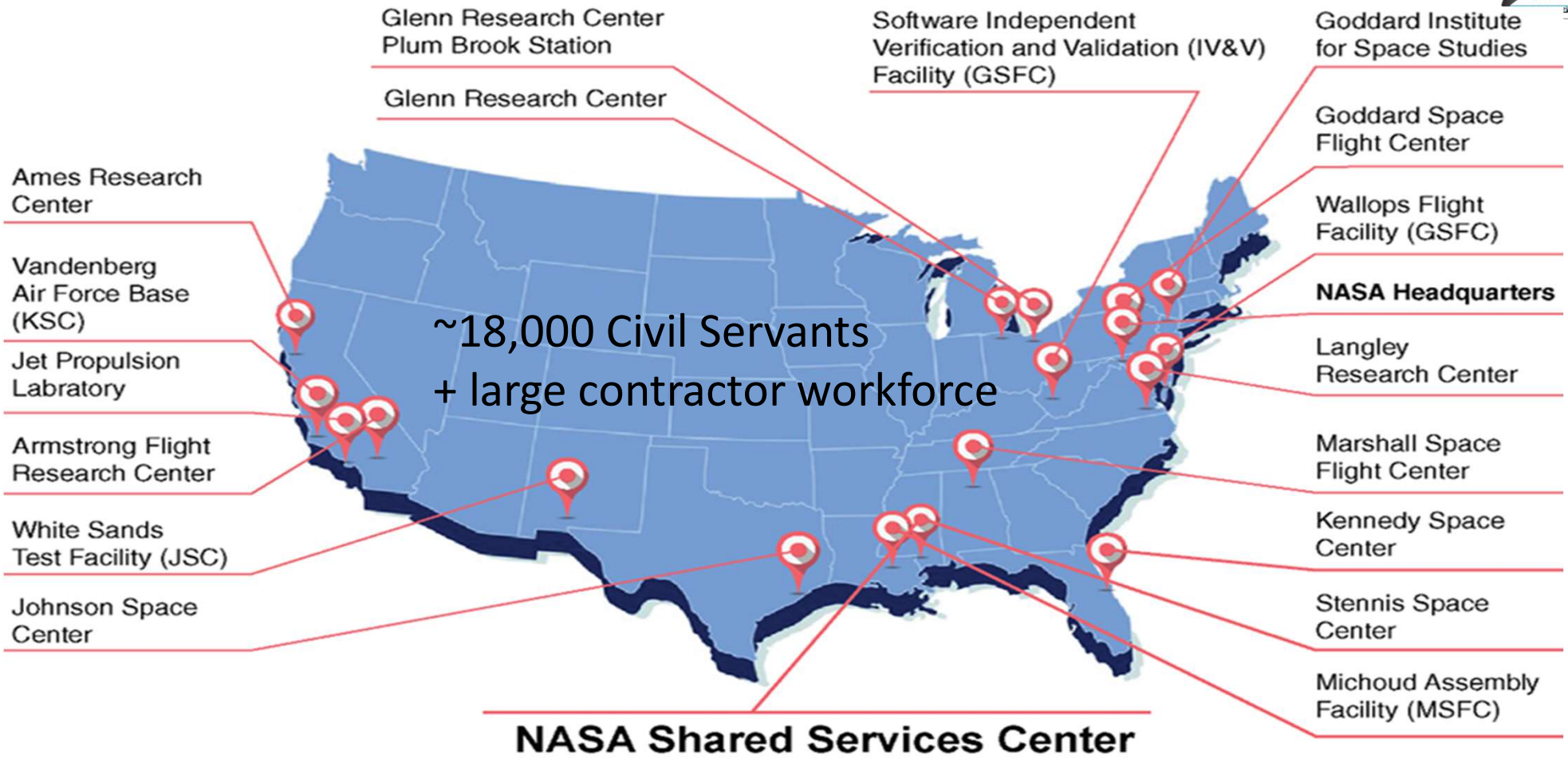
Safety Culture at NASA, From Top to Bottom

Grant M Watson

October 26, 2023

NASA


Glenn Research Center
Plum Brook Station
Glenn Research Center
Software Independent
Verification and Validation (IV&V)
Facility (GSFC)
Goddard Institute
for Space Studies
Goddard Space
Flight Center
Wallops Flight
Facility (GSFC)
NASA Headquarters
Langley
Research Center
Ames Research
Center
Vandenberg
Air Force Base
(KSC)
Jet Propulsion
Labratory
Armstrong Flight
Research Center
White Sands
Test Facility (JSC)
Johnson Space
Center
~18,000 Civil Servants
+ large contractor workforce
Marshall Space
Flight Center
Kennedy Space
Center
Stennis Space
Center
Michoud Assembly
Facility (MSFC)
NASA Shared Services Center

Our History – Many Successes

Shuttle Disasters

January 28, 1986, the shuttle Challenger exploded 73 seconds into its launch, all seven crew members are lost

February 1, 2003, the shuttle Columbia disintegrates as it enters the Earth atmosphere, all seven crew members are lost

Columbia Accident Investigation Board (CAIB) Report

"The foam debris hit was not the single cause of the Columbia accident, just as the failure of the joint seal that permitted O-ring erosion was not the single cause of Challenger. **Both Columbia and Challenger were lost also because of the failure of NASA's organizational system**."

- CAIB Report, pg 195

"Safety culture refers to the collection of characteristics and attitudes in an organization – promoted by its leaders and internalized by its members – that makes safety an overriding priority. In the following analysis, the Board outlines **shortcomings in the Space Shuttle Program, Debris Assessment Team, and Mission Management Team that resulted from a flawed safety culture**."

- CAIB Report, pg 190

SC & HF Program Executive
Tracy Dillinger
tracy.dillinger@nasa.gov

SAFETY CULTURE PROGRAM

HUMAN FACTORS PROGRAM

SC Detailee
Manny Dominguez
manuel.b.dominguez@nasa.gov
Kody Carr
kody.carr@nasa.gov

Project Manager
Susan Anderson
susan.d.anderson@nasa.gov

HF Detailee
Andre Karpowich
andre.a.karpowich@nasa.gov

SC PhD Intern

SC Working Group

Interagency Advisor
Lt Col Denise Zona
denise.zona@nasa.gov

HF Task Force

HF PhD Intern
Isabel Hernandez
isabel.hernandez@nasa.gov

SC & HF Data Analyst
Sam Serafini
samuel.j.serafini@nasa.gov

SC & HF Comm
Adam Schabel
adam.c.schabel@nasa.gov

Enabling Functions

OSMA RMO
Melanie Osei-Acheampong
melanie.a.osei@nasa.gov

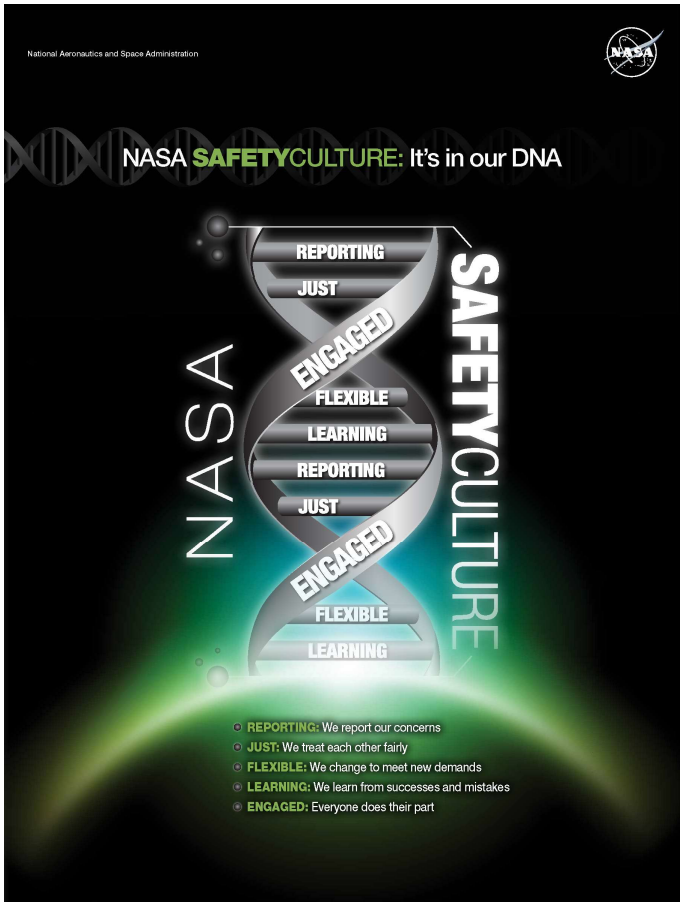
Agency Legal
Dan Thomas
dan.thomas@nasa.gov

NASA Mishap Manager
Carolyn Turner
carolyn.turner-1@nasa.gov

Organization
- MPAD
- Detailee
- Matrixed
- Contractor
- Other

October15, 2023

Safety Culture



5-Factor Model of
Safety Culture Reporting

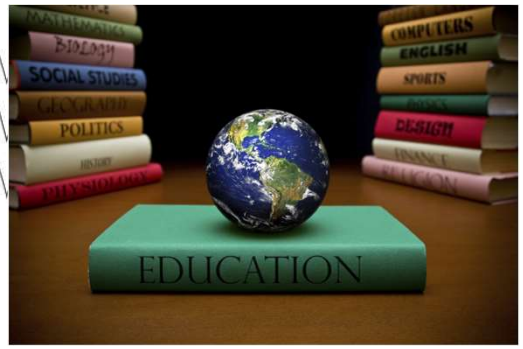
Reporting
Just
Flexible
Learning
Engaged

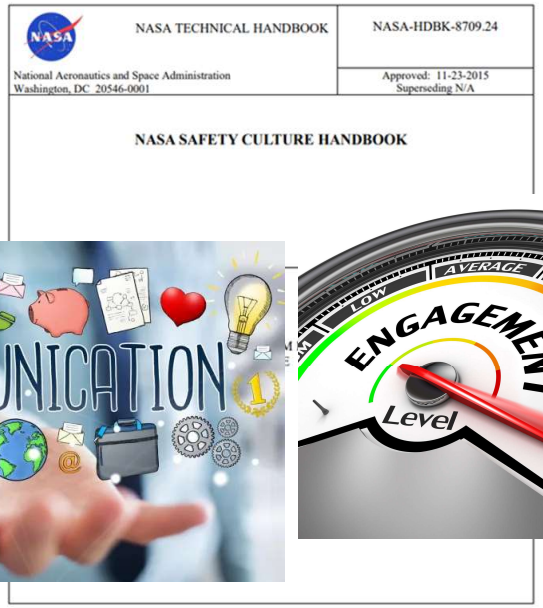
According to NASA-HDBK-8709.22 Safety & Mission Assurance Acronyms, Abbreviations, & Definitions, **Safety Culture** is the value placed on safety, as demonstrated by people's behavior. It is the way safety is perceived, valued, and prioritized in an organization. It reflects the commitment to safety at all levels in an organization. It's also described as "how an organization behaves when no one is watching." Safety Culture is expressed and observed via individual and group attitudes and behavior, as well as organizational processes.

Safety Culture Program Elements

These elements are fundamental to our Safety Culture program:

- Assessment
- Education
- Media/Tools
- Guidance
- Engagement





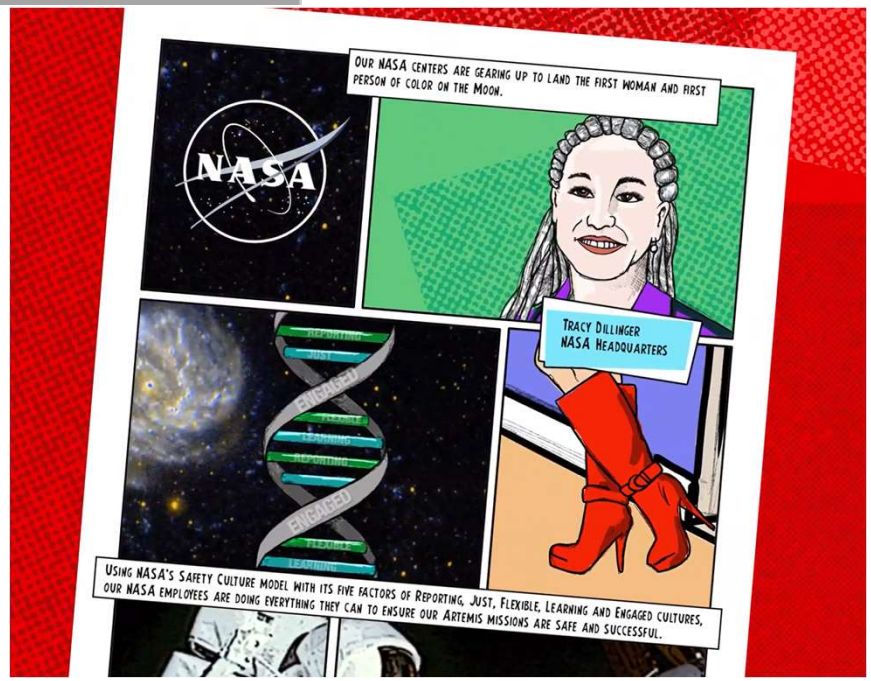
Safety Culture Program Elements

Assessment

- The Safety Culture Survey (SCS)
  - Administered every 2 years per NPR 8705.6
  - Civil servant and contractor participation
  - Program/Projects questions
  - Aviation Climate Survey
- Institutional Safety Program Audit (ISPA)
  - Safety Culture Assessments are part of the ISPAs

Safety Culture Program Elements

Education



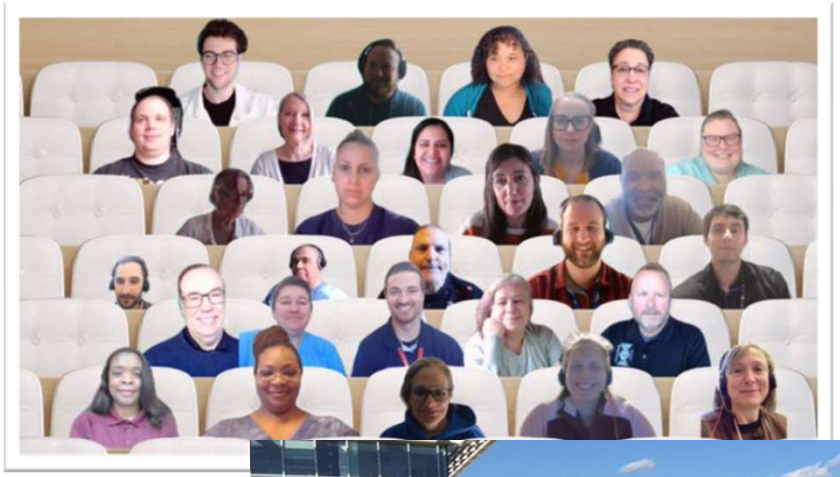
[Boots on the Moon]

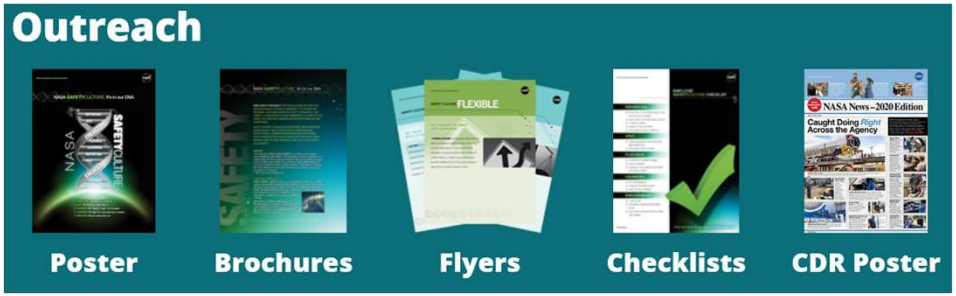
- Two SATERN Safety Culture Courses
  - Orientation to NASA Safety Culture
    - Required in first 90 days
  - Safety Culture for Supervisors
    - Required in first 90 days
- Safety Culture scenarios will be updated 2023-2024 to include hybrid work environment and expectations

Safety Culture Program Elements

Media/Tools

- OSMA Safety Culture Website
  - Safety Culture (nasa.gov)
- Safety Culture Working Group SharePoint
  - SCWG Share Point site
- Posters/Brochures/Fliers
- Quick Start Guide
- Safety Culture Checklist





Safety Culture Program Elements

Guidance

- NASA NPD 8700.1 provides Safety Culture Philosophy
- NASA NPR 8705.6 Safety Culture Survey Requirements
- NASA-HDBK-8709.22 provides Safety Culture Definition
- NASA-HDBK-8709.24 provides guidance on Safety Culture Program
- Up Next: NPR 8715.1 Safety Culture guidance in contracts

Safety Culture Program Elements

Engagement

- Yes, If recognition program
- Caught Doing Right

NASA Langley's Approach to Strengthening Safety Culture


Workforce of ~3,600
• ~1,800 Civil Servants
• ~1,700 Contractors
• Diverse workforce of researchers, engineers, technicians (maintenance and high-tech), and business/administrative
VPP
Voluntary Protection Programs
An OSHA Cooperative Program
Since 1998
NASA Langley is a small town

Safety Culture "Flavor of the Month"

Improving Safety Culture at Langley

2004: Consultant #1 brings their method to NASA.

2008: Consultant #2 customizes the Air Force's method for NASA.

2010: NASA develops its own safety culture model to use and forms an implementation team.

2012: Langley considers implementing a major contractor's method (Consultant #3).

Lessons Learned:

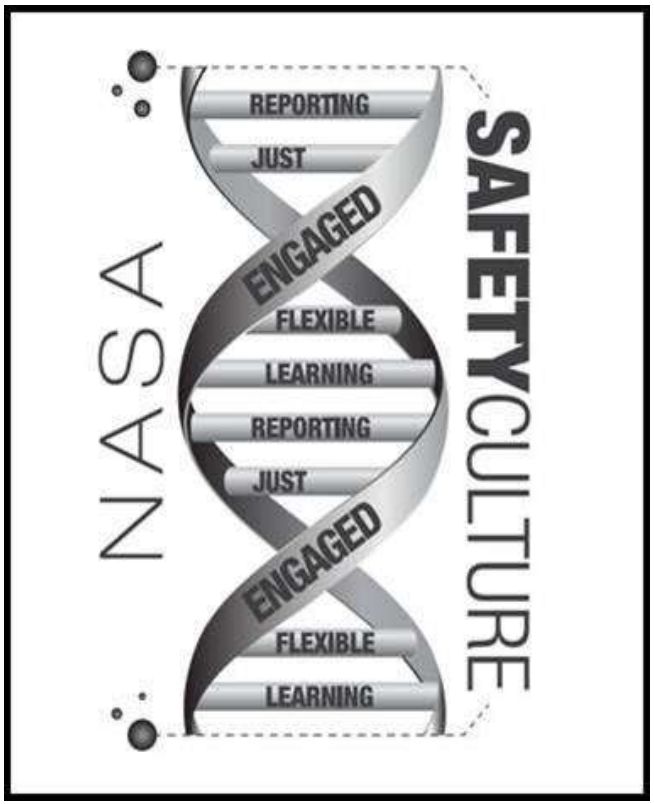
- Strengthening Safety Culture is not about the method you use it's about what you do.
- Combine methods and customize them to your organization.
- Sometimes you need to just start doing something and "correct" as you go.

In 2011, we educated the workforce on NASA's safety culture model, at risk behaviors, and expectations when they see a hazard.

NASA Safety Culture

- NASA's Safety Culture is like DNA – it guides and defines safety within NASA.

- The five elements of a strong safety culture are:
  - a reporting culture,
  - a just culture,
  - a flexible culture,
  - a learning culture, and
  - an engaged culture, which is the one that binds them all together.



NASA model based on the work of James Reason

As an Employee at Langley What Would You Do?

You are just about to do this and a thought pops into your head

1. **Throw the box over the edge.**
2. **Nothing, you've done this a thousand times before.**
3. **Be extra careful since you can't see well.**
4. **Make sure the stairwell is clear of items before you start down.**
5. ✓ **Turn around – and carry the box in a way I can see and use the elevator.**

This is how management expects employees to behave

As an Employee at Langley What Would You Do?

You see a nail on a pallet located on the floor

1. **Nothing – worse thing that can happen is a scratch.**
2. ✓ **Tell the Facility Safety Head about it.**
3. ✓ **Tell somebody to fix the issue and follow up that it got done.**
4. **Submit a safety concern. The safety office can handle this**
5. ✓ **Replace the nail.**

This is how management expects employees to behave

I felt something was missing.

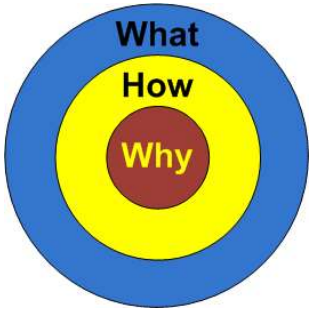
So, I conducted several brainstorming session called the "Why Safety" Challenge.

The Golden Circle

(Based work of Simon Sinek)

WHY speaks to our heart

- **Why**: Driving motivation behind safety (e.g., the value that drives safety).



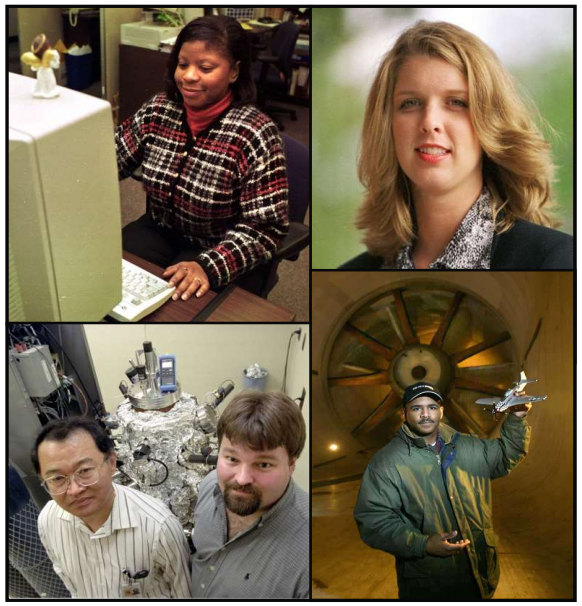
WHAT & HOW speak to our brains

- **How**: The means taken to create safety (e.g., hire a safety manager).
- **What**: The tangible steps taken to ensure safety (e.g., safety inspections & safety minutes).

Sinek Video: http://www.ted.com/talks/simon_sinek_how_great_leaders_inspire_action.html

Ref. Simon Sinek, Start with Why,

Why Safety → People



People at Work

People at Home

Safety is about the people at home and work

Langley needed to change some of the ways we thought about safety (i.e., paradigm shifts)

Paradigm Shift #1

This was all about me.
I needed to focus on Leadership and Employee Involvement.

Paradigm Shift #2

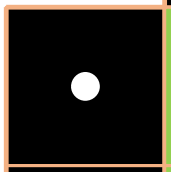
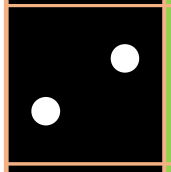
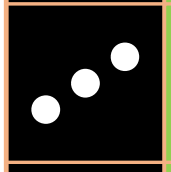
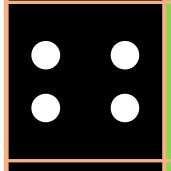
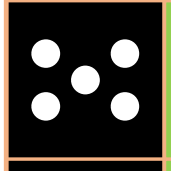
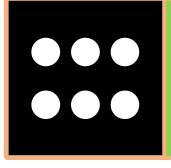
This was about employees.

Needed them to personalize safety and realize that safety applies to everybody, at home and work.

Gambling with LIFE

Presented by: Grant Watson

What are you willing to gamble with to get a job done faster, cheaper, or because of an inconvenience?

	Distracted Driving (e.g., cell phone use)	Not Wearing Personnel Protective Equipment (e.g., safety glasses)	Unsafe ladder use (e.g., reaching to far)
		Congratulation (maybe) you got away with it	
			
		OH NO ! I just lost the vision in my right eye and …	
			
			OH NO! My injuries lead to missing 3 months of work and …
			

- Ask for a volunteer who likes to gamble of take safety risks.
- Ask them which one of the three categories is their most often unsafe practice.
- Have them roll a die and then select the number it lands on.
- Have them read the words and add to the …. If applicable.
- Repeat that person rolling the die until an injury appears.

Paradigm Shift #3

This was about leadership.

Needed them to:

1) **personalize safety,**
2) **engage with their employees at a more personal level, and**
3) **believe that no injury is tolerable to achieve our mission.**

Evolution of a sign

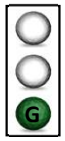
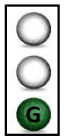
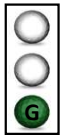
Before 2011

After 2011

Langley Research Center

SAFETY FOCUS

October 14, 2014

REACTION	CS Total Case Incidence Rate (TCIR)		TCIR = 0.7 < Goal 0.9 (10% reduction) TCIR = 0.7 < VPP limit of 1.2
	CS Days Away or Restricted / Transfer Cases (DART)		DART = 0.2 < Goal 0.5 (10% reduction) DART = 0.2 < VPP limit 0.5
	Team Total Case Incidence Rate (TCIR)		TCIR = 1.0 < Goal of 1.1 (10% reduction) TCIR = 1.0 < VPP limit of 2.4
	Team Days Away or Restricted / Transfer Cases (DART)		DART = 0.4 = Goal of 0.4 (10%reduction) DART = 0.4 < VPP limit of 1.9
	Equipment Loss / Property Damage		Damage = $113,000 < Goal $500,000

TCIR – Number of employees injured (OSHA recordable, restricted, or lost time) per 200,000 hrs worked
DART – Number of restricted or lost time injuries per 200,000 hrs worked
Yellow indicates we are not achieving our desired reduction of 10% below the last three year average
Red indicates that we are exceeding the average rates of similar organizations as determined by OSHA
The above chart reflects injury data through the end of September 2014

Langley Research Center

FOCUS

October 14, 2014

REACTION

30 people have been injured this fiscal year

3 shoulder strains	1 sprained ankle	2 finger lacerations	7 back injuries
2 eye injuries	1 neck strain	1 finger contusion	3 elbow injuries
1 toe injury	2 wrist injuries	3 hand injuries	1 insect bite
2 knee injuries	1 foot injury		

36 people were injured last fiscal year

aggravated hernia	security training	2 car accidents	4 hand injuries
cut finger	3 knee injuries	3 shoulder strains	5 back injuries
twisted ankle	2 insect bites	chest discomfort	elbow/face injury
4 eye injuries	chemical inhaled	pinched finger	skin rash
2 wrist sprains	2 fire training injuries		

Note: Total people injured refers to OSHA recordable, restricted duty or Lost-Time Injuries. The words above provide a general description of the type and impact of the injuries at LaRC.

Monthly Health & Safety Activities

Supervisors perform a Monthly Safety Inspection

Changed to a Monthly Health & Safety Activity

- A health and safety activity can be a 10-minute video, a 1-hour safety meeting, a supervisors doing a safety walk-through or inspection …… we told them to do what fits your organization.
- Created a website to track completion and provide ideas.

Paradigm Shift #3

This was about leadership.

Needed them to:

1) personalize safety,
2) engage with their employees at a more personal level, and
3) **believe that no injury is tolerable to achieve our mission.**

Zero Injuries

Injury Free

3) believe that no injury is tolerable to achieve our mission.

Langley Research Center

FOCUS SAFETY

October 14, 2014

REACTION

30 people have been injured this fiscal year

3 shoulder strains	1 sprained ankle	2 finger lacerations	7 back injuries
2 eye injuries	1 neck strain	1 finger contusion	3 elbow injuries
1 toe injury	2 wrist injuries	3 hand injuries	1 insect bite
2 knee injuries	1 foot injury		

Are these injuries a tolerable cost for Langley to achieve its mission (Yes or No)?

aggravated hernia	security training	2 car accidents	4 hand injuries
cut finger	3 knee injuries	3 shoulder strains	5 back injuries
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Langley Research Center

FOCUS SAFETY

October 14, 2014

REACTION

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2 eye injuries	1 neck strain	1 finger contusion	3 elbow injuries
1 toe injury	2 wrist injuries	3 hand injuries	1 insect bite
2 knee injuries	1 foot injury		

What is an acceptable injury to one of your employees for Langley to achieve its mission?

aggravated hernia	security training	2 car accidents	4 hand injuries
cut finger	3 knee injuries	3 shoulder strains	5 back injuries
twisted ankle	2 insect bites	chest discomfort	elbow/face injury
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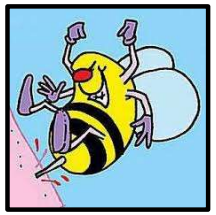
Note: Total people injured refers to OSHA recordable, restricted duty or Lost-Time Injuries. The words above provide a general description of the type and impact of the injuries at LaRC.

Define Tolerable

What do we mean by no injury is tolerable



- Don’t have the paradigm that accidents will happen and there is nothing I can do about some of them.
- Say to yourself every morning and when you assign work, what am I going to do to make sure nobody is injured.
- If somebody is injured, do not tolerate it, no matter how minor, learn from it and take actions to prevent reoccurrence.

Final Remarks

"Accomplishments will prove to be a journey, not a destination."

- Dwight D. Eisenhower

"Leadership is the art of getting someone else to do something you want done because he wants to do it."

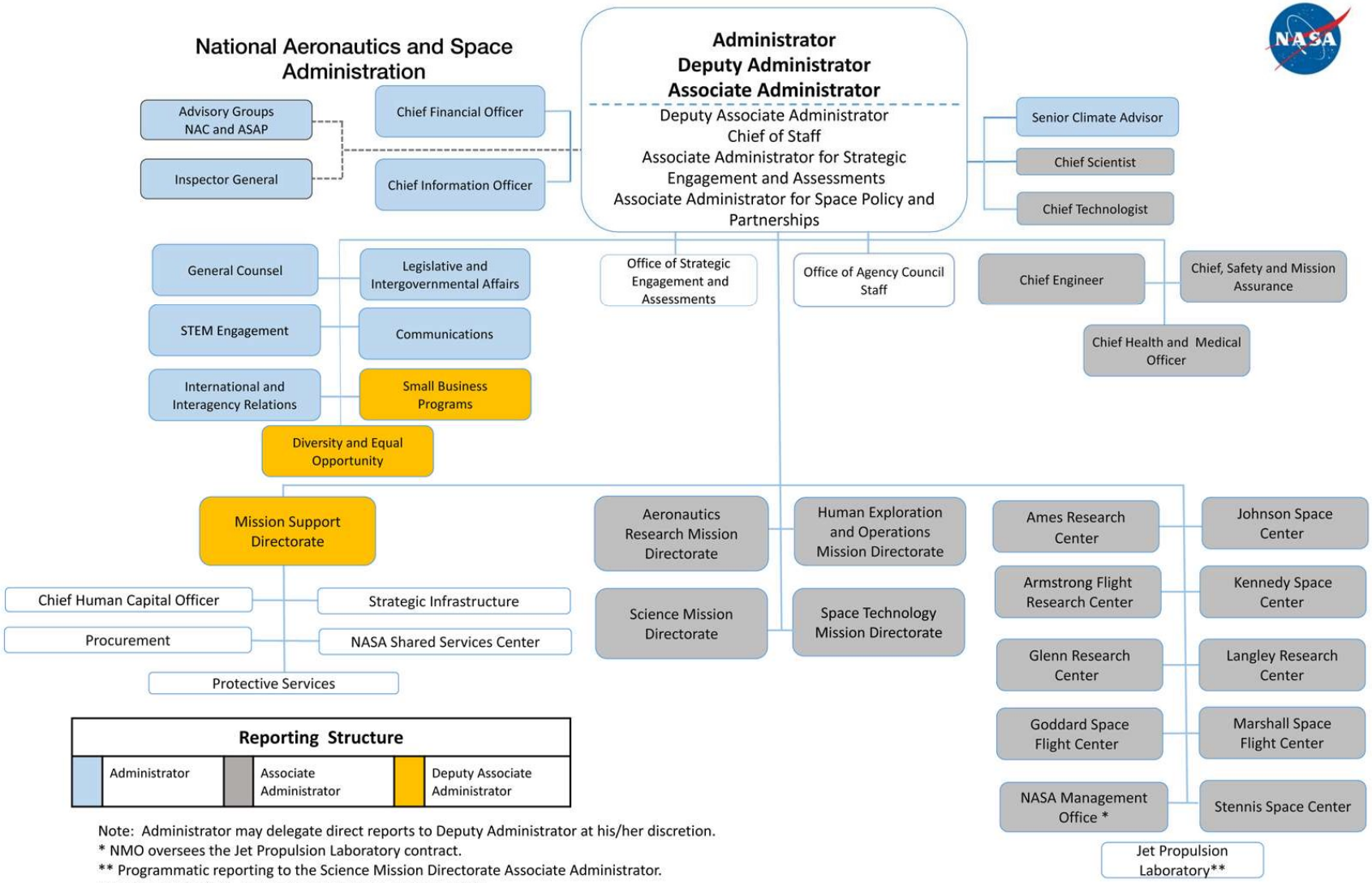
- Dwight D. Eisenhower

Questions

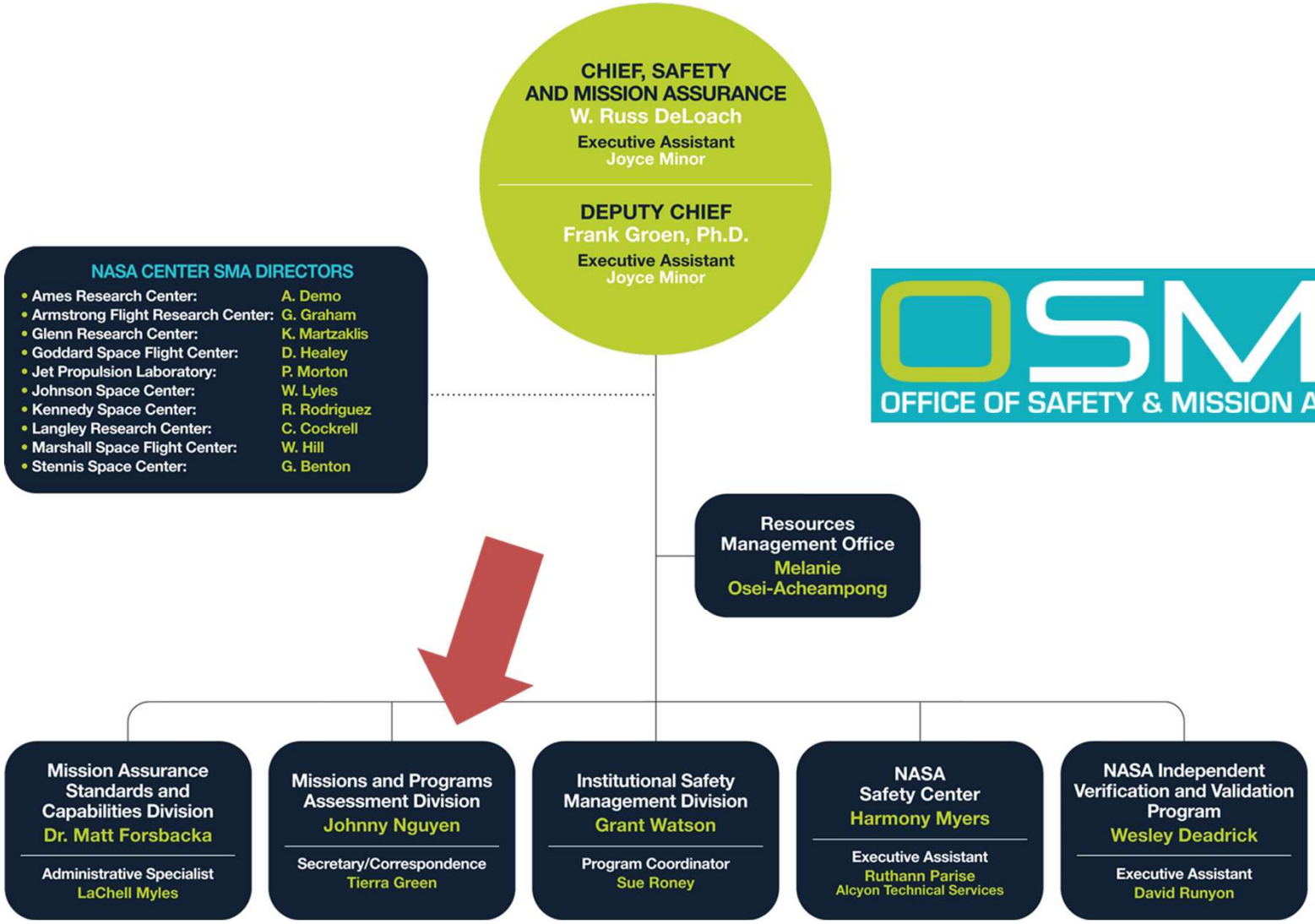
My e-mail: grant.m.watson@nasa.gov

Back Up

National Aeronautics and Space Administration



Note: Administrator may delegate direct reports to Deputy Administrator at his/her discretion.
* NMO oversees the Jet Propulsion Laboratory contract.
** Programmatic reporting to the Science Mission Directorate Associate Administrator.
JPL will participate in Agency-level functions, such as APMC.
JPL is a Federally Funded Research and Development Center (FFRDC).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