

NEXT GEN AT JOHNSON SPACE CENTER – BOLDLY EXPANDING THE FRONTIERS OF HUMAN SPACE EXPLORATION

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ABSTRACT

Younger generations are no longer connecting to NASA’s vision. The current and future missions of the agency fail to capture the hearts and minds of the world’s young people as the Apollo Program once did. In 2009, passion for space seems like it is no longer widespread across the United States. The wonder and excitement of Apollo that once captivated so many seems to have faded. If progress is to be made on the frontiers of space in the coming decades, proactive measures must be taken to expand NASA’s engagement of younger generations.

As a premier space center in the world’s human spaceflight efforts, the Johnson Space Center (JSC) stands at a unique junction in history to connect young people to space exploration. Realizing this position as a world leader, JSC’s Advanced Planning Office sponsored a 2-day workshop in March 2008, with a group of thirty young professionals. The overall goal was to gain insight into the ideas and desires for the future of the space center their generation will eventually inherit. The group’s efforts culminated in a long-term vision for JSC and specific implementation tactics to realize that vision. Throughout the process, the team found success with a fluid leadership model that adapted to the rapid dissemination of information required for the effort.

The team’s vision for JSC to be a “collaborative, innovative and integrated space center, boldly expanding the frontiers of human space exploration” and their associated recommendations have ignited a new conversation across JSC which is spreading to other NASA centers and spaceflight communities.

In reaching out to its own future leaders to help craft its future, JSC has taken a bold and innovative step to engage its workforce in realizing the long-term goals of space exploration. In doing so, the center has created a new organizational leadership model—one in which all generations can work together across institutional and hierarchical barriers—founded on openness, inclusion, transparency, and accountability. Opportunities have led team members to the doors of international aerospace conferences, NASA headquarters meetings, and have sparked conversations across a wide field, ranging from small engineering teams to leadership groups at the Pentagon, United Nations, FAA, and the U.S. Naval Academy.

This paper will document the leadership lessons learned, as well as the team’s efforts to engage its own generation, create a vision for the space center, and develop a community of passionate space professionals across all generations devoted to realizing a brighter future for space exploration.

INTRODUCTION

In March 2008, the Johnson Space Center (JSC) Center Director and the JSC Advanced Planning Office (APO) invited 30 young professionals from both the civil servant and contractor workforce to attend a two day workshop, giving them the opportunity to present their ideas and desires for the future of the center. At the workshop, these individuals were asked to develop their 20-year vision for JSC, including a strategy and one-year implementation plan to guide the center on the path towards realizing their vision.

The members of this JSC 20-Year Vision Team worked diligently throughout the two days. At the end of the workshop they realized that subsequent work would be needed to present a united vision and strategy that all the members could stand behind and agree with. Through after-work, late night, and weekend meetings, the team operated under a fluid leadership model with multiple leaders emerging and fading as the needs and focus of the team evolved.

After six weeks the team accomplished its goal: a vision was developed, and five key recommendations were presented.

As a result of this activity, JSC has embarked upon a number of efforts aimed at improving the center through collaborative and innovative approaches; in order to place it as an innovative leader in human space exploration. Members of the 20-Year Vision Team continue to participate in developing and implementing these initiatives and in so doing, demonstrate and evolve their leadership model in the process.

THE PROBLEM

On July 29, 2008, NASA celebrated its fiftieth anniversary. Celebrations were held all over the United States, as people remembered with pride the accomplishments of humanity's first fifty years of space exploration. These years were an inspiring time for the agency and the rest of the world: television stations transmitted images of astronauts and cosmonauts strapped atop massive rockets, riding into the heavens, stepping out onto the surface of another world for the first time in human history. The world stood in awe, gazing up into the night, as Sputnik streaked across the skies; less than five years later, these same individuals marveled at news of Yuri Gagarin's successful launch into space. People around the globe likewise looked on as Ed White floated gracefully against a backdrop of blackness, with the bright colors of the Earth glowing underneath him. And the masses once again celebrated as Neil Armstrong stepped foot on the moon and uttered the memorable words quoted even today: "That's one small step for (a) man, one giant leap for mankind."

However, as the years progressed, these momentous occasions settled into the background noise of the public's interest and imagination. The space program, which had inspired millions, challenging the traditional concept of "impossible," had become a nostalgic symbol for American and human technological progress. Somewhere in the midst of triumph and glory, the public simply stopped caring about exploration. Long-range plans failed to gain enough momentum before being tossed aside. The agency lacked vision and leadership, pundits and critics cried, and complacency set in. Something needed to be done.

Leaders at JSC were at a crossroads. As a key center for NASA's human spaceflight programs, JSC has been at the leading edge of space exploration initiatives for many years. As the world looked ahead and wondered what the next fifty years of spaceflight would bring, leaders at JSC realized that they were approaching a huge opportunity to lay the

groundwork for an even more vigorous half century of innovation, technological progress, and inspiration for the next generation of explorers.

A SOLUTION

As JSC's leaders tackled the challenge of surpassing the agency's (and the center's) previous accomplishments and increasing public engagement, they realized that a significant resource was available in their existing workforce. It was clear that to adapt and cater to a world more progressive than that of the past – a world more connected, open, global, and collaborative – the center would need to understand and appreciate the viewpoints of its personnel, from all generations, backgrounds, and experience levels.

With these thoughts in mind, in March 2008, JSC leadership decided to engage younger professionals through the 20-Year Vision effort led by APO. These individuals were selected for the passion and diligence that they exhibited in their daily contributions towards human spaceflight, as well as their demonstration of leadership abilities in their professional organizations. The years of work experience in this group ranged from recent college graduates to those with over 5 years experience within the aerospace sector. They came from all over the civil servant and contractor JSC community with areas of expertise including business development, engineering, mission operations, and life sciences.

This approach in gathering input from a relatively young cross-section of the workforce was a radical departure from traditional data collection methods that characterized the decision-making process at the center. Management's recognition of these individuals' passion and value to their respective organizations at the center marked the transition towards a more open, inclusive, and collaborative approach towards problem solving.

LEADERSHIP PROCESS

Throughout history, mankind's successes and failures can often be attributed to the existence or lack of leadership within organizations. It is imperative to have an understanding of various leadership models and structures in order to understand how organizations function, and more importantly, why they succeed or fail. Throughout the course of the two-day workshop and subsequent six weeks of activity, the members of the 20-Year Vision Team exhibited leadership and followership traits that were influenced by their particular situation. Leaders emerged and faded as the availability of the

individual team members and needs of the group changed, while the values and motivational factors that drove participation evolved. The leadership and followership processes together defined "a social influence process shared among *all* members of [the] group" (HGC 10). It is important to analyze the organization, leadership, and followership of the JSC 20-Year Vision team due to the unique context and organizational characteristics that emerged throughout these efforts. Through this analysis, this new, dynamic, transparent, and unique organizational leadership model that was developed can be understood.

Evolution of the Team

Though tasked with a daunting endeavor, over the course of the two days, the members of the group "interact[ed] with one another in such a manner that each person influence[d] and [was] influence[d] by each other person" (HGC 294), through mutual interaction and reciprocal influence. At the end of the two days, however, it was evident that the group had begun evolving into a team. The first set of subsequent meetings could be characterized as somewhat disorganized but the strong sense of identification, common goal, and task interdependence that existed amongst the team members created an environment in which each individual had a vested interest in contributing towards the final product (HGC 293).

After initial conflicting viewpoints were voiced and lengthy discussions were had, one point was agreed upon by all: the team would have to start at the very root of the task - identify and articulate values which could be woven into a vision statement for the JSC of 2030. This collective understanding of the goal allowed for the team to seamlessly transition leadership throughout the development process. This led to "greater power sharing and decentralized authority...which in turn create[d] greater interdependence among...[the team]...and increased [the] need for collaboration" (HGC 29-30). Through this process, leaders emerged who kept the team organized, guided the completion of various components of the overall task, and generally "influenced [the] group toward goal achievement" (HGC 28). Without widespread acceptance of the goal, the unique and fluid transition of leaders at various times could not have occurred, likely hindering overall success.

Though the workshop was initially intended to last only two days, the event sponsors became just as aware as the team that more time would be needed.

These experts shifted roles and transitioned the responsibility onto the individual members of the team, allowing them to take ownership of the task at hand. An emphasis on mentoring was placed throughout this transition process, to ensure that the team members proceeded with the proper guidance and direction. This type of investment in the task and future of the Center inspired and empowered the team to develop and present a polished, final vision statement and five implementable tactics

RESULTS

To begin developing the vision, the team began keyword brainstorming to generate a list of characteristics and adjectives that they envisioned JSC to epitomize in the future. Along with a list of definitions for each word, the team refined their final vision statement based on general consensus on the key points the team wanted to convey. More details and a description of these key themes and thoughts can be found in Appendix A. In addition, the team chose to define each of the keywords that were used in the vision statement to present specific examples of what the team envisioned their statement to portray. This effort helped the team generate a list of over one-hundred tactics - or ways individual members of the team thought the vision could be realized *today*. This list was then filtered to a top five, based on factors such as relation to the vision statement, feasibility, and need for implementation at the center.

The Vision

The team's vision for the Johnson Space Center was for JSC to be:

"A collaborative, integrated, and innovative space center, boldly expanding the frontiers of human space exploration"

The following further defines the vision.

Collaborative: The availability of *appropriate* collaboration venues to all aspects of the JSC community – civil servant/contractor workforce, academia, industry, internationals, and the general public; availability of avenues of discussion, discovery of lessons learned, and knowledge to help guide the center toward a common goal.

Innovative: The ability to turn great ideas into useful progress. The first step is coming up with a great idea, but implementation in the current environment can prove challenging. In 20 years, JSC should stand

out as a prime example of how to innovate.

Integrated: All collaborative teams are united toward a common vision. The entire JSC community can easily be united by having a voice in defining what the vision means to them.

Boldly: Embodiment of the spirit to disrupt the “it has always been done this way, so it must be right” mentality; inspiration to look at problems in a new light, to change on a local, sometimes unseen level.

Human Spaceflight: A driver for the 30 developers of the vision statement; the section of the vision never questioned or debated for the right words. JSC has an opportunity to make a unique contribution to the United States and humanity at large. In 100 years, humans will have more ability to travel into space due to contributions from JSC.

Upon completion of the vision statement, the team was surprised to find that their vision greatly coincided with the JSC vision developed in the early 1960s by Dr. Robert Gilruth, the first Center Director of JSC, then known as the Manned Spacecraft Center:

“The free world’s largest and most advanced research and development center devoted to manned spaceflight”

The obvious similarities provided a level of validation for the team members, who realized that despite the societal changes in the world over the last fifty years, the original spirit in which JSC was founded still thrives today.

Implementation Strategies for the Vision

The team generated the following list of five tactics to demonstrate examples in which JSC could begin to realize the vision statement presented. Each tactic was chosen for its envisioned ability to realize specific parts of the vision statement.

- Virtual Collaboration Center
- Ultimate New Employee Experience
- Innovation Sphere
- 360 Degree Mentoring
- Explore JSC Contest

The Virtual Collaboration Center is an open-source, profile-based online collaboration tool that encourages collaboration, integration, and innovation across the JSC community, by allowing users from various organizations to communicate, present

organizational problems, and work together to generate solutions.

The Ultimate New Employee Experience is an enhancement of the existing orientation program, incorporating interactive team activities, leading to the development of employee personal and professional networks. In so doing, this program encourages collaboration and integration across the JSC community from an early stage in an employee’s career.

The Innovation Sphere is a physical space used for innovative idea development and co-working. The Sphere encourages innovative thinking and collaboration across the JSC community.

The 360-degree Mentoring Program is an enhancement of current initiatives to incorporate a 360° approach to mentoring, based on the concept of 360° peer reviews, across the entire JSC community – both contractor and civil servant. In its implementation, the program encourages integration across the JSC community.

The Explore JSC Contest is a series of competitions amongst university students to develop a media layout for JSC content targeted towards K-12 students, thereby encouraging public innovation and collaboration.

LEADERSHIP ANALYSIS

Leaders & Followers

With six weeks of continuous work, it should come as no surprise that no consistent leader was observed throughout the course of the project timeline. As focus shifted and tasks evolved from brainstorming, to note-taking, to consolidation of information, different leaders emerged, leveraging their strengths to guide the team towards completion. As the needs changed, these leaders similarly transitioned into follower roles and other leaders emerged, offering their strengths to the group. Surprisingly, this continuous transition of leadership spurred little discourse within the team. Each leader was followed by the rest of the team during his/her tenure with little or no resistance.

It was clear that the emergent leaders all had common traits that allowed them to take the reins of the projects at various moments during its cycles. Every leader was committed to putting the appropriate amount of extra time necessary to follow through on their assigned actions and delegate responsibilities as

needed. Each could be characterized as a "team player;" continuously demonstrating their flexibility and adaptability as the focus on the tasks changed throughout the course of the project. Each leader also exhibited excellent communication skills, which allowed him/her to maintain a good relationship with the rest of the team, as well as the sponsoring organizations. The organizational skills of each individual leader were an asset to the team; they utilized various means of communication to keep the team on track.

As the needs and focus of the tasks changed, the leaders were able to transition back to being a follower. As followers, the former leaders and existing followers all demonstrated their passion and commitment to completing their assigned tasks throughout the project time frame. The engaging and positive attitude exhibited by all members, as well as the acceptance of the various emergent leaders, helped transition the team from one state of focus to another.

Values & Motivations

As with any team united by a common goal, the members of the JSC 20-Year Vision Team were motivated by several factors, particularly those intrinsic to each individual. Throughout the course of the project timeline, it was clear that the members of the team all shared a common passion for space exploration. They had a desire to contribute towards one of humanity's greatest achievements - space exploration. Though no formal incentive program was put in place, the team members worked beyond their expected workload to ensure completion of the task. Recognition from management and their peers similarly motivated members of the team to contribute to their best ability and develop a product each member was willing to stand behind and acknowledge their own participation.

Benefits

The main benefit of this type of a fluid leadership model lay in the fact that the responsibility and subsequent burden of all the successes and failures throughout the process never rested on one person's shoulders. Because of the intensive nature and small-group structure of the initial two-day workshop, the members of the 20-Year Vision Team became intimately familiar with each member's obvious strengths and weaknesses early on. Each individual who led the teams through various phases during each project had a working understanding of not only his or her own strengths and weaknesses, but also

that of the other active members of the teams. This recognition allowed for the continual transition of leaders through each project, as each recognized when his or her skills were most useful and when another individual was better suited to lead.

As with any exercise in delegating responsibility, these efforts have allowed the members of the 20-Year Vision Team to not only gain leadership and followership experiences, but also to create a network of like-minded, yet very different individuals, within their own generation, as well as within others. This idea of networking and appreciating the contributions of those around the community was heavily emphasized in discussions during the 20-Year Vision development phases. Engaging these networks is the key to exciting the immediate communities within any organization, in order to create a connection to the mission and values of that organization. The 20-Year Vision effort allowed for this very engagement to occur within the 30 initial members. These members, in turn, took on the roles of ambassadors within their generational, as well as workplace community, to help motivate and inspire those around them to be more passionate about their work and feel connected to the Johnson Space Center and NASA missions.

IMPACT

Upon completion of their tasks, the 20-Year Vision Team presented their work to several groups across the JSC community, including the JSC Center Director and his Senior Staff, the Joint Leadership Team (senior JSC and contractor managers), the Lockheed Martin Leadership Association, ESCG Senior Staff, and at a number of open forums at JSC. The team also hosted a cross-generational discussion to gain additional insight into the acceptance of the vision by employees within the JSC community.

Inclusion and Innovation Council

The presentations made by the JSC 20-Year Vision Team and subsequent discussions around the center spurred a response within JSC senior management to begin implementation of several of the tactics presented by the team. The resulting initiative, known as the JSC Innovation & Inclusion (I&I) Council, organized small groups of employees across the civil servant and contractor community into I&I Engagement Teams targeted at specific JSC-improvement projects. These teams allowed employees with varying levels of work experience across the JSC community to participate in the

development of recommendations targeting key areas of concern to senior management, including:

- Information Technology
- Recruiting and Ultimate Employee Experience
- Communications
- Mentoring
- Work/Life Fit
- Awards and Recognition
- Barrier Analysis

As a result of the contributions by the members of the 20-Year Vision Team, JSC senior management specifically requested representation from the team within each I&I engagement team. Each team also consisted of employees across the JSC community, as well as JSC and contractor senior management. Over the course of several months, the teams worked together to generate several recommendations that were presented to the I&I Council and the Joint Leadership Team. These recommendations, ranging from a revamping of the current Mentoring Program to the development of a physical Collaboration Center to the introduction of innovative awards, were subsequently evaluated for feasibility and many are currently being implemented throughout JSC and contractor organizations.

In contrast to the 20-Year Vision effort, some members of the I&I Engagement teams were able to use limited time during their workweek to contribute towards their particular project. This resource encouraged participation across the center, as team members were able to contribute as a part of their assigned tasks.

Project Blue Moon

As a follow-on activity, the JSC APO once again gathered the members of the 20-Year Vision Team together. This time, along with several motivated employees around the center, they were asked to help with the development of a new online tool, in hopes of spurring collaboration across JSC and the Jet Propulsion Laboratory (JPL). Just as was observed during the development of the 20-year vision, leaders emerged once again within the group to create the basis for a pilot project known as Project Blue Moon, whose purpose was to demonstrate the value and use of multi-disciplinary collaboration across both JSC and JPL. A new team gathered through the recruitment efforts of members of the original 20-Year Vision Team to develop the guidelines and requirements for an online tool that encourages

problem-sharing and collaboration to generate solutions.

Approximately 40 individuals are working to beta-test the tool and demonstrate a proof-of-concept. Upon completion of the beta test, lessons learned will be gathered from the participants of the pilot study in order to make modifications for a wider-release to the JSC and JPL communities.

Support for Project Blue Moon from senior management at the center allowed participation from a more diverse group of employees across the JSC community. Once again, as seen during the 20-Year Vision development, participants were motivated by the strong support from within their organization, leading to more active contributions throughout the pilot-study development process. Beyond that, the ultimate goal of the project is to connect every NASA center together in a collaborative professional network helping fellow employees on real problems.

Beyond JSC

A key theme that consistently came to the forefront of discussions throughout the 20-year vision development process, as well as the subsequent initiatives, was that of the importance of outreach. As discussed previously, the members of the team unanimously agreed that public interest in human spaceflight in the United States has waned significantly over the years. As these discussions progressed, another common thought prevailed: in order to gain interest within the general public, those within the JSC community must be passionate and excited to tell the tale of human spaceflight. The team members used this very notion to fuel their desire to make JSC more innovative, more collaborative, more exciting, and develop a vision and strategic plan that allowed for this to be achieved. Ultimately, it is still the wish of every team member that this excitement about human spaceflight be conveyed not only across the JSC community, but across the agency, the United States, and the world.

CONCLUSIONS

Throughout this experience, the 20-Year Vision Team members discovered a collective passion for human spaceflight within themselves, their peers, and their colleagues. Through various discussions between themselves, their co-workers, and with others across the JSC community, the participants realized that they all had one trait in common: the desire to be invested in the future of the human

spaceflight program, within the center and the agency.

The 20-year vision development was just the beginning of a shift to understanding and appreciating the value of cross-generational, cross-disciplinary perspectives within the center. Over the last year and a half, JSC has embarked on incrementally creating an environment in which its employees can thrive and prosper, collaborate with their peers, and develop innovative products; all in support of human spaceflight.

The leadership lessons learned throughout the vision development process, as well as the subsequent center efforts, such as the I&I Council Engagement Teams and Project Blue Moon, will have great value for the young professionals within the JSC community in the coming years. Their experiences will shape the Johnson Space Center and NASA itself.

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APPENDIX A:

Key Themes and Thoughts from the Vision & Tactic Development Process

The vision for the future of JSC was developed from the ideas, principles, and values of the 20-Year Vision Team. To help better understand the context in which it was generated, the following key thoughts from those discussions are included.

- **Safety and mission success will always be number one:**
Above all things, adherence to technical excellence to fly safely and successfully will always come first. The qualities of professional excellence (discipline, competence, confidence, responsibility, toughness, teamwork, and vigilance) as defined in the Foundations of Mission Operations could not have been stated any better.
- **Why we explore:**
To ask questions about our place in the universe, inspire all generations to challenge what is considered impossible and create a better future for all of humanity
- **Engaging people is not just an opportunity; it is a reason for going in the first place.**
The future of human space exploration will not just be experienced by the few people who physically travel to space (initially), or the several thousand people who actually make it happen (aerospace industry). All of humanity will be enabled to experience space through participatory exploration because engaging people in the adventures we undertake is an underlying reason for exploring in the first place and we now have the ability to invite everyone to be a part of them.
- **Human spaceflight is about PEOPLE.**
In order to engage people in human space exploration, we must remember that it is *people* who make the exploration compelling. We need to share the compelling stories of our astronauts, our engineers, our managers, and those who are inspired to participate in our endeavors all over the world.
- **Beware the “Field of Dreams” paradox.**
The idea that "if we build it, they will come" will not adequately engage the public or the future workforce in the endeavors of human space exploration. Relying on this mentality will prove

dangerous to the sustainability of current and future manned space programs. Instead of the idea, "we just need to better tell people what we are doing" we should facilitate a discussion, both internally and externally about space, and allow people to contribute to our missions.

- **Empower people to use their talents to look at the same thing but to see something different.**
From Google: "Give the proper tools to a group of people who want to make a difference, and they will." Through empowerment, small changes begin to happen and, taken collectively, these small changes make an organization better.
- **Openness**
The term "openness" refers to a mindset that underlies a strategy for innovation and collaboration. By creating an open environment where employees can contribute to the missions of the Agency across multiple disciplines and diverse backgrounds and the public can participate in the science and exploration missions of manned spaceflight, mission success and the perceived relevance of mission success will be realized to a greater degree than the Agency has enjoyed to date.
- **The “why it can’t” mentality must go.**
Too often we are confronted by a mentality that explains to us, "why it can't". New ideas and methods are met with many reasons why they can't work and few reasons why they can or, further, what can be done to make them work. In order to "boldly push the limits of human space exploration", an environment that fosters innovation, empowers people to create and expand on new ideas, and takes advantage of the incredible benefits of collaboration must be implemented.
- **The world is connected today in ways that are shattering traditional communications concepts.**
Where previous generations have grown up absorbing information through one-way communications media, new generations experience the world through many-to-many communications media, and this has and will shape future generations differently. Participation and collaboration are now expected throughout all areas of communications.
- **But we still need traditional communications strategies.**

The world may be changing rapidly, but that doesn't mean we need to throw everything out the window. Traditional top-down, one-way communications media are necessary for the successful operations of any complex organization, though continuous organizational improvement requires the synthesizing of new ideas and approaches to consistently maintain the standards of excellence we value as a world leader in manned spaceflight.

- We don't have all the answers. As a generation of passionate, excited space professionals ready to make a difference in the world of space exploration, we must constantly inquire to understand the traditions and processes we use but also realize that we don't have all the answers. Our opinions and perspectives make up one piece of a larger puzzle, which will need all opinions and perspectives to make a complete picture.