Changing the Face of Safety:
Creation of a New Langley Safety Culture

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Abstract

Recent decades have seen an increased emphasis on on-the-job safety in the workplace. Although the workforce at NASA Langley currently views safety as important, the Safety and Mission Assurance Office (SMAO) would like to improve the safety culture to encourage workers to pay closer attention to safety of coworkers and family, both at work and at home. The SMAO has assigned me and my fellow intern Kat Roberts with the task of investigating the current safety culture of NASA Langley and discovering what can be done to increase awareness of and willingness to follow safety procedures, and to create a business and marketing plan that can be implemented to improve the safety of NASA Langley employees.

To study NASA Langley employees' current attitude towards safety, a voluntary survey of nearly two hundred Langley employees was conducted during the SMAO's annual safety week. Six demographic-based focus groups were conducted to get a more in-depth understanding of Langley's current safety culture and what employees feel can be done to achieve our goal of increasing work safety. Research of safety cultures and campaigns at similar sites was conducted to get an idea of methods of advertisement that can be used in our safety campaign. Additionally, a brainstorming session of SMAO team members and the LARSS interns provided more ideas and suggestions about how to subtly change the culture of safety at Langley.

The research conducted suggests that visual and personal advertisements are the best method of changing the attitudes towards safety of Langley personnel. A business proposal for new electronic signs to be placed around the Center was created for approval from upper management, and advertising suggestions (signs, slogans, logos) were combined into an itemized business model that the SMAO can use to implement their safety campaign.

The work of myself and my coworkers this summer will allow the SMAO to complete their mission statement; "To bring about a change to the current LaRC safety culture through a proactive subtle awareness approach that reinforces the message that an incident-free culture is possible because we all have a natural desire to be injury free – no one wants to get hurt in a way that it negatively affects themselves, their friends, and their family," as well as NASA's mission of maintaining a safe workplace.

Introduction/Background

NASA Langley's Safety and Mission Assurance Office (SMAO) is in charge of safety on Center. They respond to mishaps, help prevent safety issues, and encourage safety for all Langley employees. The SMAO has tasked me and my coworker Katherine Roberts, another LARSS intern, with creating a safety campaign that can subtly improve the safety culture of Langley. Our goal for the duration of our summer internship was to:

> Help bring about change to the current LaRC safety culture through a proactive subtle awareness approach that reinforces the message that an incident-free culture is possible because we all have a natural desire to be injury-free—nobody wants to get hurt in a way that negatively effects themselves, their friends, and their family.

At the beginning of the summer, Grant Watson, the director of the SMAO, provided some background information on where Langley is today and what the SMAO hopes to achieve.

The Four Eras of Safety and a History of NASA Safety

Prior to the 1960s, very little effort was put into safety at NASA. During this era, known as the "era of death," workers were viewed as expendable; if you die, you can be easily replaced. Workers complied with safety rules only when convenient.

In the early 1960s, a new era—the "era of engineering"—took over. During this era, safety professionals believed that safety was merely a corporate issue. Rules regarding safety were established and workers began to comply with safety regulations to avoid getting into trouble.

However, following the 1968 Apollo 1 explosion, a government panel mandated that safety become a bigger concern and the Aerospace Safety Advisory Panel was established.

> *"The committee can only conclude that NASA's long history of successes in testing and launching space…led to overconfidence and complacency."*
>
> -The Apollo 204 Report, 1968

The panel discovered that poor communication within the NASA organization and leniency about safety regulations—despite concerns from numerous parties—led to the fatalities of the three Apollo 1 astronauts. The panel decided that the establishment of an independent panel was necessary to address safety concerns.

> *"The Panel shall review safety studies and operations plans that are referred to it and shall make reports thereon, shall advise the Administrator with respect to the hazards of proposed operations and with respect to the adequacy of proposed or existing safety standards, and shall perform such other duties as the Administrator may request."*

-NASA Authorization Act of 1968

This led to the third era, the "era of legislation", where safety was considered both a corporate and government issue, but workers were still believed to only comply with safety to avoid repercussion.

Beginning in the late 1980s and early 1990s, the organization pushed to make safety a personal issue, or "behavior-based safety", where employees had a *desire* to be safe for the sake of safety itself. We feel that we are in this fourth era of safety, where most safety incidents are a result of behavior or culture.
The crashes of both Challenger and Columbia were revealed by government investigations to be partially caused by miscommunication between concerned scientists and upper management.
The Rogers Commission, formed in response to the *Challenger* explosion in 1986, determined that poor decisions were made prior to the launch of the vehicle despite numerous concerns.

> *"...failures in communication... resulted in a decision to launch 51-L based on incomplete and sometimes misleading information, a conflict between engineering data and management judgments, and a NASA management structure that permitted internal flight safety problems to bypass key Shuttle managers."*
>
> -Rogers Commission Final Report, 1986

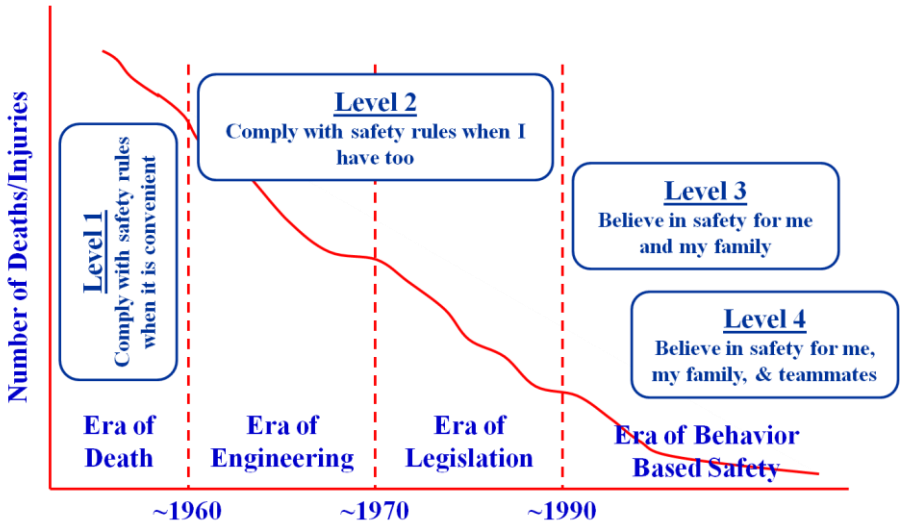
A press release following the Columbia accident in 2003 revealed internal communication issues and a poor safety culture.

> *"The CAIB report concludes that while NASA's present Space Shuttle is not inherently unsafe, a number of mechanical fixes are required to make the Shuttle safer in the short term. The report also concludes that NASA's management system is unsafe to manage the shuttle system beyond the short term and that the agency does not have a strong safety culture.*
>
> *The Board determined that physical and organizational causes played an equal role in the Columbia accident - that the NASA organizational culture had as much to do with the accident as the foam that struck the Orbiter on ascent. The report also notes other significant factors and observations that may help prevent the next accident."*
>
> - Columbia Accident Investigation Board, 2003

The continued goal of the SMAO, who operates under the NASA-wide Office of Safety and Mission Assurance (OSMA), which was created in response to the investigations revealing serious internal safety problems. Employees at Langley are encouraged to reveal safety issues that arise to increase the well-being of all Langley employees. However, many workers still fail to have a desire to follow safety procedures for themselves, much less coworkers.

The Human Side of Safety
Each person has his own attitude towards safety, which can be divided into four levels, each corresponding with an aforementioned era of safety.

Level 1: I comply with safety rules only when it is convenient.
Level 2: I comply with safety rules when I have to.
Level 3: I believe in safety for myself and my family.
Level 4: I believe in safety for myself, my family, and my teammates.



A person's attitude toward safety is his own choice, and is dependent on his risk tolerance. He can be unaware of the hazards around him, complacent about potential problems, or excited about the thrill of risky behavior. The purpose of our summer project is to make Langley employees aware of the risks of work and encourage them to increase a desire to practice safe behavior. The biggest influences that lead to change are feedback from the world around us, both through experience and through culture, and taking it from our heads to our hearts.

The Elements of an Incident-Free Culture
There are several elements of an incident-free culture, which we believe is possible. No one wants to be injured, so it should be possible for no one to be injured. These keys are:

- Safety is everyone's responsibility.
- Safety and the job are one-and-the same.
- Management at all levels value safety.
- I have a belief that my safety is my responsibility.
- A belief that my coworkers' safety is my responsibility.
- I have the same attitude toward safety at home and at work.
- I believe that "no incidents" is possible.

The SMAO needs to address this "human element" of safety to achieve an incident-free culture. We believe that it can be achieved through a subtle approach and safety

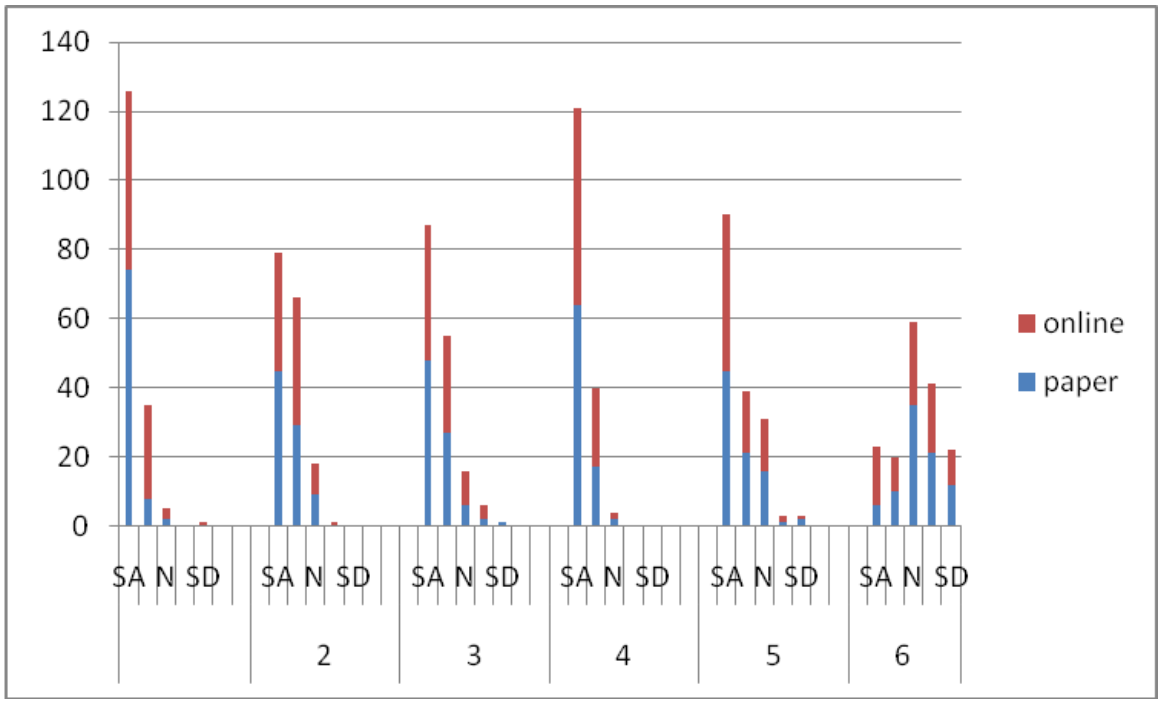
campaign. Kat Roberts and I were brought in because of our fresh perspective and marketing and communications background to study the current Langley culture and plan and implement a campaign to encourage changing safety behaviors.

Our Project

Safety and Health Awareness Week (SHAW) Survey and Results
To get an initial analysis and understanding of how Langley employees view safety at work and home, a voluntary six-question survey (either paper or electronic submission) was conducted at SHAW by the LARSS interns.
The survey asked participants to choose one of five options from "strongly agree" to "strongly disagree" for each of the six questions:

1. I believe safety at work is my responsibility.
2. I believe my coworkers' safety at work is my responsibility.
3. My attitude towards safety does not change whether I am at work or at home.
4. Injury to family members or friends will affect life at home.
5. I will not have an injury at work in the next 12 months.
6. No LaRC employee will be injured in the next 12 months.

Results of the eighty-four paper and eight-one online surveys were tabulated and analyzed.



Most responders agreed that their own safety is their responsibility, that their attitudes toward safety remain the same at work and at home, and that they will not be injured at work in the next 12 months.
However, the data for question 2—whether coworkers' safety is everyone's responsibility—is more skewed towards agreeing and neutral, telling us that many Langley employees are not yet at a "level 4".
Question 6—no one will be injured at work in the next 12 months—provided mostly negative responses. This information was of most interest and use to us because it tells us that we need to convince Langley staff that it IS possible for no injuries to take place and that everyone needs to watch out for coworkers and friends to obtain a safe working environment.

Focus Groups
Once a general understanding of Langley employees' views toward safety was determined, further investigation into the perspective of specified groups of Langley's workforce was collected through voluntary focus groups at Langley's Navigation Center with the assistance of Donna Speller-Turner.
Employees were divided by demographics to gain an understanding of different groups' feelings toward safety. Six focus groups were conducted; members from the Langley Emerging Professionals Committee (LEPC), safety heads and facility coordinators, technicians, researchers, office workers, and managers and supervisors were asked to attend a scheduled 1.5 hour session in the morning or afternoon. Attendance for some groups was greater than for others, but valuable information about each demographic group was collected.
The focus groups began with an introductory PowerPoint presentation describing the Langley safety culture and purpose of the focus groups. Five questions were asked to guide attendees to provide valuable, useful information that would allow the LARSS interns to complete their summer goal:

1. What level do you think Langley is at currently?
    a. Do you think this level differs from the level at home?
    b. Are there different amounts of risk tolerance at work versus at home?
    c. Is there any part of the current Langley culture that encourages/promotes risk taking at work?

2. How do we get Langley from its current level to Level 4?
    a. How do we move the concept of safety from our head to our heart?
    b. How do we remove imbedded risk tolerance and potentially harmful behaviors from Langley's culture?
    c. How do we create a new safety culture?
    d. What is a good timeframe/ point(s) at which to implement this culture change?

3. What are ways to spread/advertise this new safety culture around the Center?
    a. New ways to use current Langley resources (ex: outdoor electronic signs, @LaRC, Center-wide emails)?

b. Develop new ways to advertise? Discuss popularity/potential usefulness of:
    i. Social networking sites
    ii. Modern print, video ad campaigns
    iii. Safety text messaging service (both already in-place and new alerts)
    iv. Smartphone applications
    v. Monthly safety bulletins
    vi. Continue free safety handouts (to be used both at work and home)
c. Other methods of advertising ideas?

4. What can you do to make this culture change a reality?
    a. What can other groups at the Center do to make this culture change a reality?

5. Any other thoughts, ideas.

Participants were then asked to write their response to questions on several white boards and discussion of answers followed—thus increasing suggestions from participants who created new ideas and thoughts based on others' responses. Once discussion of responses was complete, participants were thanked for their time and valuable insight, and digital photos of the boards were taken and sent to the LARSS students for further investigation. While perspectives between demographic groups differed, some common threads were mentioned repeatedly.

- Safety awareness has to come from the top. Management (especially upper management) need to care about safety, too. "walk the talk."
- Personal stories and anecdotes are a great way to make Langley employees think about safety risks.
- Increase awareness and explain regulations and rules.
- Make safety an important part of all meetings, even for office workers. Increase frequency of meetings, and make them mandatory.
- Establish positive reinforcement for good behavior rather than bad responses to negative behavior.
- Make safety more participatory; have group activities or competitions.
    - Increase the feeling of family so employees want to help each other.
- Use varied methods of advertisement, but visual works best.
- Free handouts, electronic signs, bulletins are effective.
- Create varied campaigns based on demographics, i.e. young people/new employees vs older, office workers vs technicians.

With this in-depth feedback from Langley staff, we were able to get further understanding of what works and what doesn't, and what the SMAO can do to increase the effectiveness of safety procedures at Langley, both in our new safety campaign and in the SMAO in general.

Brainstorming

SMAO staff, including the LARSS interns, participated in a brainstorming session at the Navigation Center, again with the assistance of Donna Speller-Turner. Four questions were the focus of the session:

1. What is the safety message we want to give?
2. How do we get that message out?
    a. What media should we use?
3. How do we get employees to take safety messages home?

The process of the brainstorming session was similar to that of the focus groups; each participant wrote ideas on white boards and responses were discussed and expanded upon, and photos of the board were taken for future use.
Ideas for messages and their delivery method included:

- Rename everyday food
    - "safety green beans"
- Pamphlet display
    - Booklets
    - Handouts
    - Spin display, in Caf or Reid
- Contests and games
    - Safety theme song
    - Branch/directorate competitions
    - LaRC safety messages
- "chalk talk"
- Text messages
    - Safety tip of the day.
- Signs (electronic and paper)
- Safety character/mascot
- Personal stories
- Temp tattoos
- @LaRC slideshows of photos
    - What not to do
- Why?
    - Avoid injury
    - No damage to expensive equipment
    - Keeps environment healthy
    - Enables variety in work life
    - Eliminates obstacles to high performance.
    - Encourages team spirit
- Take-home activities
    - Safety stuff
    - Reverse 911
    - Make ads for families
- Smartphone app
- NASA Edge

- Safety moments before meetings.
- Comic strips, caricatures.
- Cling film
- Car: bumper sticker, license plate, ribbon.
- Website update
    - Electronic copy of safety handouts.
- Print
    - Signs
    - Posters
    - Handouts
- Effects of no safety procedures.
- Effects on family/friends/pets.
- Ice cream party.
- Simple and memorable.
- Podcast stories
- Bathroom mirror/stall doors/urinal stickers/logos, etc.
- Videos to share with family
    - Family-friendly messages
        - Stuff for kids, too.
- "sound bites"
- Get kids involved.
    - Contests
    - Activities
- "Safety is in your hands."
    - Others depend on you.
- Safety awards/recognition for everyone

Research

Online research of safety campaigns and safety cultures from other, similar corporations was conducted. Some visual ad campaigns include visually interesting (and sometimes shocking) photographs that catch viewer attention and encourage change. Others are simpler graphically-designed elements that promote the idea of safety with the use of visually stimulating shapes and colors. In both cases, the purpose of the sign is to be interesting and use simplicity to encourage safe behavior at work and at home.

Study of creative campaign ideas provided suggestions like social media networks (YouTube, Facebook, Twitter, yammer, etc), text messaging, Smartphone applications, and other multimedia methods.

Additionally, Langley's current safety website was analyzed and compared to similar safety websites; most specifically, NASA's National Safety Center (http://nsc.nasa.gov/home.aspx). The layout, use of multimedia, and color palette of the NSC website are far superior to those of the Langley website. The current Langley safety website is visually unattractive, possesses poor navigation, and very little multimedia. As mentioned in both focus groups and the brainstorming session, electronic copies of safety bulletins, multimedia, stories, and other information could be added to the site to make it an important resource for Langley employees.

Results

The research conducted via brainstorming sessions and focus groups was combined and used to create a business plan and timeline consisting of three phases that the SMAO can use to implement the safety culture change desired. Items in Phase 1 are low cost and easy to implement immediately, while Phase 2 items require more planning and resources, and Phase 3 require the most funds and organization. Phase 1 can begin immediately, with Phases 2 and 3 can begin at a later time when items in Phase 1 are completed.

Phase 1

- Use current outdoor electronic signs to display weekly safety messages.
- Continue handing out free PPE equipment for Langley employees to take home and use outside of the work environment.
- Use @LaRC for daily or weekly safety messages; messages can also be sent in the daily @LaRC emails.
- "Spotlight on Safety" on @LaRC. All focus groups emphasized the importance of personal stories from Langley employees. Similar to the Researcher News weekly employee profile, spotlight a Langley employee who either practices good safety procedures or has had an experience with safety concerns to personalize the safety messages.
- Encourage mandatory "safety moments" in meetings and make safety training uniform across the Center (monthly safety meetings for all staff). Make staff aware of relevant safety issues, e.g. office safety for office workers and lab safety for researchers.
- Urge Center upper management to "walk the talk" and show interest in safety. Focus groups emphasized the desire to have Center leaders put more emphasis on the importance of safety at Langley.
- "In my world" safety badges and personal statements. Personalize safety by giving employees a reminder of why safety is important to them. Signs and badges say "In my world, I am safe because…" with each employee's personal reason for safety, such as a photo of children or pets.
- Begin to make SMAO website more user-friendly. Focus groups claim to have difficulty finding things on safety website and don't know where to submit a safety concern. Make all safety bulletins, handouts, "Spotlight on Safety" stories, etc, available as electronic downloads on website to encourage employees to return to the site and access more information about safety.

Phase 2

- Allow Langley employees to sign up for daily or weekly Langley safety text messages and mandate that all employees sign up for Reverse 911 (an emergency messaging service).
- Develop Smartphone applications that provide safety messages (similar to those in the text messaging), safety information, and SMAO contact information.

- Set up Langley safety profiles on social networking sites (YouTube, Facebook, Yammer) that provide safety tips and information for Langley employees. Allows employees who cannot access @LaRC or internal websites to obtain safety information.
- Create cheap but effective safety reminders on door mats, bumper stickers, etc. These are viewed repeatedly by many people and provide a subtle encouragement to improve safety at work and outside Langley.
- Create monthly safety bulletins to be placed in easily-seen public areas, such as hallways and restrooms. They can include short articles about safety information, personal safety stories, and other relevant information.
- Begin safety contests for both employees and their children, such as coming up with a SMAO mascot, slogan, jingles, etc, or branch/directorate competitions (e.g. draw safety-related sidewalk designs).
- Create a SMAO mascot that can be a repeated visual reminder of the importance of safety and existence of the SMAO. Include the mascot with all safety bulletins, handouts, etc.

Phase 3

- Create a print ad campaign with safety messages that can be placed throughout the Center. The campaign can include posters, handouts, pamphlets, booklets, bulletin boards, etc.
    - Make ads personal and relevant to employees.
    - Help employees understand *why* some safety regulations are used. Relevant and informative.
- Update the safety video collection, creating short LaRC safety videos that are informative and relevant. Allow access to electronic copies of some of these videos on SMAO website.
- Prepare take-home, family-friendly activities that employees can share with their family to encourage off-Center safety habits.
- Have a mandatory safety day or all-hands kickoff similar to SHAW where employees participate in fun safety-related activities.
- Complete redesign of the SMAO website, as described in research section. Make it more user-friendly and informative, with multimedia available.
- Purchase new two-sided electronic signs to improve the effectiveness of safety messages on Center.
- Provide physical rewards for proper safety behavior and establish a positive reinforcement program.

Conclusion and Future Research

As previously stated, the information and opinions collected in focus groups can be used both for our campaign and for use by the SMAO to improve the effectiveness of the office in general, such as increasing effectiveness and promptness of safety concern

responses and implementation of positive reinforcement for good behavior rather than negative responses to poor behavior.

Further research can be conducted at the conclusion of the three phases to see which parts of the campaign were effective and which could be improved, allowing refinement of the culture change campaign and optimizing Langley's safety. Summer LARSS interns could be hired to do this analysis.

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