Assessment and Plan for Organizational Culture Change at NASA

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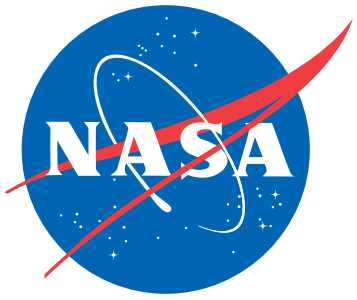

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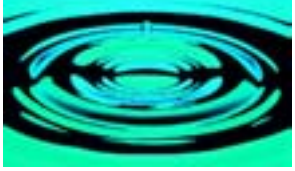


Executive Summary

On February 1, 2003, the Space Shuttle Columbia and its crew of seven were lost during return to Earth. A group of distinguished experts was appointed to comprise the Columbia Accident Investigation Board (CAIB), and this group spent six months conducting a thorough investigation of the causes of the accident. The CAIB found that NASA's history and culture contributed as much to the Columbia accident as any technical failure.

As a result of the CAIB and related activities, NASA established the objective of completely transforming its organizational and safety culture. BST was selected to assist NASA in the development and implementation of a plan for changing the safety climate and culture Agency-wide. The scope of this effort is to develop and deploy an organizational culture change initiative within NASA, with an emphasis on safety climate and culture.

The first task assigned to BST was to conduct an assessment of the current status and develop an implementation plan, both to be completed within 30 days. This report summarizes the assessment findings and the recommended implementation plan.

This assessment concluded that there are many positive aspects to the NASA culture. The NASA culture reflects a long legacy of technical excellence, a spirit of teamwork and pride, and a can-do approach to task achievement. In particular, culture attributes related to work group functioning at the peer level are among the strongest we have seen. These characteristics are consistent with NASA's rating in the 2003 Office of Personnel Management Survey at the top of the Best Places to Work in the Federal government.

Despite these positive attributes, there are some important needs for improvement. The present NASA culture does not yet fully reflect the Agency's espoused core values of Safety, People, Excellence, and Integrity. The culture reflects an organization in transition, with many ongoing initiatives and lack of a clear sense at working levels of "how it all fits together."

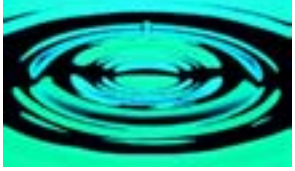
Manifesting NASA's espoused core values in the culture:

- **Safety** is something to which NASA personnel are strongly committed in concept, but NASA has not yet created a culture that is fully supportive of safety. Open communication is not yet the norm, and people do not feel fully comfortable raising safety concerns to management.
- **People** do not feel respected or appreciated by the organization. As a result the strong commitment people feel to their technical work does not transfer to a strong commitment to the organization.
- **Excellence** is a treasured value when it comes to technical work, but is not seen by many NASA personnel as an imperative for other aspects of the organization's functioning (such as management skills, supporting administrative functions, and creating an environment that encourages excellence in communications.)

- **Integrity** is generally understood and manifested in people's work. However, there appear to be pockets where the management chain has (possibly unintentionally) sent signals that the raising of issues is not welcome. This is inconsistent with an organization that truly values integrity.

There is an opportunity and need to become an organization whose espoused values are fully integrated into its culture - an organization that "lives the values" by fostering cultural integrity. We recommend an initiative with that as its theme.

The recommended initiative should address working through existing leaders to instill behaviors consistent with the Agency's values and the desired culture, while also establishing the foundation for developing future leaders who will sustain that culture and individual contributors who reflect the desired culture in their actions. A long-term (three year) plan is identified with a specific series of actions identified for the first five months to launch this effort.



Introduction

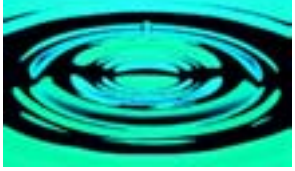
On February 1, 2003, the Space Shuttle Columbia and its crew of seven were lost during return to Earth. A group of distinguished experts was appointed to comprise the Columbia Accident Investigation Board (CAIB), and this group spent six months conducting a thorough investigation of the causes of the accident.

The CAIB issued its report in August 2003 with findings focused on three key areas: (1) systemic safety cultural and organizational issues, including decision making, risk management, and communication; (2) requirements for returning safely to flight; and (3) technical excellence. The CAIB found that NASA's culture and related history contributed as much to the Columbia accident as any technical failure.

As a result of the CAIB and related activities, NASA established the objective of completely transforming its organizational and safety culture. At a minimum, NASA targeted making measurable progress in changing its culture within six months; being able to demonstrate significant transformation in its culture within a year; and having broad changes in effect across the Agency over a period not to exceed three years. The six-month marker was identified as particularly critical as the Agency prepares to Return to Flight.

BST was selected to assist NASA in the development and implementation of a plan for changing the safety climate and culture agency wide. The scope of this effort is to develop and deploy an organizational culture change initiative within NASA, with an emphasis on safety climate and culture. BST was asked to provide for a systematic, integrated, NASA-wide approach to understanding the prior and current safety climate and culture norms, and to diagnose aspects of climate and culture that do not support the Agency's effective adoption of changes identified by the CAIB. BST was further asked to propose a course or courses of action that will change behaviors and introduce new norms that will (1) eliminate barriers to a safety culture and mindset; (2) facilitate collaboration, integration and alignment of the NASA workforce in support of a strong safety and mission success culture; and (3) align with, but not duplicate, current initiatives already underway in the Agency such as One NASA and Return to Flight.

The first task assigned to BST was to conduct an assessment of the current status and develop an implementation plan, both to be completed within 30 days. This report summarizes the assessment findings and the recommended implementation plan.



Assessment of the Current Situation

2.1 Introduction

BST's first efforts were to understand the current culture and climate at NASA in order to identify focus areas for improvement. We approached this task with the belief that there was much that was positive about NASA's culture. Our challenge was to build from positive aspects of the existing culture, strengthening the culture and at the same time addressing the issues raised in the CAIB report.

By culture we mean the shared values and beliefs of an organization - commonly described as "the way we do things here." The culture can also be thought of as the shared norms for behavior in the organization, often motivated by unstated assumptions.

Where organizational culture comprises unstated assumptions that govern how we do things within an organization, climate describes the prevailing influences on a particular area of functioning (such as safety) at a particular time. Thus, culture is something that is more deeply embedded and long-term, taking longer to change and influencing organizational performance across many areas of functioning. Climate, on the other hand, changes faster and more immediately reflects the attention of leadership.

Behaviors, the actions people take, may be task-related, or may involve leadership or management activity. Culture influences behavior in that the group's shared norms and beliefs will influence what people do. However, leaders' behavior is an important influence on culture. Through the examples they set, the messages they send, and the consequences they provide, leaders influence the behaviors of others, as well as their beliefs about what is acceptable and what is valuable to the organization.

The assessment described in this report was based on review of previous work, a survey of NASA employees, and a program of interviews. These are described in the following sections.

2.2 Columbia Accident Investigation Board (CAIB) Report

The CAIB has produced a detailed report on the causes of the Columbia accident, and explicitly addressed "organizational causes" as a critical contributor. Specifically, the CAIB identified the following organizational cause of the Columbia accident:

"The organizational causes of this accident are rooted in the Space Shuttle Program's history and culture, including the original compromises that were required to gain approval for the shuttle program, subsequent years of resource constraints, fluctuating priorities, schedule pressures, mischaracterizations of the Shuttle as operational rather than developmental, and lack of an agreed national vision. Cultural traits and organizational practices detrimental to safety were allowed to develop, including: reliance on past success as a substitute for sound engineering practices (such as testing to understand why systems were not performing in accordance with requirements/

specifications); organizational barriers that prevented effective communication of critical safety information and stifled professional differences of opinion; lack of integrated management across program elements; and the evolution of an informal chain of command and decision making processes that operated outside the organization's rules." (CAIB Report, chapter 7, p 177)

The CAIB made specific recommendations for a number of structural changes to the organization, and identified a number of gaps in leadership practices important to safety. While there are no CAIB recommendations explicitly addressing leadership practices, our review of the CAIB report identified many examples of gaps in the leadership practices that support safety, such as:

- Failing to follow NASA's own procedures
- Requiring people to prove the existence of a problem rather than assuming the need to assure there was not a problem
- Creating a perception that schedule pressure was a critical driver of the program

2.3 Diaz report

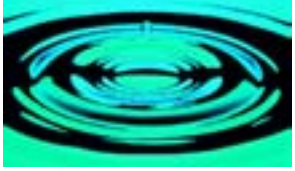
In late 2003, Administrator O'Keefe commissioned a detailed review of the CAIB report to determine which recommendations, observations, and findings (R-O-Fs) in the CAIB report have Agency-wide applicability to NASA and to develop measures to address each one. The team that conducted this review (led by Goddard Center Director Al Diaz and known as the Diaz team) produced a detailed report that identified a number of concrete improvement actions and recommended assignment of these actions to various units within NASA.

The Diaz Report indicates that the team focused on the organizational (as opposed to physical) causes identified in the CAIB report but that the team, in its own words, "did not do a broad, in-depth assessment of the cultural changes needed to address the organizational causes."

The Diaz team recommendations are divided into seven major topics:

- Leadership
- Learning
- Communication
- Processes and rules
- Technical capabilities
- Organizational structure
- Risk management

The Diaz report recognized that there was a broader need for culture change that the Diaz team was not addressing. They said "some of the recommended actions are those one might expect in an organization trying to change its culture, but the goals offered by the Team are intended only as a first step in the process."



Our review of the Diaz Team's recommendations indicates that they represent a series of important initiatives that will help support the kind of consistent performance excellence to which NASA aspires. However, we agree with the Diaz Team's observation that culture change requires more than these steps.

We believe that an organizational "trap" into which NASA must avoid falling is to think of its response to the CAIB report purely in a project-driven manner. The NASA culture tends to think in terms of identifying problems and solving them through discrete projects. Over the years NASA has proven to be outstanding at defining and executing projects. However a project is, by its very nature, something that has a discrete starting point and ending point. By identifying discrete projects that allow NASA to respond to specific items within the CAIB and Diaz Reports, the Agency could fail to address the underlying culture issues that gave rise to the need for these projects. One might speculate that this is a reason that safety climate changes observed after Challenger did not generalize and become part of the ongoing culture.

Changing the culture requires changing the organization's behavioral norms. The most efficient change strategy is for this change to begin with senior leadership. The strategy must be carefully designed to assure that each successive level of the organization has strong leadership consistently behaving in ways that exemplify the desired culture, thereby sending continuous signals about what the organization expects and values. Creating such leadership behavior is a challenge addressed by our recommended action plan.

2.4 Guiding Principles

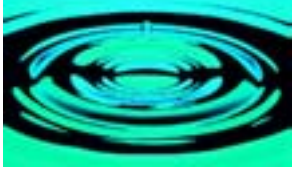
In late 2003, NASA Administrator O'Keefe requested the preliminary identification of a set of guiding principles that would help define the desired culture for NASA. The intent was to be able to describe the key attributes of a culture that would consistently deliver excellence in safety and mission success. These principles were based on a combination of what was known by experts about safety excellence, what the CAIB Report identified as issues within NASA, and some interviewing within the Agency.

Five guiding principles were identified for consideration. These are:

1. **Open communication** is encouraged and modeled
2. **Rigorously informed judgment** is the sole basis for decision-making
3. **Personal responsibility** is taken by each individual
4. **Integrated technical competence** is our shared value
5. **Individual accountability** is the basis for high reliability

Additional explanatory detail on these principles is included in an Appendix to this report.

The guiding principles, although not yet fully validated or rolled out within the Agency, represent a description of culture against which the existing NASA culture may be compared. Accordingly these principles were factored into the BST Safety Climate and Culture Survey administered within NASA.



2.5 Previous Culture Surveys

Previous culture surveys conducted at NASA were reviewed to provide historical perspective for this assessment.

During 2003, the Federal Office of Personnel Management (OPM) conducted a survey throughout the Executive Branch entitled the "Best Places to Work" survey. This survey measured employee attitudes about various aspects of their respective Agencies, and resulted in an overall ranking of Agencies and locations within Agencies.

NASA ranked highest among all agencies in this survey, and five NASA locations were in the top ten "subagencies" of the entire Federal government (including the top four.) This survey found strengths in teamwork, employee skills-mission match, and strategic management. The survey was also designed to identify areas in which each agency could make improvement, and at each NASA center the general category of "Leadership" was identified as an improvement target.

These findings were generally consistent with results NASA has obtained in its own previous surveys. While NASA has not conducted an Agency-wide culture survey in many years, there have been such surveys at several of the individual Centers within the last few years.

Langley conducted a culture survey in 2000 and again in 2002. The 2002 survey identified leadership as among the top areas for improvement. Similarly, Goddard conducted a culture survey in 2002, and found leadership to be an area for improvement.

In addition to these surveys, there have been annual Performance Evaluation Profile surveys to assess the safety programs, with the focus primarily on "industrial" safety. The PEP surveys do not address the same issues looked at in this present work. PEP surveys are positioned primarily at the program evaluation (not culture) level. In addition, in our experience it is not unusual to find differences in performance between industrial safety and systems or mission safety. The former generally involves issues that are more straightforward and where corrective actions have less potential to adversely impact program schedule and budget. Thus people's perceptions about the organization's readiness to deal with industrial safety can be quite different from their perceptions of the organization's readiness to address mission safety issues.

These previous surveys suggested that leadership was a general area in which there were improvement opportunities at NASA. However, the nature of the leadership improvement opportunity was not clearly defined by previous surveys.

2.6 BST Safety Climate and Culture Survey

2.6.1 Description of the survey

A specially modified version of the BST Safety Climate and Culture Survey was conducted at all 11 NASA locations. All NASA employees plus JPL employees were asked to complete the survey. Contractor employees were not included at this time. Employees were sent email notifications asking them to go to an Internet link where the survey could be completed anonymously.

The BST Safety Climate and Culture Survey measures and reports on the underlying organizational determinants of organizational culture and safety climate. It has long been recognized that safety climate and culture are key elements in safety performance improvement. While training, awareness, and incentive programs can result in short-term changes, it is the underlying culture that must be supportive for sustainable improvement to occur.

The items on the survey are organized into 11 scales, or groups of items that measure a particular aspect of organizational functioning. Nine of the scales are also grouped into three general factors, and these are predictive of excellent safety performance. The scales are:

A. Organizational Factor

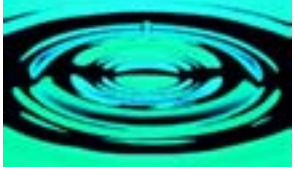
- **Procedural Justice.** (perceived fairness in actions by first-level supervisors)
- **Leader-Member Exchange.** (beliefs about the strength of employees' working relationships with the supervisor)
- **Management Credibility.** (perceptions about management's judgment, honesty, consistency, fairness, and openness in dealing with workers.)
- **Perceived Organizational Support.** (perceptions of the organization's concern for the needs and interests of employees)

B. Team Factor

- **Teamwork.** (perceived effectiveness of work groups to function effectively)
- **Work Group Relations.** (perceptions about how coworkers treat each other)

C. Safety Specific Factor

- **Safety Climate.** (perceptions of the extent to which the organization values safety)
- **Upward Communication.** (perceptions of the quality and quantity of upward communications about safety)
- **Approaching Others.** (beliefs about the likelihood that workers will speak up to a co-worker)



The additional two scales measure issues that are generally seen as important to strong performance:

Additional Scales

- **Social Efficacy.** (beliefs about the ability of workers to advocate a position to peers)
- **Reporting.** (tendency of employees to report incidents and deviations)

Survey scales are described in additional detail in an Appendix to this report.

Responses are provided on a five-point scale, ranging from "strongly agree" to "strongly disagree", with the mid point defined as "neither agree nor disagree."

The survey was administered to solicit information about mission safety, which was defined in the survey as follows: "Mission safety refers to the prevention and avoidance of injury, or damage to the mission or its hardware, in all aspects of NASA missions."

In addition to the basic survey scales, the survey was supplemented for use within NASA through the addition of approximately 30 additional questions. Those questions were designed to evaluate the current situation in comparison to the desired state described by the guiding principles, and to gather data on several specific culture-related issues raised by the CAIB report.

NASA and JPL employees were solicited to respond via an email invitation sent from NASA Headquarters. NASA Center Directors were also asked to encourage response. A second email request from headquarters was sent part way through the response period.

2.6.2 Survey validity

The basic BST Safety Climate and Culture Survey was developed based on extensive literature review, selection of validated constructs and related questions, and pilot testing. The survey has been administered to approximately 250 organizations over the last four years. Prior to this application of the survey, the basic survey questions were reviewed by a group of experienced NASA personnel, as were the NASA-specific questions added for this survey administration.

An overall response rate of 45.2% was obtained for NASA employees, while JPL's response rate was 14.4%. The response rate by location is shown in Table 1 (following page).

Survey Response Rates	(%)
NASA Headquarters	34.9
Ames Research Center	33.4
Dryden Flight Research Center	38.5
Glenn Research Center	32.4
Goddard Space Flight Center	24.5
Johnson Space Center	55.1
Kennedy Space Center	41.1
Langley Research Center	52.0
Marshall Space Flight Center	49.8
Stennis Space Center	45.2
Total Federal Employees	45.2
Jet Propulsion Laboratory	14.4

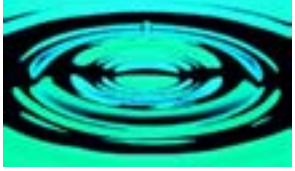
Table 1: Survey Response Rates

The Federal Employee response rate is comparable to response rates obtained on previous NASA culture surveys.[1]

Two tests were done to evaluate potential response bias in the sample of people who responded. Several demographic characteristics of the respondent group were compared to demographics of the overall NASA population, and the characteristics of the groups were found to be generally comparable. In addition, the first 10% of responses to be submitted were compared with the last 10% submitted to determine if people who responded immediately had different views from those who responded only after several rounds of request and encouragement. The former group had a slightly lower response on the Management Credibility scale, but otherwise there were no significant differences. These data are found in the Appendix of this report.

There were respondents who chose not to identify the organizational unit within their location with which they are associated (and in some cases they provided little other demographic information as well.) These responses represented 2.6% of all responses. (An additional 2.7% selected the organizational unit of "Other", which was offered as a choice on the survey although the expectation was that the list of units would comprehensively cover all NASA employees.) The percentage of responses that omitted organizational affiliation varied among NASA locations. Ames, Dryden, and Glenn had 5-6% of responses in this category, while Johnson and Kennedy had 1-2% in this category. BST's experience with this survey is that the median percentage of respondents who do not provide organizational unit identification is 8.8% of respondents. Even NASA sites with the highest rate of blanks in this category fall well below that median.

[1] E.g., Langley Organizational Performance Survey 2002, Goddard 2002 Culture Survey



It is reasonable to infer that those not indicating their organizational unit may have a high level of concern about the potential for adverse consequences that could result from expressing their opinions. There may be additional people with similar concerns who chose not to respond to the survey at all, and who could be underrepresented in the pool of survey respondents. To the extent that the views of this "no affiliation" subgroup differ from the overall results, it is worth noting.

The responses of the group not identifying organizational unit affiliation are lower than the overall NASA average on all survey scales. The general pattern of scale results is the same for the "no affiliation" respondents as for other respondents, but their scores average 0.25 lower on the survey's five-point response scale. The largest difference (0.41) is on the Management Credibility scale, which is expected among people who are especially concerned to protect their anonymity. The responses of the group not identifying organizational unit affiliation also differ from the overall survey response on many of the NASA-specific questions. These differences are a "red flag." Where open communications are recognized as critical to the culture NASA wishes to create, having a group that feels inhibited from speaking up is problematic. This tends to confirm that an important target for the culture change effort will be building leadership behaviors at all levels that encourage and reinforce open communications.

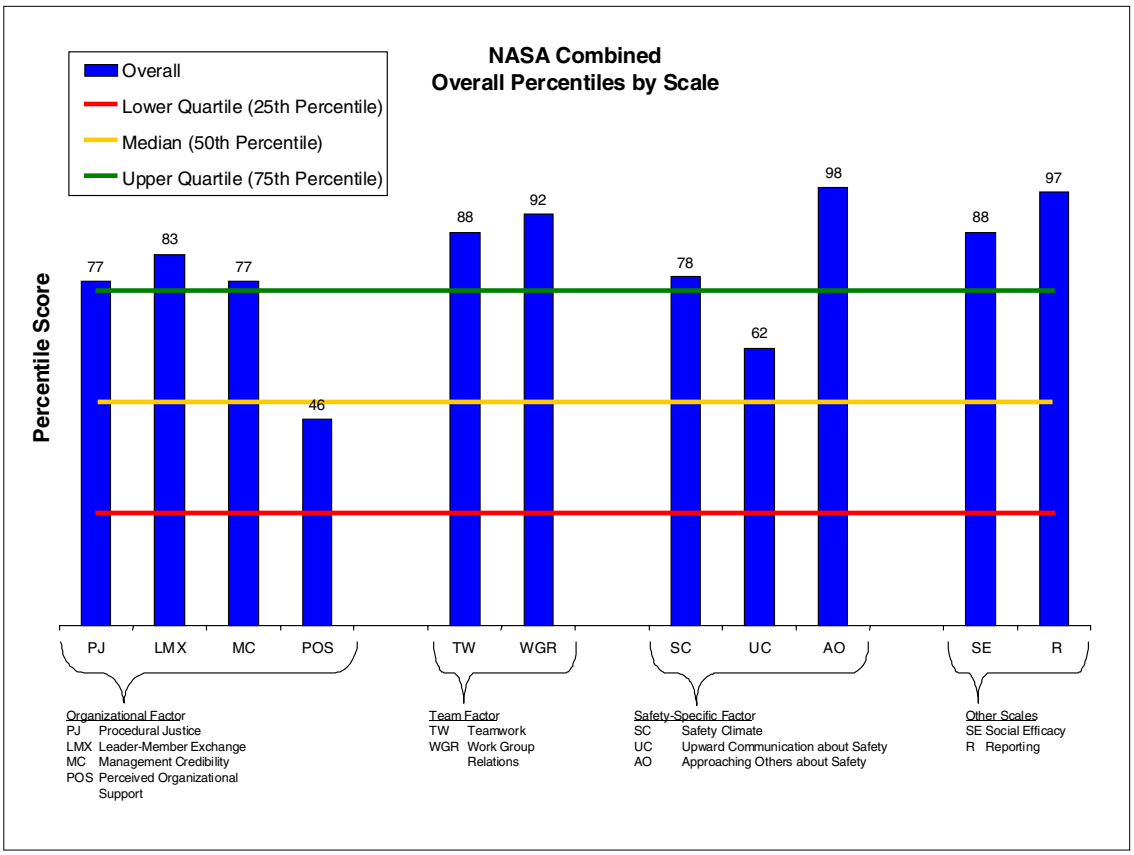


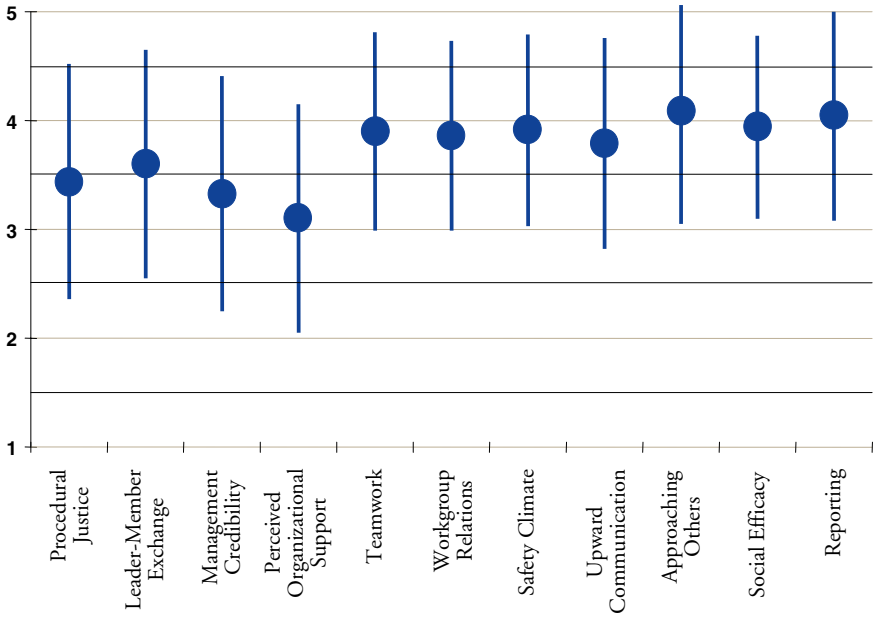
Figure 1: Agency-wide Percentile Results

2.6.3 Survey results

The survey provided a wealth of valuable and interesting data that can be used to explore a variety of issues. The data have been used thus far to assist in the development of the plan for culture change, and the most central findings from that analysis are presented in this report.

Agency-wide response to the basic survey scales is shown in Figure 1 (percentile scores) and Figure 2 (mean and standard deviation scores). The percentiles in Figure 1 reflect comparison of NASA with a normed database compiled by BST using this survey. The norms database includes 222 organizations, ranging from manufacturing to research to construction and transportation organizations. The commonality of these organizations is that they have an interest in safety improvement.

At an Agency-wide level, NASA scores well in relation to other organizations in the database on most of the scales comprising the survey. The NASA scores are above the 90th percentile on Approaching Others, Work Group Relations, and Reporting, and between the 80th and 90th percentiles for Social Efficacy, Teamwork, and Leader/Member Exchange. These results indicate that as a generality across the Agency, there is effective team functioning at the local level with employees who have the ability and inclination to speak up to peers. However the raw scores on these scales range from 3.60 to 4.09 on the five-point scale. Given the objective of cultural excellence it would be desirable to achieve consistent scores above 4.5 on these scales.



Scale:
5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Figure 2: Agency-Wide Results (mean and Standard deviation)

On this and subsequent figures, each circle indicates the mean of responses for an item. The vertical lines above and below each circle represent one standard deviation. That is, approximately 1/3 of individual responses fell within the range represented by the upper line, and 1/3 fell within the range represented by the lower line.

The two scales where NASA scores lowest are Perceived Organizational Support (46th percentile) and Upward Communication (62nd percentile.) Perceived Organizational Support (POS) measures perceptions about the organization's concern for the needs and interests of employees. Individuals' perceptions of organizational concern for them influence beliefs about the organization's values for safety. This influences employees' willingness to raise safety concerns. Upward Communication (UC) measures perceptions about the quality and quantity of upward communication about safety, the extent to which people feel encouraged to bring up safety concerns, and the level of comfort discussing safety-related issues with the supervisor.

Lower scores on Perceived Organizational Support and Upward Communication indicate areas for particular focus during the culture change effort. Senior management and the behaviors that they stimulate through the management chain influence both of these factors. These factors are also strongly influential on the culture in ways that relate directly to mission safety.

Perceived Organizational Support and Management Credibility are often related - that is, when one is low it is common for both to be low. However, in the NASA survey Management Credibility is relatively good (77th percentile, 3.33 raw score) while Perceived Organizational Support is the lowest scale. This suggests that while employees perceive that they are not valued by the organization, they also have a relatively good level of trust in management. That reflects an environment that will be receptive to management-led change.

Factor	Managers	Non-Managers
Procedural Justice	**3.37**	**3.45**
Leader-Member Exchange	**3.49**	**3.63**
Management Credibility	**3.57**	**3.28**
Perceived Organizational Support	**3.24**	**3.06**
Teamwork	3.92	3.90
Workgroup Relations	3.84	3.86
Safety Climate	**3.97**	**3.90**
Upward Communication	3.79	3.80
Approaching Others	**3.90**	**4.13**

Table 2: Manager and Worker Survey Scores

Bold values are statistically higher than **blue bold underlined** values ($p<.005$)

Looking across the nine core survey scales, managers' responses are very similar to non-manager responses. (See Table 2 on the following page. Managers are higher on three, non-managers are higher on three, and three are the same.) This is an unusual result. In most cases manager perceptions of how employees feel are higher than the actual non-manager perceptions. Having similar results among managers and non-managers indicates good alignment in perceptions - that is, managers understand how non-managers see things.

The scales on which management's scores are lower are those related to employee perceptions of their immediate supervisors. This indicates that immediate supervisors may be doing a better job than managers and supervisors collectively perceive; however the absolute scores of both managers and non-managers indicate that there is significant opportunity for improvement in this area.

The Upward Communications scale - one of the lowest in percentile terms on the survey overall - is one on which there is no difference between managers and non-managers. It is noteworthy that there is a common perception that this area is not strong, and this sets the stage for an improvement effort.

Results by role within the organization (Table 3) show that on scales characterizing employees' relationship to the organization, senior-most managers tend to have the highest scores, with team leaders and individual contributors lowest. This "stair step" pattern is evident in the Perceived Organizational Support, Management Credibility, and Safety Climate scales. This suggests that the higher up in the organization one goes, the farther removed one becomes from front-line employee perceptions of the organization. Specifically, the higher one is in the organization, the less one tends to see problems related to organizational support, management credibility, and safety climate.

One of the scales with this stair step pattern is Perceived Organizational Support. That scale is also one of the lowest scales overall in percentile terms, and is one of the lowest scales at every individual center. Perceived Organizational Support reflects the degree to which the employee feels supported and cared about. It leads to a sense of commitment and loyalty to the organization, which helps the organization achieve its objectives. At NASA we see a notable sense of commitment and loyalty to the technical work being performed, but much less commitment to the organization itself. This is an important improvement opportunity for the Agency.

On scales related to employees' perceptions of immediate supervisors (Leader/Member Exchange, Procedural Justice, and Upward Communication) there is generally no difference among roles. This is also true on scales related to perceptions of work group. However on the Reporting scale, individual contributor and team leader scores were higher than the scores of managers and above. This indicates that managers are more skeptical about employees' reporting of issues and deviations than are employees themselves.

	Procedural Justice	Leader-Member Exchange	Perceived Organizational Support	Management Credibility	Workgroup Relations	Teamwork	Safety Climate	Upward Communication	Approaching Others	Reporting	Social Efficacy
Executive Leader	3.51	**3.52**	**3.82**	**3.79**	3.85	3.92	**4.21**	3.89	4.03	**3.72**	3.85
Senior Leader	3.49	3.56	3.35	**3.73**	3.94	**4.03**	4.16	**3.91**	3.96	**3.80**	3.83
Manager or Supervisor	3.43	3.55	**3.22**	**3.59**	3.89	3.94	3.98	3.82	**3.96**	**3.71**	**3.80**
Team/Group Leader	3.42	**3.65**	**3.03**	**3.27**	3.88	3.92	**3.89**	3.85	**4.18**	**4.06**	**4.02**
Individual Contributor	3.43	3.58	**3.07**	**3.28**	3.84	**3.87**	**3.89**	**3.74**	4.09	**4.08**	3.93

Table 3: Score by Role

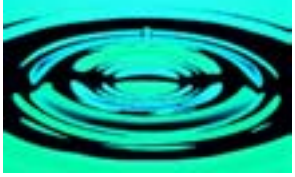
Blue bold underlined scores are statistically higher than the **red bold** scores ($p<0.005$)

Results categorized by occupational groups are shown in Table 4. Scores from the Technician group are lowest on most scales, and scores from the Scientists are also low on several scales. On Upward Communication, a scale with relatively low overall results, Scientists' scores are lowest of all groups and significantly lower than Engineers. Scientists' scores are also among the lowest on Perceived Organizational Support.

Occupational Group	Procedural Justice	Leader-Member Exchange	Perceived Organizational Support	Management Credibility	Workgroup Relations	Teamwork	Safety Climate	Upward Communication	Approaching Others	Reporting	Social Efficacy
Clerical	**3.72**	**3.74**	**3.35**	**3.49**	3.81	**3.98**	**4.07**	3.79	**3.87**	**4.07**	**4.00**
Professional/Administrative	3.44	3.60	**3.18**	**3.36**	**3.84**	3.89	**3.99**	3.76	4.04	3.98	3.94
Engineer	3.45	**3.63**	3.08	**3.37**	**3.91**	3.92	3.90	**3.84**	**4.17**	**4.05**	**3.96**
Scientist	**3.37**	3.59	**2.89**	3.27	**3.89**	3.94	**3.81**	**3.73**	**4.08**	3.95	3.90
Technician	**3.28**	**3.42**	**2.96**	**2.98**	**3.70**	**3.76**	**3.76**	3.75	**4.07**	**3.94**	3.91
Other	**3.37**	**3.52**	3.04	3.25	**3.74**	**3.83**	**3.86**	3.75	4.01	3.95	**3.88**

Table 4: Occupational Group Scores

Blue bold underlined scores are statistically higher than the **red bold** scores ($p<0.005$)



Results categorized by years of NASA service (Table 5) show an interesting pattern. Those with less than five years service and those with more than 35 years of service tend to have the highest scores on most survey scales, while there is no difference based on length of service for those with five to 35 years of service. Those with more than 35 years of service (comprising more than 5% of survey respondents) entered the Agency prior to 1970, and so have roots in the days of the Apollo program when we have been told that the Agency had a uniquely strong culture and a powerful sense of purpose and achievement. Those with less than five years service did not experience the most dramatic (and by many accounts traumatic) changes that occurred during the 1990s at the Agency.

Years at NASA	Procedural Justice	Leader-Member Exchange	Perceived Organizational Support	Management Credibility	Workgroup Relations	Teamwork	Safety Climate	Upward Communication	Approaching Others	Reporting	Social Efficacy
1-5	**3.51**	**3.68**	**3.26**	**3.49**	3.88	3.91	3.92	3.78	4.09	4.02	3.97
6-10	3.43	3.62	**3.07**	**3.30**	**3.82**	3.90	**3.84**	3.76	**4.14**	4.00	3.93
11-15	3.42	3.60	**3.06**	**3.31**	**3.84**	3.88	3.91	3.80	4.11	4.02	3.95
16-20	**3.40**	3.57	**3.06**	**3.28**	**3.85**	3.89	3.91	3.80	4.10	4.01	3.93
21-25	3.43	3.58	**3.01**	**3.29**	3.87	3.91	3.94	3.81	**4.13**	4.04	3.94
26-30	**3.35**	**3.53**	**3.01**	**3.22**	**3.80**	3.87	**3.84**	3.74	**4.00**	3.95	3.86
31-35	3.43	3.55	**3.08**	3.35	3.87	3.92	3.96	3.81	4.06	3.98	3.94
More than 35	**3.50**	**3.64**	3.15	**3.45**	**3.98**	4.01	**4.01**	3.84	4.11	4.05	3.97

Table 5: Score by Length of NASA Service

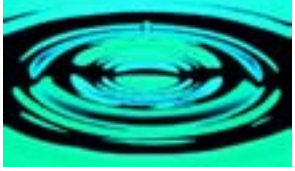
Blue bold underlined scores are statistically higher than the **red bold** scores ($p<0.005$)

We also examined results based on program involvement (Table 6). To do this we isolated those who reported spending more than 80% of their time on a single program and then compared results by program. These results showed that the Biological Sciences Research Program had lower

	Procedural Justice	Leader-Member Exchange	Perceived Organizational Support	Management Credibility	Workgroup Relations	Teamwork	Safety Climate	Upward Communication	Approaching Others	Reporting	Social Efficacy
Aeronautics technology	3.38	3.56	2.94	3.23	3.86	3.88	3.84	3.81	4.17	3.97	3.90
Astronomical search for origins	3.30	**3.42**	3.04	3.32	3.79	3.93	**3.73**	**3.55**	4.07	**3.88**	3.85
Biological sciences research	**3.20**	**3.39**	**2.70**	**3.15**	3.83	3.91	3.79	3.67	4.14	3.97	3.97
Business operations and human resources	3.37	3.51	3.11	3.37	3.76	3.89	3.93	3.72	4.12	4.06	3.97
Earth system applications	3.36	3.68	**2.83**	3.25	3.72	3.83	**3.70**	3.60	4.14	**3.86**	3.91
Earth system science	3.45	3.63	2.95	3.39	3.90	3.95	3.77	3.67	4.11	4.02	3.90
Education	3.30	3.48	**3.23**	3.23	3.87	3.88	3.98	3.71	4.05	3.98	3.86
Human & robotic technology	3.34	3.56	3.11	3.43	3.87	3.87	3.84	3.70	4.01	**3.88**	3.86
Mars exploration	3.25	3.59	2.95	3.34	3.97	4.00	**3.74**	3.60	4.13	4.00	3.90
Physical systems research	**3.20**	3.48	3.08	3.23	3.72	3.72	3.81	3.66	4.05	3.92	3.84
Research partnerships & flight support	3.35	3.55	3.02	3.28	**3.69**	3.75	3.93	3.78	4.08	4.04	3.93
Solar system exploration	3.42	3.68	3.09	3.44	3.98	3.97	3.84	3.73	4.25	**4.14**	4.03
Space flight support	3.42	3.54	3.13	3.36	3.80	3.85	3.92	3.78	4.08	4.07	3.93
Space shuttle	3.56	3.70	**3.23**	3.52	3.98	3.97	**4.09**	**3.95**	4.21	**4.20**	4.01
Space station	3.53	3.67	3.19	3.46	3.92	3.95	**4.09**	**3.94**	4.19	**4.14**	4.01
Structure & evolution of the universe	**3.69**	**3.78**	3.20	**3.66**	4.00	4.09	4.01	3.84	4.27	**4.29**	3.93
Sun-Earth connections	**3.65**	**3.90**	3.16	**3.65**	**4.08**	4.07	3.88	3.70	4.05	**4.22**	3.92
Transportation systems	3.42	3.59	3.03	3.29	3.92	3.95	3.96	3.85	4.10	4.01	4.00

Table 6: Score by Program

Blue bold underlined scores are statistically higher than the **red bold** scores ($p<0.005$)
Includes respondents indicating >80% of time spent on this program



scores than others, but there was little variation otherwise. The Space Shuttle Program and Space Station Program had relatively strong scores on Upward Communication, which may reflect the emphasis on this topic within Shuttle and Space Station since the CAIB report. These scores are encouraging, as the human space flight programs, with their high risk profile and high complexity, require exceptional strength in the safety-related scales. While the scores on these scales for Shuttle and Space Station are relatively high, we believe that these programs should be setting targets in absolute terms that are essentially second to none (e.g., 99th percentile.)

The location-by-location results (Tables 7 and 8) show general consistency among Centers, with the exceptions of Glenn and Stennis, which have lower scores but reflect the same general pattern of lower scores on Perceived Organizational Support and Upward Communication. Other than Glenn and Stennis, there tends to be little variation among Centers on any of the survey scales. This overall consistency indicates that a consistent basic approach to culture change should be effective throughout NASA.

While the overall scores show general consistency, there are noteworthy observations in the center-specific data. These observations are found in the appendices of this report.

Center	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Organizational Support	Teamwork	Workgroup Relations	Safety Climate	Upward Communication	Approaching Others	Reporting	Social Efficacy
Ames	3.40	**3.57**	3.31	3.00	**3.89**	**3.84**	3.81	3.77	4.06	3.96	3.91
Dryden	**3.32**	**3.54**	3.26	3.01	**3.90**	3.81	**3.93**	**3.83**	4.07	**3.94**	3.89
Glenn	**3.19**	**3.36**	**3.04**	**2.90**	**3.72**	**3.70**	**3.68**	**3.64**	4.01	**3.92**	**3.83**
Goddard	**3.51**	**3.65**	**3.43**	**3.11**	**3.91**	**3.86**	**3.78**	**3.65**	4.03	**4.02**	3.90
HQ	**3.30**	3.52	**3.21**	**3.14**	**3.80**	3.79	3.85	**3.64**	**3.97**	**3.95**	**3.85**
Johnson	3.45	**3.64**	**3.38**	3.03	**3.96**	**3.89**	**3.80**	3.72	**4.12**	**4.06**	3.91
JPL	3.48	**3.65**	**3.45**	**3.15**	**3.96**	**3.91**	**4.05**	**3.87**	**4.13**	**4.11**	**3.97**
Kennedy	**3.56**	**3.70**	**3.44**	**3.27**	**3.93**	**3.90**	**4.03**	**3.94**	**4.14**	**4.13**	**4.03**
Langley	3.39	**3.57**	**3.21**	3.00	3.86	**3.84**	3.87	**3.81**	**4.10**	3.98	3.90
Marshall	**3.53**	**3.66**	**3.38**	**3.18**	**3.94**	**3.90**	**4.02**	**3.87**	**4.09**	**4.11**	**4.02**
Stennis	**3.20**	**3.36**	**3.21**	**3.10**	**3.74**	**3.70**	3.88	3.70	4.04	**3.95**	**3.84**

Table 7: Center by Center Results (raw scores)

Blue bold underlined scores are statistically higher than the **red bold** scores ($p<0.005$)

Center	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Organizational Support	Teamwork	Workgroup Relations	Safety Climate	Upward Communication	Approaching Others	Reporting	Social Efficacy
Ames	72	**78**	74	35	**88**	**92**	64	51	96	90	78
Dryden	**57**	**78**	70	35	**88**	86	**83**	**73**	96	**90**	78
Glenn	**36**	**39**	**44**	**21**	**50**	**66**	**48**	**34**	92	**86**	**64**
Goddard	**82**	**89**	**84**	**46**	**88**	**92**	**64**	**34**	96	**95**	78
HQ	**57**	72	**66**	**53**	**71**	86	72	**34**	**87**	**90**	**64**
Johnson	82	**89**	**84**	53	**93**	**94**	**92**	73	**99**	**98**	88
JPL	77	**89**	**81**	**41**	**93**	**94**	**64**	**41**	**98**	**97**	**78**
Kennedy	**88**	**95**	**84**	**68**	**93**	**94**	**92**	**88**	**99**	**99**	**98**
Langley	72	**78**	**66**	35	81	**92**	72	**62**	**98**	95	78
Marshall	**88**	**89**	**91**	**61**	**93**	**94**	**88**	**73**	**98**	**98**	**95**
Stennis	**36**	**39**	**66**	**46**	**60**	**66**	78	41	96	**90**	**64**

Table 8: Center by Center Results (percentile scores) **Blue bold underlined** scores are statistically higher than the **red bold** scores ($p<0.005$)

In addition to the basic survey scales, this survey included a series of NASA-specific questions. The NASA specific questions have been grouped into several thematic areas, the first of which is guiding principles. A series of questions was asked to determine employees' perceptions of how well NASA currently reflects those principles, and whether this has changed since the Columbia accident. Figures 3 and 4 (following) show the responses to these questions.

There is slight to moderate agreement regarding perceptions that the guiding principles are being reflected in NASA's activities. While there tends to be agreement that these principles are exhibited at NASA, we believe that NASA must have strong agreement by employees that these practices are in place in order to reach the objective of cultural integrity. NASA is engaged in highly complex missions with serious risk and significant uncertainty. That operating environment, inherent in NASA's mission, demands exceptional and unambiguous implementation of the guiding principles. Therefore while the survey results are not poor, they should be seen as representing a platform from which to build necessary improvements.

There is general agreement that there has been improvement in the degree to which NASA's safety climate reflects the guiding principles since the Columbia accident (Figure 4.) This forms a good foundation on which to build efforts to strengthen and institutionalize leadership practices consistent with the guiding principles.

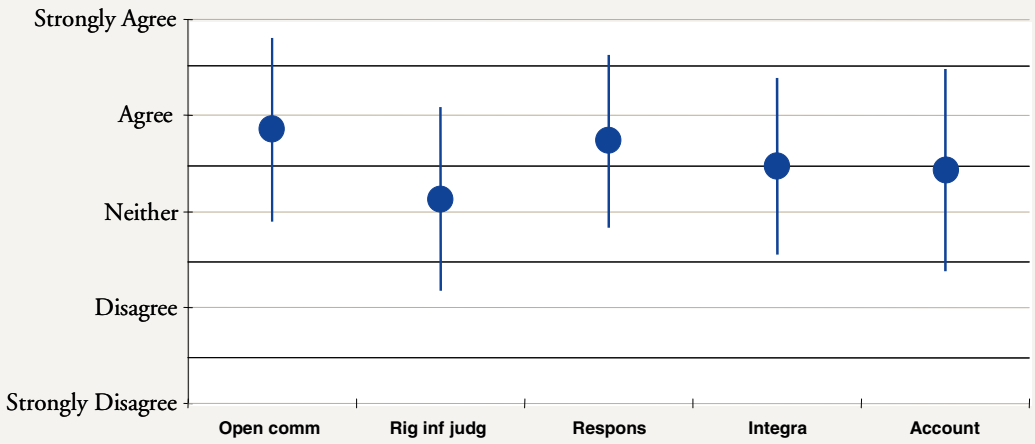


Figure 3: Overall Responses to Guiding Principles Question.

Questions[2]:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
- **Integra:** There is integration of mission safety considerations with engineering, cost, and schedule considerations within our Center
- **Account:** Individuals are held accountable for following procedures within our Center.

[2] On all questions the form used at Headquarters asked about Headquarters rather than "our Center".

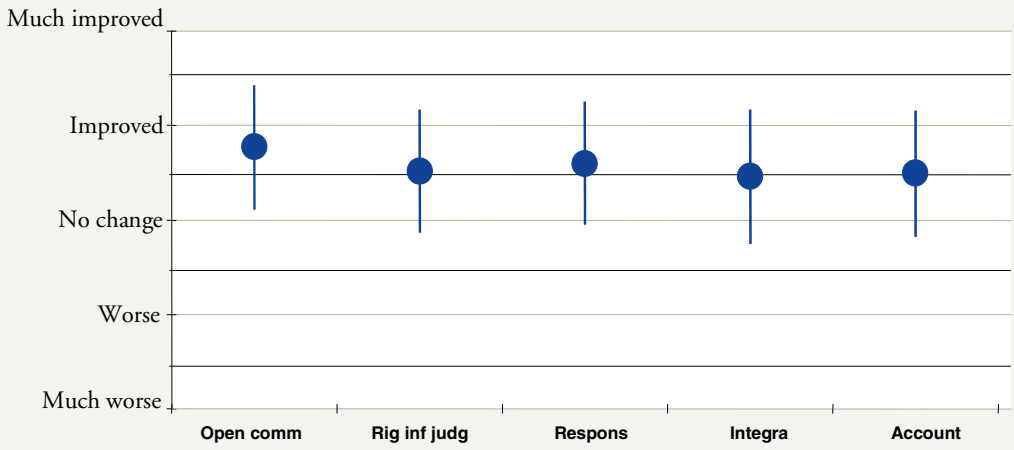


Figure 4: Overall Responses on Changes in Exhibiting Guiding Principles

Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
- **Respons:** How has individuals' taking personal responsibility for mission safety changed within your Center since the Columbia accident?
- **Integra:** How has integration of mission safety with engineering, cost, and schedule considerations changed within your Center since the Columbia accident?
- **Account:** How has individual accountability for following procedures changed within your Center since the Columbia accident?

The next group of NASA-specific questions asked about consistency between words and actions regarding mission safety. Employees were asked to provide perceptions about consistency between word and action among Agency leadership, managers and supervisors, and employees generally. Results are shown in Figure 5.

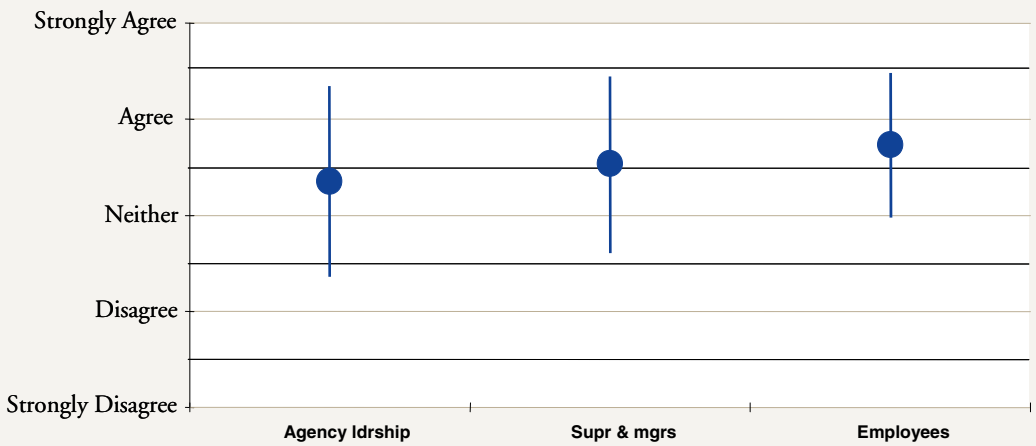


Figure 5: Perceptions of Consistency Between Words and Actions

Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
- **Employees' actions** are consistent with their words on mission safety.

These results indicate that employees see the least consistency between words and actions at levels highest above them. This suggests that leaders at the executive, senior, and mid levels need to concentrate on assuring that they do not send mixed messages and that they regularly and consistently employ practices that are consistent with their stated values and goals. Improving in this area is critical if culture change is to occur.

Cooperation, communication, and collaboration have previously been identified as significant issues within NASA. To explore this issue, questions were asked to examine cooperation between headquarters and centers, among centers, between programs and line organizations, and between NASA and contractors. Results are shown in Figure 6.

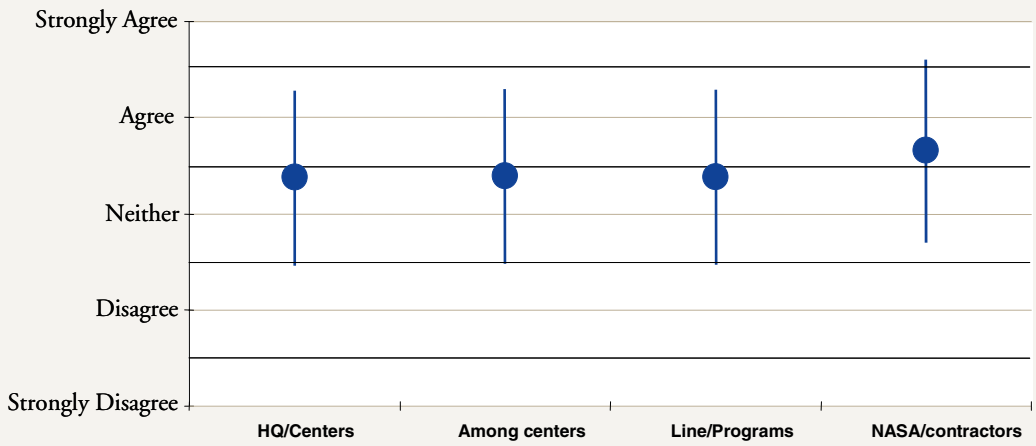


Figure 6: Cooperation and Collaboration

Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

These results indicate that employees perceive there is some (but not strong) cooperation and collaboration across organizational lines regarding mission safety. This represents an important improvement opportunity. The Diaz Report and One NASA recommendations have identified a number of process and structure issues that can contribute to strengthening collaboration and communication, but real improvement is unlikely to occur in a sustainable way unless there is effective leadership behavior in support of collaboration and communication.

A series of questions was asked to explore the presence of practices that could be inhibiting to mission safety. The practices asked about were:

- Budget constraints
- Schedule pressure
- Shortcutting procedures to achieve efficiency
- Acceptance of inconsistency with specifications based on prior history
- Brushing aside (rather than investigating) concerns

Results are shown in Figure 7.

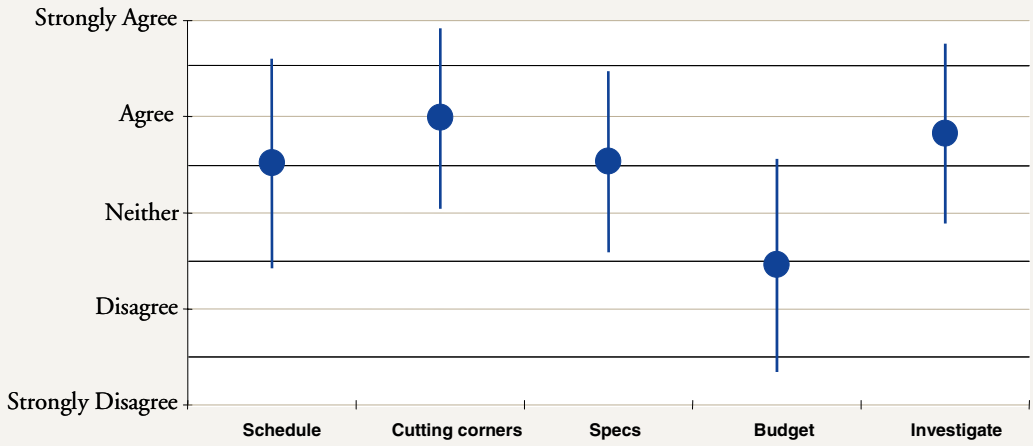


Figure 7: Potential Inhibitors

Questions[3]:

- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
- At this Center, when we know something works we *still* worry if it is inconsistent with the **specifications**.
- **Budget** constraints *do not* compromise engineering and mission safety
- Management at our Center wants to **get to the bottom of mission safety concerns** and not just brush them aside

There is a clear perception that budget constraints compromise engineering and mission safety. This calls for two kinds of leadership action. First, it is important for leadership to assure that the appropriate resources are allocated to mission safety and engineering, which may or may not be the case at this time. However, beyond assuring resources, leadership must be sure that appropriate two-way communication is occurring so that perceptions are based on facts, and so that leadership is sensitive to situations where there may be issues.

[3] Several of these questions were expressed on the survey in reversed form – i.e., agreeing was detrimental to mission safety. For consistent reporting, those data have been transposed so that high scores are desirable, and the questions modified as shown in italics to reflect the tranposition.

Beyond the budget issue, employee perception regarding willingness to accept deviation from specifications "when something works" and regarding the impact of schedules on safety deserve attention. With the current safety climate, where these issues have received a large amount of visibility, the fact that employees do not firmly agree in responding to those questions suggests that there continues to be uncertainty about leadership's "real" intent. These are issues that should be addressed through appropriate leadership practices and communications.

Questions regarding roles and impact on mission safety yielded encouraging response. As Figure 8 displays, employees feel connected to the issue of mission safety. The final group of questions addresses communications. Figure 9 displays responses to those questions.

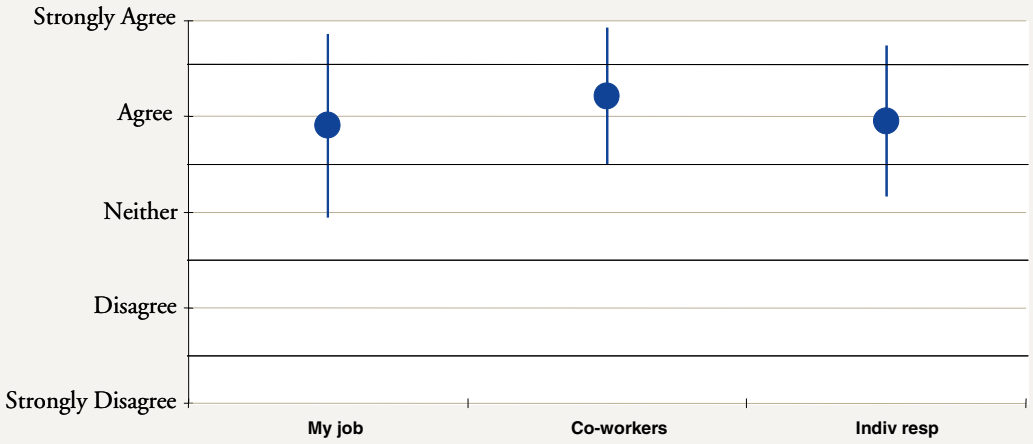


Figure 8: Employee "Connection" to Mission Safety

Questions:

- **My job** can have an impact on mission safety
- **My co-workers** believe that mission safety is critical to overall mission success
- **Individuals take personal responsibility** for mission safety within our Center

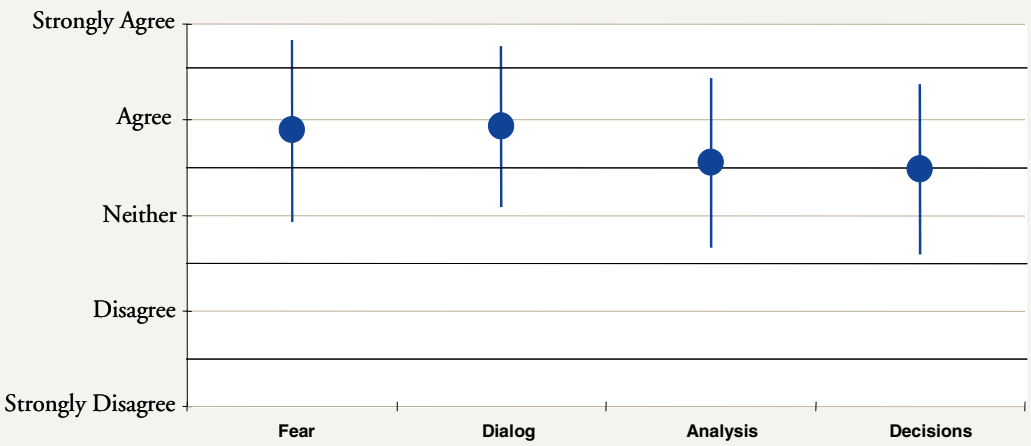


Figure 9: Communication

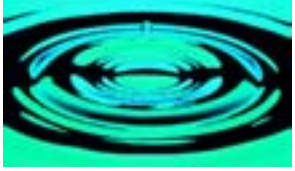
Questions:

- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

Variation in responses to NASA-specific questions among subgroups within the overall respondent pool follows patterns similar to those seen in the basic survey scales. On most NASA-specific questions there is a stair step pattern in responses among people with different roles, and those higher in the organization have more favorable responses than individual contributors and team leaders. Among occupation groups, technicians and scientists tend to have the lowest scores. Employees with more than 35 years service tend to have higher scores than others.

2.7 Interview Findings

To help provide context for the survey results, a series of interviews was conducted at representative locations. Interviews were conducted with more than 120 people at NASA Headquarters, the Glenn Research Center, and the Johnson Space Center. At each location individual interviews were conducted with members of the senior management, and group interviews were conducted with representative groups of individual contributors and supervisors and managers. The purpose of these interviews was to provide us with general background to help us interpret survey data.



We found that there is a strong sense of dedication and commitment to the Agency's work. However, there is frustration about a number of things.

Both at Centers and at Headquarters there are frustrations about the relationship between headquarters and the Centers. Neither side believes that communications are good or that there is good cooperation. There is also much concern about competition among centers. Both individual contributors and managers mention this as an issue.

During the interview program we received a number of indications that there are impediments to speaking up at NASA. On more than one occasion individuals would hang back at the end of a group session and either make comments after others had left or leave written notes expressing thoughts they had not brought up in front of others. These comments tended to be on the topic of barriers to communication. This is consistent with the Upward Communication survey result, and indicates that there is a group of non-managers within NASA who feel that open communication is impeded.

We also heard many comments indicating that there is variability in the leadership and management skill level of individuals in management and supervisory positions. A common theme in these comments was the issue of respect for individuals, and the need for some managers to act in ways that better reflect that value.

Individuals express concern about the relationship between NASA and its primary contractors. On many occasions we were asked if our assessment included contractors and were advised that they are a key part of the overall NASA culture. Where contractors are involved in operational work and function side-by-side with NASA personnel, they should be included in overall culture change plans.

There is also some degree of confusion around the wide variety of initiatives that have been launched. Among others, NASA is engaged in Return to Flight, One NASA, Freedom to Manage, Integrated Financial Management, the Diaz Report and its follow-up, the Clarity team, the present Culture Change initiative, and efforts to integrate the new national vision for space exploration into the Agency. There is overlap among these initiatives and their respective roles are not always clear to people.

2.8 Safety & Mission Success Week Data

In November 2003, NASA held Safety and Mission Success Week. During this week each Center Director was asked to collect feedback from his workforce on the CAIB report and the issues it raised.

The One NASA team analyzed data from the centers, identifying major themes. The summary of this data became available as this report was being prepared, and is consistent with the findings of this report. Several of the themes and specific issues identified from Safety and Mission Success Week input are important to culture change at NASA, including:

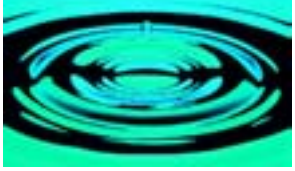
- Contractors treated as second-class citizens. This can result in inhibiting communications with the potential for impeding performance excellence.
- Lack of a process for delivering upward feedback. This is reflected in the survey scores for Upward Communication.
- Leaders do not follow words with actions. This contributes directly to lower Management Credibility.
- Message of "what" delivered without "why". This is likely to contribute to lower Management Credibility and lower Perceived Organizational Support.
- Culture that values and promotes respect and cooperation is needed. This is related to Perceived Organizational Support.
- Respect for others and cooperation - need for renewed emphasis on respect for each other.
- Embrace minority opinions - create an open atmosphere where disagreements are encouraged and new ideas/alternatives are pursued. This is consistent with survey findings that Upward Communication is one of the weakest scales measured.

2.9 Conclusions

The NASA culture reflects a long legacy of a can-do approach to task achievement but does not yet fully reflect the Agency's espoused core values of Safety, People, Excellence, and Integrity. The culture reflects an organization in transition, with many ongoing initiatives and lack of a clear sense at working levels of "how it all fits together."

Examining NASA's espoused core values:

- **Safety** is something to which NASA personnel are strongly committed in concept, but NASA has not yet created a culture that is fully supportive of safety. Open communication is not yet the norm, and people do not feel fully comfortable raising safety concerns to management.
- **People** do not feel respected or appreciated by the organization. As a result the strong commitment people feel to their technical work does not transfer to a strong commitment to the organization. People in support functions frequently do not fully understand or appreciate their connection to the Agency's mission, and people in technical positions do not fully value the contribution of support functions to their success.
- **Excellence** is a treasured value when it comes to technical work, but is not seen by many NASA personnel as an imperative for other aspects of the organization's functioning (such as management skills, supporting administrative functions, and creating an environment that encourages excellence in communications.)
- **Integrity** is generally understood and manifested in people's work. However there appear to be pockets where the management chain has (possibly unintentionally) sent signals that the raising of issues is not welcome. This is inconsistent with an organization that truly values integrity.

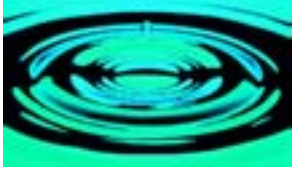


There is an opportunity and need to strengthen the culture's integrity by becoming an organization that ***lives the values***.

The culture change initiative should build on the strengths shown in the safety climate and culture survey. NASA employees generally work well as teams, like and respect each other, and feel comfortable talking to peers. These strengths can be harnessed to create reinforcement mechanisms for behaviors that support the Agency's values and desired culture.

The culture change initiative should also focus on helping managers and supervisors maintain an effective balance between task orientation and relationship orientation. At NASA many managers have a natural inclination toward task orientation, which is not unusual for technical organizations. However strong task orientation at the expense of relationship orientation can lead to inhibition of upward communication and weak perceived organizational support. By taking steps to help managers and supervisors improve their balance between task and relationship orientation, NASA can move toward integrating its values of safety and people into fabric of the organization, and creating a culture that will more effectively support NASA's mission.

The following section of this report describes our recommendations to help NASA ***live its values***.



Recommended Plan

3.1 Introduction

Based on our assessment, we have developed a recommended plan for implementing culture change within NASA. This plan recognizes that the NASA culture must be supportive of NASA's core values, spanning Safety, People, Excellence, and Integrity. The culture change effort is designed to encompass key culture elements addressing all of those areas, as well as culture elements of NASA's desire to become a better integrated, cohesive organization.

3.2 Background

We recommend an approach to cultural transformation based on the following core concepts:

Guiding principles must underlie the definition of desired culture

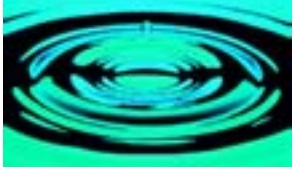
We believe that guiding principles get to the essence of what needs to be given priority in order to assure that objectives are reached. In the present context, guiding principles will serve as a framework for mission safety improvement at NASA. They will help inform everyone in the agency about the considerations that should be reflected in day-to-day actions and decisions. They set out the basis for the strategic considerations necessary for success and help assure that everyone understands the organization's expectations of them.

Having guiding principles is important because achieving excellence requires relying upon many individuals making judgments continuously throughout their work. We cannot create rules for every situation and variation, thereby eliminating the need for judgment. In the complex world in which NASA functions, the Agency must be able to rely on individuals making independent judgments about unexpected and unforeseen situations. Having principles that are well understood and embraced by members of the organization reduces the variability with which these judgments are made.

Assessment results indicate that there is not uniformity of adherence to the underlying principles that will lead to safety performance excellence. It is important that the guiding principles for safety-supporting culture be widely disseminated and embraced within NASA and that leaders throughout the Agency create an environment that supports these principles.

Both climate and culture are important

While identifying principles is an important first step, building these principles into the fabric of the Agency requires transforming the culture. By culture we mean the shared values and beliefs of an organization - commonly described as "the way we do things here." This concept is widely understood, but what is less widely understood is the relationship between organizational culture and safety climate. Both are critically important.



Where organizational culture comprises unstated assumptions that govern how we do things around here, climate is the prevailing influences on a particular area of functioning (such as safety) at a particular time. Thus, culture is something that is more deeply embedded and long-term, taking longer to change and influencing organizational performance across many areas of functioning. Climate, on the other hand, changes faster and more immediately reflects the attention of leadership. One can think of culture as background influence on the organization, while climate is foreground. Climate changes faster than culture.

Organizational climate often changes very quickly after a significant incident, but the underlying organizational culture may not change sufficiently to prevent further incidents from occurring. Since climate that is inconsistent with culture will not be sustained, a favorable safety climate following an incident does not assure real improvement unless steps are taken to shift the culture.

The current climate for safety in NASA is strong and favorable even though the culture will take significant time and effort to change. Since favorable organizational climate is a condition for successful culture change, this situation presents a limited-time opportunity to introduce new principles that could lead an Agency-wide cultural change initiative.

Assessment results confirm that the current climate for safety at NASA is strong. People throughout the Agency were deeply affected by the Columbia accident, and the NASA leadership declaration that the CAIB recommendations would be embraced, together with activities such as Safety and Mission Success Week, have created a positive climate for safety.

Leaders drive culture change (intentionally or unintentionally) through their behavior

In our experience, the key to changing culture is through leadership. In working with hundreds of organizations, we have studied the differences in safety results among organizations that are outwardly similar and have similar management systems. The primary differentiator between those achieving excellence and others is the quality of safety leadership.

Leaders influence safety through what they do and what they don't do. The leaders can express this influence intentionally or unintentionally. However, leaders with the right knowledge and skills can move the culture in desired ways and do so with accelerated results.

The ways in which leaders influence the behavior of others within the organization is well understood, as is the culture change that occurs when new behavioral norms are established. By using a set of behavior-based tools, organizations can undertake very concrete and specific initiatives to accelerate cultural transformation and can measure progress toward results.

Behavior-based methods can be used to create accelerated change within organizations as well as to assure that future leaders are selected and developed to sustain the desired culture. Our assessment results confirm the opportunities to use these tools for the change desired by NASA.

There should be one, single culture change initiative

NASA is in a period of change, with many active teams and task forces. Many of these have identified issues that relate to culture, and this raises the possibility that here could be overlapping, or even contradictory, initiatives.

For culture change at NASA to be successful, there should be a single culture change initiative that incorporates all of NASA's culture-related issues. The plan recommended in this report will be effective in addressing the culture change issues identified by various NASA work groups.

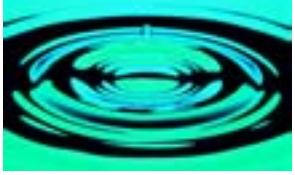
3.3 Recommended Approach

NASA has the objective of transforming the organizational culture within the next three years to help drive a commitment to excellence within the Agency. Within that overall objective, NASA has the specific objective of achieving measurable improvement in the culture within five months from the date of this report. That shorter-term objective is tied directly to NASA's Return to Flight (RTF) initiative.

In order to achieve cultural change of this magnitude across a large, decentralized, geographically dispersed agency, perseverance and strong support from senior agency leadership will be required. Cultural effects are systemic and enterprise-wide; accordingly cultural transformation requires a systemic, enterprise-wide approach.

Specifically, senior management alignment, focus, openness, teamwork and discipline will be required in ways that have perhaps never before been fully contemplated. Changes will be required in many deeply-embedded organizational systems and processes. Leadership attitudes, beliefs and behaviors will need to change in very significant ways, and sound management practices will be more important than ever. While it may seem daunting, culture change is possible, and the actions such as those outlined above will have the effect of creating the organizational conditions wherein the preferred culture will emerge, gain momentum, and ultimately flourish.

BST's recommended approach involves a comprehensive plan to achieve cultural transformation within three years. Specific implementation steps for the first six months are described in section 3.3.1, and the longer-term plan is described in section 3.3.2.



3.3.1 Specific near-term implementation steps

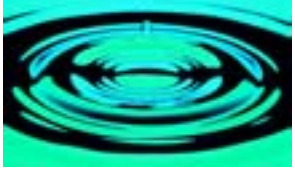
We recommend that the following steps be undertaken during months one through five:

1. Facilitate a one-day planning meeting with the appropriate NASA Agency executive leadership. This meeting will build upon all of the efforts that have already been completed by the Agency, and those which are currently underway. The strategic purpose of this meeting is to work with Agency leadership to "Align For Flawless Execution" (of the NASA Cultural Transformation). During this session we will help the team reaffirm agency values, consider the merit (or lack thereof) of various "Center Values", discuss and re-validate the recently developed Guiding Principles for Safety Excellence. Once this level of alignment has been achieved, we will assist Agency leadership in identifying and confirming the Critical Imperatives that represent the Agency's "do or die" imperatives. As the ability to measure progress pertaining to NASA's Critical Imperatives is essential, we will also work with the executive leadership group to identify leading and lagging indicators for each Critical Imperative.

2. Work individually with and provide Executive Leadership Coaching to the Administrator, Deputy Administrator, and Enterprise Associate Administrators plus SMA Associate Administrator (10 people in total). This is a detailed, confidential coaching process designed to help each leader understand his/her strengths and developmental needs, as well as to develop a very specific individual action plan for providing effective strategic leadership for the NASA Cultural Transformation and for "Living the NASA Values and Guiding Principles" within his or her organization. This step will involve:

   - Initial one-to-one meeting with the each leader being coached to discuss the Agency goals for the work, establish individual professional leadership improvement goals, and to identify the interview list for the personal assessment.
   - Initial personal assessment of each person using the BST Leadership Survey and 360° interviews with 8 to 12 individuals.
   - Preparation of a detailed assessment report and recommendations providing feedback on the individual leader's effectiveness in achieving his/her goals and advancing the organization's values. This is generally a 15-25 page individual report.
   - Individual coaching meetings between the coach and the leader. The first session will involve providing feedback on the assessment and developing an individual plan. Sessions for the Administrator will continue monthly throughout this performance period, and others will have two sessions after which case-by-case determination can be made on the value of continuing individual sessions.

3. Serve in a direct advisory capacity to support the organizational design activities and other system and process-related and structure-related initiatives that (e.g., One NASA, Clarity, Diaz, Return to Flight) currently under way at NASA (as well as other, functional HR/ Human Capital-related Systems and Processes). This will help NASA ensure consistency of approaches and philosophies, and that new organizational designs and process changes eliminate



unnecessary ambiguity regarding lines of authority, support the desired culture, and maintain adequate checks and balances.

4. Develop Center-specific implementation plans that integrate existing activities and initiatives where appropriate, but minimize the proliferation of multiple approaches, philosophies, models, methods, and terminology. We will visit each location and will:

   - Meet with the Center's leadership to present and discuss assessment survey findings and their implications.
   - Review the overall culture change plan.
   - Review the location's existing programs related to culture change, leadership, and team building. This will determine where there are existing efforts addressing culture change issues, and allow us to assess the consistency of any such efforts with the recommended approach.
   - Create a Center-specific implementation plan that allows us to integrate ongoing efforts and/or modify them as needed. The plan for each center will include detailed schedule and steps for implementing the approach described in the overall Agency plan.

   This approach will allow for the compilation of a NASA-wide needs analysis and current inventory, while also being responsive to urgent local requirements.

5. Begin analysis, design, development/customization and/or evaluation of pre-existing tools that will be required to support the Agency-wide rollout of cultural transformation activities. Specifically, significant analysis, design, and customization work will be performed to evaluate and finalize recommendations regarding the content of Team (and team member) Effectiveness Training and the Advanced Safety Leadership Assessment Centers for all management levels.

6. Implement the following culture change initiatives across the JSC Engineering Directorate and Mission Operations Directorate during this first five-month period.

   i. Individual leadership practices assessment and coaching.
   - Conduct individual assessments using the BST Leadership Survey and 360º interviewing of eight to twelve individuals for each leader, preparing a detailed leadership assessment for each leader. Leaders covered by individual assessments will be the Center Director, Office Directors for Engineering and Mission Operations, and the key direct reports of these office Directors.
   - We will conduct a leadership workshop for the Center Director, Office Directors for Engineering and Mission Operations Directorates, and Office Directors' key direct reports to review behavior-based leadership approaches.
   - Following the workshop we will conduct one-on-one coaching sessions with each leader to help them evaluate assessment feedback, develop action plans, and monitor progress on these plans. We will hold two to three individual meetings with each leader.

- For the other levels of management and supervision we will cascade down the leadership workshop but rely more heavily on group-based planning and use of the behavioral observation and feedback process (see below) to target individual working sessions.

ii. Implement a behavioral observation and feedback process including structured feedback and data analysis that will begin with all leaders, managers and supervisors and be cascaded down and through the organization to the individual contributor level. This process will target key leadership behaviors that promote rigorously open and honest, upward communication, proactively encourage minority and dissenting opinions, improve perceived organizational support, demonstrate respect for individual differences and diversity, and enhance cross-Center communication and problem-solving. The key steps in implementing this process are
   - NASA convenes an implementation team of supervisors and managers that BST trains in basic concepts of behavior-based leadership,
   - BST develops a "straw man" set of critical leadership behaviors tailored to the needs of these groups, the implementation team fine tunes this list and its operational definitions,
   - BST and the implementation team design the appropriate observation and feedback strategy,
   - BST trains people to be effective behavioral observers and provide behavioral feedback, and
   - BST helps the implementation team and the Center's leadership monitor the data produced by this process.

iii. Conduct comprehensive team effectiveness training (including team member training) for key NASA teams in which Engineering and Mission Operations personnel play key roles.

7. Implement the same culture change initiatives described in item 6 at the John Glenn Research Center. Detailed leadership assessment and coaching will be included for six individuals.

8. Implement the same culture change initiatives described in item 6 at the Stennis Space Flight Center. Detailed leadership assessment and coaching will be included for six individuals.

9. Work with the Kennedy Space Center Safety and Mission Assurance group to build organizational effectiveness. This will be the first step toward the broader objective of enhancing the effectiveness of Safety and Mission Assurance personnel throughout the Agency. This task will involve

   - Evaluating current roles of SMA personnel as seen by SMA itself and by leaders in other parts of the center.

   - Identifying behaviors and practices that can increase the actual and perceived value added by the group and its individual members.

   - Conducting alignment workshops for SMA staff regarding how they can (and could further) contribute to NASA's vision and values, and where they do (and could further) add value to the organization.

- Providing training in behavior-based tools with which staff can add greater value at the Center.

10. Perform an objective, detailed analysis of all NASA-sponsored leadership and management development programs and processes, succession planning and promotional processes. More than any other subject matter, these programs have long-term impact on leader/manager attitudes and beliefs—and thus, culture. NASA's Leadership and Management Development curriculum should provide a true best-of-class, competency-based, developmental track, while also supporting the desired cultural attributes. We will:

    - Review the content and design of existing leadership and management training programs.
    - Recommend changes that can make these programs most effective in promoting and supporting the desired NASA values and culture.
    - Develop recommendations for enhancing the current NASA competency model, especially leadership competencies and those competencies related to "Social Intelligence" (vs. technical competencies).
    - Begin developing the competency-based success profile for top leadership positions in the Agency. These activities will provide groundwork for subsequent implementation of enhanced succession planning, performance management and accountability systems, and competency-based promotion and selection.

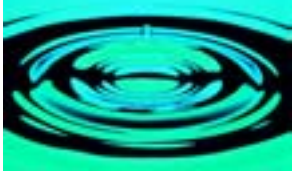
11. We recommend that key operating contractors be included in this effort, but our assessment did not include contractors. In order to develop an appropriate plan for how to best involve contractors, we will assess the ways in which contractors influence and are influenced by the NASA culture and make recommendations based on our findings.

12. Collect and evaluate measures of progress, including:

    - The data gathered through the behavioral observation and feedback process at JSC, GRC, and SSFC will be compiled and analyzed to evaluate changes in leadership practices that support key cultural attributes.
    - The BST Safety Climate and Culture Survey will be re-administered at the JSC, GRC, and SSFC, and possibly at one other center that will comprise a control group, at the end of five months. Results will be compared to the February 2004 survey that serves as a baseline.
    - A report on measurable progress seen during the five months of this effort will be delivered within three weeks of the closing of the survey.

13. Manage these efforts, maintaining close contact with NASA and providing NASA with a monthly progress report.

14. Work with NASA to devise a communications plan to disseminate the Values, Guiding Principles, and Critical Imperatives within the Agency, and to communicate effectively about the culture change initiative and its progress. We will develop themes, messages, and strategies for communicating during the five-month period.



3.3.2 Long-term plan

The following longer-term "roadmap" for culture change activities will follow the initial steps described in section 3.3.1. The plan is subject to modification based on lessons learned during the five month initial period. The plan also does not attempt at this stage to indicate the order of locations to be covered in steps where staged rollout occurs. Selection of order will be more meaningfully done in collaboration with NASA HQ after development of center-specific plans.

1. Behavioral leadership enhancement

Content: This is the set of initiatives being launched at JSC, Glenn and Stennis during months 1-5, and it will be rolled out agency-wide between months 7 and 36. This includes behavior-based Executive Leadership Coaching for senior leadership, leadership plan development for other levels of managers and supervisors, and implementation of behavioral observation and feedback processes. The long-term implementation strategy for this expansion will be designed based on experience during months 1 through 5.

Schedule: The current plan, subject to revision based on experience during the next few months, is to begin these initiatives at all remaining locations beginning in Months 7 and 8 through month 13. The current plan is that entire locations will not be done once, instead beginning in selected portions of each location. Each location will then be completed during a second "wave" of implementation during months 14-20.

2. Behavioral leadership enhancement phase 2

Content: Phase 2 involves follow-up working sessions with groups of managers and supervisors to review their behavioral observation and feedback processes, results, action plans, and barriers encountered. The purpose of these reviews is to reinforce integration of the process in the day-to-day life of NASA managers and supervisors, and to assure that the process evolves and develops in a way that best serves the needs of the organization.

Schedule: This will occur at each center approximately five months after completion of the initial implementation of the behavioral leadership enhancement process activities.

3. Behavior-based team effectiveness training

Content: This task involves comprehensive, organizational behavior-based team effectiveness training for intact teams, ad-hoc teams, team members and team leaders. This will help to improve the communications climate, communications effectiveness and overall team functioning. This intervention will be provided to both intra-center and inter-center teams, especially at the program/Project level. It will address topics including (but not limited to) Working as a Team; Running Effective Meetings; Valuing Differences and Minority Opinions; Reaching Group Agreement; Building Trust; Holding Your Ground Against Peer Pressure; Optimizing Team Performance;

Working Through Conflict; Adapting to Change; Feedback Fundamentals; Effective and Compelling Communication; Effective Interaction Skills; Goal Setting for Supervisors/Managers; Becoming a Learning Leader; Rapid Decision Making (in a high-stakes environment); Managing Performance Problems; and Scenario-Based Evaluation for all of above.

Schedule: This training will be provided in several modules that will be rolled out throughout the Agency during months 3 through 36.

4. Cognitive bias training:

Content: This is training for technical personnel and leadership throughout NASA to help them develop increased understanding of cognitive bias and its potential impact on decision making. This is important to creating an environment in which decisions are fully informed, and the right questions are raised and issues explored.

Schedule: This training will be rolled out center-by-center in an order to be determined in collaboration with NASA between months 9 and 27.

5. Safety & mission assurance effectiveness enhancement:

Content: This is the set of interventions that will be more fully defined through the initial work at KSC, and is designed to improve the actual and perceived effectiveness of the SMA groups throughout the Agency. Development of new, behavior-based training on Effective Leadership for Safety Professionals is likely to be at the center of this important improvement effort.

Schedule: It will be introduced in all locations in several stages. Three centers will be addressed during months 8 through 11, three more during months 14-17, and three more during months 21-25.

6. Competency-based assessment and selection systems for hiring and promotional decisions:

Content: This involves augmenting and enhancing the NASA competency model to include leadership competencies in greater detail; developing comprehensive competency-based assessment programs for use in future hiring decisions, promotion decisions and succession planning; and rolling these out through all Centers.

Schedule: Development work will occur during months 7 through 12 and rolling out during months 13 through 36.

7. Competency-based performance management system:

Content: Implement a competency-based (leadership and technical competencies) enterprise-wide, performance management/accountability system to achieve full alignment among Agency, Center and Program priorities, and internal and contracted requirements. This system will help clarify daily NASA leadership, supervisory and workforce responsibility, accountability and authority.

Equally as important, a competency-based system will ensure that Agency values become an operational focus, and "institutionalized". Further, this system will integrate the essential element of individual development plans for all NASA employees as part of leadership/managerial responsibility.

Schedule: Development work during months 7-9, with rollout to all locations during months 10-16 and follow-up support.

8. Success profiles for all supervisory/managerial/leadership jobs:

Content: Conduct competency-based job analysis for all leadership positions, and create success profiles to be utilized in all selection and promotion decisions, and as a "standard" against which individual development plans for existing leaders may be created.

Schedule: Months 10-36.

9. Behavior-based management & leadership development processes:

Content: During months one through five we are assessing leadership and management development programs. Based on the results of that assessment, we will recommend ways that these programs can be improved or modified to ensure that NASA has one cohesive leadership/management model, rather than myriad different models, and that all management and leadership development activities reinforce and support NASA's desired culture based on values and competencies. For example this may include recommendations regarding rotational assignments including potential assignments outside NASA and/or outside the Federal government. During months beyond seven we will help NASA implement these improvements.

Schedule: Specific schedule to be determined.

10. Talent management and succession planning process

Content: The Agency lacks a common and comprehensive approach to identifying exceptional talent early in the career cycle, proactively developing that organizational talent across the Agency in ways that support the desired culture, and systematically deploying talent in the most strategic ways to achieve the mission of the Agency. This task involves assisting NASA in development of a succession planning process that can help sustain the culture throughout the Agency.

Schedule: Months 7-16.

11. Measure progress:

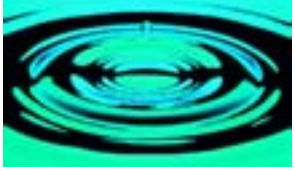
Content: To provide ongoing metrics on progress being made in culture change, we will periodically gather, analyze, and report on data that measures progress and indicates where additional attention may be required.

Schedule: Measure at the end of each 12 month period.

12. Contractors:

Content: During Months one through five we will be working with NASA to develop recommendations on ways to involve contractors in the culture change effort. In later stages of the effort we will implement those recommendations.

Schedule: to be determined based on content.



Appendix A: Guiding Principles for a Culture of Safety Excellence

A passionate commitment to mission success

We proudly accept the challenge of the experimental exploration of space, knowing of its inherent risks while convinced of its over-riding value to our country. In so doing, we recognize that mission safety forms the foundation of our endeavor, and is essential to achieving our goals. We are committed to mission safety as parents are to their children. We accept the responsibility to manage the risks of space flight, such that no accident will ever happen through lack of diligence. These principles describe our commitment, reflect our devotion, and guide our day-to-day actions in mission safety.

1. Open and clear communication is encouraged and modeled

People at every level of the organization must be committed to the free and unobstructed flow of information up and down within the organization. This means having the courage to question assumptions, and the willingness to ask even seemingly obvious questions, to listen actively, and be ready to learn. It describes a value for shared inquiry that is unimpeded by concern about "looking bad." It also means being able to disagree vigorously and profitably and engage in productive dialogue, where clarifying, understanding, and illuminating the issue at stake takes precedence over all other considerations for all parties. Open and clear communication means that people feel free from intimidation or retribution in raising issues, and are encouraged to ask questions or raise issues rather than feeling that expressing differing points of view is risky.

2. Rigorously informed judgment is the sole basis for decision-making

Robust processes for analysis, judgment and decision-making must be flawlessly executed without cognitive bias. The only basis for confidence is properly understood data that meet safety and reliability criteria. Assumptions are explicitly acknowledged and constantly challenged. Cognitive bias is understood by decision makers and leaders are committed to eliminating it as a source of influence on decision making. Decisions are based on scientifically grounded assessment of risk.

3. Personal responsibility is taken by each individual

Each individual is responsible for upholding a safety-supporting culture in what we do and how we do it. Each individual feels a sense of duty, responsibility, and ownership for the safety of every mission in which he or she is involved, and acts accordingly. It is unacceptable to assume that someone else will handle your issues or questions. Each individual is fully engaged in the pursuit of long-term and short-term success, of which safety is an integral part. Each individual feels a sense of personal ownership for his or her contribution to the overall effort.

4. Integrated technical and managerial competence is our shared value

We require excellence in every aspect of our work. We hold that optimal safety follows from integrated technical and managerial competence. Mission success is accomplished by integrating all aspects of program management: safety, engineering, cost and schedule, across functional and organizational lines.

5. Individual accountability is the basis for high reliability

Mission safety results from actions, not just words. Our credibility is built on the consistency between our words and our actions. Procedures, values, objectives and plans are only worthwhile to the extent that they can be reliably executed. We will set new standards of flawless execution in both our management practices and our technical work. Each individual will be accountable for performing to that standard. In our leadership and management as well as in our execution of technical work we will act in ways that consistently reinforce a safety-supporting culture.

Appendix B: BST Safety Climate and Culture Survey

It has long been recognized that safety climate and culture are key elements in safety performance improvement. While training, awareness, and incentive programs can result in short-term changes, it is the underlying culture that must be supportive for sustainable improvement to occur. The BST Safety Climate and Culture Survey measures and reports on these underlying organizational determinants of culture.

There are two versions of the survey, one for individual contributors, and another for supervisors, managers, and executives. The two versions have the same content, but from different points of view.

In general, the questions on the individual contributor form ask about the employee's perceptions regarding his or her own work group or supervisor. The manager/supervisor version asks about perceptions of employees, or work groups, or supervisors in general.

The items on the survey are organized into 11 scales, or groups of items that measure a particular aspect of organizational functioning. Nine of the scales are also grouped into three general factors. It is noteworthy that six of the scales are not safety-specific but rather measure general organizational characteristics that influence safety as well as other areas of performance. All of the items on the survey have a 5-point response scale, with higher scores being more favorable. Descriptions of the factors and the scales follow.

A. Organizational Factor

Procedural Justice. Addresses perceived fairness in actions by first-level supervisors that impact employees. This factor is a fundamental influence on other aspects of organizational life. For instance, perceptions of fairness affect employee beliefs about the organization's concern for them as individuals. Supervisor fairness is also related to effectiveness of team functioning, employee communication of safety concerns, perceptions of the organization's value for safety, and employee willingness to contribute above and beyond immediate job duties.

Leader-Member Exchange. Measures beliefs about the strength of employees' working relationships with the supervisor, such as the supervisor's willingness to "go to bat" for the employee. Employees who believe they have a good relationship with the supervisor are more likely to be cooperative, and live up to the spirit, rather than the letter, of organizational objectives. Worker-supervisor relationships influence work group effectiveness, inter-worker relationships, and employee communication about safety concerns.

Management Credibility. Measures perceptions about management's judgment, honesty, consistency, fairness, and openness in dealing with workers. Perceptions of fairness influence beliefs about the value of safety, and the extent to which individuals feel responsible for safety. Perceptions of fairness also influence beliefs about the organization's concern for employees, and the willingness of employees to raise safety concerns, and to report incidents or deviations.

Perceived Organizational Support. Measures perceptions of the organization's concern for the needs and interests of employees, and the availability of support. Individuals' perceptions of organizational concern for them influence beliefs about the organization's values for safety. That is, employees who believe that the organization is concerned about their needs in general are also likely to believe that the organization values safety. Perceptions about organizational support are also related to effectiveness of group functioning, and the willingness of workers to raise safety concerns.

B. Team Factor

Teamwork. Measures the perceived effectiveness of work groups to function as an effective team. Group process affects whether people will talk to one another about safety, and is directly related to safety outcomes such as level of at-risk behavior and reporting or concerns and deviations. It also influences perceptions of communication around safety, and organizational values for safety.

Work Group Relations. Measures perceptions about the degree to which coworkers treat each other with respect, listen to each other's ideas, help one another out, and follow through on commitments made. Work group relations are related to supervisor fairness, and worker-supervisor relationships. These beliefs influence whether employees will speak up to one another about safety issues, and raise safety concerns with the supervisor.

C. Safety Specific Factor

Safety Climate. Measures perceptions of the extent to which the organization values safety as represented by the priority of safety compared to other concerns, how informed management is about safety issues, and the willingness of management to invest time, energy, and/or money in addressing safety issues. The higher the perceived value for safety, the more likely it is that workers will raise safety issues, work in ways consistent with safety, and not cover up incidents and deviations.

Upward Communication. Measures perceptions of the quality and quantity of upward communications about safety, the extent to which people feel encouraged to bring up safety concerns, and the level of comfort in discussing safety-related issues with the supervisor. The climate around communication influences the willingness of workers to speak up to one another about safety and reported incidents.

Approaching Others. Measures beliefs about the likelihood that workers will speak up to a co-worker whom they think is compromising safety, pass along information about safety, or step up to help a co-worker do a job in a manner consistent with safe outcomes.

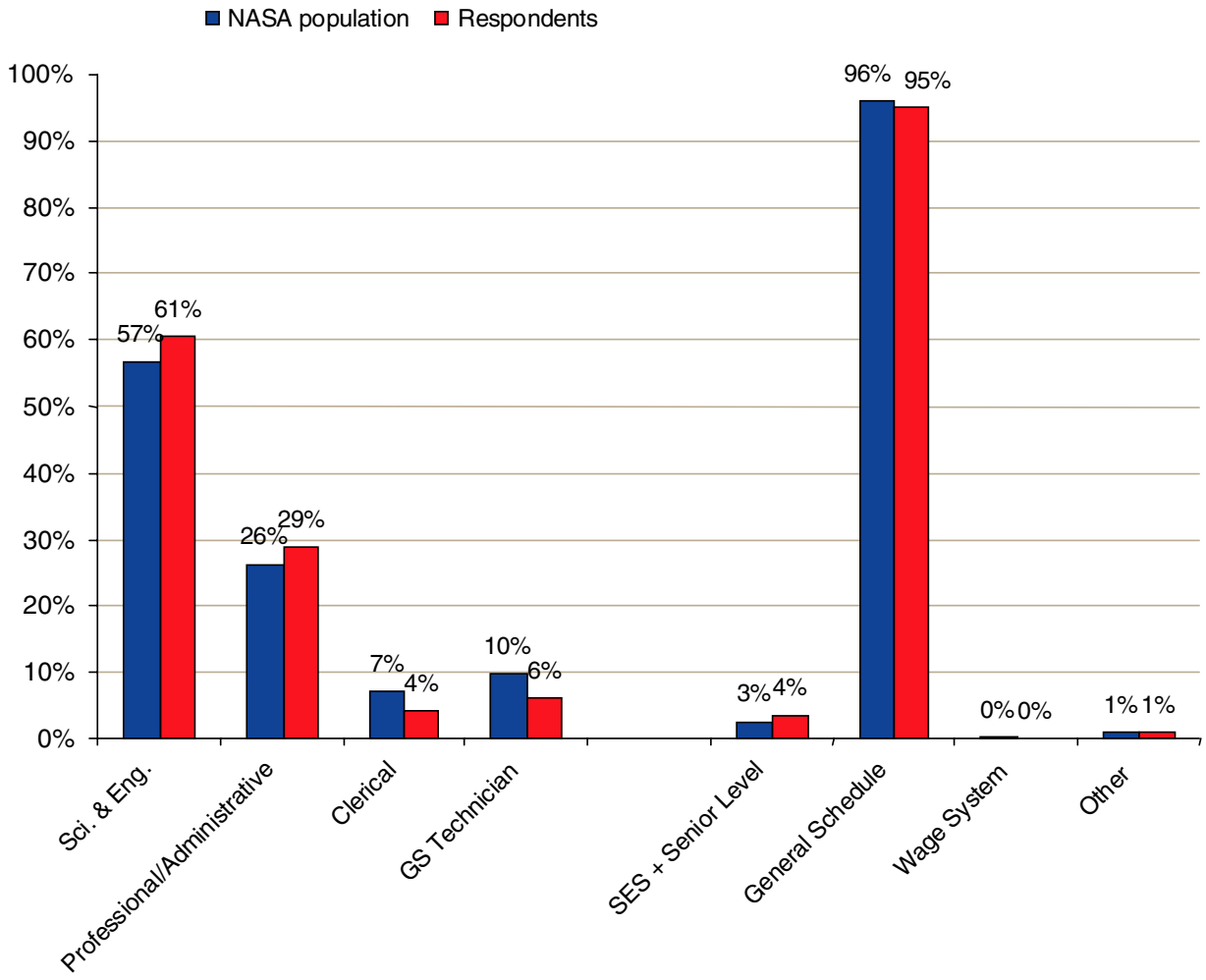
Additional Scales

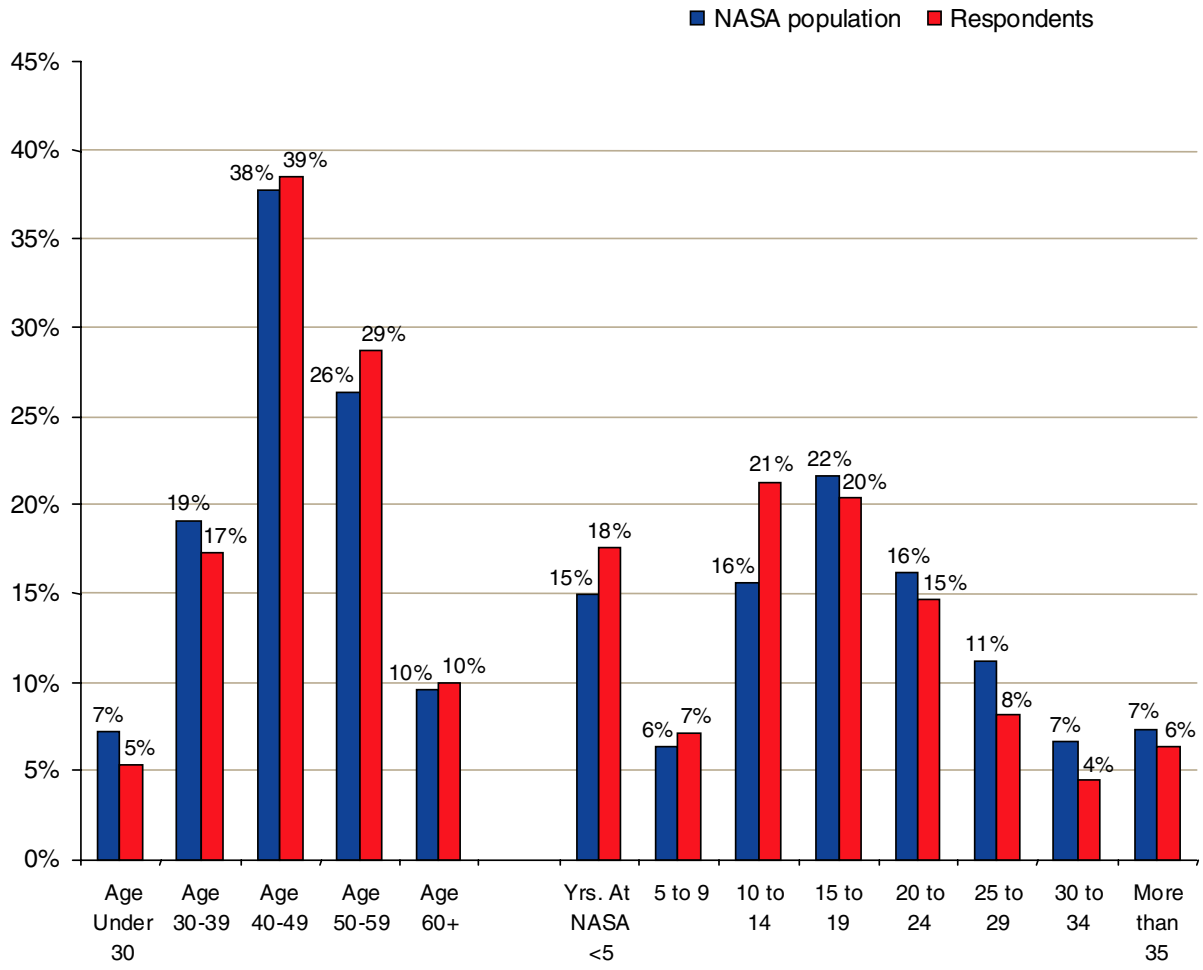
Social Efficacy. Measures beliefs about the ability of workers to relate effectively with others, to advocate a position within the workgroup, and to stick to their point of view despite opposition. Higher scores on this scale are associated with approaching others, and with raising safety concerns.

Reporting. Measures tendency of workers to report incidents and deviations, and the general climate around reporting.

Appendix C: Response Bias Tests

The following graphs show comparison of respondents to the actual NASA population, and comparison of immediate responders (first 10%) to late (prompted) responders (last 10%).



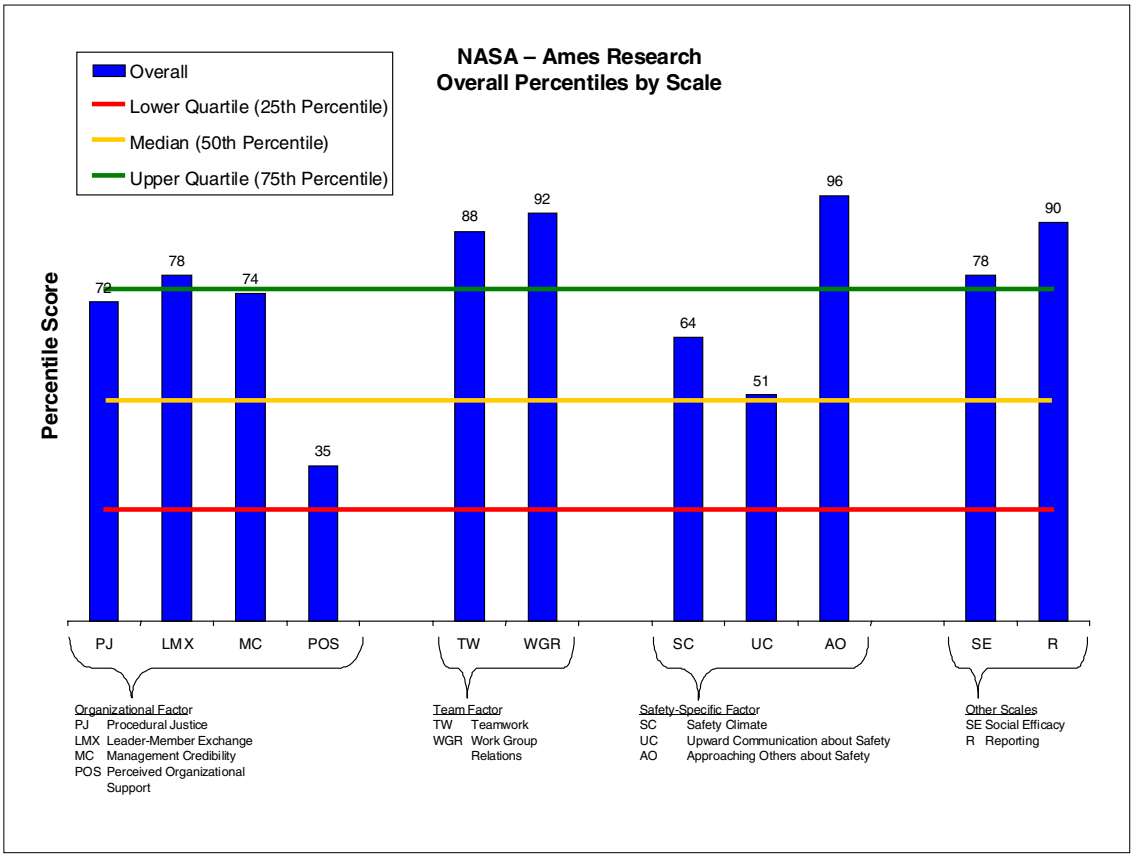


Submission Timing	Significant Difference	First 10% Respondents	Last 10% Respondents
Procedural Justice	N	3.39	3.46
Leader-Member Exchange	N	3.59	3.62
Management Credibility	Y	3.28	3.37
Perceived Organizational Support	N	3.02	3.14
Teamwork	N	3.89	3.91
Workgroup Relations	N	3.86	3.85
Safety Climate	N	3.88	3.93
Upward Communication	N	3.77	3.80
Approaching Others	N	4.11	4.07
Social Efficacy	N	3.94	3.93
Reporting	N	4.02	4.00

Appendix D: Center-by-Center Survey Highlights

Ames Research Center

Ames' results are generally consistent with the overall Agency results, although Safety Climate is somewhat lower relative to other scales at Ames than in NASA in general. There is good alignment of views within the Center, with no organizational unit differing significantly from others.



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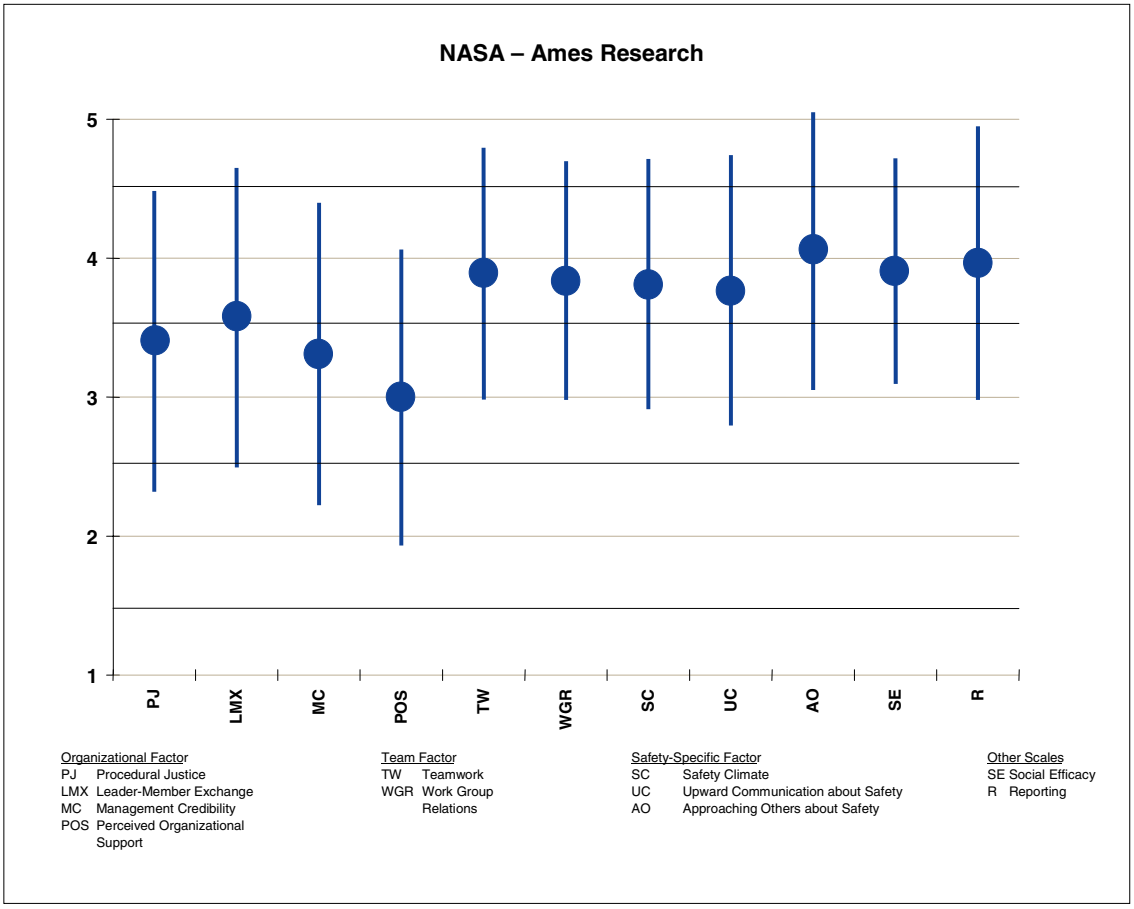

Scale:
5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Office of Director	19	84.7	84.4	76.4	53.9	75.2	84.5	67.9	77.4	67.5	70.4	90.6	85.5	86.7	87.8
Office of CFO	12	90.5	84.4	93.4	85.6	91.9	86.5	80.8	83.9	75.2	83.1	78.3	83.5	92.0	80.8
Safe/Env/Assur	25	74.3	84.4	74.6	41.2	69.9	49.4	70.3	59.9	65.6	83.8	86.5	84.4	68.2	87.6
Aerospace Direct	73	74.2	85.2	47.7	19.4	52.3	76.8	78.9	78.7	44.7	52.1	87.5	71.5	75.3	76.6
Info Sciences/Tech	66	69.9	78.7	68.4	32.5	61.6	86.5	81.9	84.1	53.4	33.1	83.6	67.3	62	80.9
Astro/Space Res	67	32.4	35.5	57.3	24	37.3	66.5	69.2	67.8	43.1	26.3	92.2	68.9	48.1	66.4
R&D Services	31	41.1	36.3	33.6	20.5	29.3	63.9	73.2	68.4	37.1	47.6	62.1	51.8	76.2	75.2
Center Operations	49	69	74.7	70.3	54.0	67.9	69.7	68.3	68.6	78.3	70.4	88.8	88.2	79.7	77.8
Other	17	76.8	72.1	74.7	67.9	73.5	77.2	74.5	76.9	87.3	79.8	93.7	92.6	82.9	88.4
Raw Scores by Department															
Office of Director	19	3.63	3.72	3.41	3.14	3.45	3.96	3.76	3.87	3.87	3.87	4.15	3.99	4.03	4.15
Office of CFO	12	3.73	3.72	3.76	3.56	3.69	3.98	3.88	3.94	3.94	3.98	4	3.97	4.10	4.02
Safe/Env/Assur	25	3.49	3.72	3.39	3.01	3.38	3.71	3.78	3.74	3.85	3.98	4.09	3.98	3.91	4.14
Aerospace Direct	73	3.49	3.74	3.07	2.74	3.20	3.89	3.87	3.88	3.68	3.75	4.11	3.87	3.95	3.97
Info Sciences/Tech	66	3.45	3.65	3.3	2.92	3.3	3.98	3.89	3.94	3.75	3.64	4.06	3.85	3.89	4.03
Astro/Space Res	67	3.11	3.3	3.16	2.82	3.09	3.82	3.77	3.8	3.67	3.59	4.18	3.86	3.83	3.86
R&D Services	31	3.19	3.31	2.92	2.76	3.01	3.8	3.81	3.80	3.61	3.72	3.87	3.74	3.95	3.96
Center Operations	49	3.44	3.61	3.32	3.14	3.36	3.84	3.76	3.80	3.97	3.87	4.13	4.01	3.97	3.99
Other	17	3.52	3.59	3.39	3.28	3.43	3.9	3.82	3.86	4.07	3.94	4.21	4.1	4	4.16

- Department scores are based on non-mamanger-version surveys only.
- Scores for departments with fewer than 5 surveys are not shown.
- Bold values are statistically significantly higher than underlined values (probability < .005).
- Raw scores range from 20 to 100.
- Unless all respondents provided their demographic information, the number of surveys within each section of this table will not add up to the total number of surveys.

Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Level															
Manager	85	3.40	3.55	**3.67**	**3.23**	3.47	4	3.95	3.98	3.96	3.83	3.91	3.91	3.8	3.69
Non Manager	378	3.40	3.58	3.23	2.94	3.26	3.87	3.81	3.84	3.78	3.75	4.09	3.91	3.93	**4**

• Scores represent the percentage of maximum possible score.
• Scores for levels with fewer than 5 surveys are not shown.
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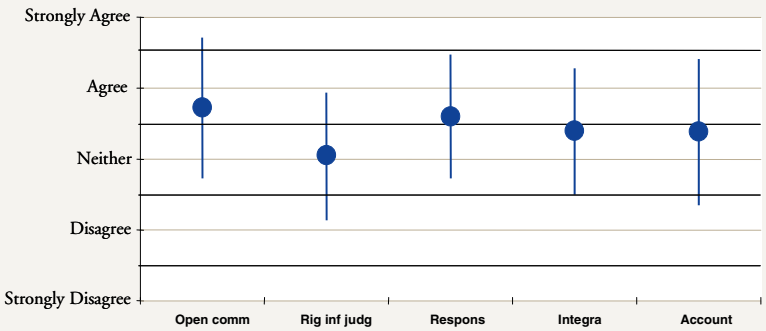
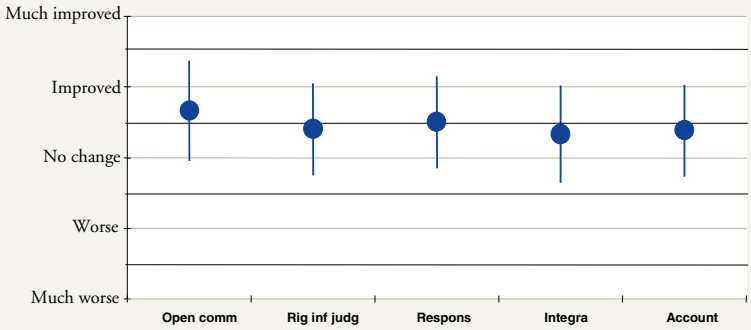
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
- **Integra:** There is integration of mission safety considerations with engineering, cost, and schedule considerations within our Center
- **Account:** Individuals are held accountable for following procedures within our Center.

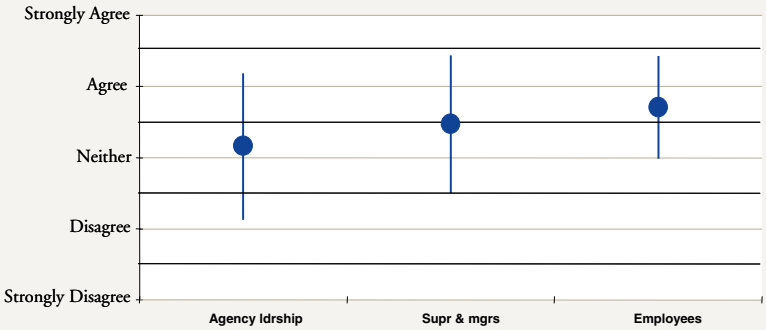
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
- **Respons:** How has individuals' taking personal responsibility for mission safety changed within your Center since the Columbia accident?
- **Integra:** How has integration of mission safety with engineering, cost, and schedule considerations changed within your Center since the Columbia accident?
- **Account:** How has individual accountability for following procedures changed within your Center since the Columbia accident?

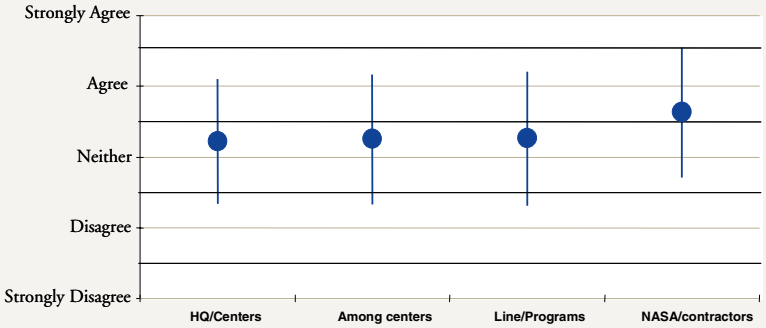
Perceptions of Consistency Between Words and Actions



Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
- **Employees' actions** are consistent with their words on mission safety.

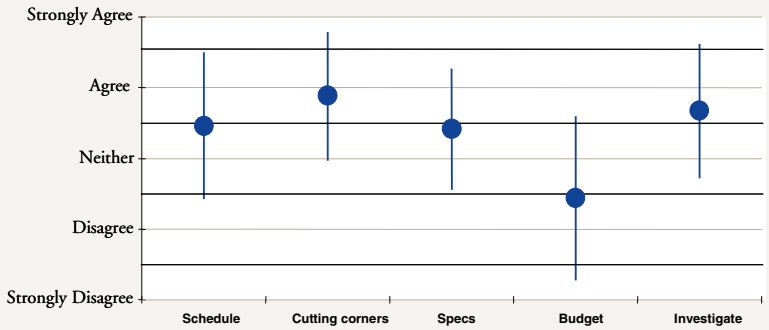
Cooperation and Collaboration



Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

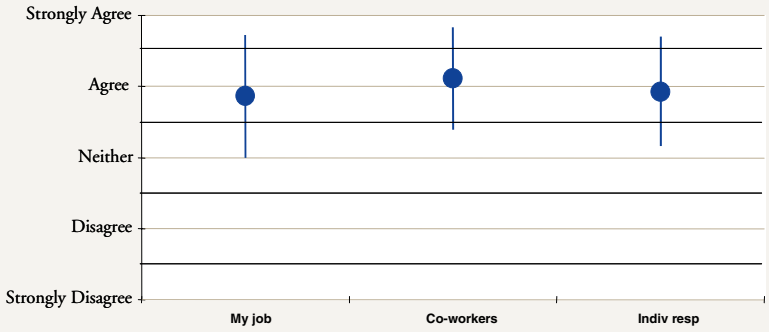
Potential Inhibitors



Questions:

- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
- At this Center, when we know something works we *still* worry if it is inconsistent with the **specifications**.
- **Budget** constraints *do not* compromise engineering and mission safety
- Management at our Center wants to **get to the bottom of mission safety concerns** and not just brush them aside

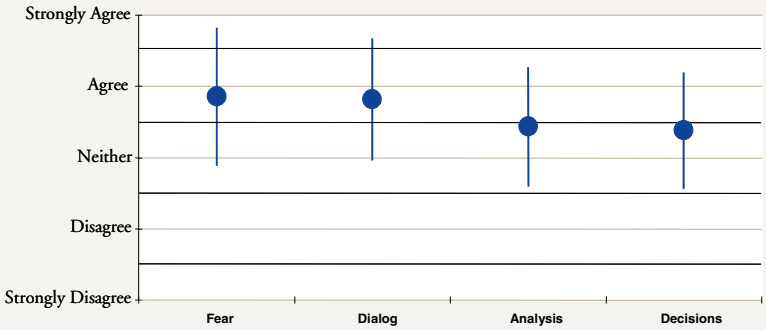
Employee "Connection" to Mission Safety



Questions:

- **My job** can have an impact on mission safety
- **My co-workers** believe that mission safety is critical to overall mission success
- **Individuals take personal responsibility** for mission safety within our Center

Communication



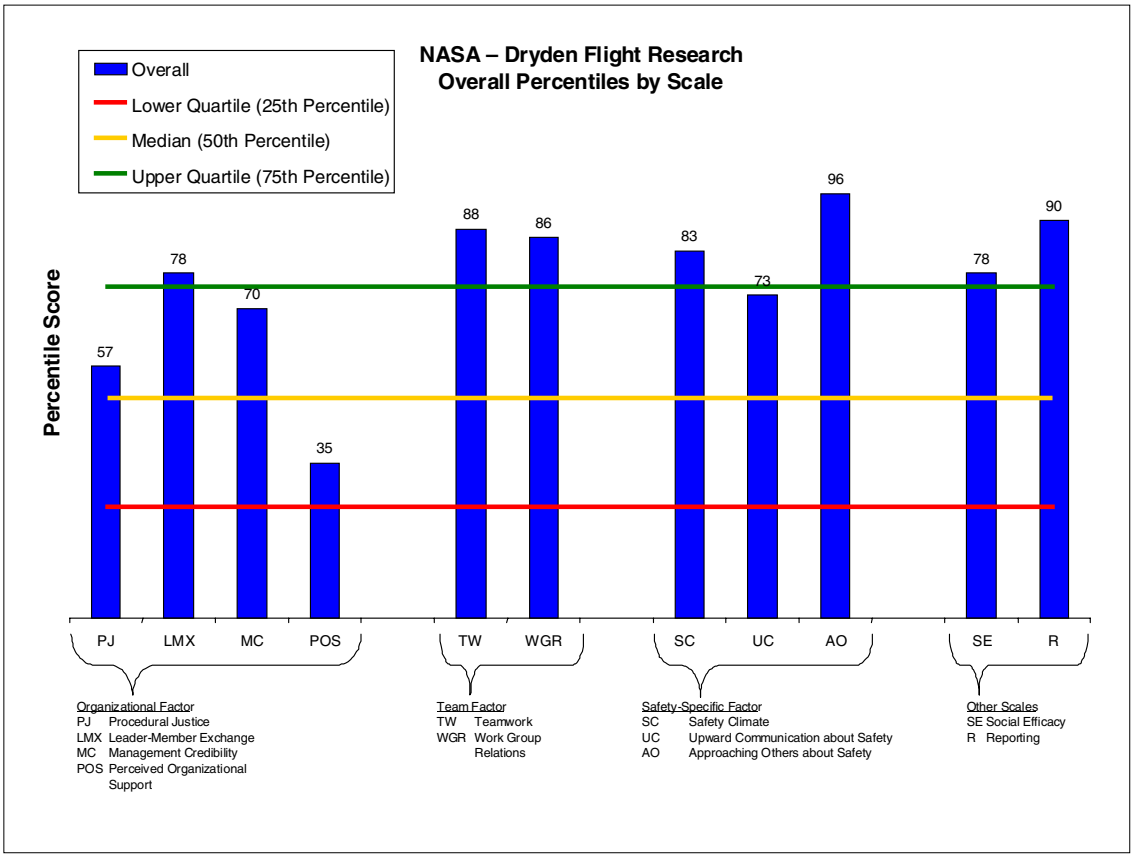
Questions:

- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

Appendix D: Center-by-Center Survey Highlights

Dryden Research Center

Results at Dryden are similar to overall results. However the Procedural Justice scale is lower at Dryden relative to other scales at Dryden, and Upward Communication is somewhat higher. The Procedural Justice score indicates an opportunity for improvement in helping first-line supervisors improve their leadership skills.



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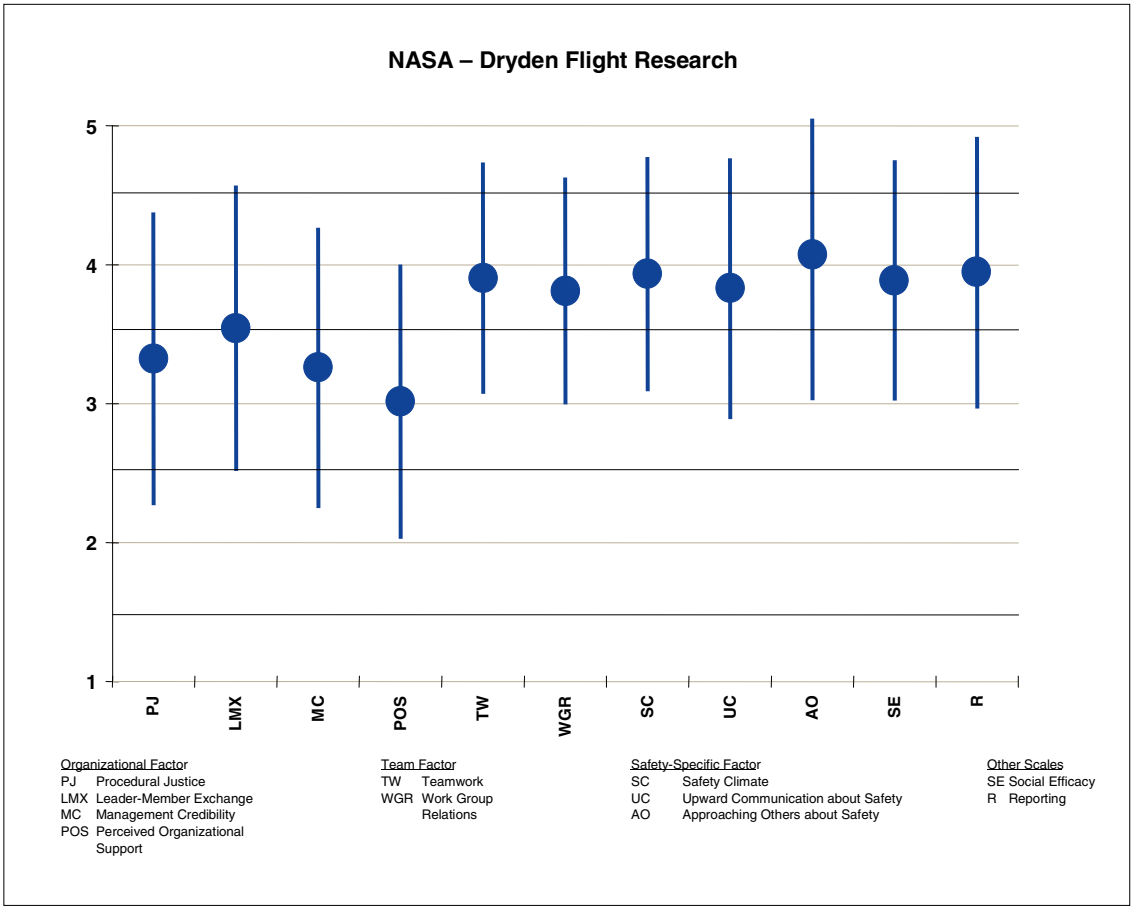

Scale:
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2 = Disagree
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Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Office of Director	6	85.9	79.9	76.6	67.7	77.2	92.3	93.0	92.6	93.2	85.4	78.3	90.5	76.9	95.2
HR Manage/Develop	6	79.9	90.3	78.6	68.8	79.9	84.3	18.6	50.6	59.9	28.5	37.5	45.8	90.9	78.7
Public Affairs/Comm	5	47.9	81.8	61.6	49.0	60.9	60.6	77.4	69.9	73.3	57.8	97.5	91	79.8	88.4
Acquisition Manage	7	68.1	83.9	44.8	32.7	55.2	49.9	49.1	50	82.9	65.5	81.4	84.4	80.5	89.7
Office of Safe/Assur	7	40.8	56.2	57.4	37.9	50.2	24.7	10.6	15.7	42.2	32.3	58.6	49.9	47	52.1
Office of CFO	16	44.9	68.7	61.3	36.1	53.6	57.2	40.2	48.7	92.2	61.7	69.4	83.5	74.0	73.1
Office of Fac Eng/As	7	72.3	90.5	40.2	24	54.8	27.9	23.5	24	79.5	83.5	89.9	89.8	7.59	85.8
Research Systems	20	56	46.5	56.2	32.4	47.6	63.9	72.9	68.4	82.3	73.5	89.8	89.0	55.1	85.1
Research Engineer	45	58.0	68.7	77.1	45.6	65.1	81.7	85.1	83.8	79.6	81.8	96.8	93.4	84.3	90.7
Flight Operations	30	61.2	69.1	37.6	22.1	41.4	80.6	86.6	84.0	41.6	59.2	94.2	77.9	77.7	47.0
Other	13	79.5	76.2	71	65.7	72.1	97.4	89.1	94.9	85.6	56.4	92.1	88.9	88.5	78.7
Raw Scores by Department															
Office of Director	6	3.66	3.67	3.42	3.28	3.48	4.07	4.02	4.05	4.19	4	4	4.06	3.96	4.33
HR Manage/Develop	6	3.56	3.81	3.45	3.3	3.51	3.96	3.35	3.68	3.8	3.61	3.68	3.71	4.08	4
Public Affairs/Comm	5	3.24	3.69	3.20	3.09	3.29	3.78	3.85	3.81	3.92	3.79	4.36	4.07	3.98	4.16
Acquisition Manage	7	3.43	3.71	3.04	2.92	3.23	3.71	3.63	3.67	4.01	3.84	4.04	3.98	3.98	4.18
Office of Safe/Assur	7	3.19	3.47	3.16	2.98	3.18	3.51	3.23	3.38	3.66	3.63	3.85	3.73	3.82	3.71
Office of CFO	16	3.22	3.56	3.20	2.96	3.21	3.76	3.55	3.66	4.14	3.81	3.93	3.97	3.95	3.94
Office of Fac Eng/As	7	3.48	3.82	3	2.82	3.22	3.54	3.4	3.47	3.99	3.98	4.14	4.05	3.57	4.12
Research Systems	20	3.31	3.39	3.15	2.92	3.17	3.8	3.81	3.80	4.01	3.89	4.14	4.03	3.86	4.11
Research Engineer	45	3.33	3.56	3.43	3.05	3.33	3.94	3.93	3.93	3.99	3.96	4.3	4.11	4.01	4.21
Flight Operations	30	3.36	3.56	2.96	2.78	3.12	3.93	3.95	3.94	3.65	3.8	4.22	3.92	3.96	3.66
Other	13	3.55	3.62	3.33	3.26	3.41	4.21	3.97	4.1	4.05	3.78	4.17	4.03	4.05	4

- Department scores are based on non-manager-version surveys only.
- Scores for departments with fewer than 5 surveys are not shown.
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Level															
Manager	45	3.16	3.37	3.43	3.1	3.27	3.88	3.76	3.83	3.93	3.66	3.74	3.79	3.61	3.37
Non Manager	183	3.36	3.59	3.22	2.99	3.26	3.91	3.82	3.87	3.93	3.87	**4.15**	4.01	**3.96**	**4.03**

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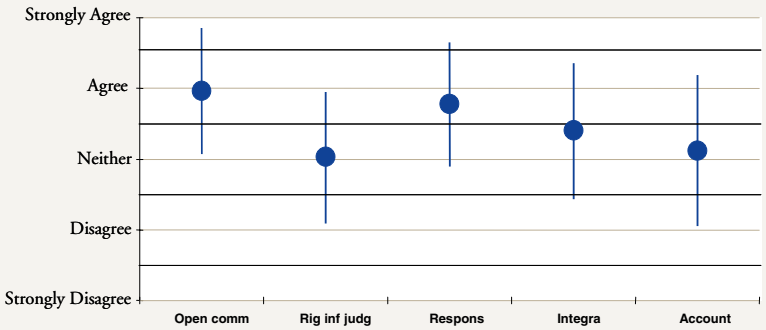
Overall Responses to Guiding Principles Question



Questions:

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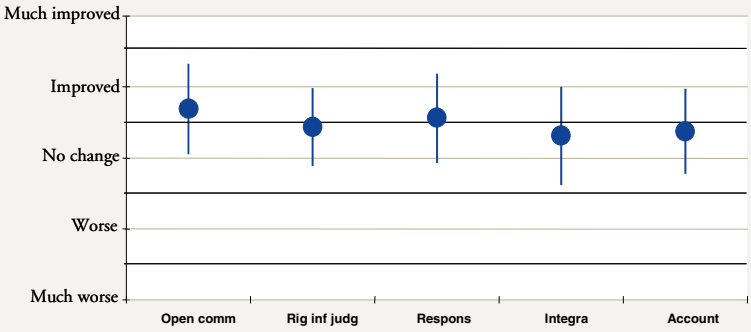
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
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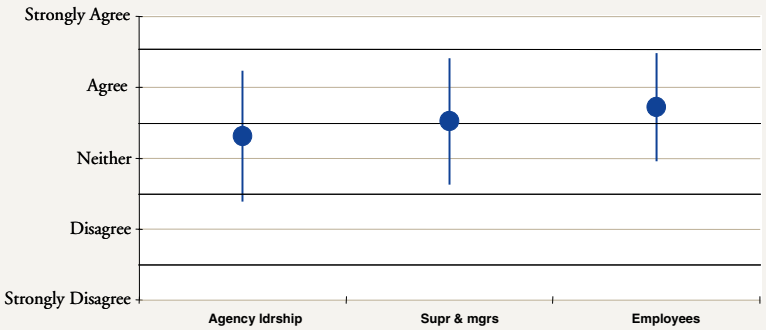
Perceptions of Consistency Between Words and Actions



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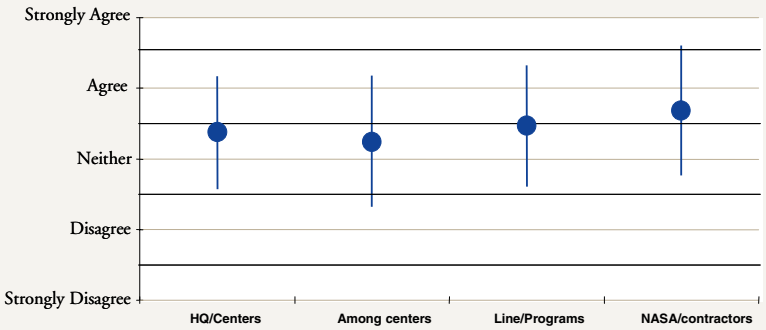
Cooperation and Collaboration



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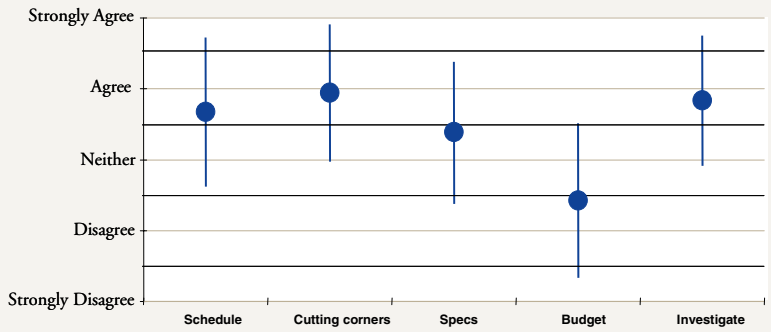

Questions:

- **Schedule** is *not* more important than mission safety in this Center
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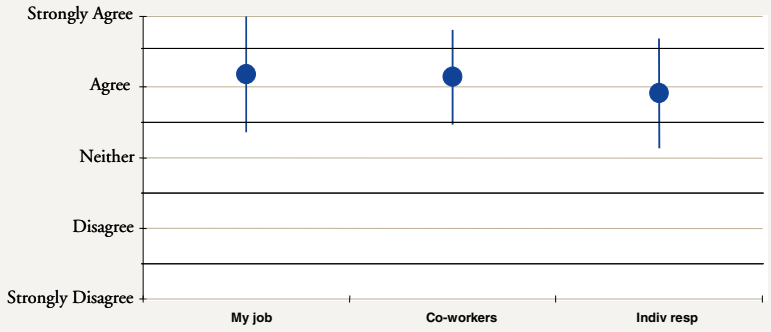
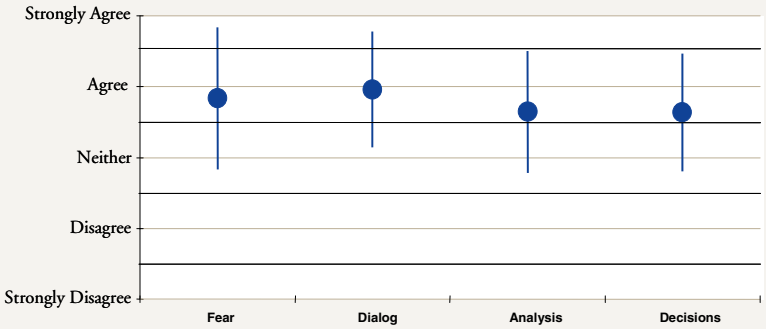
Employee "Connection" to Mission Safety



Questions:

- **My job** can have an impact on mission safety
- **My co-workers** believe that mission safety is critical to overall mission success
- **Individuals take personal responsibility** for mission safety within our Center

Communication



Questions:

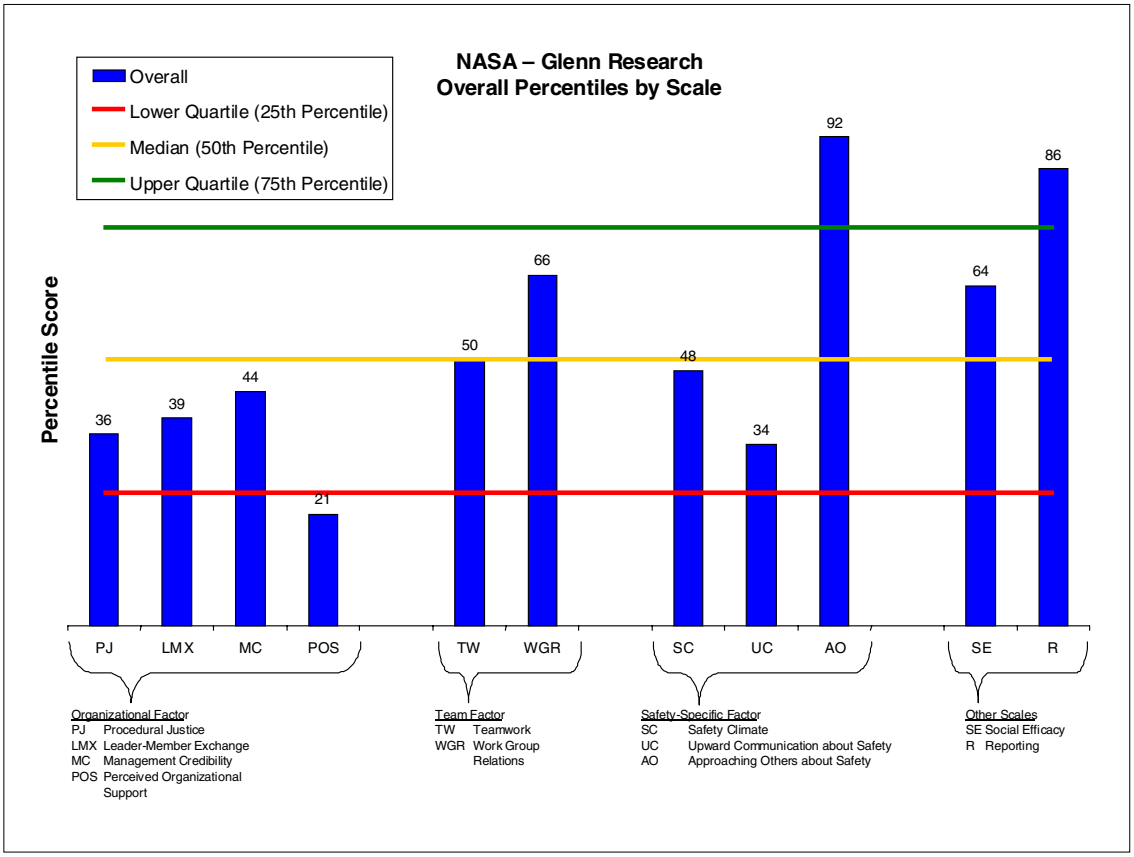
- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

Appendix D: Center-by-Center Survey Highlights

Glenn Research Center

Results from Glenn are generally low relative to other Centers. Only the three scales related to work group functioning (Teamwork, Work Group Relations, and Approaching Others) and the incident reporting scale were above the 50th percentile.

While no organizational units had high scores, Safety and Mission Assurance had especially low scores on most survey scales, and the Office of the CFO was also low.



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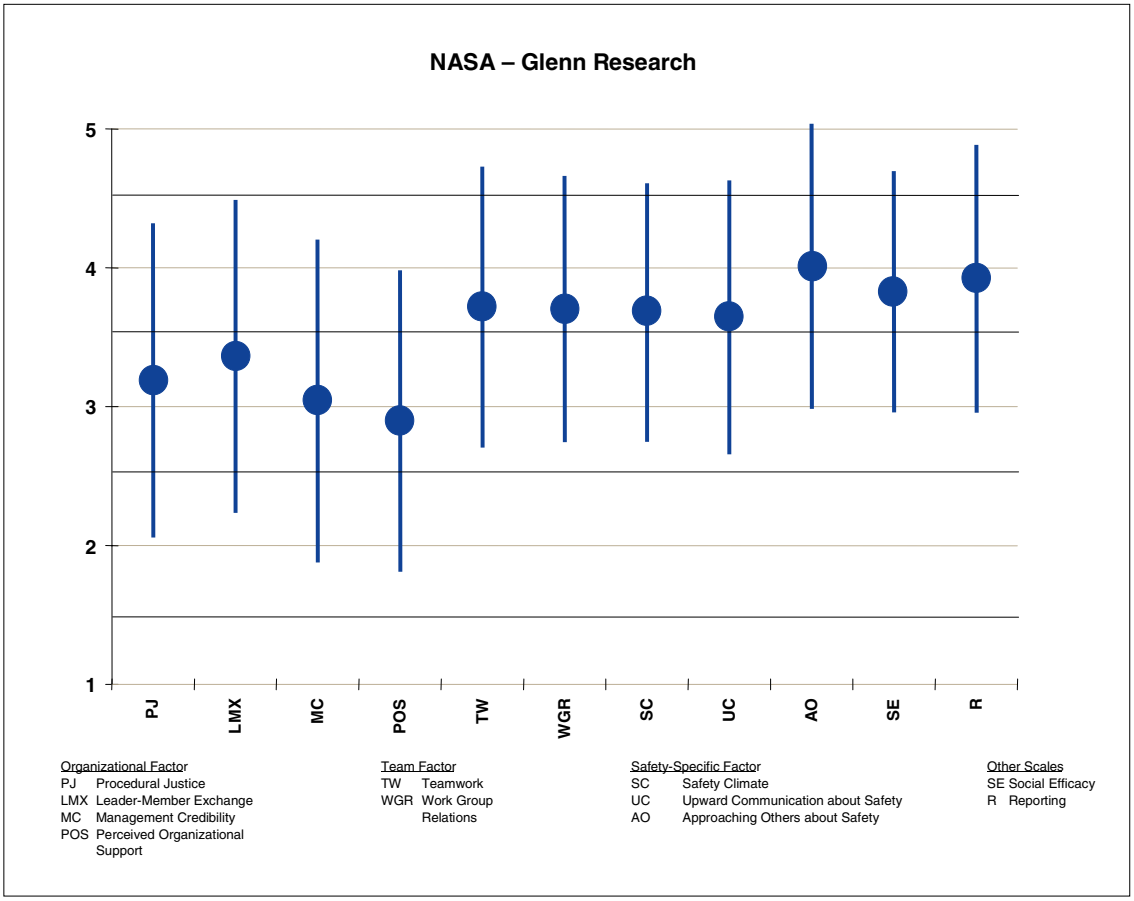

Scale:
5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Aeropropulsion Res	6	89.9	95.7	23.6	11.8	50.1	92.4	83.9	89.5	57.4	56.4	73.1	67.7	39.7	93.5
Systems Manage	5	25.1	14.5	44.6	24.8	27.2	90.4	98.4	96.3	16.5	11.7	86.9	48.3	93.5	59.7
Office of HR/Work	18	61.3	51.5	51.8	53.6	55.4	48.7	39.2	42.2	47	26.3	79.5	61.3	61.7	84.6
Office of Acquisition	27	27.3	18.8	39.6	21.4	25.5	31.0	36.4	33.1	20.9	5.52	67.7	28.5	60.1	59.5
Office of CFO	19	9.19	2.64	28.5	39.2	16.5	6.87	14	9.03	29.8	26.3	74.0	49.7	40.8	83.4
Aeronautics Direct	41	34.1	55.3	57.1	29.6	44.8	70.6	76.3	74.3	59.2	29.3	87.5	72.8	76.7	75.7
Space Directorate	71	41.8	44.0	34.6	19.4	30.3	38	58.7	48.3	40.8	26.9	75.2	54.8	70.8	75.2
Research/Tech Direct	117	51.3	57.8	39.9	18.1	35.9	62.3	71.8	66.9	38.8	43.8	89.8	68.3	50.8	81.2
Engineer/Tech Services	137	51.2	50.2	42.6	30.5	42.0	61.5	72.7	66.9	45.6	44.3	83	65.9	55.6	76.0
External Programs	14	40.8	39.4	67.5	50.0	55	95.8	94.0	95	75.4	28.8	91.2	81.5	67.2	65.9
Safety & Assurance	38	3.28	12.2	9.03	6.95	5.6	1.92	3.84	2.56	10.7	17.5	88.8	44	21.5	47.0
Other	9	15.4	31.1	2.24	3.04	4.48	14.6	3.32	7.35	33.2	23.7	80.8	54.5	14.5	66.7
Raw Scores by Department															
Aeropropulsion Res	6	**3.72**	3.98	2.8	2.63	3.18	**4.08**	3.92	4	3.78	3.78	3.96	3.85	3.79	4.29
Systems Manage	5	3.03	3.06	3.04	2.83	2.99	**4.04**	**4.29**	**4.16**	3.38	3.43	4.1	3.72	4.13	3.79
Office of HR/Work	18	3.36	3.43	3.10	3.14	3.23	3.70	3.55	3.63	3.7	3.59	4.01	3.81	3.89	4.1
Office of Acquisition	27	3.07	3.13	2.99	2.77	2.98	3.57	3.52	3.55	3.44	3.32	3.91	3.60	3.88	3.78
Office of CFO	19	2.77	2.76	2.86	2.99	2.86	3.24	3.3	3.27	3.54	3.59	3.96	3.73	3.8	4.08
Aeronautics Direct	41	3.13	3.46	3.15	2.89	3.14	3.85	3.84	3.84	3.8	3.61	4.11	3.88	3.96	3.96
Space Directorate	71	3.20	3.37	2.93	2.74	3.02	3.63	3.7	3.66	3.64	3.59	3.97	3.77	3.93	3.96
Research/Tech Direct	117	3.27	3.48	3	2.72	3.08	3.79	3.79	3.79	3.63	3.70	4.14	3.86	3.84	4.04
Engineer/Tech Services	137	3.27	3.43	3.02	2.89	3.12	3.78	3.80	3.79	3.68	3.71	4.05	3.84	3.87	3.97
External Programs	14	3.19	3.34	3.28	3.10	3.23	**4.15**	4.04	4.10	3.94	3.61	4.16	3.95	3.91	3.86
Safety & Assurance	38	2.51	3.02	2.53	2.51	2.63	3.03	3.02	3.02	3.3	3.5	4.13	3.69	3.69	3.66
Other	9	2.91	3.26	2.16	2.34	2.59	3.4	3	3.21	3.58	3.57	4.03	3.76	3.63	3.87

- Department scores are based on non-manager-version surveys only.
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- Bold values are statistically significantly higher than underlined values (probability < .005).
- Raw scores range from 20 to 100.
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Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Level															
Manager	94	3.28	3.37	**3.47**	**3.39**	**3.39**	3.83	3.75	3.8	3.84	3.68	3.75	3.76	3.63	3.53
Non Manager	526	3.17	3.36	2.96	2.80	3.04	3.69	3.69	3.69	3.65	3.64	**4.05**	3.81	**3.86**	**3.96**

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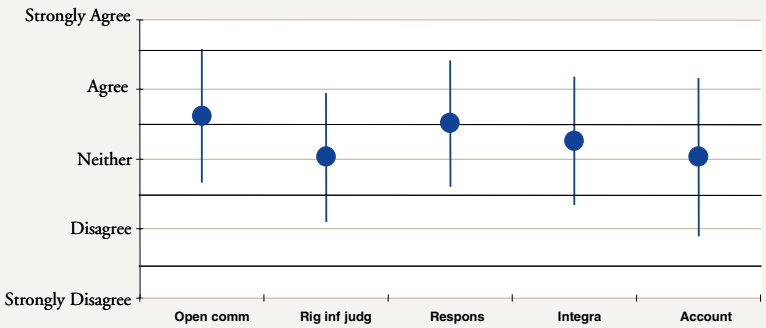
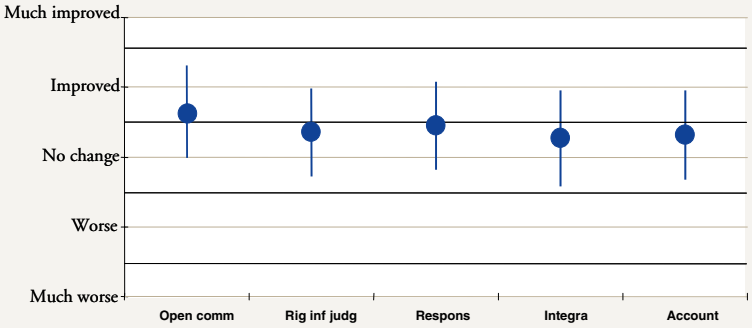
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
- **Integra:** There is integration of mission safety considerations with engineering, cost, and schedule considerations within our Center
- **Account:** Individuals are held accountable for following procedures within our Center.

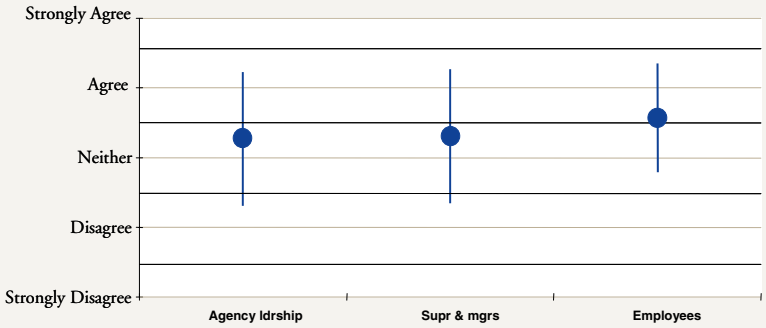
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
- **Respons:** How has individuals' taking personal responsibility for mission safety changed within your Center since the Columbia accident?
- **Integra:** How has integration of mission safety with engineering, cost, and schedule considerations changed within your Center since the Columbia accident?
- **Account:** How has individual accountability for following procedures changed within your Center since the Columbia accident?

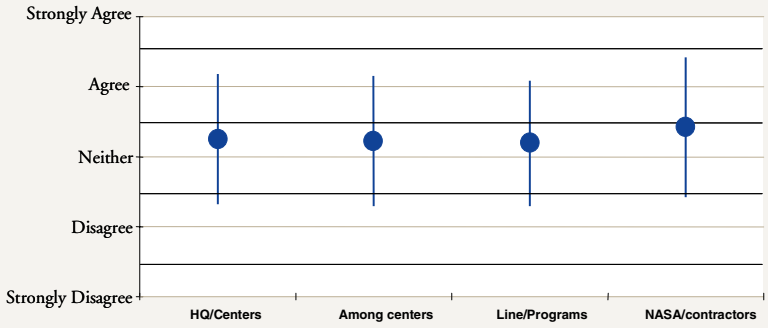
Perceptions of Consistency Between Words and Actions



Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
- **Employees' actions** are consistent with their words on mission safety.

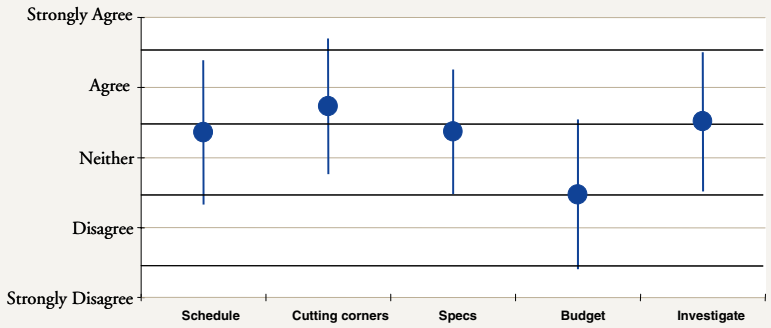
Cooperation and Collaboration



Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

Potential Inhibitors



Questions:

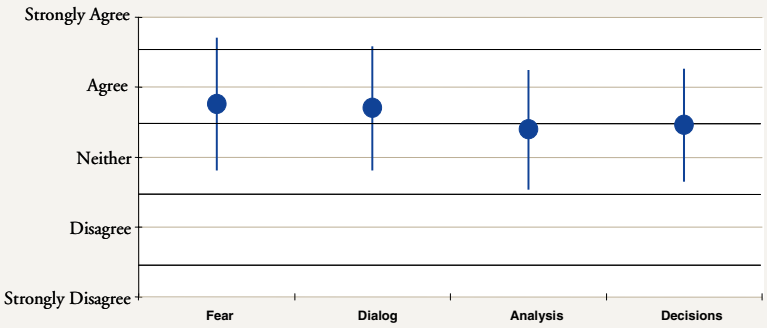
- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
- At this Center, when we know something works we *still* worry if it is inconsistent with the **specifications**.
- **Budget** constraints *do not* compromise engineering and mission safety
- Management at our Center wants to **get to the bottom of mission safety concerns** and not just brush them aside

Employee "Connection" to Mission Safety

Questions:

- **My job** can have an impact on mission safety
- **My co-workers** believe that mission safety is critical to overall mission success
- **Individuals take personal responsibility** for mission safety within our Center

Communication



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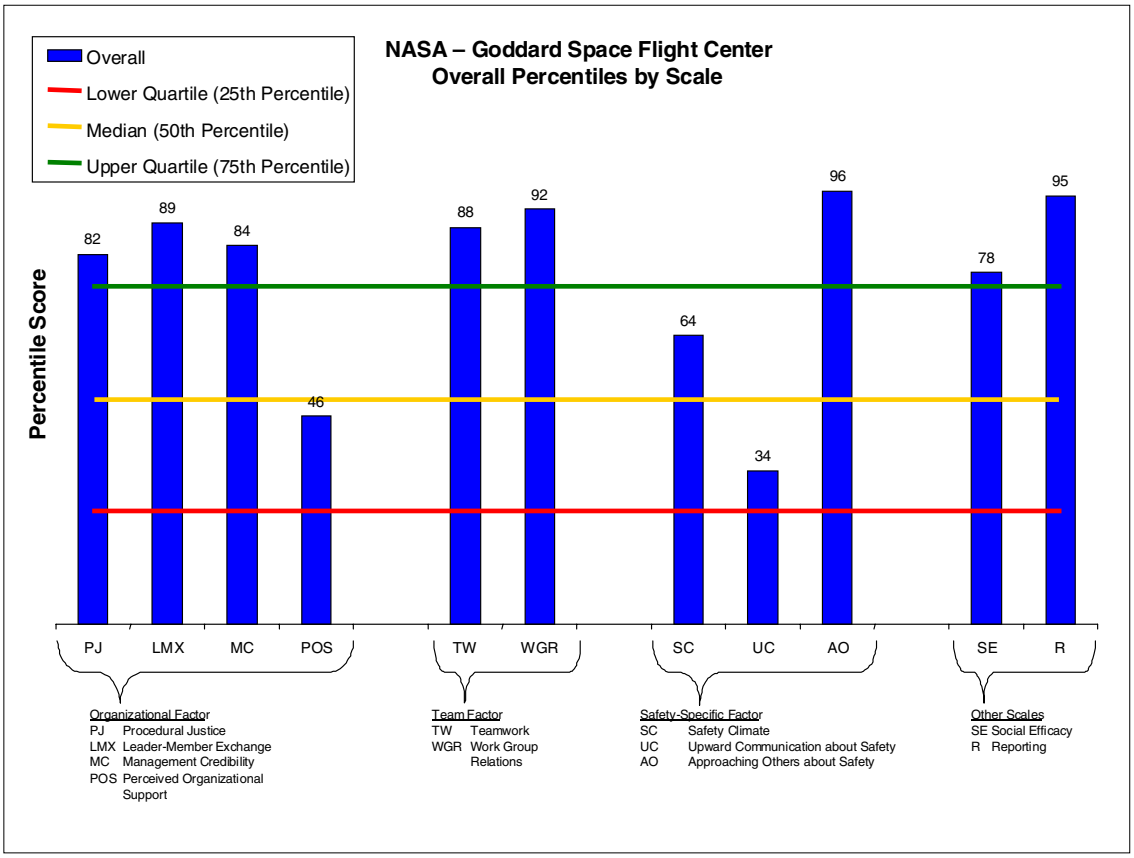
Appendix D: Center-by-Center Survey Highlights

Goddard Space Flight Center

Goddard's scores follow the same pattern as NASA overall. Within Goddard, the Office of the CFO is relatively low on most scales.



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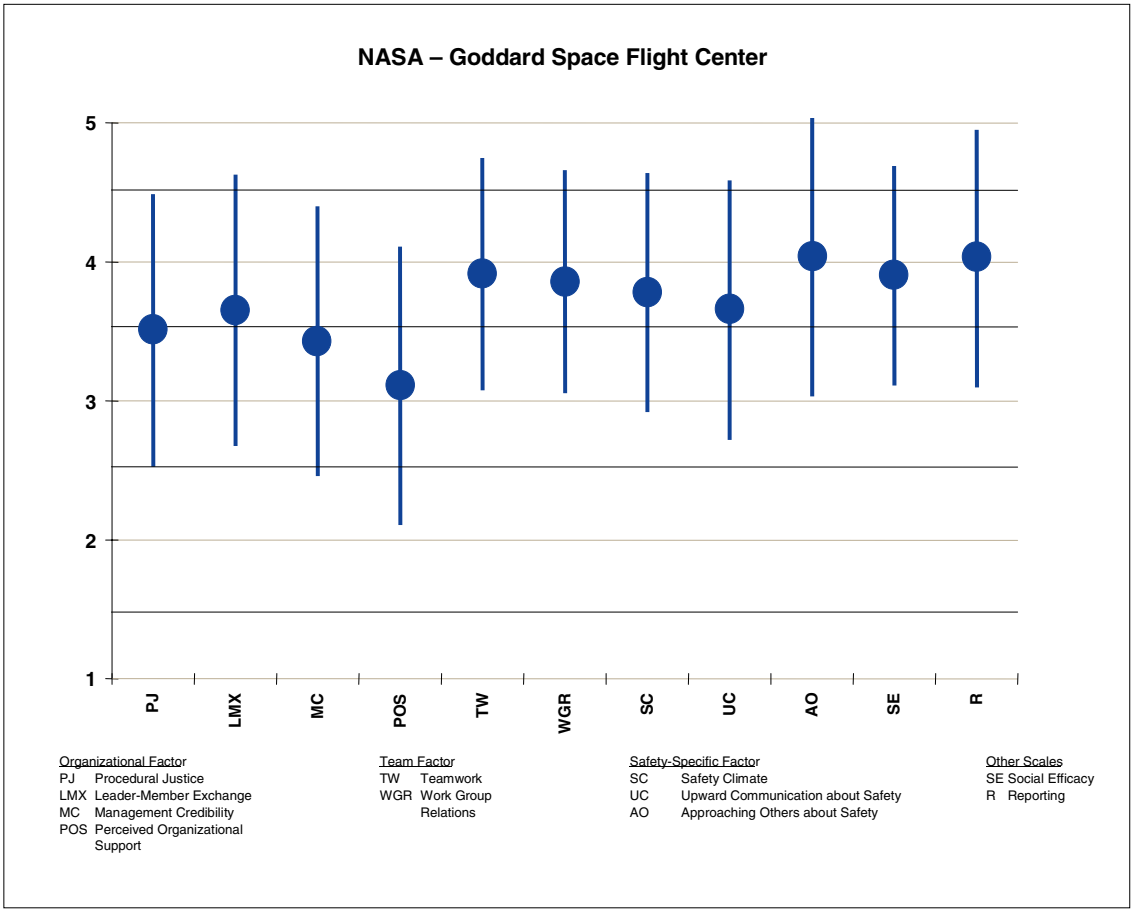

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Percentile Scores by Department															
Office of Assoc. Dir	6	96.3	98.4	87.7	39.6	88.4	98.4	98.3	98.3	43.0	19.2	98.0	82.9	97.5	95.4
Office of Public Aff	6	94.8	92.4	93.4	84.0	93.4	82.0	85.9	84.0	62	32.5	22.5	36.9	57	77.2
NASA Ind Ver/Valid	12	27.4	70.1	77.3	84.2	73	73.1	77.5	76.9	77.3	78.6	97.3	93.5	89	92.4
Office of HR	17	75.9	80.9	64.0	32.9	61.8	76.0	71.7	74.3	40.1	10.1	81.1	51.9	38.4	70.3
Office of CFO	9	7.99	8.39	8.19	1.92	4.4	0.92	4	1.92	2.08	0.24	52.7	3.28	13.3	9.67
Office of Systems Asr	29	68.3	77.1	59.6	41.5	60.3	66.5	79.9	74.3	39.4	49.2	92.9	73	80.6	77.4
Manage Operations	75	71.7	76.3	60.0	47.2	62.2	68.5	67	67.3	55.1	32.5	80.8	65.5	73.9	81.4
Applied Eng/Tech	239	74.3	78.3	77.2	53.2	71.8	75.2	80.7	79.1	52.3	33.0	86.2	69.3	70.4	87.7
Flight Programs/Proj	69	88.9	91.4	78.7	34.9	75	90.4	88.6	90.2	68.1	29.1	84.2	74.2	80.1	90.2
Space Sciences	53	73.2	78.1	62.7	23.1	56.4	81.9	84.9	83.7	39.4	20.1	84.1	57.6	61.6	68.3
Suborbital/Special	29	96.5	91.5	91.5	81.8	92.7	87.7	79.3	84.0	90.4	92.1	81.6	91.7	80.6	93.8
Earth Sciences	52	73	82.2	72.3	39.2	67.5	88.1	89.1	88.6	52	29.4	83.0	65.5	87.3	82.1
Other	16	56.4	45.9	66.3	66.3	61.8	65.1	60.2	62.3	48.4	13.5	67.9	50.5	77.0	65.5
Non Specified	12	90.2	88.6	77.8	24.8	72.1	89.8	92.6	91	73.3	76.8	65.5	76.5	81.5	86.1
Raw Scores by Department															
Office of Assoc. Dir	6	**3.91**	4.24	**3.59**	3	3.63	**4.28**	4.27	**4.27**	**3.67**	3.52	4.47	3.97	4.25	**4.34**
Office of Public Aff	6	**3.83**	3.86	**3.76**	**3.54**	3.73	**3.94**	3.94	**3.94**	**3.82**	3.63	3.54	3.66	3.87	**3.98**
NASA Ind Ver/Valid	12	3.07	3.57	**3.43**	**3.54**	3.42	**3.87**	3.85	**3.86**	**3.96**	3.93	4.35	4.11	4.05	**4.26**
Office of HR	17	3.50	3.68	3.24	2.93	3.3	**3.89**	3.79	**3.84**	**3.64**	3.42	4.03	3.74	3.79	**3.91**
Office of CFO	9	2.74	2.97	2.5	2.25	2.58	2.93	3.03	2.97	2.96	2.84	3.8	3.28	3.63	3.21
Office of Systems Asr	29	3.43	3.64	3.18	3.02	3.28	**3.82**	3.87	**3.84**	**3.63**	3.73	4.19	3.89	3.98	**3.98**
Manage Operations	75	3.47	3.63	3.19	3.07	3.30	**3.83**	3.75	**3.79**	**3.76**	3.63	4.03	3.84	3.94	**4.04**
Applied Eng/Tech	239	3.49	3.65	**3.43**	3.13	3.41	**3.89**	3.88	**3.88**	**3.74**	3.64	4.09	3.86	3.92	**4.15**
Flight Programs/Proj	69	**3.71**	3.84	**3.45**	2.94	3.45	**4.04**	3.96	**4.01**	**3.88**	3.61	4.07	3.9	3.98	**4.2**
Space Sciences	53	3.49	3.65	3.22	2.8	3.25	**3.94**	3.92	**3.93**	**3.63**	3.54	4.07	3.79	3.89	**3.89**
Suborbital/Special	29	**3.92**	3.84	**3.69**	**3.49**	3.71	**4**	3.87	**3.94**	**4.12**	**4.09**	4.04	4.08	3.98	**4.29**

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Raw Scores by Department															
Earth Sciences	52	3.48	3.69	**3.35**	3	3.35	**4.00**	3.97	**3.99**	**3.74**	3.62	4.06	3.84	4.03	**4.05**
Other	16	3.31	3.38	3.27	**3.26**	3.3	**3.80**	3.71	**3.76**	**3.71**	3.46	3.91	3.73	3.96	**3.85**
Non Specified	12	**3.72**	3.79	**3.44**	2.83	3.41	**4.03**	4.01	**4.02**	**3.92**	3.91	3.9	3.91	3.99	**4.12**

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- Raw scores range from 20 to 100.
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Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Level															
Manager	165	3.48	3.58	**3.69**	3.26	3.50	3.95	3.82	3.89	3.86	3.70	3.89	3.83	3.74	3.63
Non Manager	630	3.52	3.67	3.36	3.07	3.38	3.90	3.87	3.89	3.76	3.64	**4.07**	3.86	**3.94**	**4.08**

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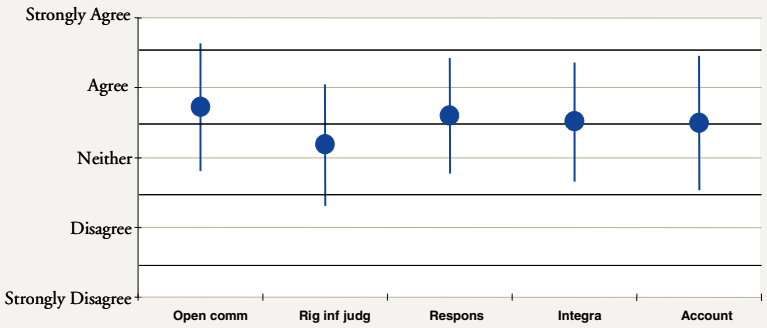
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
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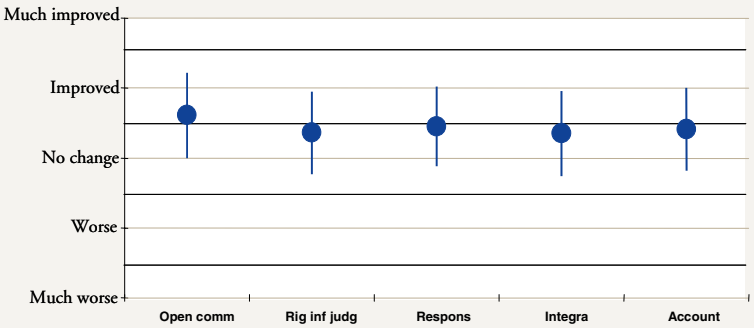
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
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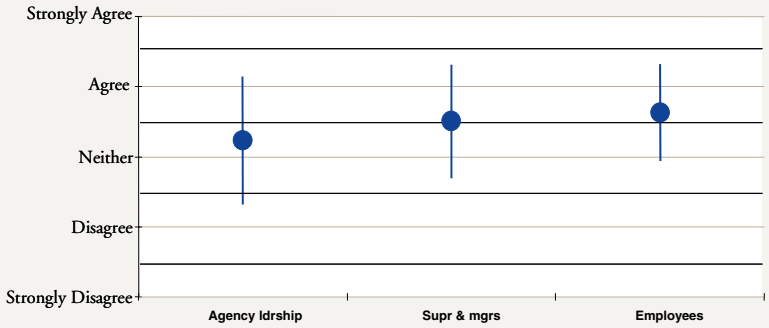
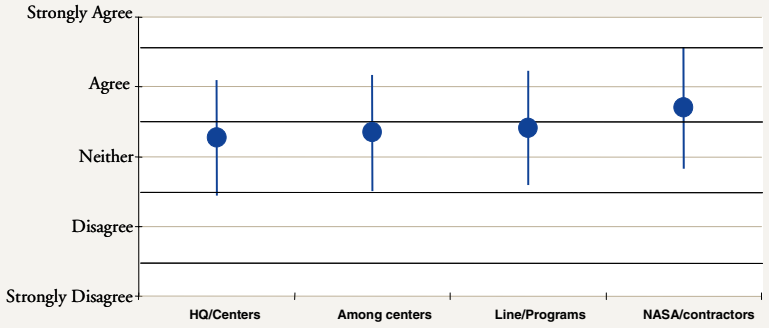
Perceptions of Consistency Between Words and Actions



Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
- **Employees' actions** are consistent with their words on mission safety.

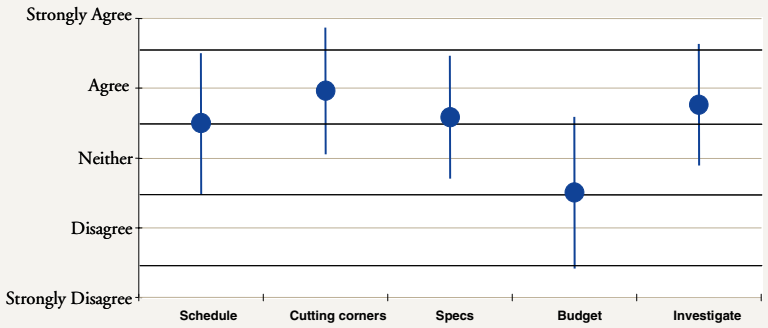
Cooperation and Collaboration



Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

Potential Inhibitors



Questions:

- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
- At this Center, when we know something works we *still* worry if it is inconsistent with the **specifications**.
- **Budget** constraints *do not* compromise engineering and mission safety
- Management at our Center wants to **get to the bottom of mission safety concerns** and not just brush them aside

Employee "Connection" to Mission Safety

Questions:

- **My job** can have an impact on mission safety
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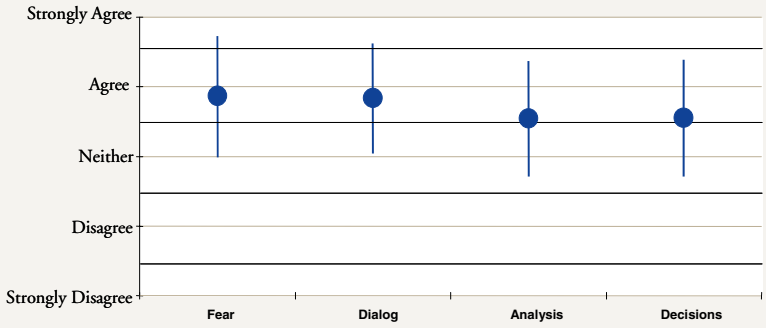


Questions:

- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

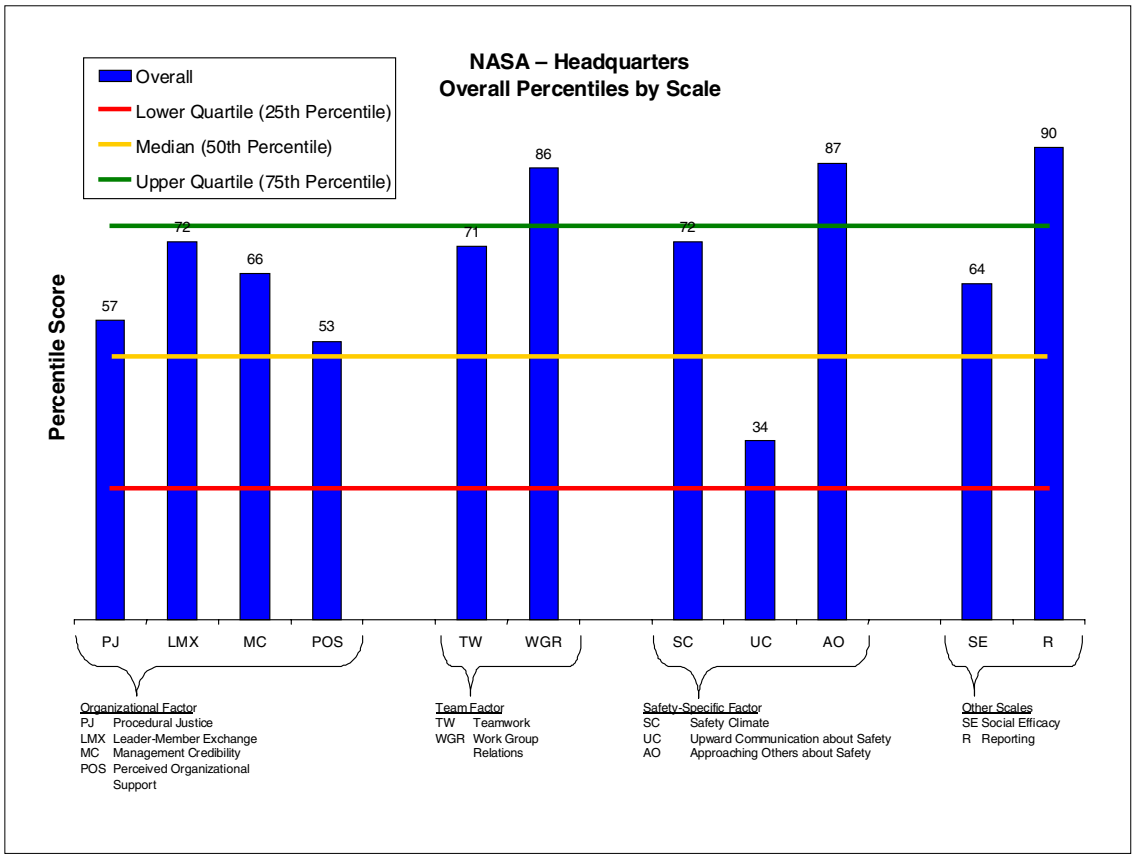
Appendix D: Center-by-Center Survey Highlights

Headquarters

Headquarters scores are relatively low in Procedural Justice, Management Credibility, Teamwork, Upward Communication, Approaching Others, and Social Efficacy, and reporting. Based on interview information, we believe these results reflect frustration over the headquarters/Center relationships as well as support functions' lack of a strong sense of connection to the Agency's mission.

A striking aspect of headquarters results is the very low results from people with supervisory responsibility. On all but work group related scales, managers' scores were very low compared to other groups that have taken this survey. Headquarters managers' scores reflect frustration and lack of alignment.

Among non-managers, there is wide variation among units. The Education, Public Affairs, External Relations, Legislative Affairs, Security Management, and Aeronautics units showed the lowest scores. Interview and focus group information indicates that people within administrative support groups at headquarters do not feel connected to the Agency's mission.



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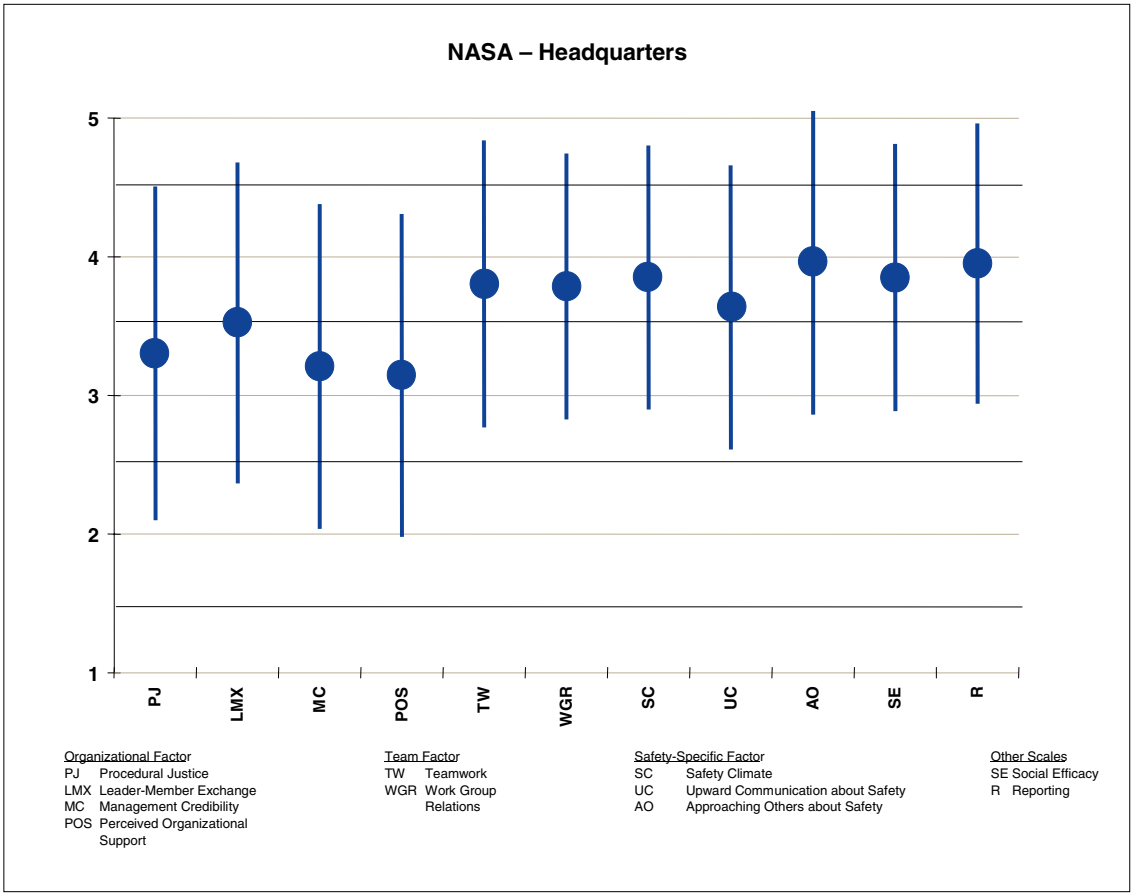

Scale:
5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Raw Scores by Department															
External Relations	8	3.07	3.40	2.92	2.94	3.06	3.55	3.69	3.62	3.64	3.5	4.24	3.87	3.84	3.82
Legislative Affairs	10	3.14	3.54	2.97	2.98	3.13	3.82	3.79	3.81	3.98	3.59	4.1	3.94	3.95	4.24
Space Flight	24	3.54	3.52	3.22	3.23	**3.35**	3.65	3.77	3.70	4.08	3.93	4.11	4.05	4.03	4.20
Education	7	2.22	2.39	1.66	1.76	1.95	3.04	3.26	3.14	3.1	2.95	3.68	3.32	3.3	3.4
Instit/Corp Manage	55	3.47	3.67	3.34	3.35	**3.44**	3.87	3.77	3.82	3.74	3.63	3.99	3.81	4	3.91
Public Affairs	14	2.88	3.66	2.48	2.45	2.81	3.74	3.68	3.71	3.55	3.45	3.96	3.7	3.86	3.77
Safe/Miss Assurance	13	3.63	3.72	3.63	3.47	**3.60**	3.85	3.91	3.88	4.10	4.18	3.72	3.96	4.02	4.05
Aeronautics	18	3.06	3.16	2.79	2.69	2.89	3.42	3.44	3.43	3.79	3.56	4.25	3.93	3.83	3.97
Space Science	32	3.63	3.79	3.56	3.21	**3.53**	4.15	4.2	4.17	**4.24**	3.94	4.01	4.07	4.14	**4.49**
Bio/Physical Research	22	3.67	3.98	3.31	3.1	**3.46**	3.95	3.91	3.93	3.99	3.76	4.04	3.96	4.10	4.15
Chief Info Officer	7	3.74	3.8	**3.81**	3.71	**3.77**	4.14	3.95	4.05	4.04	3.73	3.87	3.9	3.88	3.8
Security Manage	9	3.14	3.64	2.96	2.92	3.13	3.35	3.34	3.35	3.27	3.44	3.79	3.54	3.82	3.75
Earth Science	12	3.32	3.56	3.20	3.2	**3.30**	3.71	3.69	3.70	3.66	3.46	4.13	3.81	3.86	3.71
Other	9	3.16	3.71	3.01	2.68	3.1	3.72	3.79	3.75	3.52	3.73	3.98	3.76	3.75	4.03
Not Specified	15	3.18	3.69	2.89	2.69	3.07	3.95	4.05	4	3.79	3.73	4.03	3.88	3.97	3.98

- Department scores are based on non-manager-version surveys only.
- Scores for departments with fewer than 5 surveys are not shown.
- Bold values are statistically significantly higher than underlined values (probability < .005).
- Raw scores range from 20 to 100.
- Unless all respondents provided their demographic information, the number of surveys within each section of this table will not add up to the total number of surveys.

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
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Percentile Scores by Department															
Office of Admin	7	59.1	53.7	47.1	37.9	48.9	69.6	68.8	69.1	49.2	13.4	82.6	57.6	96.6	83.5
Chief Financial	11	85.6	88.8	77.1	87.6	87.2	80.5	61.0	72.0	95.4	66.8	98.1	97.2	89.3	96.2
Human Resources	20	86.0	94.6	75.1	69.3	82.8	79.2	80.7	80.9	72.6	48.2	73.1	73	93.4	82.1
General Counsel	14	96.5	98.2	96.2	97.7	97.9	99.6	98.6	98.6	95	75.5	97.5	96.2	97.3	95.6
Procurement	14	81	79.1	73.5	69.2	75.4	70.3	90.4	82.4	86.3	67.1	87.9	88.9	84.5	95.1
External Relations	8	27.5	47.6	34.1	34.3	34	28.8	58.4	41.2	40.8	17.5	94.7	70.4	50.7	62.6
Legislative Affairs	10	35.0	65.3	38	37.5	42.3	67.1	71.8	69.3	78.9	26.1	86.9	79.5	74.5	91.8
Space Flight	24	78.5	62.9	62.7	63.1	67.2	40.8	68.5	54.7	87.4	78.3	87.8	90.1	87.2	90.6
Education	7	0.64	0.56	0.16	0.16	0.32	2	12.3	5.2	4.4	0.56	37.4	3.76	0.88	20.9
Instit/Corp Manage	55	71.7	79.7	71.5	71.9	74.7	73.5	69	71.8	51.6	31.4	76.4	62.0	82.1	71
Public Affairs	14	14.1	79.7	7.67	5.36	12.7	52.7	57.3	56.3	30.2	12.9	74.1	44.8	55.2	58.0
Safe/Miss Assurance	13	84.7	84.7	89.2	80.7	87.5	71.1	83.0	78.7	89.2	96.3	42.8	82.5	85.7	81.7
Aeronautics	18	26.9	20.6	22.9	14.7	18.9	16.1	27.3	19.7	58.7	22.5	94.8	78.1	48.8	76.3
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Chief Info Officer	7	91.1	89.2	95.0	92.4	94.6	95.6	86.8	92.6	85.5	49.6	62.1	74.3	58.6	60.6
Security Manage	9	35.1	77.1	37.7	32.5	44	11.3	17.6	13.5	9.59	11.8	51.9	19.4	46.5	55.2
Earth Science	12	57.4	68.7	61.5	59.8	62.0	49.1	58.5	54.6	42.3	13.8	88.6	60.7	55.2	51.6
Other	9	36.5	83.1	41.3	14.3	38.4	50.5	71.2	61.2	27.6	49.4	76.1	54.5	30.3	81.1
Not Specified	15	40.0	82.2	30.9	14.8	35.3	83.1	94.2	89.5	58.3	48.5	81.2	72.3	79.7	77.4
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Human Resources	20	3.66	3.94	3.39	3.31	**3.55**	3.92	3.88	3.9	3.92	3.72	3.96	3.89	4.12	4.05
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Porcurement	14	3.57	3.66	3.37	3.31	**3.45**	3.85	3.99	3.92	4.06	3.85	4.12	4.03	4.01	4.33

Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
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Level															
Manager	127	2.95	3.13	3.19	3.12	3.11	3.65	3.61	3.63	3.72	3.39	3.73	3.64	3.43	3.38
Non Manager	336	**3.43**	**3.67**	3.22	3.15	3.34	3.86	**3.85**	3.85	3.9	**3.73**	**4.05**	**3.92**	**4.00**	**4.08**

• Scores represent the percentage of maximum possible score.
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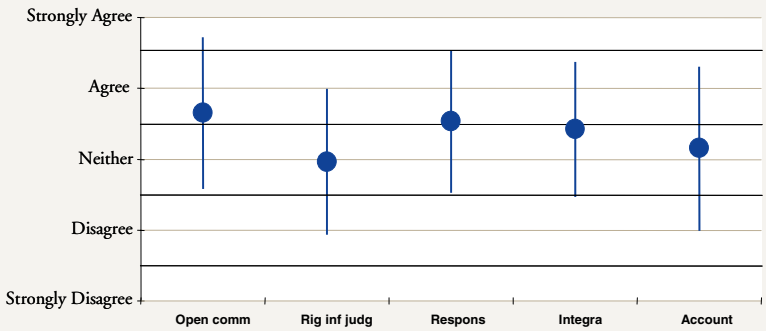
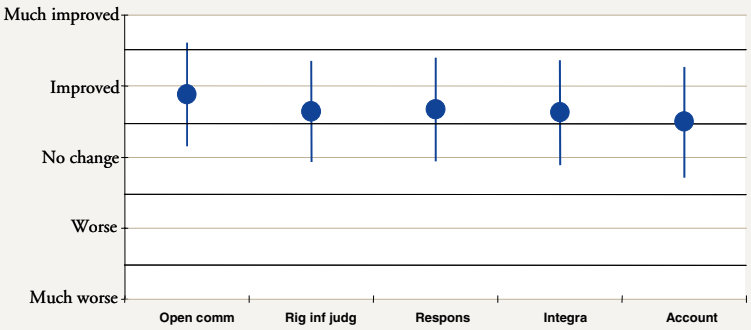
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
- **Integra:** There is integration of mission safety considerations with engineering, cost, and schedule considerations within our Center
- **Account:** Individuals are held accountable for following procedures within our Center.

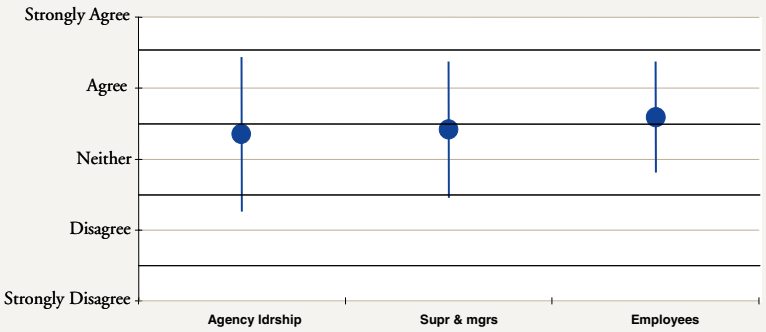
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
- **Respons:** How has individuals' taking personal responsibility for mission safety changed within your Center since the Columbia accident?
- **Integra:** How has integration of mission safety with engineering, cost, and schedule considerations changed within your Center since the Columbia accident?
- **Account:** How has individual accountability for following procedures changed within your Center since the Columbia accident?

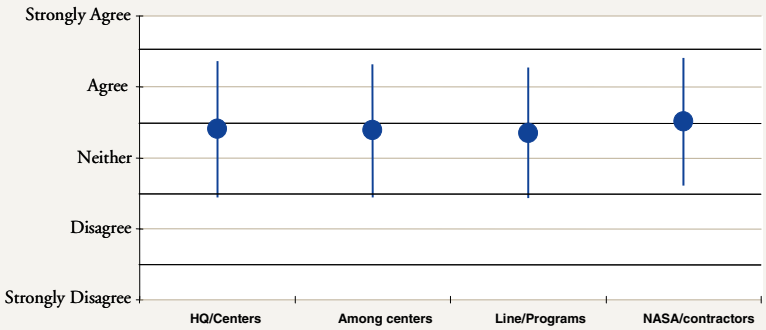
Perceptions of Consistency Between Words and Actions



Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
- **Employees' actions** are consistent with their words on mission safety.

Cooperation and Collaboration



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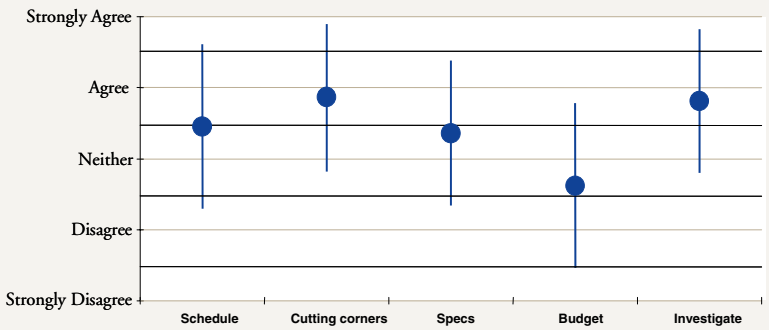

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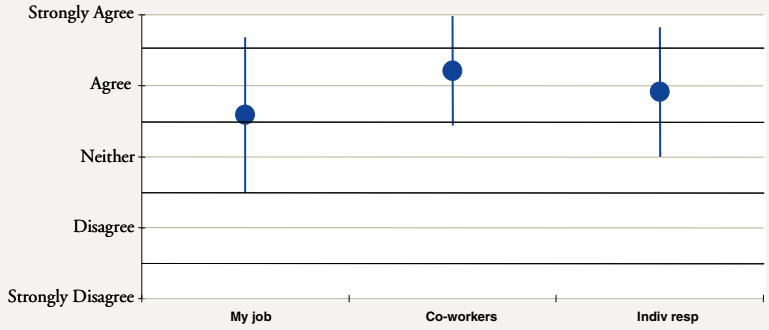

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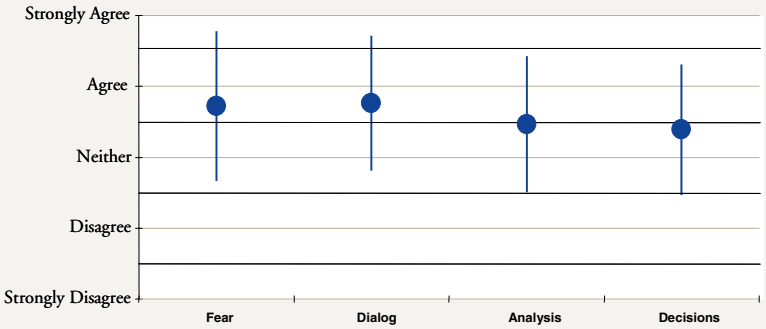
Communication



Questions:

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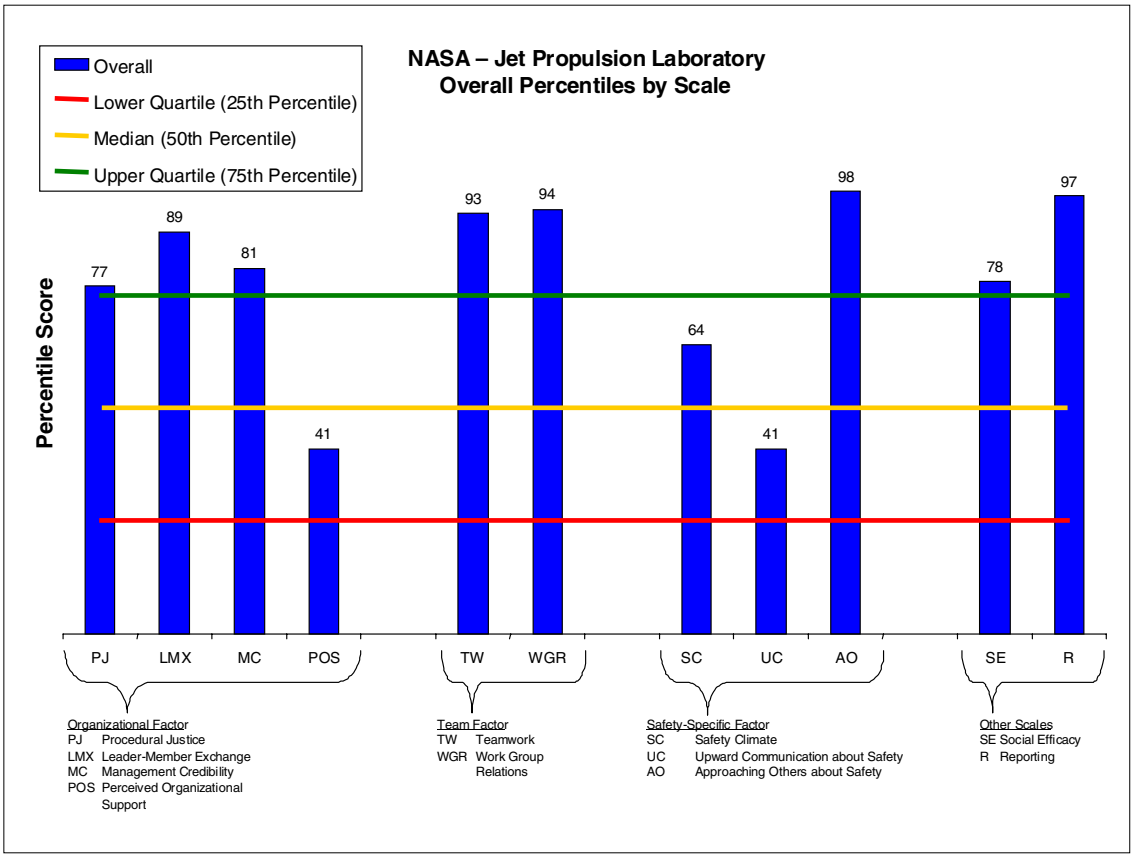
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

Appendix D: Center-by-Center Survey Highlights

Jet Propulsion Laboratory

JPL scores follow the same pattern as NASA generally. Within JPL there is excellent alignment with virtually no differences among organizational units.



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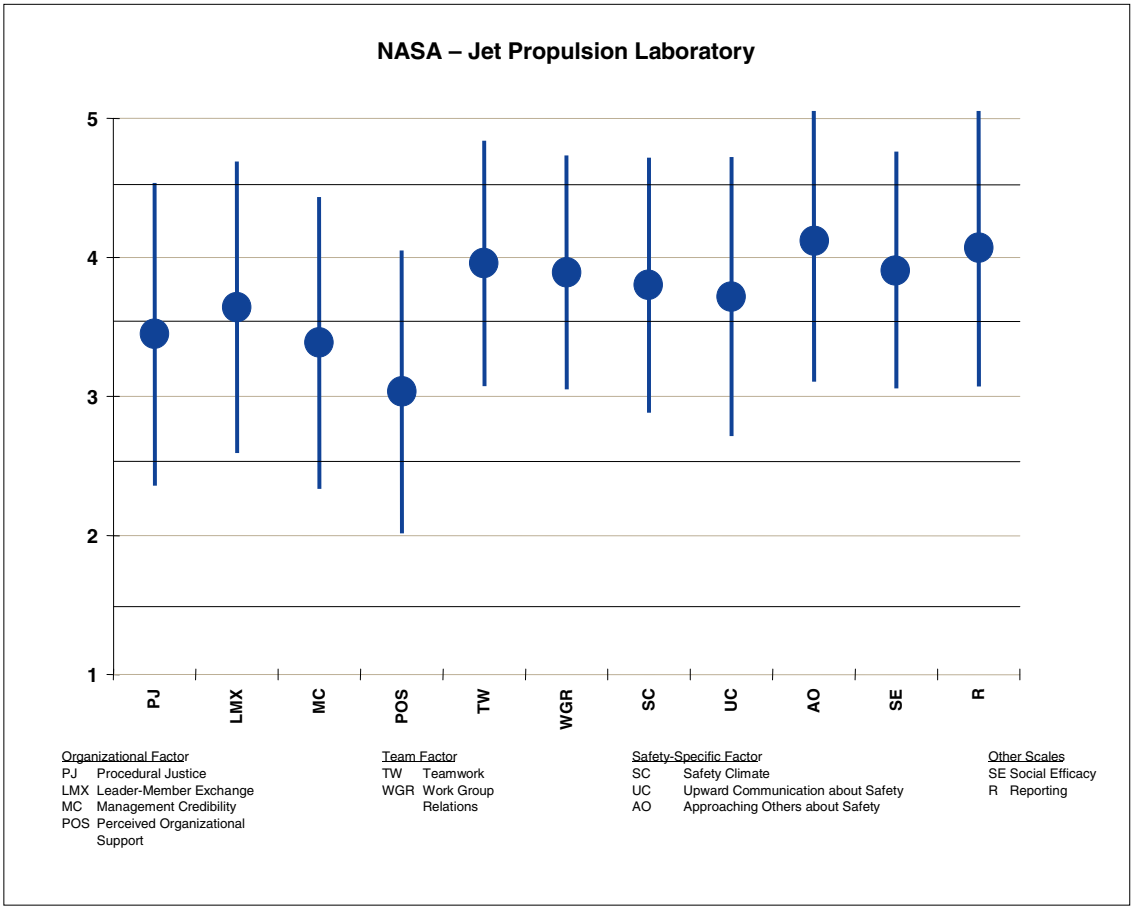

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Percentile Scores by Department															
Office of Director	12	87.3	96.3	85.4	74.5	88.6	94.6	92.5	93.5	98.5	96.7	99.0	99.0	94.9	97.8
Office of Comm/Educ	6	10.8	19.6	45.7	23.7	23.8	50.4	16.7	31.3	28.5	5	85.2	46.1	8.63	83.1
Jupiter Icy Moons	5	97.7	95.6	97.4	91.8	97.2	95.1	94.1	94.8	88.7	90	65.9	87.7	88.8	93.5
Office of Safe/Mis	42	75.3	84.4	58.2	32.8	60.5	74.8	71.9	74.0	60.3	70.3	93.9	85.5	77.5	82.6
Bus Operations/HR	58	41.3	47.3	65.9	44.8	54.6	66.1	68.9	66.8	65.8	28.5	87.5	74.2	73	88.6
Engin/Science Direct	285	71.7	82.2	71.2	32.8	64.6	85.3	84.7	84.7	51.5	45.1	92.2	77.5	68.4	86.6
Mars Explor/Solar Sys	22	76.8	92.0	76.8	64.7	78.3	97.4	98.2	97.6	70.2	47.7	95.5	87.4	84.3	83.9
Planetary Flight Proj	17	72.8	88.6	71.2	10.5	58.6	88.9	87.3	88.5	71.1	59.2	97.8	92.3	89.4	91.5
Astronomy/Physics	17	91.6	86.2	89.6	77.8	88.3	88.6	90.4	90.0	68.1	56.5	83.9	79.5	69.4	71.8
Earth Science/Tech	25	59.9	76.4	70.5	34.9	60.5	76.8	76.3	77.2	47.4	26.9	88.8	67.9	49.2	83.2
Interplanetary Network	14	85.6	97	43.9	15.0	60.0	96.6	95.3	96.1	53	56.8	97.5	88.1	94.2	96.5
Other	47	81.4	83.9	74.3	67.9	76.2	85	82.5	83.9	67.1	49.2	54.4	61.3	74.2	77.9
Not Specified	14	46.8	48.5	34.9	22.8	34	39.9	52.6	44.7	28.7	6.08	62.5	33.3	43.4	64.4
Raw Scores by Department															
Office of Director	12	3.68	4.01	3.55	3.39	3.63	4.12	4.01	4.07	4.4	4.21	**4.8**	4.53	4.16	4.5
Office of Comm/Educ	6	2.81	3.14	3.05	2.81	2.96	3.72	3.33	3.53	3.53	3.31	4.08	3.71	3.58	4.07
Jupiter Icy Moons	5	4.03	3.97	3.96	**3.69**	3.9	4.13	4.05	4.09	4.1	4.06	3.9	4.01	4.05	4.29
Office of Safe/Mis	42	3.5	3.72	3.17	2.92	3.28	3.88	3.8	3.84	3.80	3.87	4.21	3.99	3.96	4.06
Bus Operations/HR	58	3.2	3.4	3.26	3.05	3.22	3.81	3.77	3.79	3.85	3.61	4.11	3.9	3.94	4.16
Engin/Science Direct	285	3.47	3.69	3.34	2.93	3.33	3.97	3.92	3.95	3.74	3.71	4.18	3.91	3.92	4.13
Mars Explor/Solar Sys	22	3.52	3.85	3.42	3.25	3.49	4.22	4.22	4.22	3.9	3.72	4.26	4.00	4.01	4.09
Planetary Flight Proj	17	3.48	3.79	3.34	2.6	3.26	4.02	3.95	3.99	3.90	3.79	4.42	4.09	4.06	4.23
Astronomy/Physics	17	3.75	3.75	3.64	3.44	3.63	4.01	3.99	4.00	3.88	3.78	4.07	3.93	3.92	3.92
Earth Science/Tech	25	3.34	3.63	3.32	2.94	3.28	3.89	3.84	3.87	3.7	3.6	4.13	3.86	3.84	4.07
Interplanetary Network	14	3.64	4.06	3.04	2.69	3.28	4.18	4.09	4.14	3.75	3.78	4.36	4.01	4.14	4.39

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Raw Scores by Department															
Other	47	3.57	3.71	3.38	3.28	3.46	3.97	3.90	3.94	3.86	3.73	3.81	3.81	3.95	3.99
Not Specified	14	3.23	3.41	2.93	2.79	3.06	3.64	3.64	3.64	3.54	3.35	3.87	3.63	3.81	3.83

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Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
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Level															
Manager	129	3.39	3.5	**3.64**	3.18	3.43	3.98	3.87	3.93	3.86	3.73	3.96	3.87	3.79	3.68
Non Manager	567	3.46	3.68	3.32	3	3.34	3.95	3.9	3.93	3.79	3.72	**4.16**	3.92	3.94	**4.11**

• Scores represent the percentage of maximum possible score.
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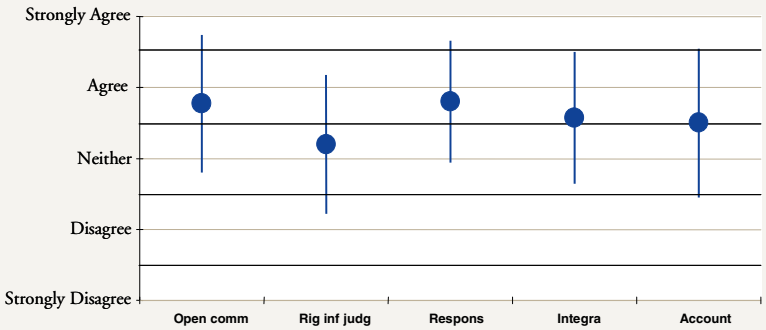
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
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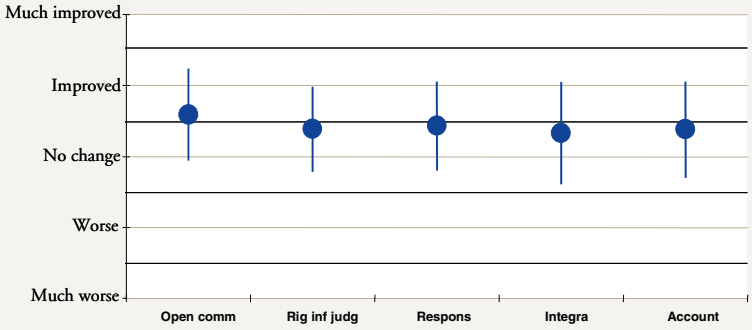

Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
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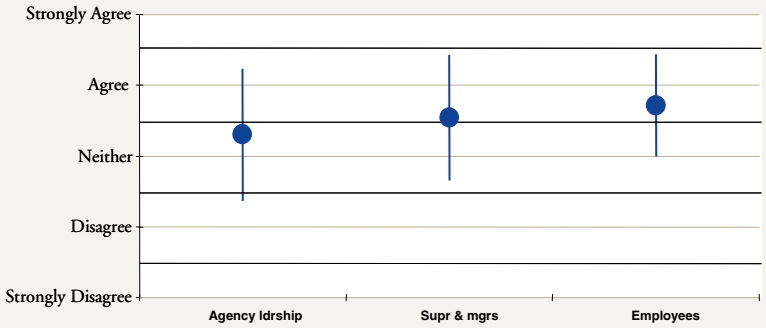

Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
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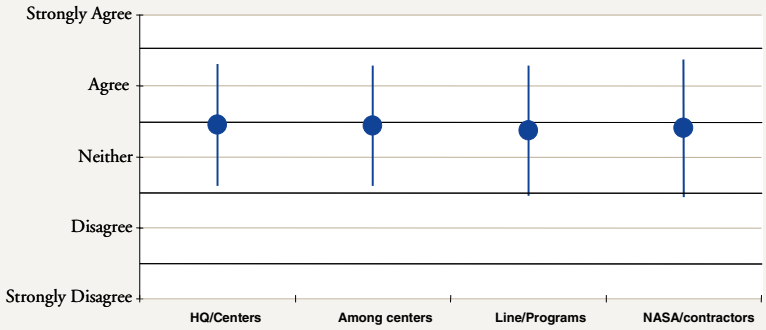
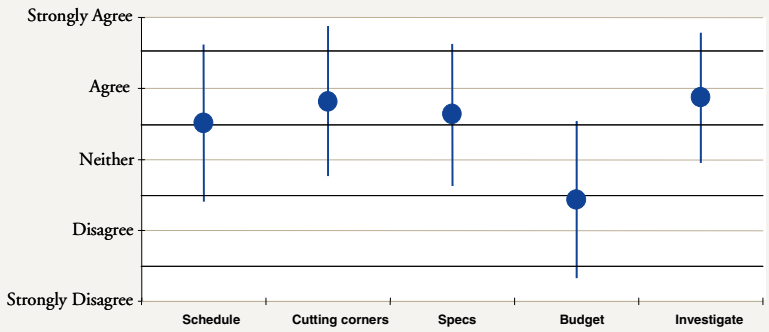
Cooperation and Collaboration



Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

Potential Inhibitors



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- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
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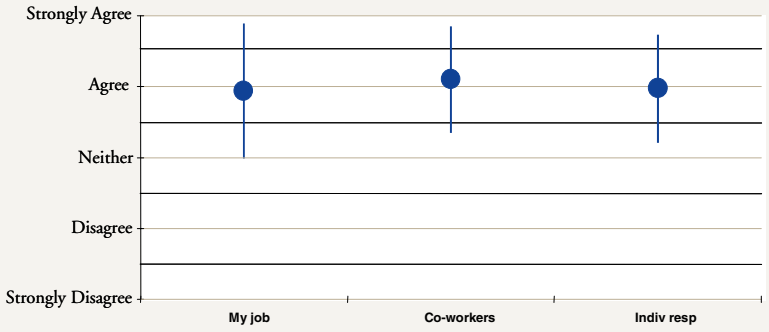

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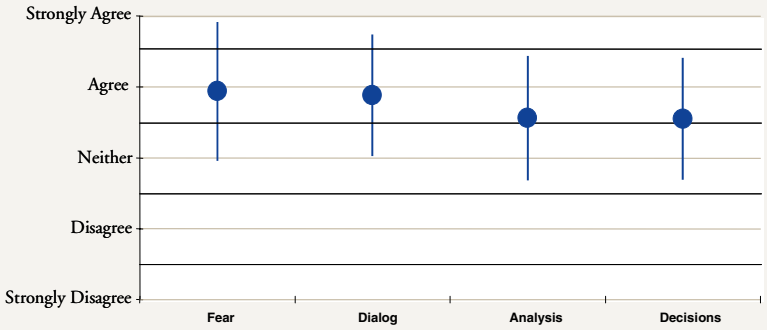
Communication



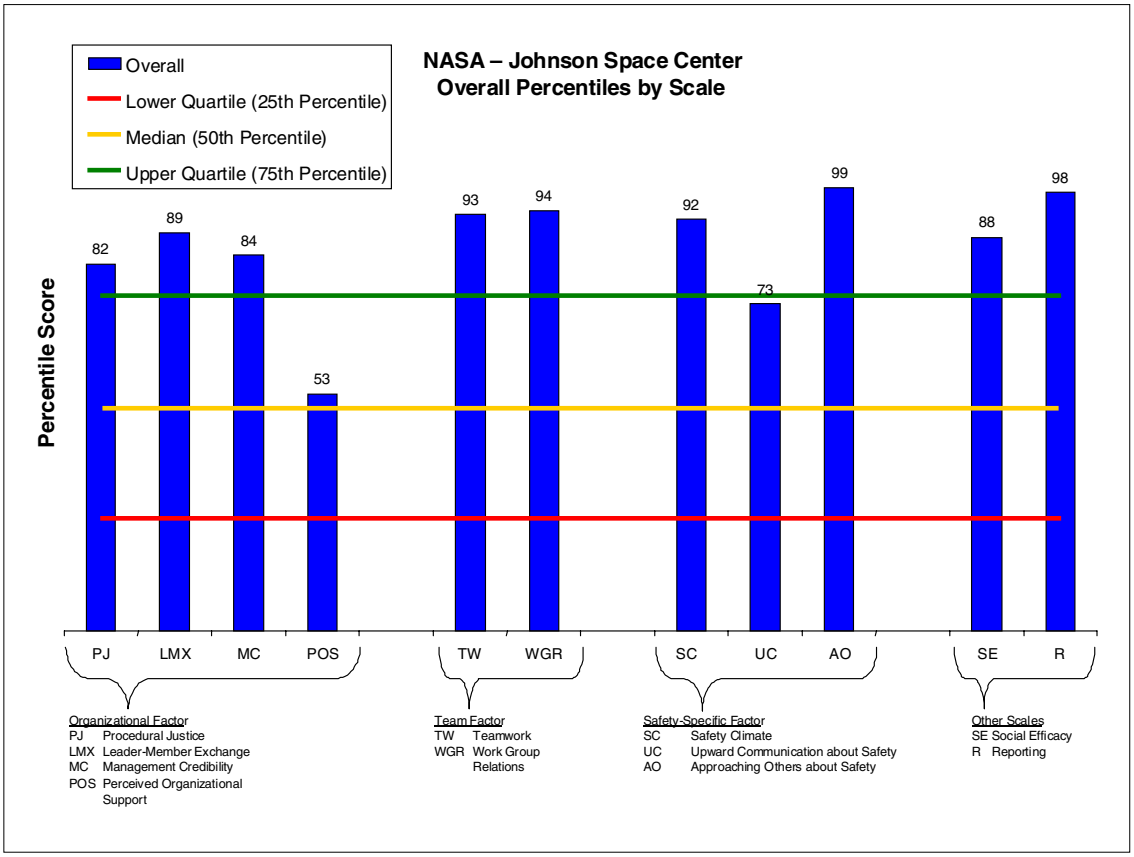
Questions:

- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

Appendix D: Center-by-Center Survey Highlights

Johnson Space Center

JSC scores follow the same basic pattern as NASA overall results, although JSC scores are relatively high on most survey scales.



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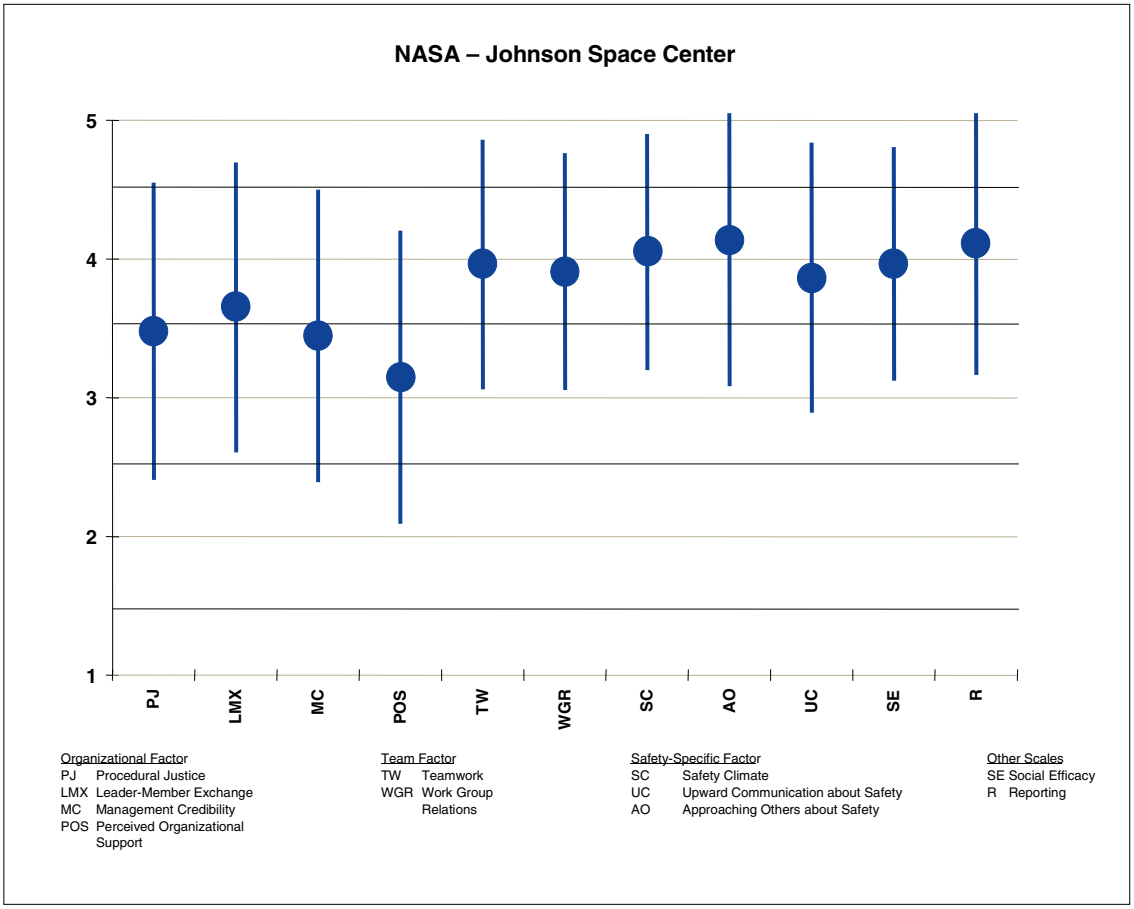

Scale:
5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Office of Director	9	65.7	84.8	72.5	34.1	64.7	80.1	94.4	88.5	93.7	55.1	95.7	93.9	85	97.0
SSP Office	51	80.7	82.7	81.9	54	75.5	80.7	82.8	83.1	95.5	84.3	95.1	95.8	85.1	96.8
ISS Program	74	55.6	59.7	54	26.1	47.3	66.3	67.6	66.7	80.7	55.2	93.7	88.9	74.6	86.9
Office of Chief Engin	6	94.8	92.4	92.4	84.0	92.9	98.4	98.3	98.3	97.8	87.8	98.3	98.5	98.3	97.6
HR/ Education	20	84.1	94.1	94.9	81.1	92.6	99	98.2	98.3	95.5	69.5	91.1	93.8	95.9	94.0
Leagal Office	6	77.6	84.7	89.8	37.6	75.4	91.2	97.0	94.9	92.4	60.9	86.6	89.8	87.9	89.2
Public Affairs	10	9.67	13.6	43.3	14.8	18.9	25.1	15.5	18.7	51.5	13.5	71.2	53.6	85	85.1
Office of Procurement	80	65.9	66.2	69.7	59.3	67.2	77.9	82.5	81.1	78.7	40.9	86.5	81.6	84.7	84.1
Office of CFO	102	83	88.2	79.3	56.8	77	79.8	76.4	79.1	86.3	43.1	79.4	81.5	87.7	88.2
Information Resources	45	40.0	45.2	65.9	54.8	55.9	76.5	82.4	80.3	62.9	30	79.2	66.6	78.3	81.7
Center Operations	49	51.6	55	52.3	43.6	51.4	35.9	31.1	33.7	75.8	52.5	48.4	63.9	60.6	80.6
Safety/Mission Assur	60	77.9	82.7	71.1	54.8	71	83.9	86.2	85.3	81.5	81.4	91.0	90.1	89.8	85.8
Flight Crew Operations	72	72.1	84.7	78.3	58.5	74.7	90.6	89.9	91	87.8	86.6	90.5	92.5	89.5	81.1
Mission Operations	182	85.9	92.8	89	69.1	86.9	91.5	92.5	91.6	90.8	84.7	96.2	95	90.7	92.6
Engineering Direct	385	83	87.9	83.5	57.2	79.2	92.1	93.2	92.6	86.3	74.7	96.3	93.8	88.2	89.7
White Sands Test	31	86.9	90.6	87.7	73	86.6	80.7	88.8	85.1	87.3	92.2	96.5	95.1	92.1	86.1
Space/Life Sciences	64	52.6	69.5	58.4	36.1	54.5	56.4	60.5	58.9	79.9	66.8	88.4	87.7	79.2	79.6
Orbital Space Plane	23	57.2	38.8	30.7	14.8	28.9	62.3	57.3	59.2	53.9	32	94.5	77.9	71.6	80.8
EVA Office	11	76.6	89.0	79	63.3	77.3	94.7	95.1	95.0	95	96.5	92.6	96.2	87.4	93.7
Other	8	98.1	92.7	90.2	56.2	89.9	81.7	70.1	77.2	87.8	79.6	69.2	84.4	91.7	87.8
Not Specified	21	20.4	30.5	15.4	13.0	15.7	31.7	27.6	29.3	46.6	30.3	87	66.2	55.9	65.9
Raw Scores by Department															
Office of Director	9	3.41	3.73	3.36	2.94	3.33	3.93	4.06	3.99	**4.2**	3.77	4.27	4.12	4.01	4.43
SSP Office	51	3.57	3.70	**3.5**	3.14	3.46	3.93	3.91	3.92	**4.25**	3.99	4.25	4.19	4.01	4.40
ISS Program	74	3.30	3.5	3.12	2.85	3.16	3.81	3.76	3.79	4	3.78	4.21	4.03	3.95	4.14
Office of Chief Engin	6	3.83	**3.86**	**3.72**	**3.54**	**3.72**	**4.28**	**4.27**	**4.27**	**4.33**	4.02	**4.56**	**4.35**	4.38	4.48

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Raw Scores by Department															
HR/ Education	20	3.62	**3.93**	**3.80**	3.48	**3.70**	**4.31**	**4.24**	**4.28**	**4.24**	3.86	4.16	4.12	4.18	4.3
Leagal Office	6	3.53	3.73	**3.64**	2.98	3.45	4.06	4.15	4.1	4.15	3.80	4.1	4.05	4.04	4.17
Public Affairs	10	2.78	3.04	3.03	2.69	2.89	3.51	3.32	3.42	3.74	3.46	3.94	3.76	4.01	4.11
Office of Procurement	80	3.41	3.54	3.31	3.19	3.35	3.90	3.90	3.90	3.98	3.68	4.09	3.96	4.01	4.09
Office of CFO	102	3.60	3.78	3.46	3.17	**3.48**	3.92	3.84	3.88	4.06	3.7	4.01	3.95	4.04	4.16
Information Resources	45	3.18	3.38	3.26	3.15	3.24	3.89	3.9	3.89	3.82	3.62	4.01	3.85	3.97	4.05
Center Operations	49	3.27	3.46	3.11	3.03	3.2	3.62	3.48	3.55	3.94	3.76	3.77	3.83	3.88	4.02
Safety/Mission Assur	60	3.53	3.7	3.34	3.15	3.40	3.96	3.94	3.95	4	3.96	4.15	4.05	4.06	4.12
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EVA Office	11	3.52	3.79	3.45	3.23	**3.48**	4.12	4.08	4.10	**4.23**	**4.19**	4.18	4.20	4.03	4.29
Other	8	**4.11**	**3.87**	3.65	3.16	**3.65**	3.94	3.78	3.87	4.09	3.94	3.92	3.98	4.1	4.15
Not Specified	21	2.97	3.26	2.66	2.66	2.85	3.58	3.45	3.52	3.69	3.62	4.10	3.85	3.87	3.86

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Non Manager	1312	3.51	**3.7**	3.41	3.14	3.42	3.96	3.92	3.94	4.04	3.87	**4.18**	4.06	**4.03**	**4.16**

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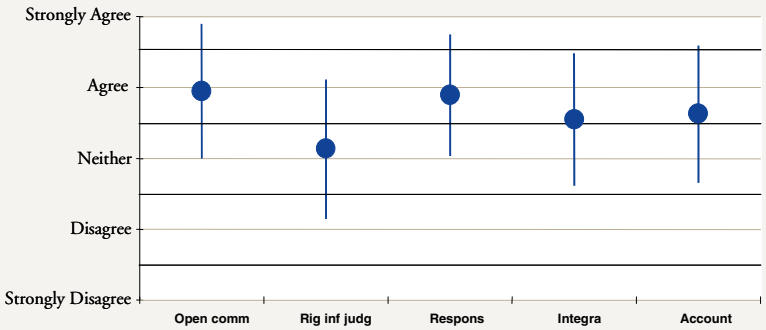

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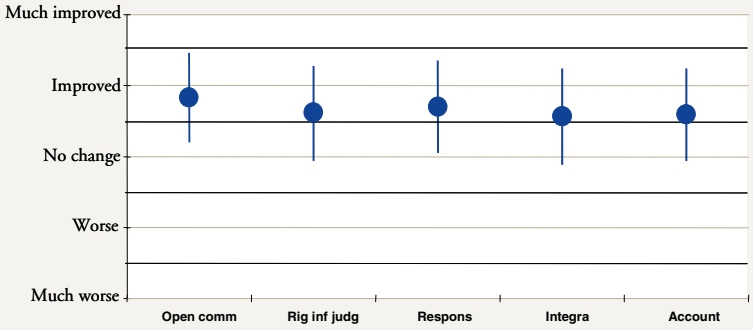

Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
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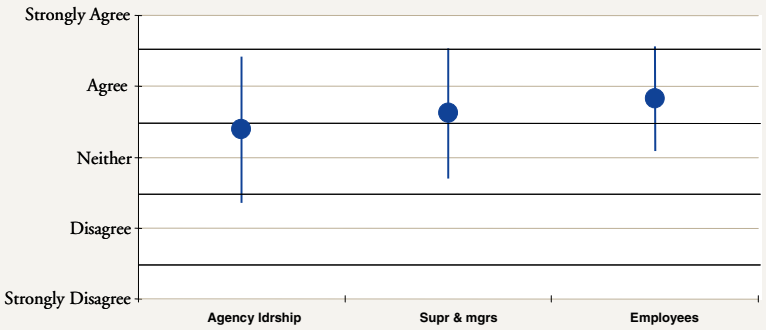

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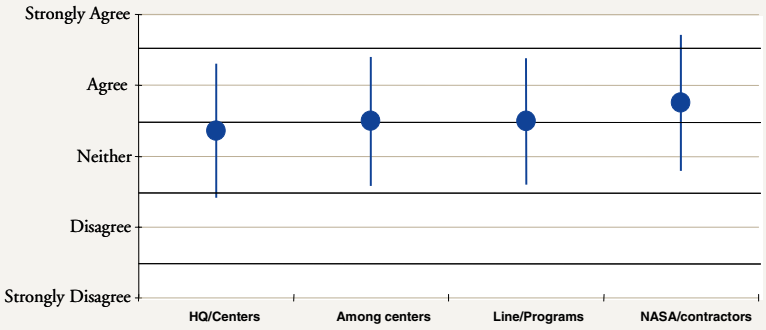

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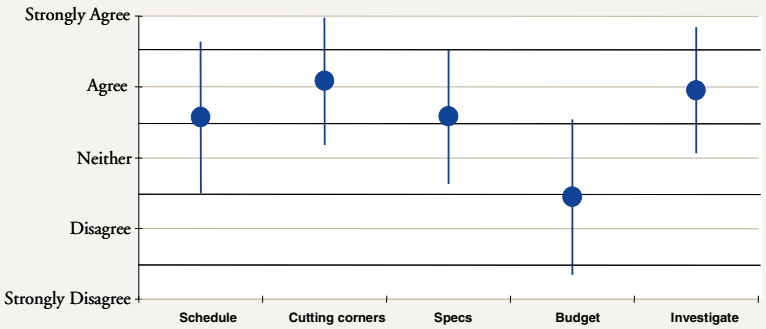

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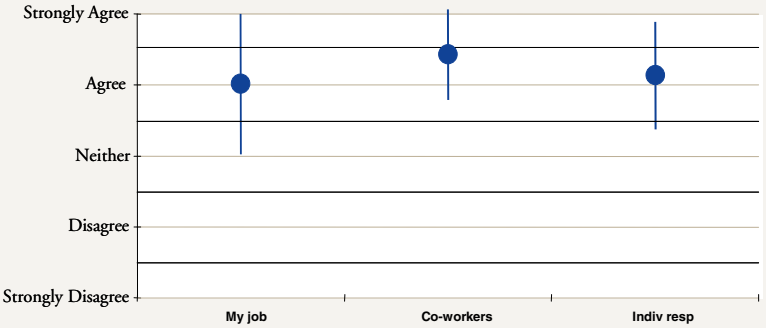

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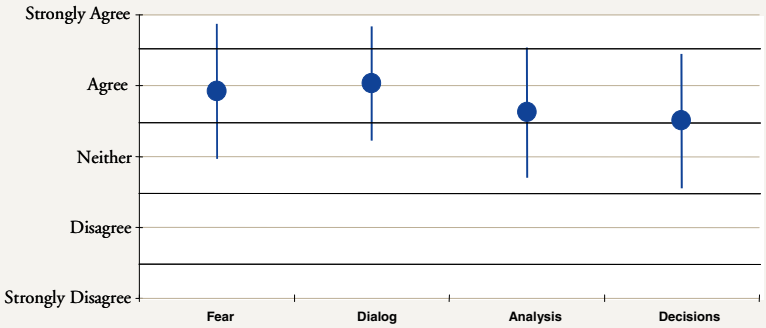

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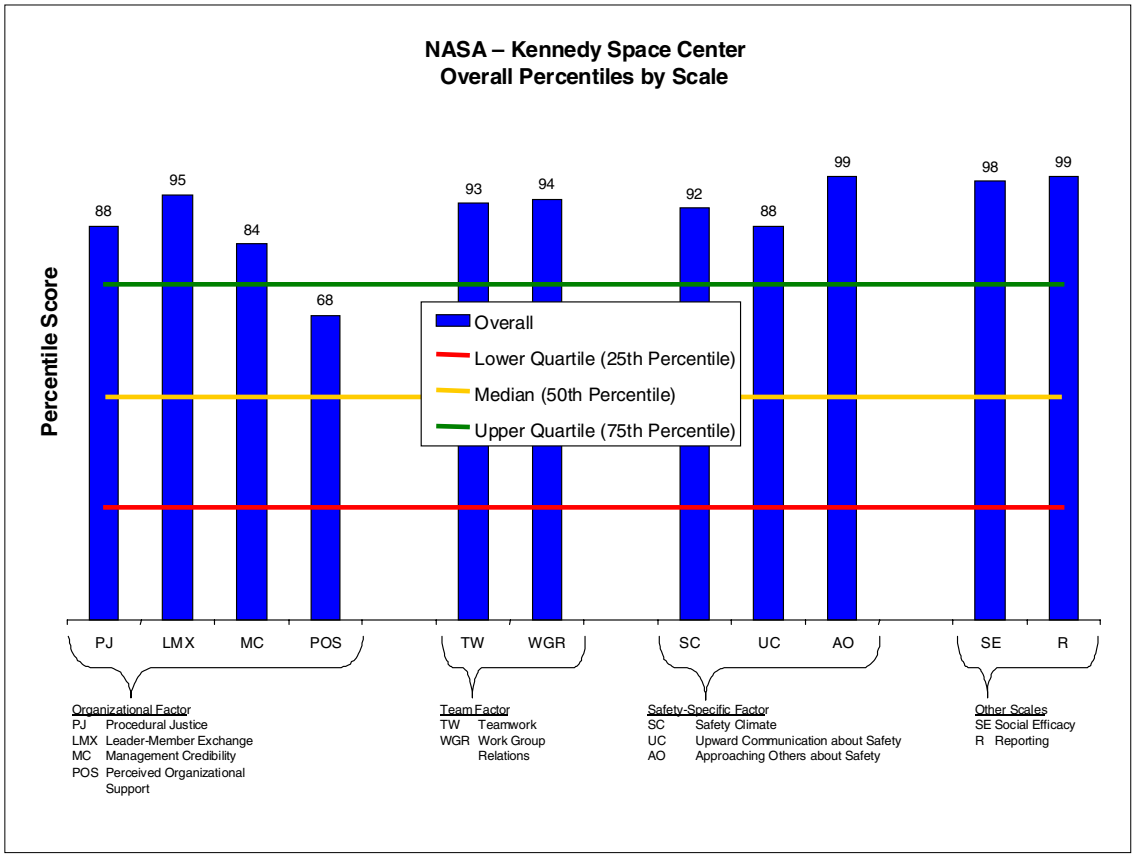
Appendix D: Center-by-Center Survey Highlights

Kennedy Space Center

Kennedy Space Center results are generally among the highest in the Agency. The Upward Communication score (88th percentile) is substantially above the overall Agency level, as is Perceived Organizational Support (68th percentile.)

The Safety, Health & Independent Assessment Office results are substantially below the KSC overall averages on all scales.

The Shuttle Processing unit also shows scores below the site's overall averages on most scales.



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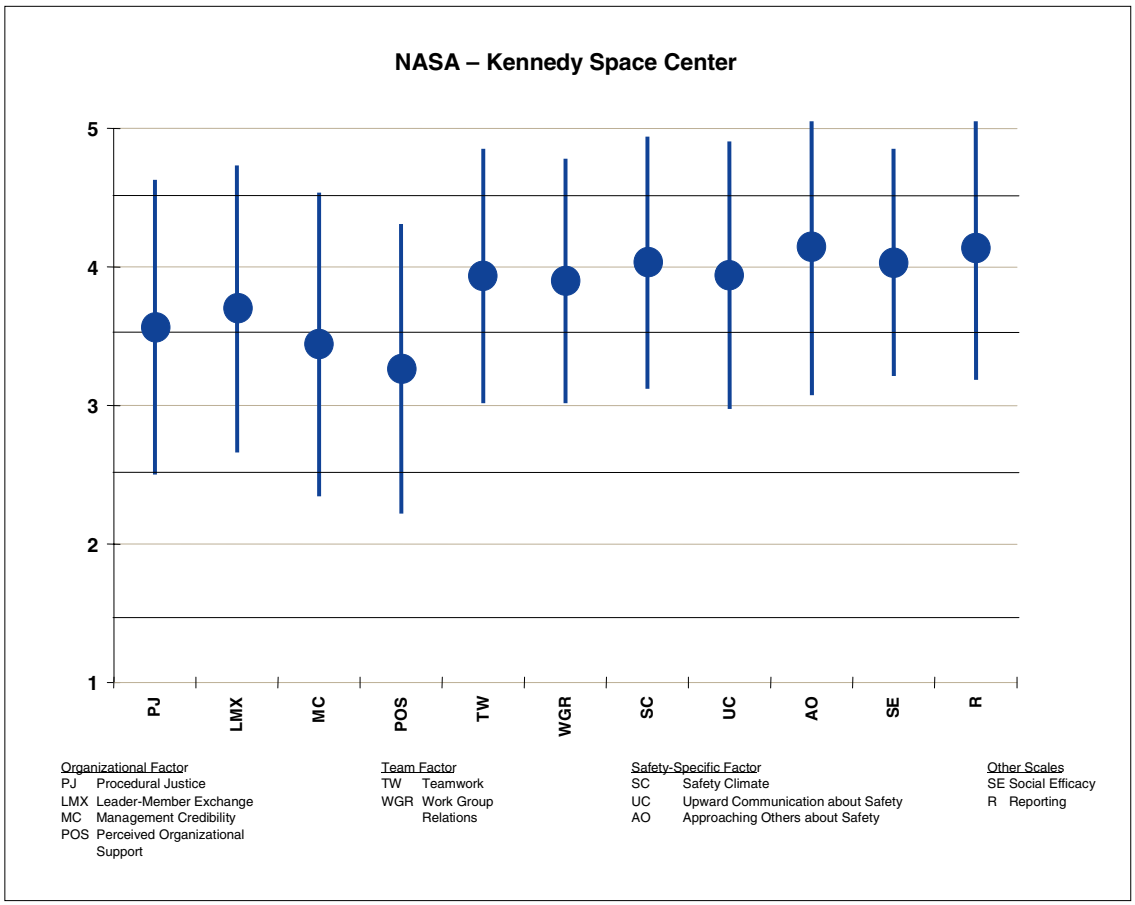


Scale:
5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Cape Canaveral Sup	8	98.9	97.9	98.2	94.7	98.0	99.6	98.2	98.6	98.3	97.7	75.7	95.8	98.0	93.8
Space Shuttle Launch	14	87.3	94.8	89.9	86.3	92.4	97	94.0	95.7	86.9	92.2	97.8	96.4	98.0	95.2
Orbital Space Plane	14	94.8	91.4	95.1	77.6	92.9	97.9	98.4	98.3	93.4	87.5	97.5	96.5	97	90.8
Chief Counsel	6	84.7	96.0	96.4	92.4	95.8	99.4	98.7	98.6	94.1	87.8	61.4	88.5	98.1	74.9
Office of CFO	31	92.0	92.1	83.1	85.6	89.7	97.4	95	96.2	95.9	86.5	70.6	90.5	93.8	94.4
Procurement Office	17	91.3	93.2	86.7	86.1	91.2	97.3	97.4	97.1	97.6	95.7	95.7	97.4	94.7	93.9
Workforce/Diversity	18	95.5	93.0	96.9	83.1	95.3	98	98.1	97.9	98.6	90.5	97.1	97.8	97.8	93.5
External Relations/Bus	24	50.8	34.8	42.9	57.7	48.6	49.7	55.2	52.8	71.2	51.1	75.2	73.9	76.1	72.6
Safety/Health/Indpend	27	26.5	44.9	16.8	28.5	24.1	29.2	42.2	34.2	27.7	29.7	88.8	59.6	82.1	72.4
Shuttle Processing	157	75.9	76.3	73	50	69.6	71.9	78.7	76.6	77.3	76.7	91.2	88.9	85.3	90.7
International Space	116	69	73.4	69.5	60.4	69.4	70.6	71.3	71.1	84.7	83.8	94.7	93.2	86.7	89.4
Launch Services	47	88.9	93.4	85.1	67.4	85.5	81.1	89.2	85.3	80.3	77.2	93.1	90.2	91.7	92.4
Spaceport Eng/Tech	61	69.7	82.2	55	40.0	60.0	65.2	78.4	72.4	61.6	65.4	89.3	81.5	81.3	85.2
Spaceport Services	52	82.0	91.7	73.6	55.6	75.5	78.7	77.4	78.8	76.0	82.8	96.3	92.5	92.1	91.5
Info Tech/Comm Serv	32	88.6	83.1	78.3	60.5	78.3	74.0	69.7	72.2	84.7	76.3	79.5	86.4	85.1	81.1
Other	7	68.1	76.9	70	54.4	67.9	43.5	44.4	42.4	67.6	65.5	55.3	65.7	27.9	82.7
Non Specified	13	44.0	60.4	60.0	50.8	55.9	82.3	69.1	77.2	68.7	38.9	76.0	70.4	77.2	64.1
Raw Scores by Department															
Cape Canaveral Sup	8	**4.27**	4.13	**4.04**	3.79	**4.03**	**4.46**	4.25	**4.36**	**4.37**	4.25	3.98	4.18	4.3	4.29
Space Shuttle Launch	14	3.68	3.95	3.65	3.58	3.7	4.2	4.05	4.13	4.07	4.09	4.41	4.21	4.3	4.33
Orbital Space Plane	14	3.83	3.84	3.82	3.44	3.72	4.24	4.31	4.27	4.19	4.02	4.36	4.22	4.22	4.22
Chief Counsel	6	3.63	4	**3.88**	3.72	3.81	4.4	4.44	**4.42**	4.20	4.02	3.86	4.02	4.30	3.95
Office of CFO	31	3.76	3.86	3.51	3.56	3.65	4.21	4.07	4.15	4.26	4.01	3.94	4.06	4.13	4.31
Procurement Office	17	3.75	3.89	3.58	3.57	3.67	4.21	4.18	4.19	**4.32**	4.14	4.27	4.26	4.15	4.3
Workforce/Diversity	18	3.87	3.88	**3.91**	3.52	3.79	4.25	4.21	4.23	**4.41**	4.06	4.32	4.29	4.26	4.29
External Relations/Bus	24	3.26	3.29	3.03	3.18	3.17	3.71	3.66	3.69	3.90	3.75	3.97	3.89	3.95	3.93

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Raw Scores by Department															
Safety/Health/Indpend	27	3.06	3.38	2.68	2.88	2.96	3.55	3.57	3.56	3.52	3.62	4.13	3.8	4	3.93
Shuttle Processing	157	3.51	3.62	3.36	3.10	3.37	3.86	3.86	3.86	3.96	3.91	4.16	4.03	4.02	4.21
International Space	116	3.44	3.6	3.31	3.21	3.37	3.85	3.79	3.82	4.03	3.98	4.24	4.10	4.03	4.18
Launch Services	47	3.71	3.9	3.54	3.27	3.58	3.93	3.97	3.95	3.99	3.92	4.2	4.06	4.1	4.26
Spaceport Eng/Tech	61	3.45	3.69	3.13	3.00	3.28	3.81	3.86	3.83	3.81	3.83	4.14	3.95	3.99	4.11
Spaceport Services	52	3.58	3.84	3.37	3.16	3.46	3.91	3.85	3.88	3.95	3.97	4.29	4.09	4.11	4.23
Info Tech/Comm Serv	32	3.70	3.71	3.45	3.21	3.49	3.88	3.78	3.83	4.03	3.91	4.01	3.99	4.02	4.03
Other	7	3.43	3.63	3.31	3.14	3.36	3.67	3.59	3.63	3.87	3.84	3.82	3.84	3.73	4.06
Non Specified	13	3.21	3.5	3.19	3.11	3.24	3.94	3.77	3.86	3.88	3.67	3.98	3.87	3.96	3.83

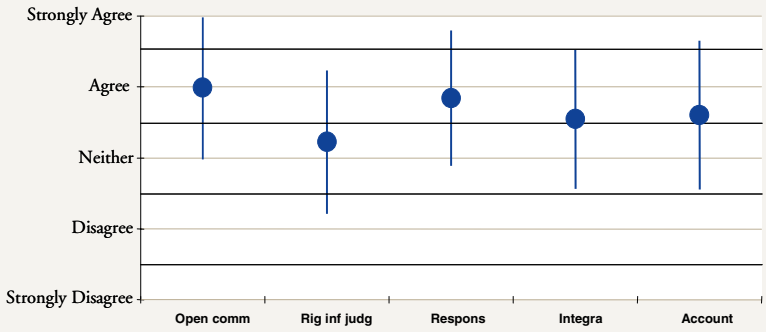
- Department scores are based on non-manager-version surveys only.
- Scores for departments with fewer than 5 surveys are not shown.
- Bold values are statistically significantly higher than underlined values (probability < .005).
- Raw scores range from 20 to 100.
- Unless all respondents provided their demographic information, the number of surveys within each section of this table will not add up to the total number of surveys.

Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Level															
Manager	133	3.66	3.70	**3.82**	**3.53**	**3.68**	4.03	3.98	4.01	4.18	3.99	4.05	4.08	3.92	3.81
Non Manager	654	3.54	3.69	3.36	3.21	3.43	3.91	3.88	3.9	4	3.93	4.16	4.05	4.05	**4.17**

• Scores represent the percentage of maximum possible score.
• Scores for levels with fewer than 5 surveys are not shown.
• Bold values are statistically significantly higher than underlined values (probability < .005).
• Unless all respondents provided their demographic information, the number of surveys within each section of this table will not add up to the total number of surveys.

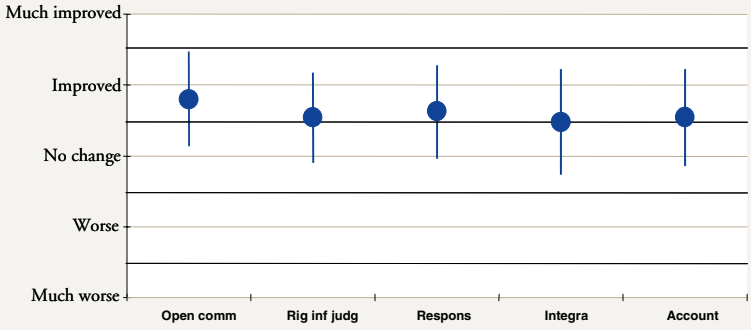
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
- **Integra:** There is integration of mission safety considerations with engineering, cost, and schedule considerations within our Center
- **Account:** Individuals are held accountable for following procedures within our Center.

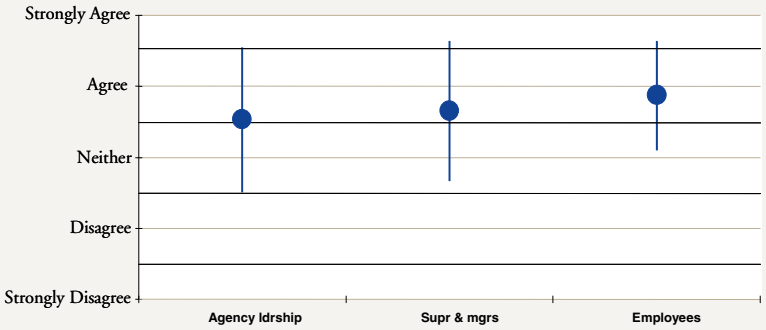
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
- **Respons:** How has individuals' taking personal responsibility for mission safety changed within your Center since the Columbia accident?
- **Integra:** How has integration of mission safety with engineering, cost, and schedule considerations changed within your Center since the Columbia accident?
- **Account:** How has individual accountability for following procedures changed within your Center since the Columbia accident?

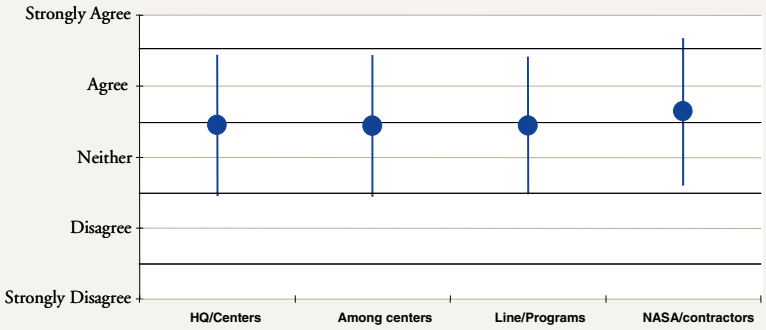
Perceptions of Consistency Between Words and Actions



Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
- **Employees' actions** are consistent with their words on mission safety.

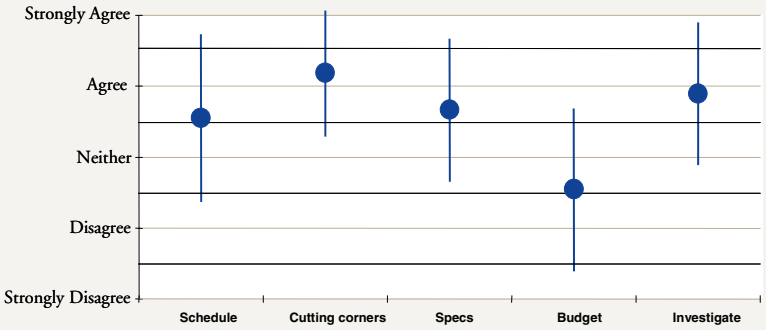
Cooperation and Collaboration



Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

Potential Inhibitors



Questions:

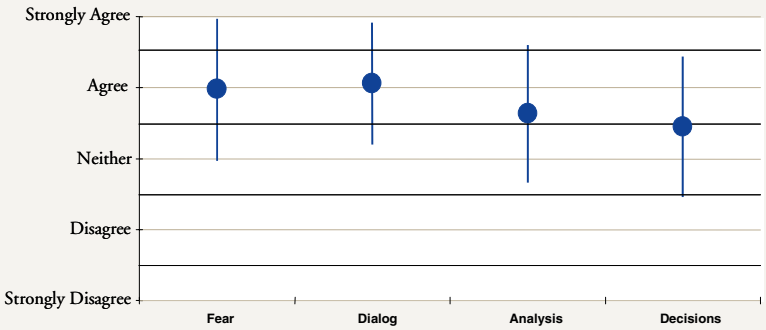
- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
- At this Center, when we know something works we *still* worry if it is inconsistent with the **specifications**.
- **Budget** constraints *do not* compromise engineering and mission safety
- Management at our Center wants to **get to the bottom of mission safety concerns** and not just brush them aside

Employee "Connection" to Mission Safety

Questions:

- **My job** can have an impact on mission safety
- **My co-workers** believe that mission safety is critical to overall mission success
- **Individuals take personal responsibility** for mission safety within our Center

Communication



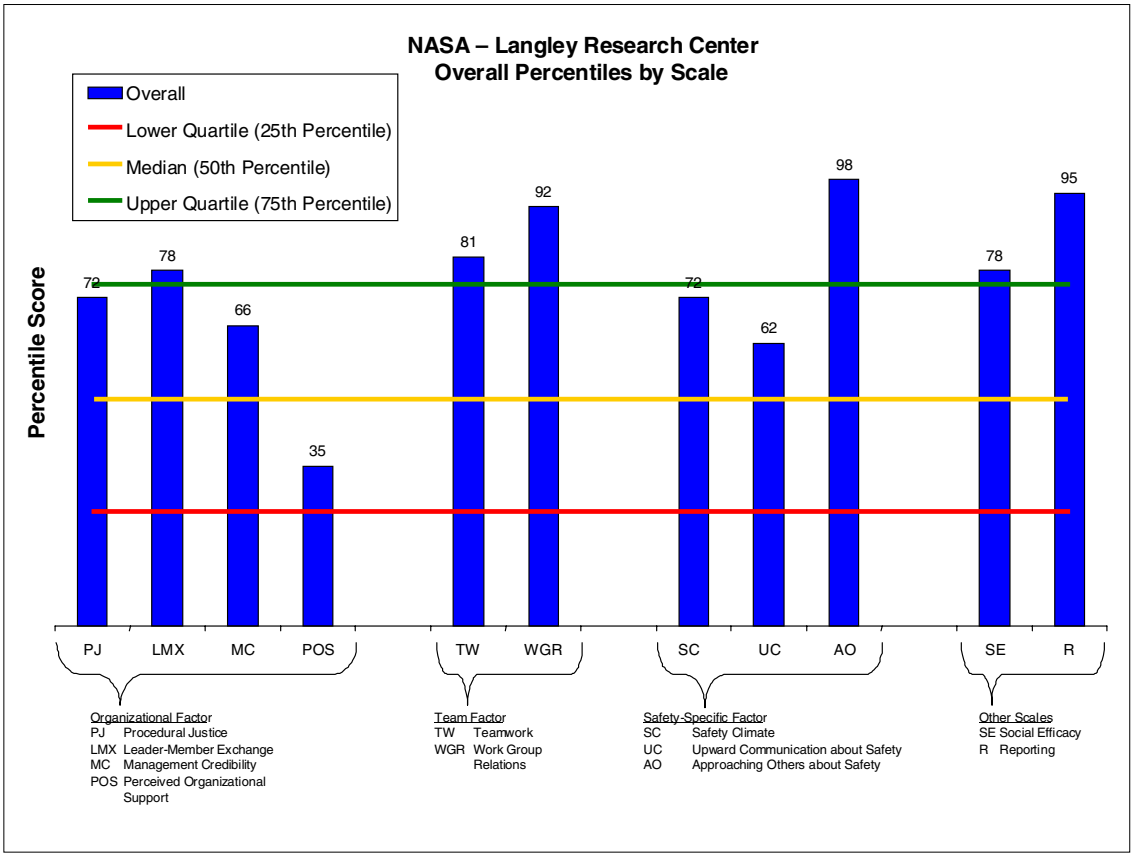
Questions:

- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

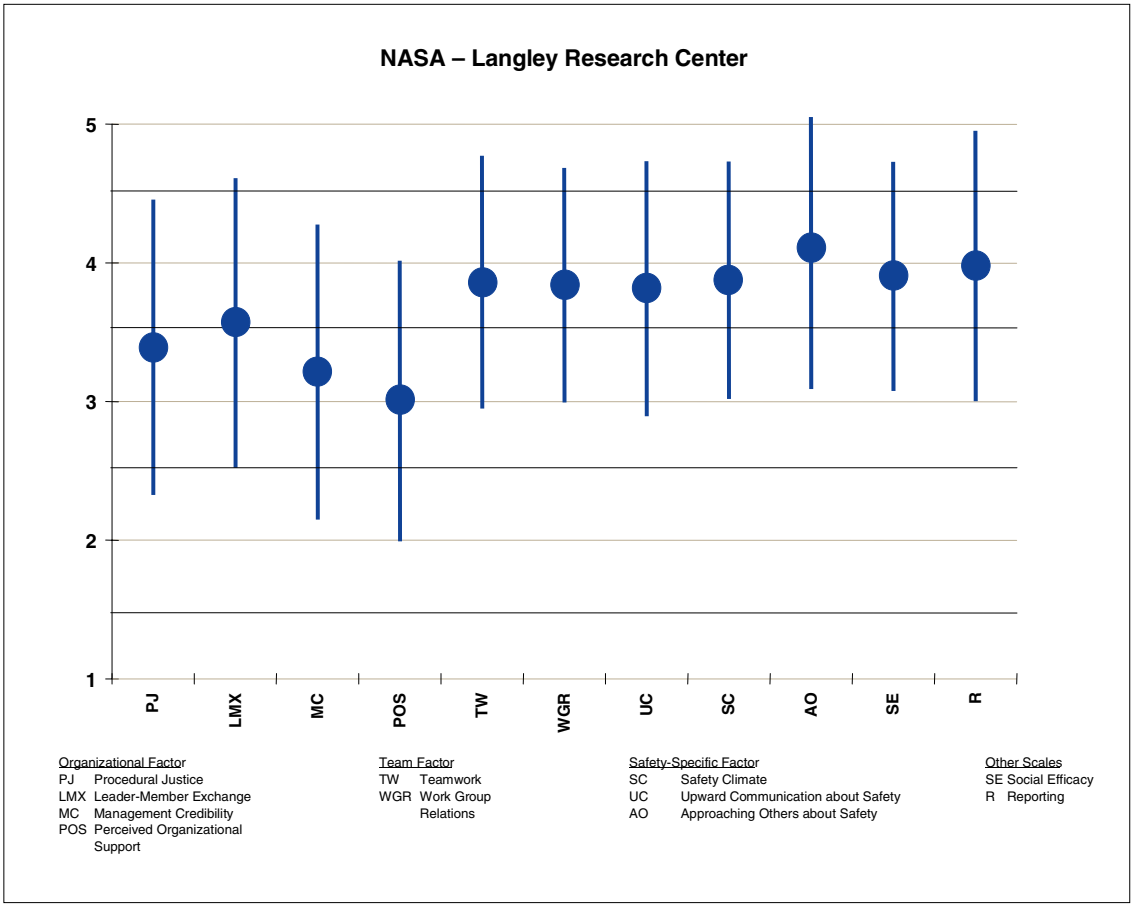
Appendix D: Center-by-Center Survey Highlights

Langley Research Center

Langley results follow the general pattern of NASA overall. The Education Office and Aviation safety tend to have higher scores. Langley had one of the highest percentages of responses where the respondent omitted his or her organizational affiliation.



On this and subsequent figures, each circle indicates the mean of responses for an item. The vertical lines above and below each circle represent one standard deviation. That is, approximately 1/3 of individual responses fell within the range represented by the upper line, and 1/3 fell within the range represented by the lower line.



Scale:

5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Office of Director	9	97.7	94.1	92.7	75.7	93.9	91.6	89.1	91	98.4	95.9	94.3	97.7	95.9	97
Aero Vehicle Systems	11	92.5	90.6	46.5	39.6	65.9	79.5	82.4	81.7	68.7	92.0	97.4	93.9	95.5	80.8
Earth/Space Science	13	76.5	87	62.3	10.1	53.6	93.1	95.7	95	78.3	48.2	95.5	88.9	88.5	92.9
Space Access/Explor	7	88.0	94.1	64.7	20.5	65.9	96.0	96.2	96.2	87.2	62.5	94	90.8	92.6	97.9
Aviation Safety	10	96.5	91.0	95.1	71.1	92.7	97.4	93.7	95.8	98.4	97.4	99.0	99.0	96.7	97.7
Aero Sys Con/Analysis	43	75.9	73.3	73.8	48.7	68.8	90.1	84.9	88.5	70.2	66.9	93.6	88.1	69.7	89.0
Aerody/Aerotherm/Acous	125	69	79.7	46.4	27.5	52.8	73.5	79.5	78.3	58.6	62.4	93.9	83.5	73.8	75.5
Structures/Materials	119	67.9	75.2	48.4	31.4	53.3	70.7	77.5	75.2	61.6	65.4	83.7	78.0	63.1	75.7
Airbone Systmes	109	72.0	79.2	55.8	32.1	57.1	81.9	82.9	83.3	55.9	70.1	94.7	85.5	71.9	82.5
Atmospheric Sciences	32	64.6	56.8	52.3	20.5	45.0	92.6	93.0	92.6	56.9	39.6	88.8	75.2	46	80.4
Systems Engineering	125	40.4	48.7	38.8	32.7	38.4	52	71.8	62.4	55.2	47.4	94.2	80.1	82.3	77.4
CFO	33	87.3	85.9	86.6	68.0	83	93.9	95.7	95.4	96.5	80.3	97.5	96.6	87.9	96.2
Chief Counsel	11	67.5	77.1	76.4	81.9	78.3	71.9	76.4	75.1	94.4	73.5	88.4	92.5	64.0	88.2
Procurement	43	91.7	95.8	88.2	77.2	90.6	96.0	96.5	96.2	87.1	75.5	79.4	87.4	92.1	85.8
Human Resources	15	75.3	80.9	78.8	59.8	74.7	66.3	73.1	69.9	82.4	52.7	93.1	88.9	52.7	85.1
External Affairs	6	94.4	90.6	95.7	80.7	93.7	96.1	88.3	93.5	95.3	83.3	97.3	96.4	96.2	98.0
Education	6	97.4	98.2	96.7	97.8	98.0	93.9	76.1	87.9	97.8	96.4	35.2	88.8	98.1	98.2
Logistics Management	8	82.0	93.8	79.1	58.5	79.9	92.6	89.8	91.9	93.1	54.0	88.2	90.1	82.9	95.4
CIO	39	57.5	69.3	64.3	33.9	56.2	54.0	65.9	60.2	69.5	49.6	77.5	73.9	72.9	81
Airspace Systems	10	85.1	81.8	87.5	69.1	82.1	46.4	31.5	38.0	97.9	88.1	94.7	96.6	93.5	85.8
Program Develop/Man	25	48.6	47.6	67.9	43.8	55.6	81.5	84.4	83.5	86.0	66.1	86.1	88.2	66.8	85.6
Research Facilities	66	49.5	41.2	39.6	34.1	39.5	47.2	52.7	49.6	57.9	63.4	83.5	76.3	53.6	65.1
Flight Research Serv	20	71.4	84.3	76.8	58.5	73.4	67.1	65.7	66.5	87.7	95.8	97.5	96.4	96.6	86.6
Safe/Sec/Env/Mis Asur	20	70.5	71.9	55.2	47.4	60.0	47.3	63.1	56.3	71.2	73.5	87.8	85.5	93.0	83.4

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Other	26	50.8	49.2	47.1	37.7	46.8	40.4	48.6	43.7	43.1	19.3	89.0	64.2	50.4	67.9
Not Specified	57	31.1	27.7	29.3	20.5	24.4	30.4	45.1	36.6	38.3	19.3	66.7	48.1	9.59	61.4
Raw Scores by Department															
Office of Director	9	**4.04**	3.92	3.73	3.41	3.74	4.06	3.97	4.02	**4.39**	4.16	4.22	4.27	4.18	4.41
Aero Vehicle Systems	11	3.77	3.82	3.05	3	3.34	3.92	3.9	3.91	3.88	4.09	4.35	4.13	4.17	4.03
Earth/Space Science	13	3.51	3.76	3.22	2.59	3.21	4.09	4.11	**4.1**	3.97	3.73	4.26	4.02	4.05	4.27
Space Access/Explor	7	3.69	3.92	3.25	2.76	3.34	4.16	4.13	**4.14**	4.07	3.82	4.21	4.07	4.11	4.51
Aviation Safety	10	3.93	3.83	3.82	3.34	3.71	**4.21**	4.04	**4.13**	**4.39**	**4.23**	4.78	**4.51**	4.21	4.49
Aero Sys Con/Analysis	43	3.50	3.6	3.37	3.08	3.37	4.04	3.92	3.99	3.9	3.85	4.21	4.01	3.92	4.17
Aerody/Aerotherm/Acous	125	3.44	3.67	3.05	2.86	3.21	3.87	3.87	3.87	3.79	3.82	4.21	3.97	3.94	3.96
Structures/Materials	119	3.43	3.62	3.07	2.9	3.21	3.85	3.85	3.85	3.81	3.84	4.07	3.92	3.89	3.96
Airbone Systmes	109	3.47	3.66	3.14	2.91	3.25	3.94	3.91	3.93	3.77	3.87	4.24	3.99	3.93	4.06
Atmospheric Sciences	32	3.4	3.47	3.11	2.76	3.14	4.08	4.02	4.05	3.78	3.68	4.13	3.90	3.82	4.02
Systems Engineering	125	3.18	3.42	2.98	2.92	3.1	3.73	3.79	3.76	3.76	3.72	4.22	3.94	4	3.98
CFO	33	3.68	3.74	3.57	3.28	3.55	4.11	4.11	**4.11**	4.28	3.95	4.37	4.23	4.04	4.38
Chief Counsel	11	3.42	3.64	3.41	3.49	3.49	3.86	3.84	3.85	4.21	3.89	4.12	4.09	3.9	4.15
Procurement	43	3.75	3.99	3.60	3.43	3.67	4.16	4.13	**4.14**	4.07	3.91	4.01	4.00	4.11	4.12
Human Resources	15	3.5	3.68	3.45	3.20	3.44	3.81	3.81	3.81	4.01	3.76	4.2	4.03	3.85	4.11
External Affairs	6	3.82	3.82	**3.85**	3.47	3.74	4.17	3.96	4.07	4.24	3.98	4.34	4.22	4.19	**4.54**
Education	6	**4**	**4.17**	**3.9**	**3.98**	**4**	4.11	3.83	3.98	4.33	**4.19**	3.66	4.02	**4.31**	**4.55**
Logistics Management	8	3.58	3.91	3.46	3.19	3.51	4.08	3.98	4.04	4.18	3.77	4.12	4.05	4	4.34
CIO	39	3.32	3.57	3.24	2.93	3.24	3.74	3.75	3.75	3.89	3.73	3.99	3.89	3.94	4.03
Airspace Systems	10	3.63	3.69	3.59	3.30	3.54	3.69	3.49	3.59	4.34	4.03	4.24	4.23	4.13	4.12
Program Develop/Man	25	3.25	3.40	3.28	3.04	3.23	3.94	3.92	3.93	4.05	3.84	4.09	4.02	3.91	4.11

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Raw Scores by Department															
Research Facilities	66	3.25	3.35	3	2.94	3.10	3.69	3.64	3.67	3.79	3.82	4.06	3.91	3.86	3.84
Flight Research Serv	20	3.47	3.72	3.42	3.19	3.43	3.82	3.75	3.79	4.08	4.14	4.36	4.21	4.20	4.13
Safe/Sec/Env/Mis Asur	20	3.46	3.58	3.13	3.07	3.28	3.69	3.73	3.71	3.90	3.89	4.11	3.99	4.11	4.08
Other	26	3.26	3.42	3.06	2.98	3.16	3.65	3.62	3.63	3.67	3.53	4.14	3.83	3.84	3.88
Not Specified	57	3.11	3.23	2.87	2.76	2.97	3.57	3.6	3.58	3.62	3.53	3.90	3.72	3.59	3.80

- Department scores are based on non-manager-version surveys only.
- Scores for departments with fewer than 5 surveys are not shown.
- Bold values are statistically significantly higher than underlined values (probability < .005).
- Raw scores range from 20 to 100.
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Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Level															
Manager	191	3.29	3.48	**3.47**	3.13	3.34	3.85	3.81	3.83	3.93	3.81	3.85	3.87	3.71	3.48
Non Manager	1000	3.41	3.59	3.17	2.98	3.25	3.86	3.85	3.86	3.86	3.81	**4.16**	3.97	**3.94**	**4.03**

• Scores represent the percentage of maximum possible score.
• Scores for levels with fewer than 5 surveys are not shown.
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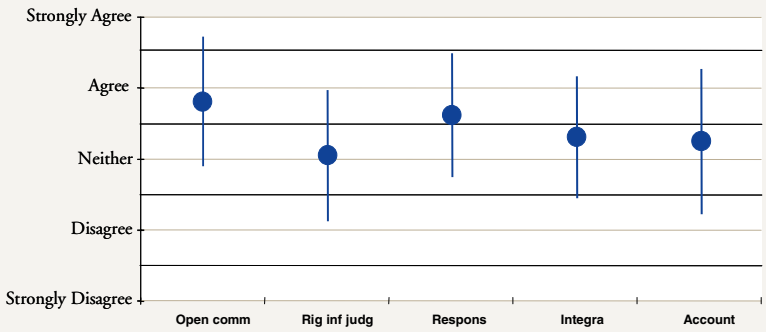
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
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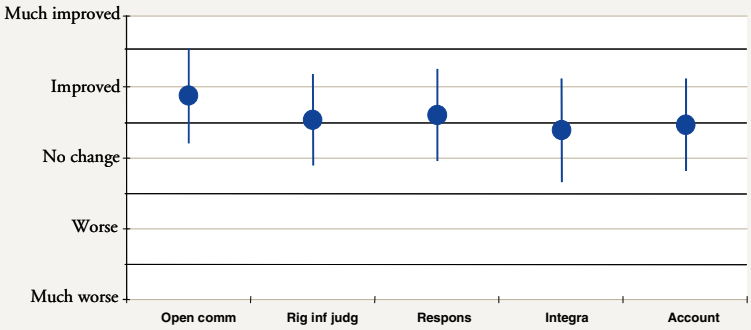
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
- **Respons:** How has individuals' taking personal responsibility for mission safety changed within your Center since the Columbia accident?
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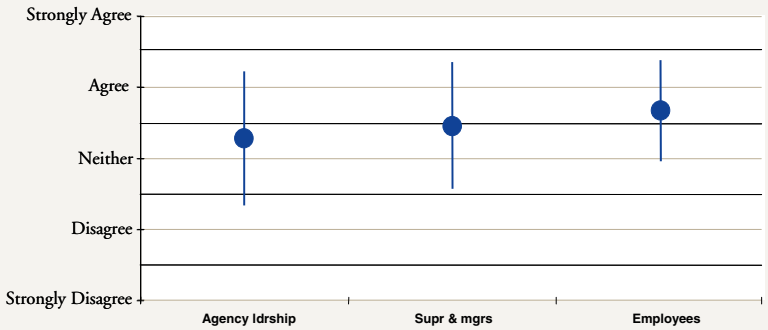
Perceptions of Consistency Between Words and Actions



Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
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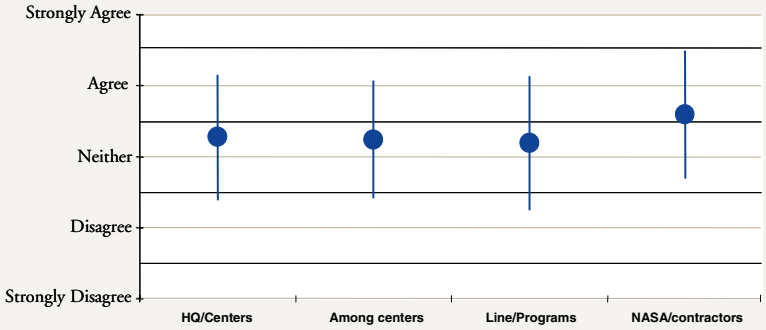
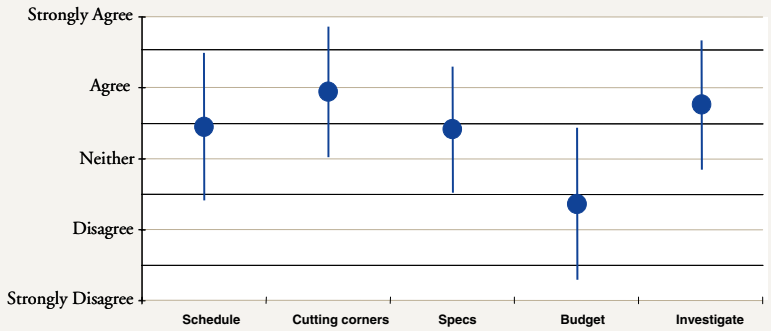
Cooperation and Collaboration



Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

Potential Inhibitors



Questions:

- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
- At this Center, when we know something works we *still* worry if it is inconsistent with the **specifications**.
- **Budget** constraints *do not* compromise engineering and mission safety
- Management at our Center wants to **get to the bottom of mission safety concerns** and not just brush them aside

Employee "Connection" to Mission Safety

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- **My job** can have an impact on mission safety
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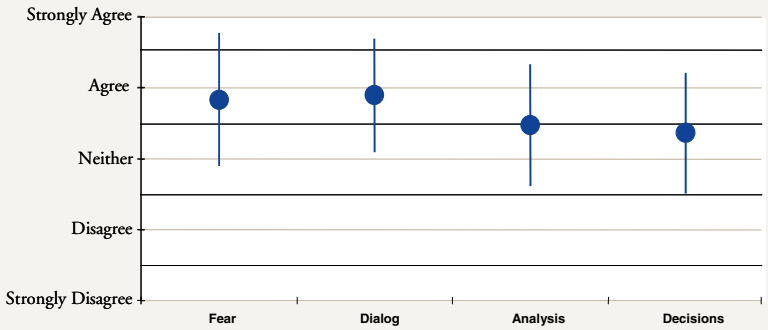
Communication



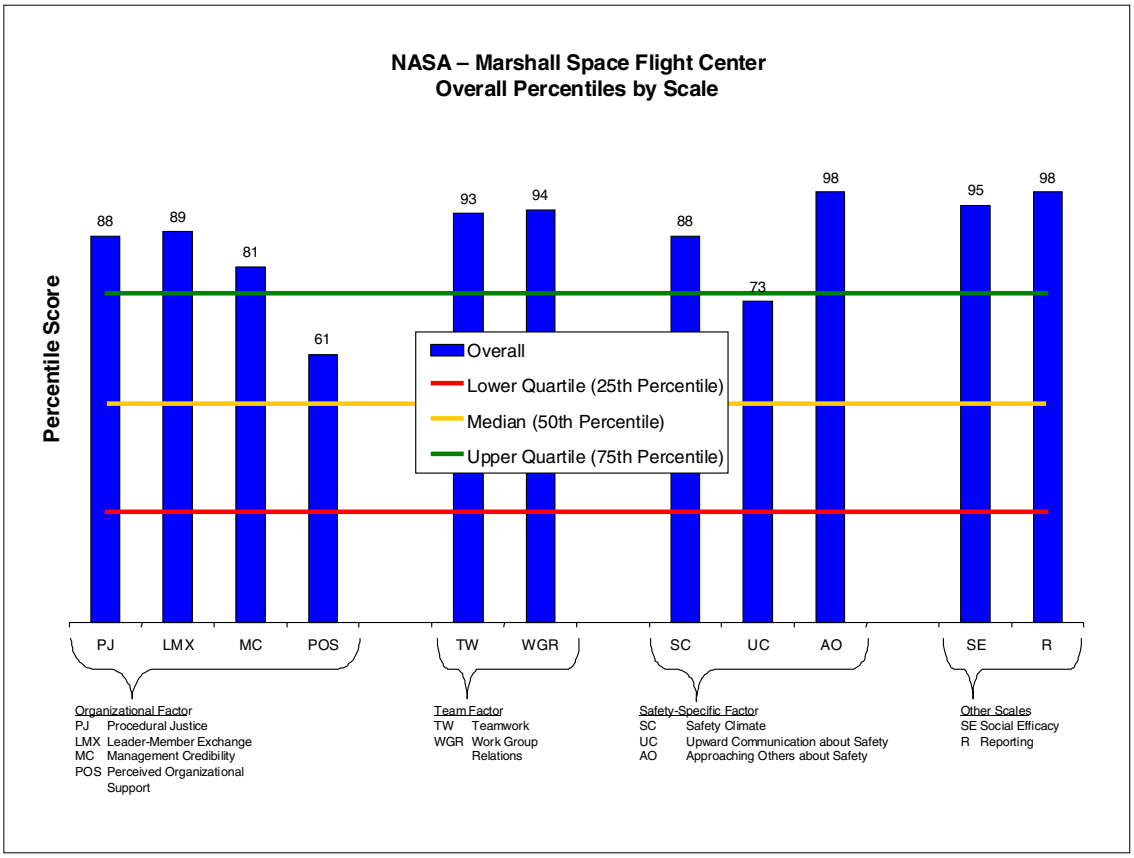
Questions:

- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

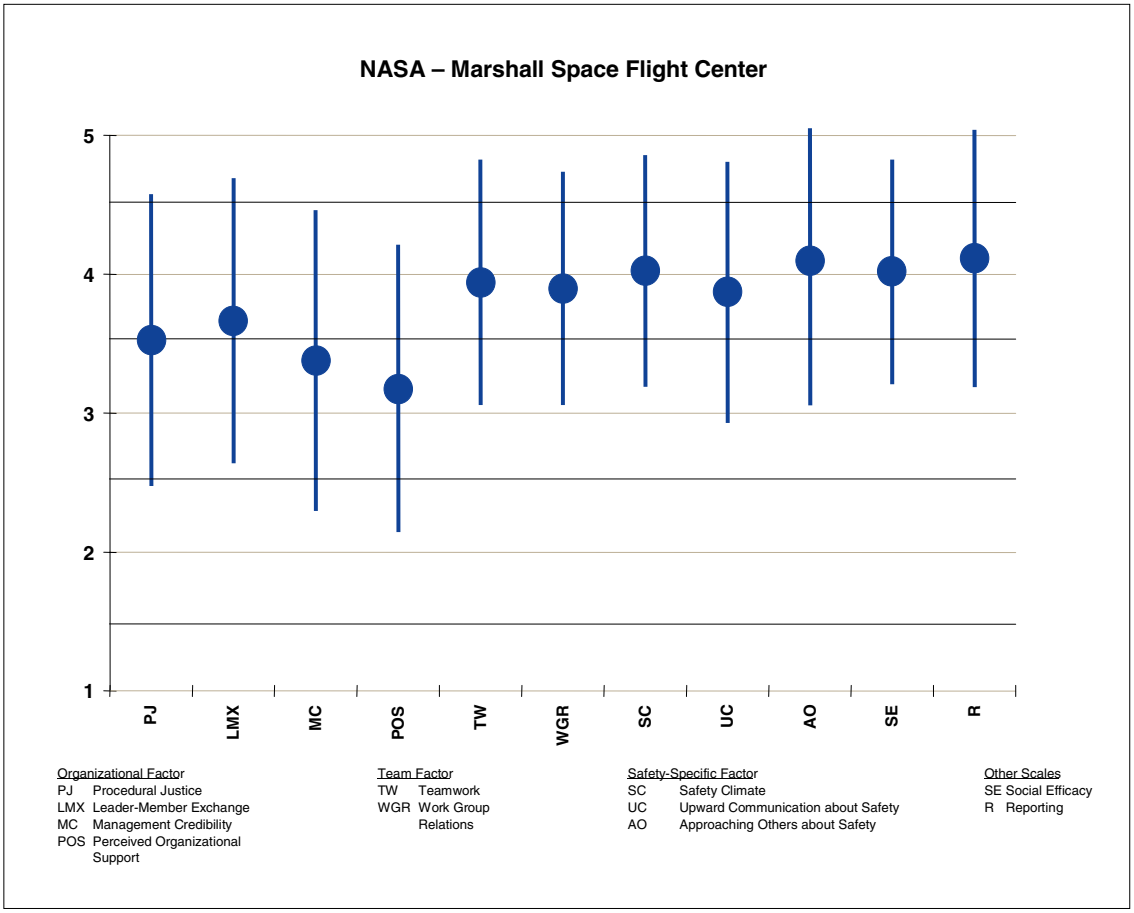
Appendix D: Center-by-Center Survey Highlights

Marshall Space Flight Center

Marshall results follow the general pattern of NASA overall. There is little variation among departments with in the site.



On this and subsequent figures, each circle indicates the mean of responses for an item. The vertical lines above and below each circle represent one standard deviation. That is, approximately 1/3 of individual responses fell within the range represented by the upper line, and 1/3 fell within the range represented by the lower line.



Scale:
5 = Strongly agree
4 = Agree
3 = Neither agree nor disagree
2 = Disagree
1 = Strongly disagree

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Percentile Scores by Department															
Office of Director	7	94.8	96.0	89.8	95	95.6	99.1	85.1	96.2	99.9	98.4	97.2	98.8	92.3	96.8
X-37 Project	5	88.5	89.1	92.8	82.7	91.4	99.0	98.2	98.3	98.4	96.3	97.6	98.3	95.8	91.5
Safe/Miss Assur	50	74.4	77.2	56	36.1	58.8	43.2	47.6	44.5	66.3	81.6	94.6	89.0	90.7	81.7
Office of CFO	58	87.8	87.7	79.9	80.7	85.5	89.8	85.4	88.2	91.2	80.3	86.5	91	94.7	90.0
Space Shuttle Prop	46	90.9	88.9	92.9	80.7	91.2	96.7	97.4	96.9	98.2	95.1	90.6	96.4	90.9	97.1
Next Gen Launch Tech	6	59.1	74.7	72	69.5	70.5	62.7	56.7	59.3	66.1	26.9	8.59	23.1	39.7	80.8
Orbital Space Plane	29	85	86.1	81.3	47.5	75.6	91.6	96.0	94.4	85.5	65.3	92.0	89.8	95.2	92.0
Procurement Office	55	64.0	69	67	70.7	69.9	65.9	67.5	66.3	86.1	45.8	89.2	87.7	65.3	82.6
Office of Chief Coun	6	49.0	60.4	73.5	24.8	54.9	95	62.9	84.3	88.7	43.3	75.1	81.5	82.9	91.8
Systems Management	5	89.3	81.8	81.4	35.2	73.9	80.7	91.4	86.3	85.5	79.9	91.9	91	58.6	98.6
Space Transportation	151	69	79.1	56.8	33.4	57.3	77.1	75.5	77.2	66.6	58.3	87.8	81.2	70.2	84.1
Science Directorate	123	87.3	86.9	79.1	63.3	79.6	92.2	88.2	90.9	88.2	74.3	88.0	90.1	91.1	90.7
Flight Projects	52	77.9	83	72.5	50.8	71	81.5	89.1	85.3	90.6	76.6	87.5	90.6	86.2	91.8
Engineering Directorate	332	72.3	77.1	67.4	50.1	66.7	76.5	83.7	81.1	75.4	65.9	88.0	85.6	90.2	86.9
Center Operations	55	78	86.2	75.5	64.2	75.7	84.9	82.4	83.8	90.8	74.3	89.7	91.2	87.8	86.6
Cust/Employ Relations	38	77.1	82.0	71.1	49.0	70.3	89.5	84.7	87.8	86.3	64.5	82.7	87.0	87.7	80.5
Other	10	77.9	86.9	56	53.5	66.8	54	44.1	49.8	93.7	76.8	97.0	95.5	96.7	76.7
Not Specified	19	56	53.9	42.6	30.7	44.3	71.9	75.1	74.3	72.2	41.8	66.5	67.9	88.9	84.9
Raw Scores by Department															
Office of Director	7	3.83	4	3.64	**3.81**	3.80	**4.33**	3.93	4.14	**4.71**	4.31	4.33	**4.46**	4.11	4.41
X-37 Project	5	3.7	3.79	3.73	3.51	3.68	**4.33**	**4.23**	**4.28**	4.39	4.18	4.38	**4.34**	4.18	4.24
Safe/Miss Assur	50	3.5	3.64	3.14	2.96	3.27	3.67	3.61	3.64	3.85	3.96	4.23	4.04	4.08	4.05
Office of CFO	58	3.69	3.77	3.47	3.47	3.58	4.03	3.93	3.98	4.13	3.95	4.1	4.07	4.16	4.19
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Next Gen Launch Tech	6	3.33	3.61	3.35	3.31	3.39	3.79	3.68	3.74	3.85	3.6	3.29	3.56	3.79	4.02
Orbital Space Plane	29	3.63	3.75	3.49	3.07	3.46	4.06	4.12	4.09	4.04	3.83	4.17	4.05	4.16	4.25

Results by Department

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
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Level															
Manager	202	3.52	3.59	**3.67**	**3.35**	**3.54**	3.97	3.88	3.93	4.1	3.90	3.94	3.99	3.88	3.77
Non Manager	1052	3.53	3.68	3.32	3.15	3.39	3.94	3.9	3.92	4.01	3.86	**4.12**	4.02	**4.04**	**4.15**

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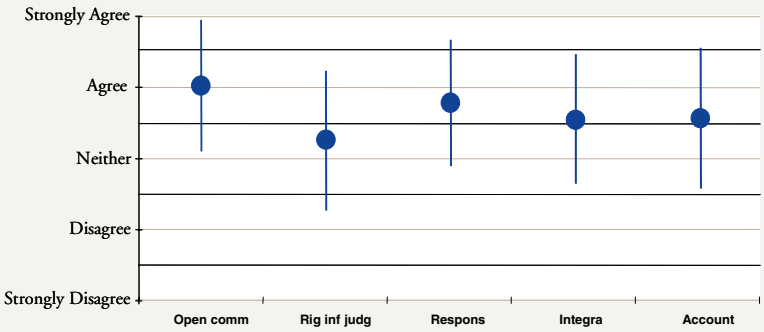
Overall Responses to Guiding Principles Question



Questions:

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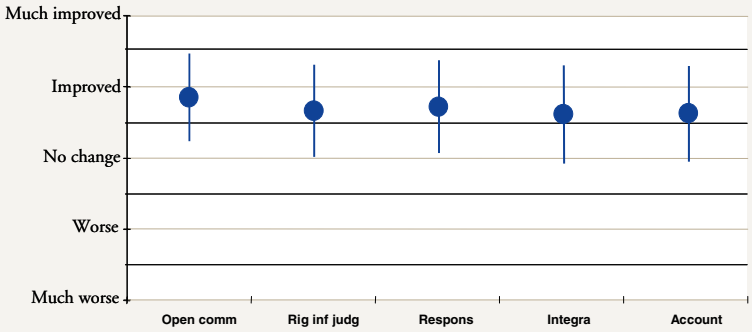

Questions:

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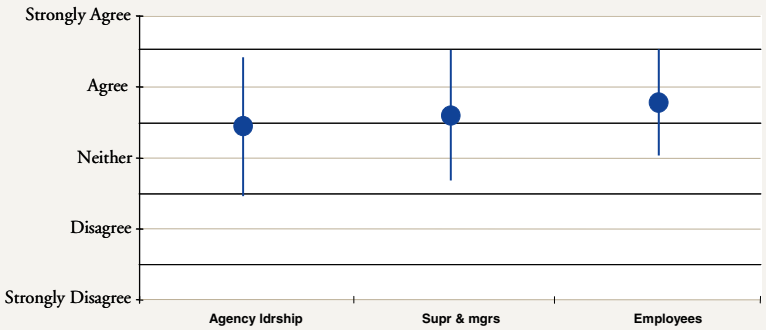

Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
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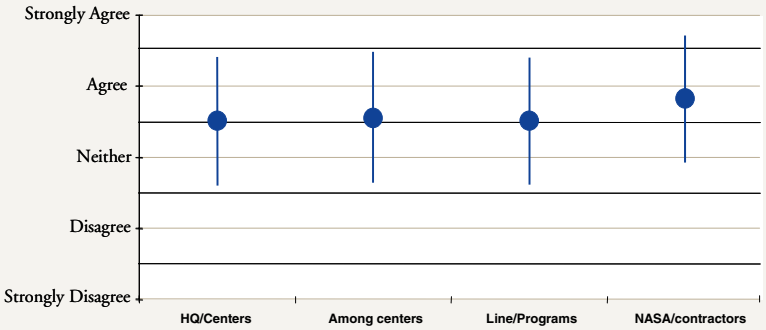
Cooperation and Collaboration



Questions:

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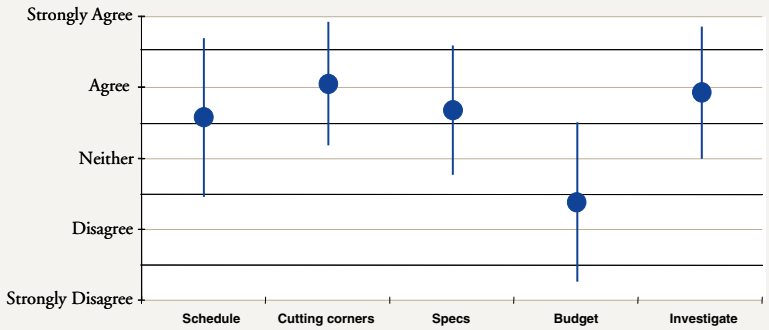

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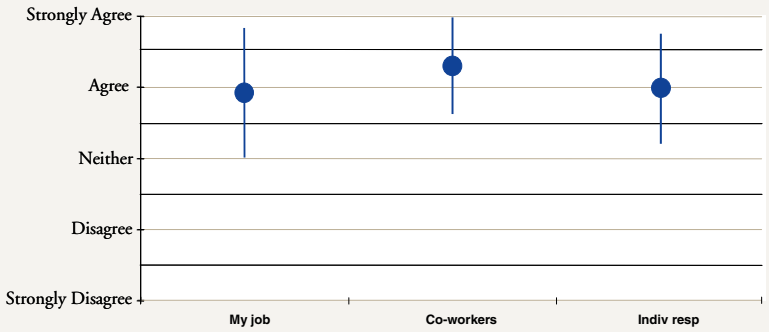

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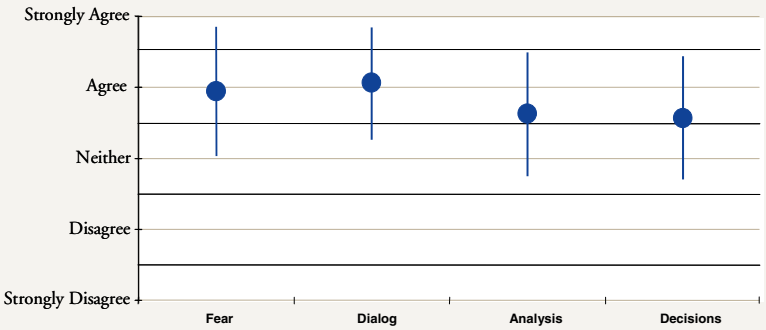

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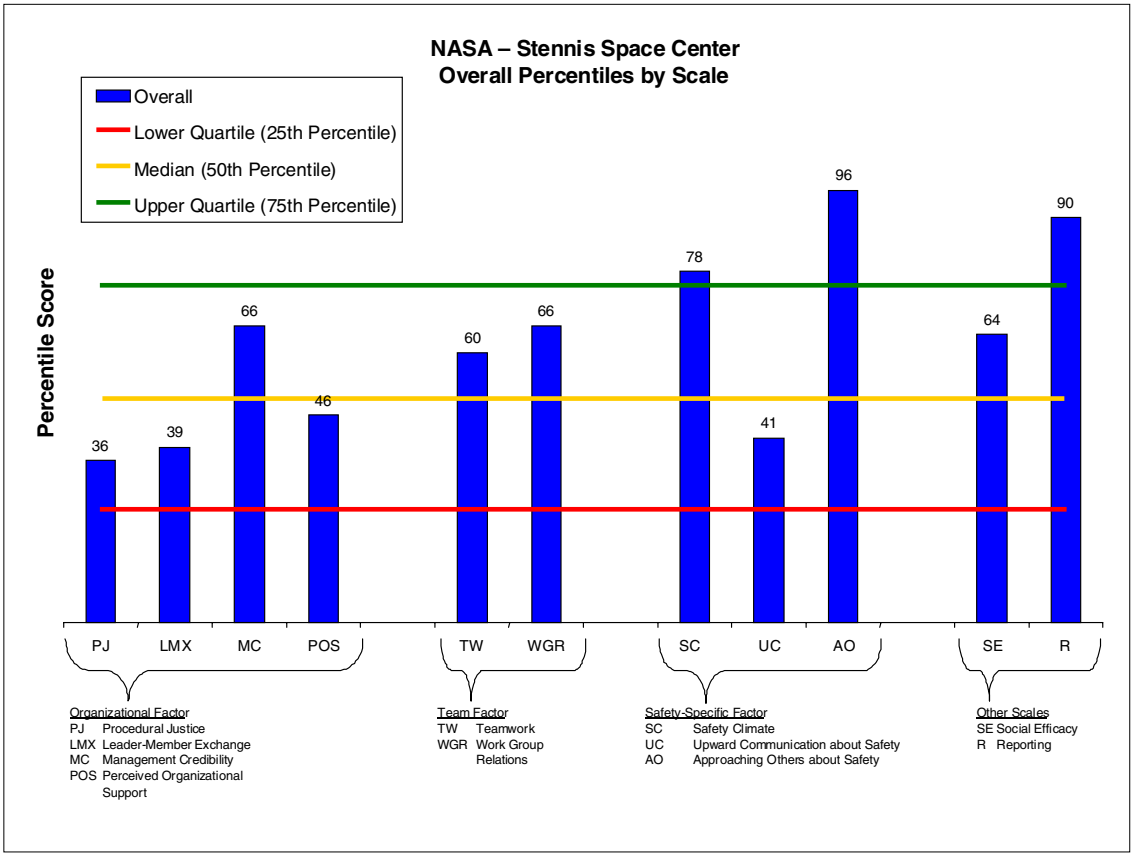
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

Appendix D: Center-by-Center Survey Highlights

Stennis Space Flight Center

Stennis results are among the lowest of NASA Centers. All scales other than Approaching Others and Reporting tend to be low. This is consistent within the site, with no significant variation among departments.



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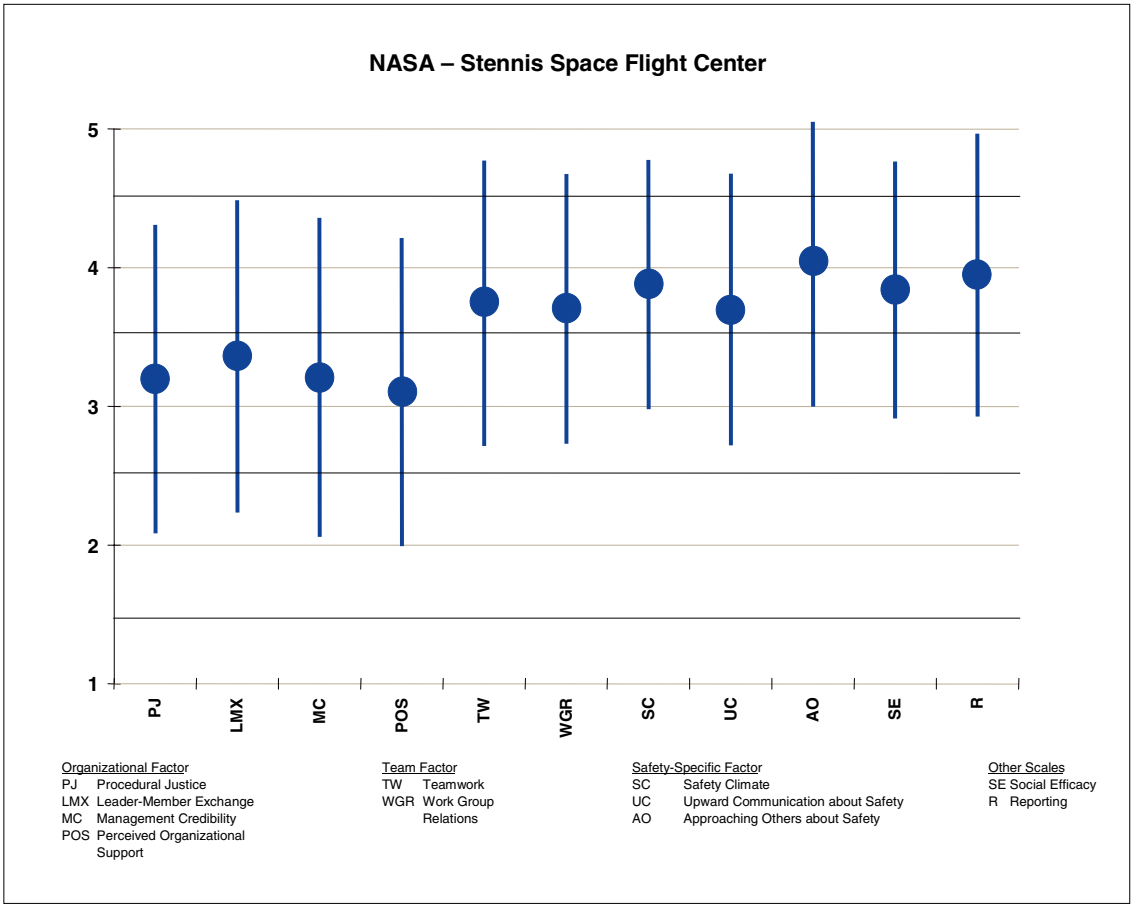

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Percentile Scores by Department															
Program Integration	8	53.8	77.6	55.9	44.1	56.8	25.2	15.2	18.6	79.9	42.4	95.1	88.9	26.3	86.6
Safe/Miss Assurance	8	35.4	54.3	54.2	65	55.6	4.4	7.51	6.08	38.6	66.1	87.8	72.1	18.5	42.6
Office of External Aff	6	76.6	53	43.6	57.1	56.5	87.7	66.5	78.7	81.5	61.7	97.6	94.2	93.8	95
Propulsion Test Direct	40	24.7	23.5	44.7	28.2	30.5	47.7	51.6	49.6	44.2	26.5	77.7	57.4	35.8	68.6
Earth Science App	5	55	79.1	30.5	7.35	31.3	10.8	18.3	13.3	59.9	50.6	90.7	78.9	86.5	68.1
Center Operations	14	44.0	53.7	47.1	32.2	43.8	93.4	98.3	96.9	69	22.7	94.6	81.3	90.9	83.1
Bus Management Dir	11	13.1	31.7	76.4	68.8	56.1	48.8	58.4	54.4	96.5	37.3	89.7	91	66.7	97.9
Raw Scores by Department															
Program Integration	8	3.29	3.64	3.14	3.04	3.25	3.51	3.31	3.42	3.99	3.7	4.25	4.03	3.72	4.13
Safe/Miss Assurance	8	3.15	3.45	3.13	3.25	3.24	3.17	3.16	3.16	3.63	3.84	4.11	3.88	3.67	3.63
Office of External Aff	6	3.52	3.44	3.03	3.17	3.25	4	3.75	3.88	4	3.81	4.39	4.14	4.13	4.32
Propulsion Test Direct	40	3.03	3.19	3.04	2.87	3.03	3.7	3.64	3.67	3.68	3.59	4	3.79	3.77	3.89
Earth Science App	5	3.3	3.66	2.88	2.53	3.03	3.33	3.35	3.34	3.8	3.74	4.15	3.93	4.03	3.89
Center Operations	14	3.21	3.45	3.06	2.91	3.13	4.10	4.26	4.18	3.88	3.56	4.23	3.95	4.08	4.07
Bus Management Dir	11	2.86	3.27	3.41	3.3	3.24	3.71	3.69	3.7	4.27	3.66	4.14	4.07	3.91	4.51

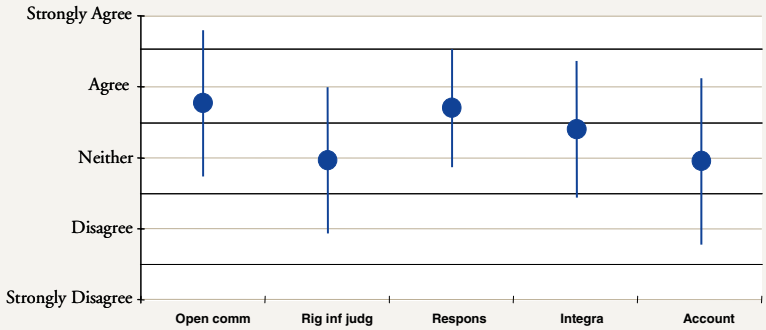
- Department scores are based on non-manager-version surveys only.
- Scores for departments with fewer than 5 surveys are not shown.
- Bold values are statistically significantly higher than underlined values (probability < .005).
- Raw scores range from 20 to 100.
- Unless all respondents provided their demographic information, the number of surveys within each section of this table will not add up to the total number of surveys.

Comparisons between Levels

		Organizational Factor					Team Factor			Safety Specific Factor				Other Scales	
	# Surveys	Procedural Justice	Leader-Member Exchange	Management Credibility	Perceived Org. Support	Org Factor	Teamwork	Work Group Relations	Team Factor	Safety Climate	Upward Comm-unication	Approaching Others	Safety Factor	Social Efficacy	Reporting
Level															
Manager	30	3.33	3.37	3.51	3.44	3.43	3.81	3.77	3.79	3.96	3.84	3.81	3.87	3.76	3.39
Non Manager	104	3.16	3.36	3.12	3.00	3.15	3.72	3.68	3.70	3.86	3.66	4.11	3.91	3.86	**4.04**

- Scores represent the percentage of maximum possible score.
- Scores for levels with fewer than 5 surveys are not shown.
- Bold values are statistically significantly higher than underlined values (probability < .005).
- Unless all respondents provided their demographic information, the number of surveys within each section of this table will not add up to the total number of surveys.

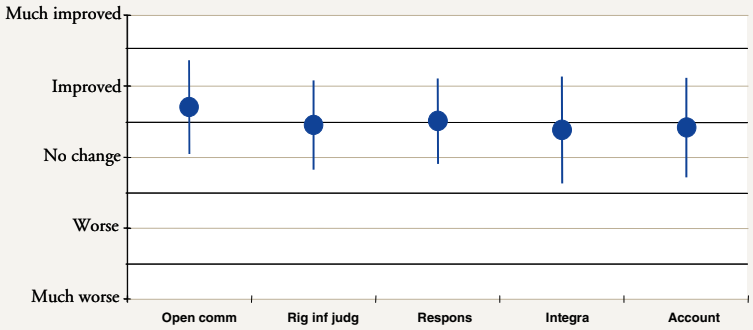
Overall Responses to Guiding Principles Question



Questions:

- **Open Comm:** There is open communication about mission safety within our Center.
- **Rig Inf Judg:** People within our Center use rigorously informed judgment as the sole basis for decision-making about mission safety concerns
- **Respons:** Individuals take personal responsibility for mission safety within our Center
- **Integra:** There is integration of mission safety considerations with engineering, cost, and schedule considerations within our Center
- **Account:** Individuals are held accountable for following procedures within our Center.

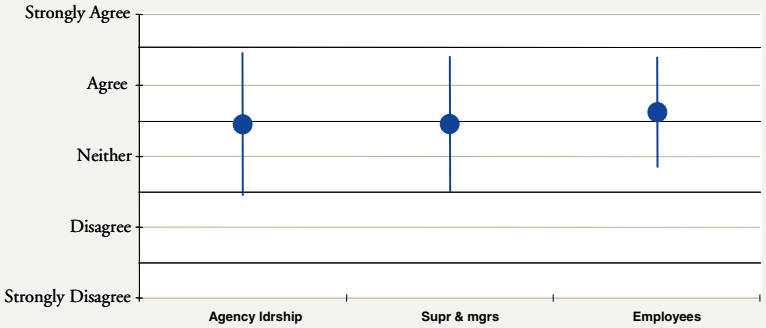
Overall Responses on Changes in Exhibiting Guiding Principles



Questions:

- **Open Comm:** How has open communication about mission safety changed within your Center since the Columbia accident?
- **Rig Inf Judg:** How has using rigorously informed judgment as the sole basis for decision-making about mission safety concerns changed within your Center since the Columbia accident?
- **Respons:** How has individuals' taking personal responsibility for mission safety changed within your Center since the Columbia accident?
- **Integra:** How has integration of mission safety with engineering, cost, and schedule considerations changed within your Center since the Columbia accident?
- **Account:** How has individual accountability for following procedures changed within your Center since the Columbia accident?

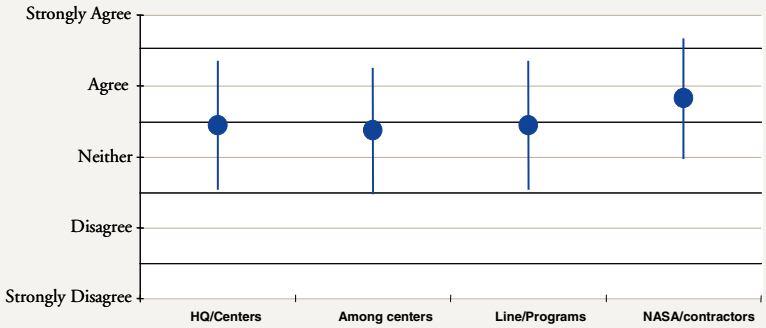
Perceptions of Consistency Between Words and Actions



Questions:

- **Agency leadership's actions** are consistent with their words on mission safety.
- **Supervisors' and managers' actions** are consistent with their words on mission safety.
- **Employees' actions** are consistent with their words on mission safety.

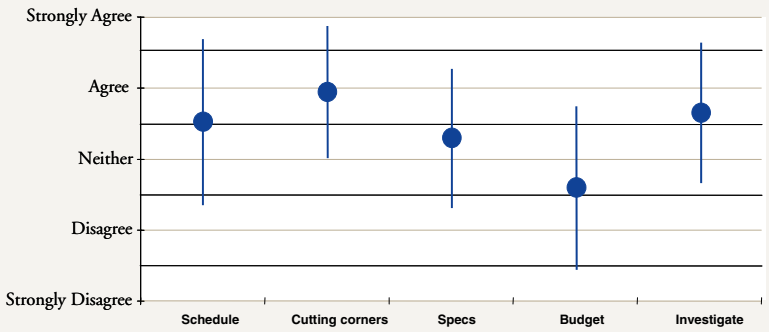
Cooperation and Collaboration



Questions:

- There is cooperation between **Headquarters and Centers** on mission safety.
- There is cooperation **among Centers** on mission safety.
- **Line and program management** collaborate well to assure mission safety.
- **Contractors and NASA** work well together to assure mission safety.

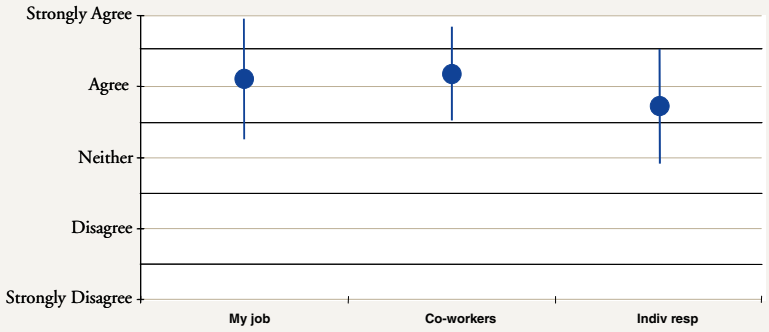
Potential Inhibitors



Questions:

- **Schedule** is *not* more important than mission safety in this Center
- I am *not* expected to **cut corners** on following procedures in order to be more efficient
- At this Center, when we know something works we *still* worry if it is inconsistent with the **specifications**.
- **Budget** constraints *do not* compromise engineering and mission safety
- Management at our Center wants to **get to the bottom of mission safety concerns** and not just brush them aside

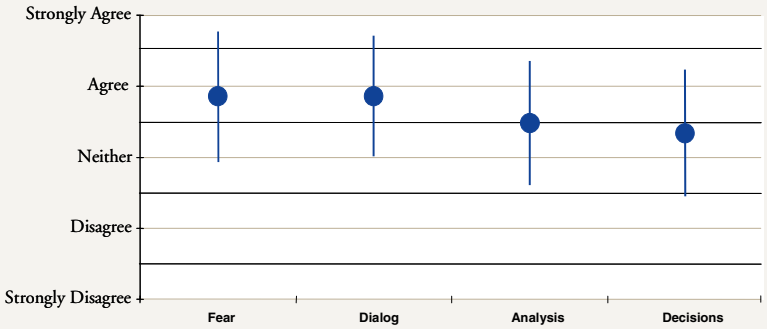
Employee "Connection" to Mission Safety



Questions:

- **My job** can have an impact on mission safety
- **My co-workers** believe that mission safety is critical to overall mission success
- **Individuals take personal responsibility** for mission safety within our Center

Communication



Questions:

- **Fear:** I can raise concerns or questions about mission safety without fear of retribution
- **Dialog:** Discussion and dialog about mission safety concerns is welcome within our Center
- **Analysis:** Decisions are based on appropriate considerations of mission safety risk
- **Decisions:** Appropriate amounts of analysis are employed to inform mission safety-related decisions

Connecting People & Systems

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