NASA Human Factors Program (HFP)

Purpose

- The National Aeronautics and Space Administrations Human Factors Program provides and expands the understanding and impact of Human Factors across the Agency.
- The Program is managed by the Office of Safety and Mission Assurance at NASA Headquarters.

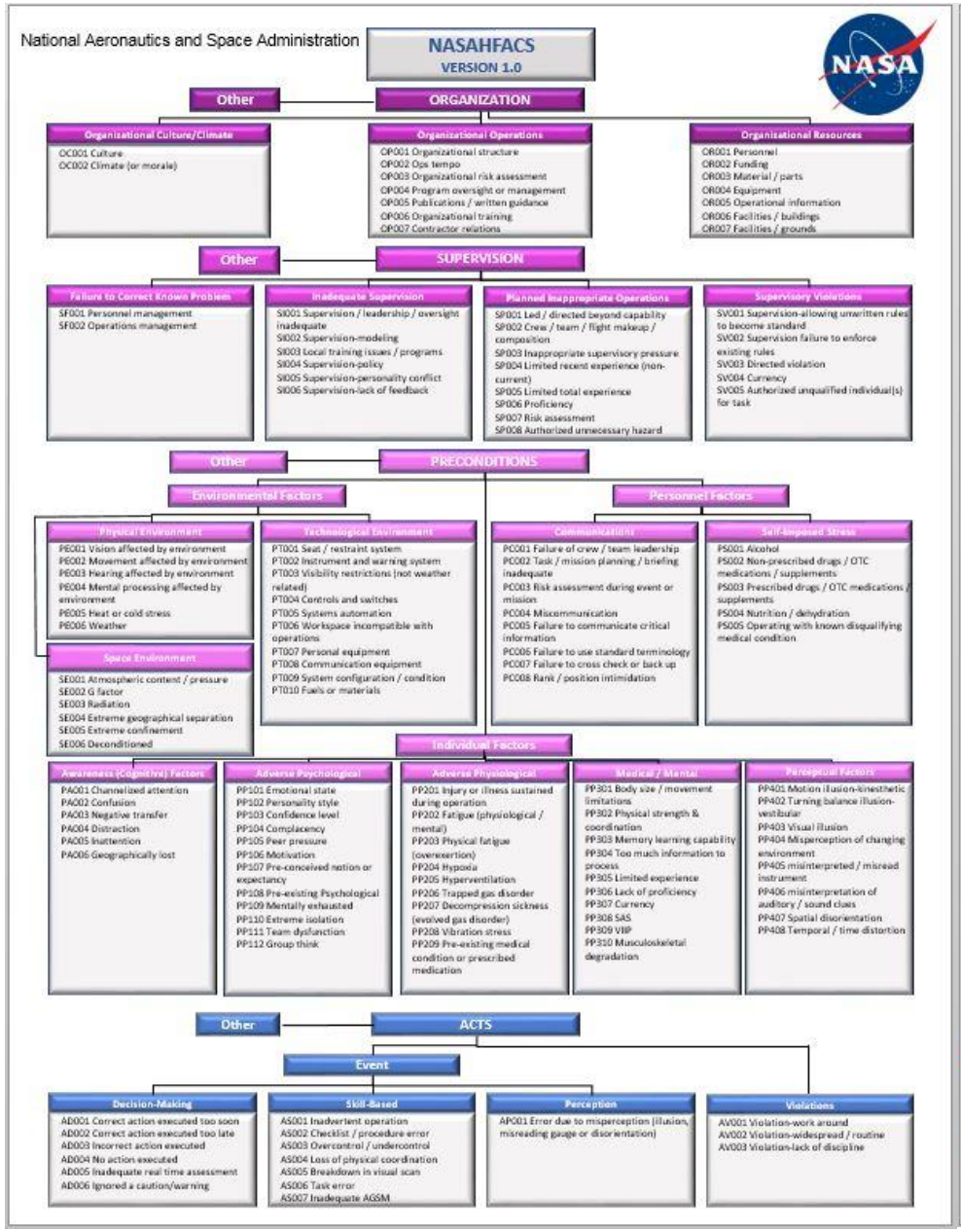
Data Base / Methodology

- NASA Mishap Information System (NMIS) derived.
- The Human Factors Task Force (HFTF) developed NASA-centric taxonomy NASAHFACS.
- An Agency level HFP allows for expansion of the program beyond aviation.
- The HFTF used original HFACS, Inc., DoD 7.0 and 10.0 as the building blocks for the taxonomy.

https://sma.nasa.gov/sma-disciplines/human-factors
Human Factors Program website Human Factors

NASA HFP Tools

NASA Quick Reference Guide aka the "spider".



NASAHFACS Weighting Chart

0	**Present** but not a factor, has potential for future mishaps
1	**Minimal** impact on mishap scenario. However it is a noted departure from processes or procedures
2	**Moderate** Impact on mishap scenario. It is a departure from process / procedure however its elimination by itself would not have prevented the mishap
3	**Major** impact on mishap scenario. Its elimination could have prevented the mishap
4	**Causal** impact if eliminated from mishap chain of events prevents its occurrence.

Acts are errors of commission / omission, or violations. These factors are often observed at the time of the mishap.

Preconditions are pre-existing environmental, individual, or personnel factors associated with the mishap.

Supervision includes guidance, training, feedback, oversight, modeling, discipline, selection, and other expectations associated with supervisory accountability and responsibility associated with the mishap.

Organizational include processes, policies, resources, and climate/culture that effect unsafe supervision, preconditions and/or acts associated with the mishap.

How to apply NASAHFACS

Ask: What **Acts** did the person or team do? Was it an error? Skill, Decision or Perception? *(Made a decision error or pushed the wrong button, misinterpreted the gauge reading etc.)* Was it a violation, i.e. deliberate departure from established process? *(Violated Directives, Requirements or Procedures)*

Determine the Preconditions:

What conditions existed before the person committed the unsafe act? Was the physical or technological environment a factor? *(Bad weather, visibility restrictions from dust / smoke, blind spots, bad location of switch / control etc.)* Was it the Physical or Mental limitations of the person / Team? *(Personal life issues, complacency, trying too hard to complete the task, lack of sleep, illness, prescribed medications etc.)* Communications, planning or self-stressors play a factor? *(Nutrition, lack of proper rest PT, alcohol, poor communications, improper planning, poor situational awareness etc.)*

Supervisor Issues: Who knew about the preconditions but did not take steps to prevent the act? *(Did the Supervisor fail to provide proper guidance, training opportunity or act as a proper role model?)* Did the Supervisor improperly plan the operation and why? Did the Supervisor fail to correct a known problem with the subordinate, provide training, or stop hazardous practices? Did the Supervisor violate policy?

Organization Issues: Are there organizational vulnerabilities that affected Supervisory practices and/or set the stage for unsafe preconditions or acts? *(Did policies, climate, Ops Tempo, inadequate risk assessments, processes or funding have a role?)*

Points of Contact

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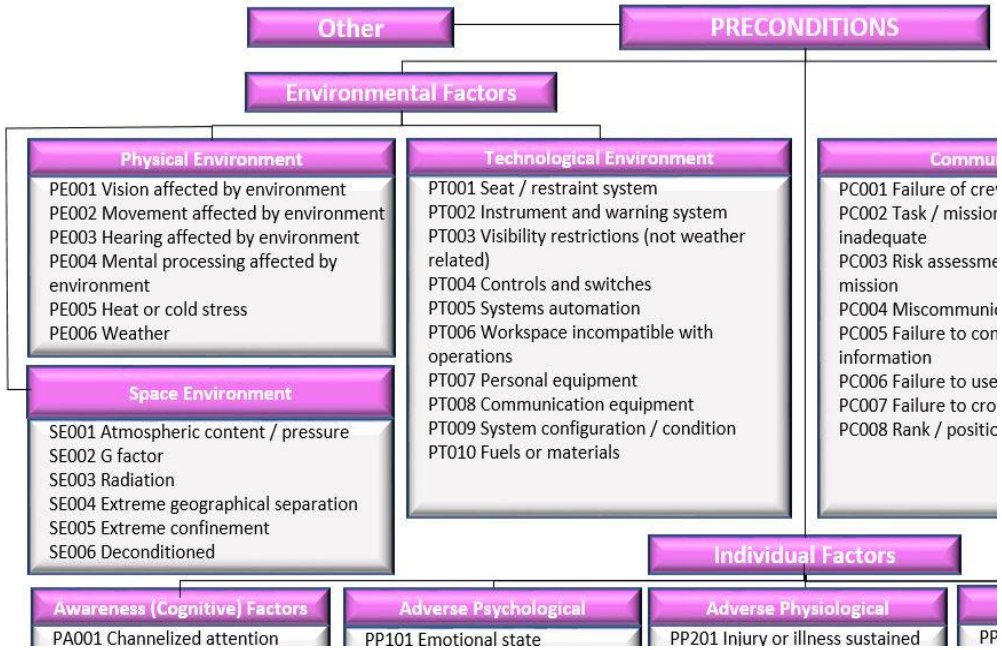
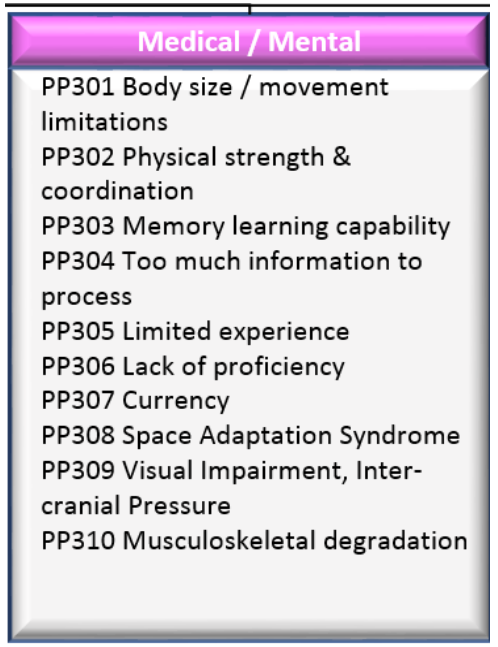
NASA HFP Unique Structure

Unique Structure

- The HFTF added a “Space” environment bucket that captures humans and vehicle conditions.
- The Task Force added nanocodes in the Medical /Mental area.
  - These fall under the Individual Factors sub-tier in the NASAHFACS structure.

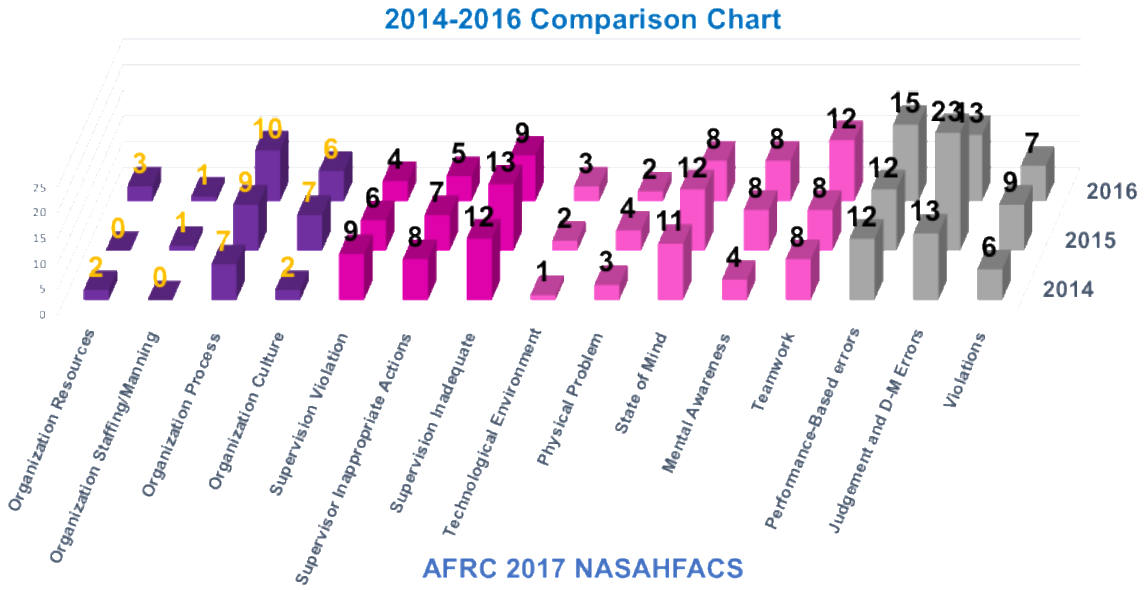


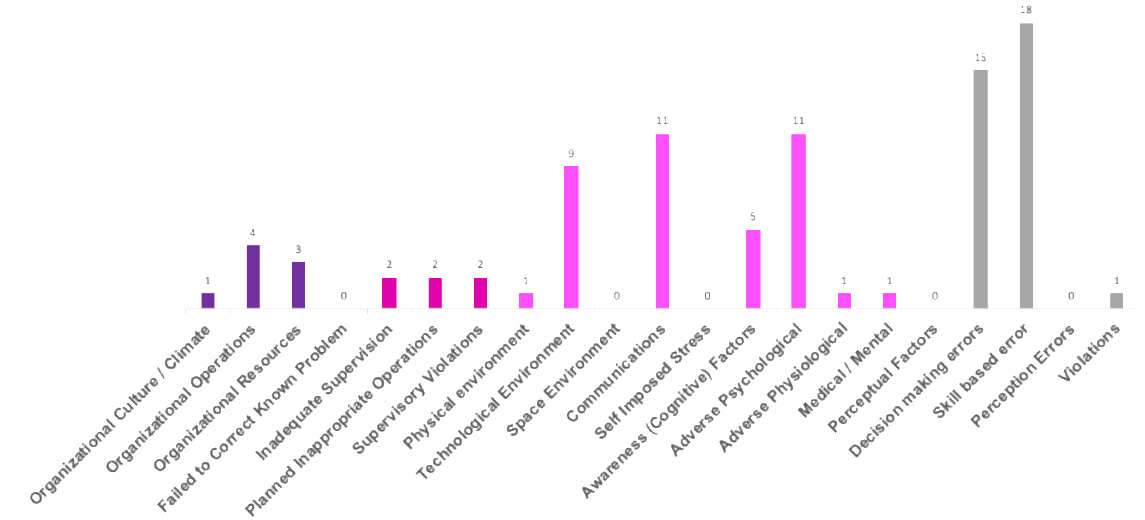


NASA HFP Example

Analysis Example

- Data from NMIS on AFRC events only for FY14 - FY16 indicated areas of concern.
- Data indicated that Human Factors training to branch level supervisors was successful in reducing the number of supervisory and organizational findings.
- The level of effectiveness of the measures taken were plotted.
  - Notice a reduced rate of Supervisor findings between the two time lines
  - Buckets with no findings are not charted.
  - The number of events coded is relatively small, typically averaging 35 a year.



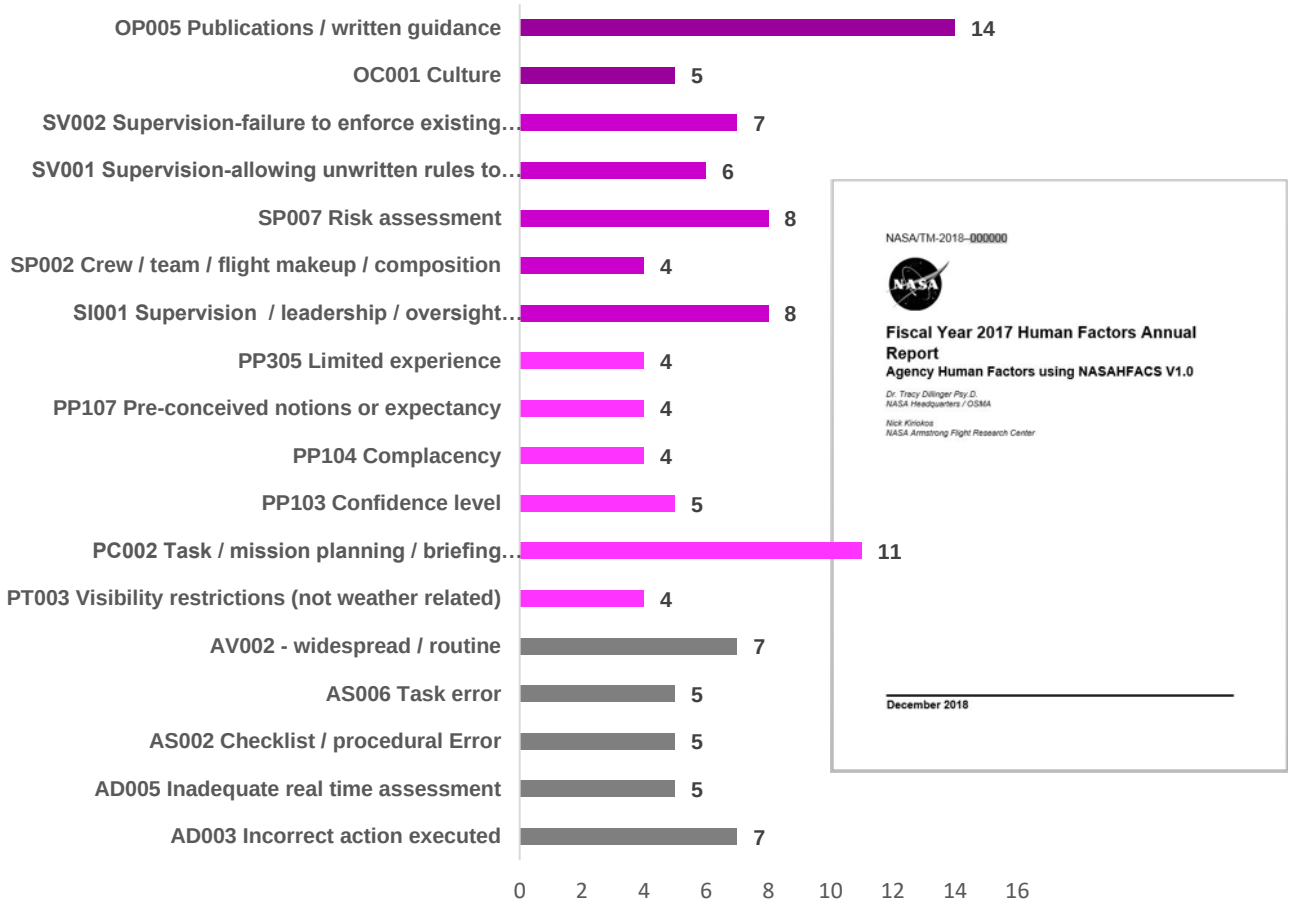


NASA HFP Report

Agency Annual Report

- FY2017 Agency wide NMIS entries for Type A, B, and C operational events were reviewed.
  - 24 events, that included 9 of the ten NASA Centers were assessed.
    - 1 - Type A event
    - 1 - Type B event
    - 22 - Type C events
    - Over $4.5M in damages
    - 433 days restricted duty
    - 10 days lost time.
- Events were coded, bar charted and descriptive context provided in a written report via the NASA Scientific Technical Information format (STI).
  - The report provided context for events that 4 or more (4+) as well as occurrences of 3 as a “high yellow” secondary areas of concern.
- This Annual Report is the first official document using the NASAHFACS V1.0.

Agency FY17 Type A, B, and C 4+ Nanocode Events



NASA Future and Training

Near Future

- The NASAHFACS taxonomy and procedural guidance will be published in STI format as a Handbook.
- Since the February 2018 F2F, the team has grown to 15 individuals across the Agency.

Training and Future Reporting

- Three training levels have been developed on NASAHFACS, they are:
  - 1 Hour Executive Level
  - 2 Hour refresher course for individuals versed in investigation or analysis
  - 2 Day Certification course
- A 5 year plan has been developed offering training at each NASA Center.
- FY18 data is being reviewed and analyzed, and will be published as an STI accessible through the NASA Technical Reporting System.
- Growth of program to allow reporting on all Type D and Close Call events and to provide greater statistical data for predictive analysis.

NASA Human Factors Program

Questions?