Breakout Session 2
Machine Learning and Autonomous Systems

Concern: If some of our framework includes open-source code, are you open to bringing this platform to your capabilities?
Response: This is well within scope. It helps in respect to the get into the Silicon Valley eco system. Sometimes it can be a challenge in the way it is being developed so NASA is encouraging everyone to think about the process in which open-source is developed.

Concern: Is NASA interested in cyber security for autonomous systems?
Response: In general, yes. It takes different approach as compared to the aviation side. That might be something that will be addressed in the future.

Concern: Is NASA interested in cognitive technologies to automate the development of applications?
Response: This is getting into very specific technology that has no thumbs up or down right now.

Concern: How do you define ISHM - integrated systems health management?
Response: Old aviation safety definition: detection, diagnosis (what is the actual condition), prognosis, mitigation.

Concern: Is NASA interested in partial solutions?
Response: NASA is interested in full integration (ISHM). We are looking at how all these pillars work together to support the common architecture.

Concern: In cognitive computing approach, you need to have access to a large number of documents. How do we prove something might work using the existing tool if we don't have the documents to refer to?
Response: We can take this question under advisement. We cannot release any detailed operation materials to the general public so we will need to find a way to provide these documents. There might be some analog of document that we may advise you to look at.

Concern: If we demonstrated a surrogate case that's technical, would that be legit?
Response: We will need to get this question back to the community.

Concern: In relation to the machine learning and data mining - how do we find the information to customize one of our existing frameworks to what you are doing? Where can we find this information?
Response: When you read the description you will be able to find the mappings to NASA problems.

Concern: Architecture of information available to autonomous systems. Are we just looking at the isolated system that just has the local resources or is it a space cloud where it can pull more information?
Response: It is all of the above. There are a lot of assets put in the orbit around Mars. Prior to a human mission to Mars there will be many more. There is always this potential to be able to call back to Earth taking under account the time delay and that sometimes communications are very difficult. If there is a situation where there is an accident that impacts communication to Earth, you are truly by yourself. State clearly what your premises are going in and show that you not only can look at all by yourself but also the ability to draw upon other resources.

Concern: Can you elaborate on cognitive architecture? E.g. approaches with large number of documents or approaches that try to mimic a human cognition? Are you concerned with the architecture itself or the performance of the system?
Response: Propose an architecture that you think will be good for goal oriented behavior. It does not need to be in the form of large documents ingestion. The need that NASA has is a 4-6 crew member. How do you offload that type of cognition that is required to pull off a mission? In an environment where you have the time delays and you cannot have mission control at your fingertips. It doesn't require that it mimic a human brain in some fashion but you should be able to articulate how the amount of work and oversight guidance is required to manage something like an ISS very near Earth could be managed by a small crew in a far out destination that NASA wants to explore.

Concern: Are you interested in predictive analytics to take data to predict the potential malfunctions and security issues?
Response: Yes. Any type of technology that can be used to detect, diagnose and provide decision support for operators on potential failures.

Concern: What is intelligent electrical power system?
Response: An intelligent system is one that can not only operate nominally, but also be able to smartly reconfigure in the event of a malfunction. The system can load-shed to continue to provide power to the most critical functions, without requiring human interface to make these decisions. The greatest advantage is the lack of need of this human interface, thus helping to enable deeper space missions (unmanned), and eventually taking burden off astronauts for future manned missions.

Concern: In general, what are you looking for in terms of innovation for software / hardware?
Response: Innovative algorithms and innovation applications of algorithms. E.g. in resilient systems technology that can help in a conceptual design. Something where you would be able to succeed as a small business. Once you develop something and it gets tested on ISS but also being to advertise it across other areas and if it provides savings that would be another success.

Concern: Do you have use cases of integrated health management system in aerospace endeavor that would help identify expectations?
Response: There are many use cases. We want to make sure the astronauts are comfortable but the bands of comfort need to be explored in order to rely on the critical functions that are needed to support them. Pay attention to what our energy consumption habits are, what astronauts would require in a sustainable habitat. One example of many.

Concern: Adapting multi mobile interfaces with augmented reality. Can you provide an example of high workloads scenario? How would the scenarios be distributed?
Response: Example of high workload situation: international space station. Russians and Americans can control the attitude of the ISS. The Russian side does it through jets and the American side does it through "gyros". One scenario is where there was a miscommunication about who should handle a malfunction in software – the American side handed off to the Russian side the control of attitude but the American side computer started acting on the malfunction without being aware that the Russian side is maintaining attitude. The system had to be debugged. This is a high workload situation. Any procedure that has an on/off activity will be high load. As for the distribution, we will make sure we address that in the solicitation.

Concern: What role does food play in this type of systems?
Response: This is something we have considered because the building that is used for research here doesn't have these type of capabilities. We have a team that is working on needs for habitats and we are hoping we will be able to review the interesting ideas from the SBC.

Concern: How much of basic technologies like algorithms software are relevant to this area?
Response: If you are asking about e.g. if we were to make any algorithmic advancing in signal. When NASA makes investments they are looking for innovation and commercialization opportunity. Make it clear why it is NASA relevant.

Concern: Integrated system health: is there any interest in psychological well-being, such as depression, stress, etc.?
Response: We are not able to provide data currently. This is something we will take into consideration.

Concern: Is NASA currently interested in technologies to assess neural state changes and keep in-flight training of astronauts' cognitive processes such as attention or memory?
Response: This is not within this area scope. But there is research going on.

Concern: Communications, I'd guess you have people looking at entangled systems. Is that right?
Response: There is a topic called out in the technology roadmaps.

Concern: Is there a distinction between how intelligent electrical system differs from intelligent system health monitoring?
Response: These are two types of opportunities under SBIR and STTR.