding was reduced, not because we got new money to do this.
 - We cannot just say we do innovation, we have to do it and it must be goal oriented
 - SLSD conducted a benchmark study in which one of the results was that 100% of participants said the collaborated to innovate, and needed to do this to achieve strategic goals and remain competitive
 - Need to access where the knowledge is, so it really is about collaboration
 - It is a challenge to get NASA scientists and engineers to look at new ways of doing things when they already think they are the most innovative people in world; one way to

address this is to appeal to their curiosity—how can a new method result in getting a solution faster, accessing data faster, getting better data

- The people that you have championing new methods have to be practitioners themselves or it doesn't work
 - Yes, innovation is required!
- Can we predict disruptive innovation?
 - Never let a good crisis go to waste—a downturn in the economy could be a strong motivator to result in disruptive innovation, since crises tend to cause humans to embrace innovation more enthusiastically; sometimes if you are under great pressure in a crisis you are required to change and not continue the old things, because there is no way to continue with the status quo
 - The environment can cause disruptive innovation, but sometimes you can actually trigger innovation by taking things away (e.g., funding) or disruptions in missions, e.g., have to fix solar array
 - GE cuts 10% of all business units that are under performing every year, pushes innovation
 - So, you can predict the cause (see it coming) but not the outcome of disruptive innovation
- Does innovation conflict with the organizational desire to maintain the status quo? How do we incentivize the organization to innovate?
 - Yes, maintaining the status quo can cause barriers to being innovative and achieving innovation
 - An organization can be incentivized by crises, or by internal changes e.g., incorporating innovation goals into performance plans
 - DLR has found that sending people out to travel and interact with other communities can foster innovation (similar to allowing employees to spend x% time on something they want to work on, e.g., as does Google and 3M)
 - A lot depends on the culture of the organization, to encourage innovation the whole institution must have a culture of innovation, and it needs to come from the top
 - If an organization's culture is positive and moving forward, then they are on the right track to innovate
 - Many workers value working on important project in the face of decreasing resources
 - Another motivating factor can be receiving a negative review and/or being told you can't do something—this can be a call to action
- Can the cost of not innovating exceed the cost of failing in the introduction of an innovation?
 - It is better to allocate money to do something and go for it then to do nothing, the cost of not innovating is higher

- No risk no fun!
- The answer to this goes back to needing to have two cultures, and needing to be attentive to both: risk averse v. fail fast and fail often, need to reward some failures—can dissect them and talk about why it happened and use this as a lesson; can't assume every attempt at innovation will be successful because it won't be, no one loses face, is a management decision, finding out why something is wrong is just as valuable to finding something that works, is knowledge
- Accelerated research model—made a flat playing field with all researchers involved, expectation to share negative data to avoid future pitfalls

Conclusions

- Jeffrey R. Davis, Director, Space Life Sciences, NASA
 - Dr. Davis thanked attendees for participating in a very productive day. He emphasized that collaborative innovation has returned good results for the Space Life Sciences Directorate (SLSD) and has provided many new good external contacts and collaborations for many technical members of the SLSD. The open approaches have expanded the problem-solving network available to NASA and we expect to continue and expand the investments in these new techniques. Finally, utilizing a more open, collaborative approach is fun and stimulates innovation within the SLSD.
- Gerd Gruppe, DLR, Member of the Executive Board responsible for the German Space Administration
- Elizabeth E. Richard, Senior Strategist, Wyle
 - Thanked all for participating and adjourned meeting.