National Aeronautics and Space Administration

Office of the Administrator
Washington, DC 20546-0001

June 27, 2011

Vice Admiral Joseph W. Dyer, USN (Ret.)
Chair
Aerospace Safety Advisory Panel
National Aeronautics and Space Administration
Washington, DC 20546

Dear ~~Admiral~~ Joe Dyer:

Enclosed are NASA's responses to recommendations from the 2011 First Quarterly Meeting of the Aerospace Safety Advisory Panel (ASAP). Please do not hesitate to contact me if the ASAP would like further background on the information provided in the enclosures.

I look forward to receiving continued advice from the ASAP that results from your important fact-finding and quarterly meetings.

Sincerely, Sincerely!

Charles F. Bolden, Jr.
Administrator

4 Enclosures:
1. Interim Response to 2011-01-01 NASA Alcohol Use and Testing Policy
2. NASA Response to 2011-01-02 S&MA Role Descriptions
3. NASA Response to 2011-01-03(a) Safety Metrics
4. NASA Response to 2011-01-03(b) Safety Metrics

ASAP Tracking Number 2011-01-01
NASA Alcohol Use and Testing Policy

Finding

At its third quarterly meeting in 2006, the ASAP made a recommendation regarding implementation of a post[-]mishap drug and alcohol testing policy. NASA now has in place a drug testing policy for civil servants and contractor employees that addresses that portion of the recommendation. However, NASA has not yet taken action to implement a post-mishap alcohol testing policy.

Recommendation

NASA should implement a post-mishap blood alcohol and drug testing program for all personnel in sensitive positions that are involved in Class A and B mishaps. That includes NASA contractors, civil servants, political appointees, and all affected visitors. This investigative tool will support key organizational learnings and is in[-]line with many legal requirements in the various jurisdictions in which NASA operates. It should be noted that this is NOT a recommendation for a random test program. It is a test for cause after a serious mishap has occurred.

Rationale

Post-mishap alcohol testing will add important information to the mishap analysis as well as provide essential input to formulation of the corrective action plan.

NASA Response

NASA concurs with the potential value of post-mishap testing for alcohol use. The Office of Safety and Mission Assurance, in conjunction with the Office of Human Capital Management and other organizations as necessary, will work to design, develop, and implement an appropriate post-mishap alcohol-testing policy, to include consulting and engaging with labor representatives through the NASA Labor-Management Forum.

ASAP Tracking Number 2011-01-02
S&MA Role Descriptions

Finding

At its first quarterly meeting in 2010, the ASAP recommended that S&MA analyze the changing S&MA work and the skills that will be needed for the future. NASA has taken a good first step in addressing this recommendation.

Recommendation

NASA should begin to draft a role description as well as some key job requirements, such as educational background and experience, for the personnel who will have to specify, manage, and assure the S&MA activities under the new program direction. NASA needs to articulate the skills needed as soon as possible.

Rationale

S&MA will need a much broader skill set to address more strategic and system issues than they do today. The STEP can help by adding more detail on what needs to be learned to make this transition. A roles and responsibilities description and early formulation of the key job requirements, such as background and experience, can help shorten the hiring timeline to bring personnel onboard during the transition to the new program direction.

NASA Response

NASA acknowledges the Panel's intent and recommendation regarding the S&MA role descriptions. NASA has already begun studying the impacts to safety and mission assurance that changing emphasis will occur from a Research, Development, Test, and Evaluation (RDT&E) environment to an early Research and Development (R&D) environment. This includes impacts to the safety and mission assurance workforce. The most significant effort to date in this area has been the completion of the NASA Office of Safety and Mission Assurance's Research and Technology Strategy (ORTS) Team Study in March 2011. A significant portion of this report addresses the workforce needs required to transition to the R&D environment.[1] From a safety and mission assurance workforce perspective, the ORTS Team concluded that the prime focus area that needs development is in the Technology Readiness Level (TRL) 4-to-6 range (Technology Development). The ORTS Team concluded that the early TRL activities (1-to-3) are already sufficiently covered by normal institutional safety processes and practices, and the higher TRL activities (7-to-9) are covered under normal program/project management practices that are akin to our regular RDT&E procedures and practices. To focus on this mid-level TRL regime, the ORTS Team recommends that NASA develop a basic course for safety and mission assurance professionals, add that course to the Safety and Mission Assurance Technical Excellence Program (STEP), and augment that training with some on-the-job practice. The ORTS report further helps to define the nature of what is required of that course; specifically, that the training target the solicitation and formulation phases of the research efforts, and that emphasis be placed on understanding the culture and needs of the research and technology

[1] NASA plans to provide a summary briefing of this report at the next quarterly ASAP meeting.

community.[2] NASA is now at the stage of formulating its plan on how to implement the development of the training.

[2] Further clarifying the scope of this training, the ORTS report postulates four key questions that define how a safety and mission assurance professional would initiate implementation of safety and mission assurance in the R&D environment. These questions are: 1. What are the nature and purpose of the research or technology development effort? 2. What are the risks of the research or technology development effort; are there any safety-related aspects of the research and technology development project? 3. How can the Safety and Mission Assurance organization help with the research and technology project? 4. Is increased safety, quality, reliability, and/or maintainability a central focus of this research?

ASAP Tracking Number 2011-01-03(a)
Safety Metrics

Finding
In response to a recommendation made at the ASAP's third quarterly meeting in 2010, the NASA Safety Center (NSC) has taken the first steps to track safety metrics and do a Center-by-Center comparison of Class A, B, C, and D mishaps in certain targeted areas. NASA stated that performing the analysis on the collected data is time-consuming and labor-intensive.

Recommendation
(a) The NSC should expand mishap analysis to include all types of mishaps, not just those in certain targeted areas. As this process develops and matures, and as the comparisons make the data more meaningful, the ASAP recommends that the NSC brief the senior leadership of the Centers and the Agency on the results.

Rationale
A reporting system that is more comprehensive, faster, and less labor intensive would be a more useful tool for Center and Agency senior management and would facilitate implementation of corrective actions.

NASA Response
NASA acknowledges and welcomes the recommendations from the ASAP. The NSC has made progress in tracking the type and classification of mishaps across the Agency. Based upon input at previous ASAP meetings, the NSC has adopted an approach to tracking mishaps at Centers and has worked closely with the S&MA personnel, including those responsible for data entry into the Incident Reporting Information System (IRIS), to help track the initiating event and cause of the mishap. These data are being presented at quarterly S&MA Director's meetings and are also a part of the monthly Agency Baseline Performance Review. Additional methods for evaluating and presenting this data are also being developed. Specifically, use of analytical tools such as the Crow-Army Materiel Systems Analysis Activity (reliability growth plots) and the MySQL (open source) database, are showing some promise in helping to identify trends in mishaps and providing results in a timely manner.

The mishap metrics are now a standard agenda item at the quarterly ASAP meetings, and the ASAP will be able to see these changes as we implement them. Current presentation results are attached for review.

ASAP Tracking Number 2011-01-03(b)
Safety Metrics

Finding
In response to a recommendation made at the ASAP's third quarterly meeting in 2010, the NASA Safety Center (NSC) has taken the first steps to track safety metrics and do a Center-by-Center comparison of Class A, B, C, and D mishaps in certain targeted areas. NASA stated that performing the analysis on the collected data is time-consuming and labor-intensive.

Recommendation
(b) The ASAP would like to understand how the IRIS supports causal analysis and include the causations in the periodic reports together with their associated mitigation actions and schedules for completion to management. Steps should be taken to have the system do the analysis and reporting automatically.

Rationale
A reporting system that is more comprehensive, faster, and less labor intensive would be a more useful tool for Center and Agency senior management and would facilitate implementation of corrective actions.

NASA Response
NASA acknowledges this recommendation from the ASAP. The NSC has been working with the Center Safety and Mission Assurance personnel and the IRIS contractor to accomplish the capture of causes of mishaps in IRIS, specifically with the Type C/D and Close-Calls, which make up over 95 percent of NASA mishaps. A substantial effort to work with the Center points of contact to revise existing data fields in IRIS is ongoing, and some progress has been made to date.

As we review data fields in IRIS, however, there is considerable evidence that when initial events and conditions are entered, not much detail is presented as to causes. Any additional description of causes can, in some cases, be found in IRIS text fields, but this requires individual data analysts to review each case. IRIS has the ability for users to enter causes, though there is a broad interpretation of how and where to record causes in IRIS.

Ongoing discussions are occurring with Center Safety and Mission Assurance personnel and the IRIS Configuration Control Board on how to definitively identify and code these causes in IRIS. It is NASA's intention to have the new cause taxonomy agreed upon and implemented within IRIS with preliminary results by the end of FY 2012, subject to funding availability. The new taxonomy in an automated system will provide the ability to analyze mishap and safety data in an automated and more timely manner. Progress in completing this task will be provided at future ASAP quarterly meetings.

Safety Metrics Update

Response to ASAP Recommendation 2011-01-03(a)

April 2011

Response to ASAP Recommendation 2011-01-03(a) from February 3-4, 2011 Meeting

2011-01-03(a) The NSC should expand mishap analysis to include all types of mishaps, not just those in certain targeted areas. As this process develops and matures, and as the comparisons make the data more meaningful, the ASAP recommends that the NSC brief the senior leadership of the Centers and the Agency on the results.

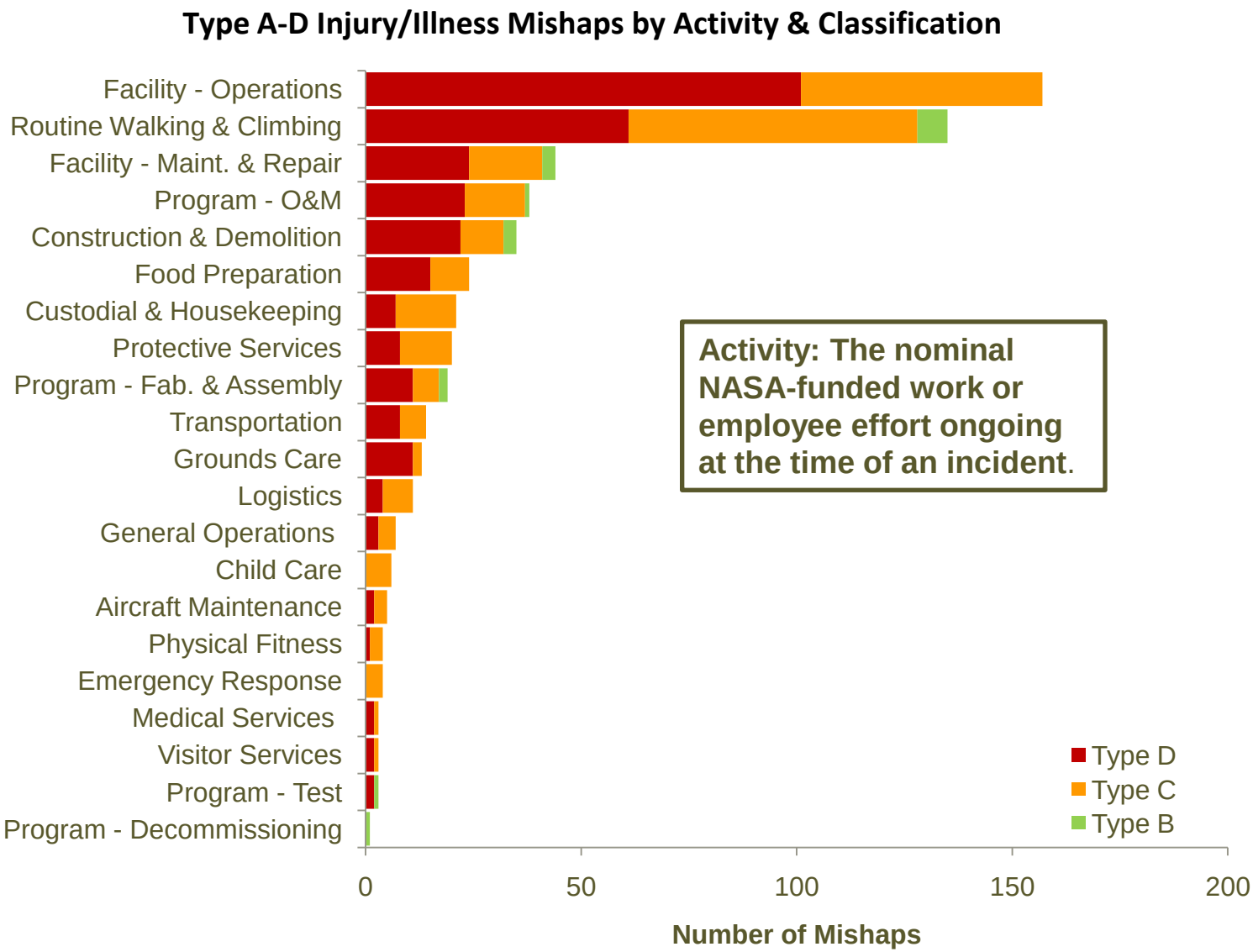
Note: the NSC has produced an Annual Mishap Summary Report that has been distributed to S&MA leads at each Center and is posted on the NSC Web site. Statistical analysis of all 2010 NASA mishaps is included.

- Several of the metrics presented herein to ASAP are part of that report. The only exception is the recent addition of normalized metrics.

Metrics in this study include both injury and damage Type A-D mishaps from January 1 – December 31, 2010. (728 mishaps)

Activity at Time of Mishap (Type A-D) for Injury/Illness Mishaps

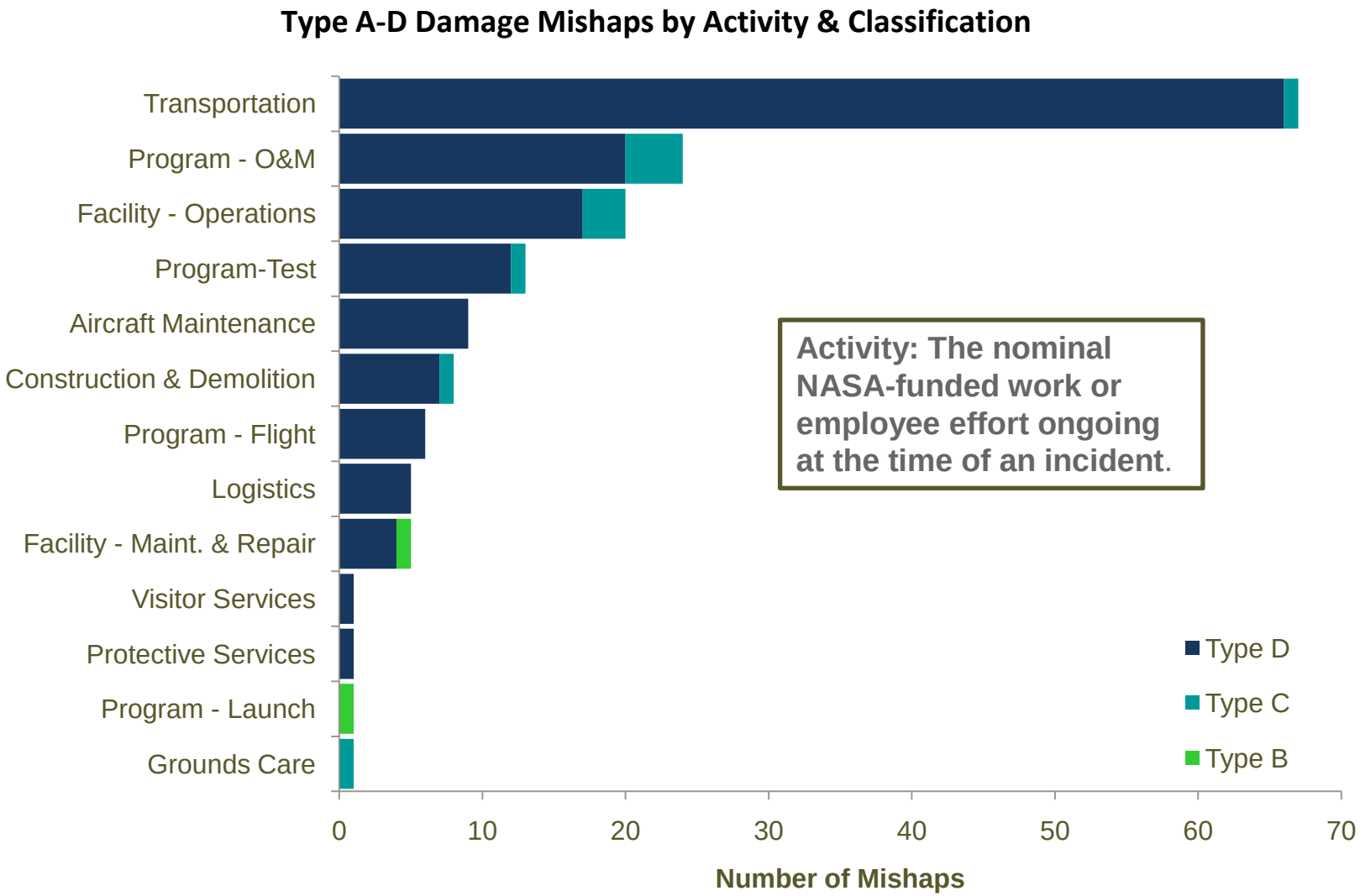
Jan 1-Dec 31, 2010



Activity: The nominal NASA-funded work or employee effort ongoing at the time of an incident.

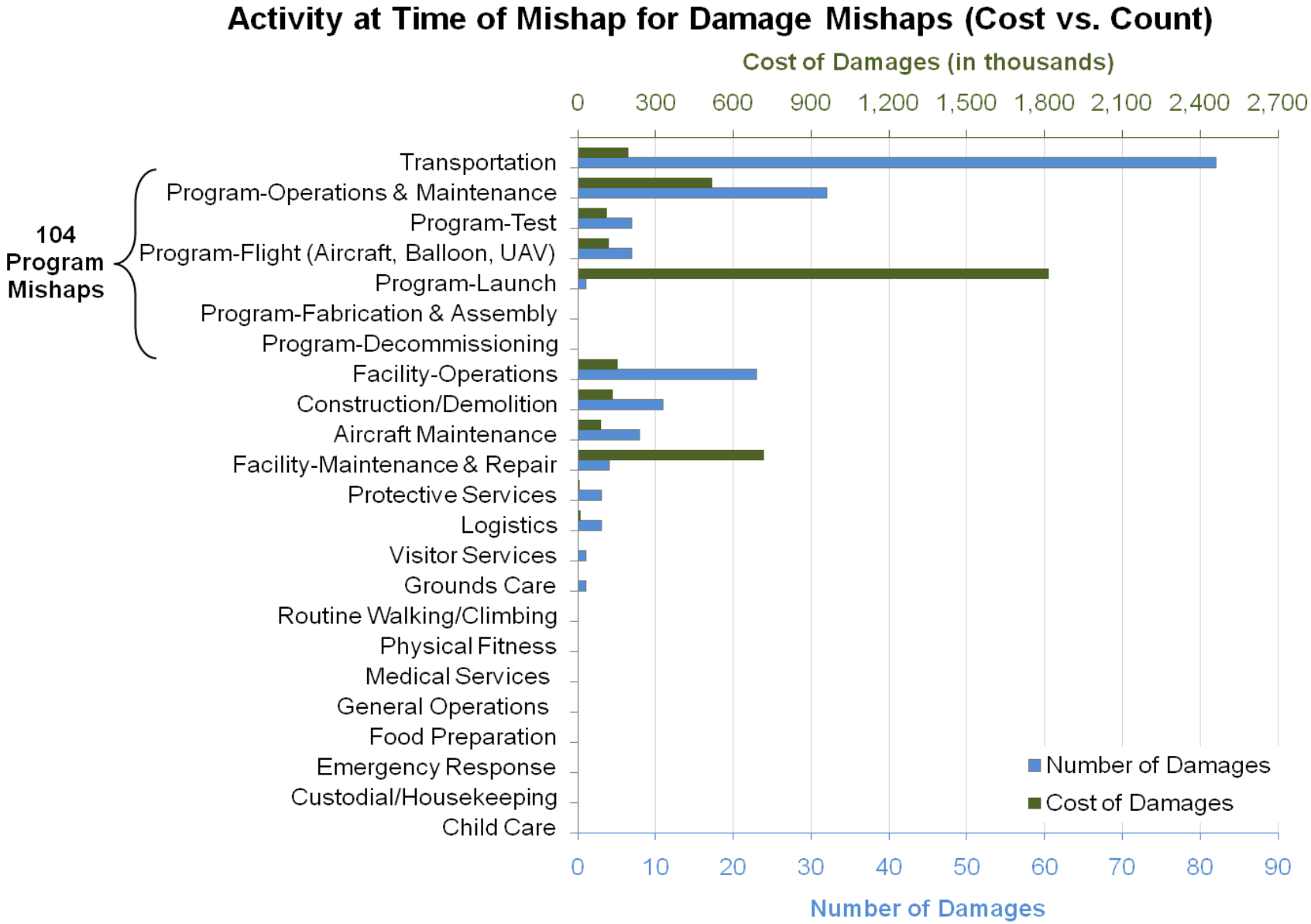
Activity at Time of Mishap (Type A-D) for Damage Mishaps

Jan 1-Dec 31, 2010

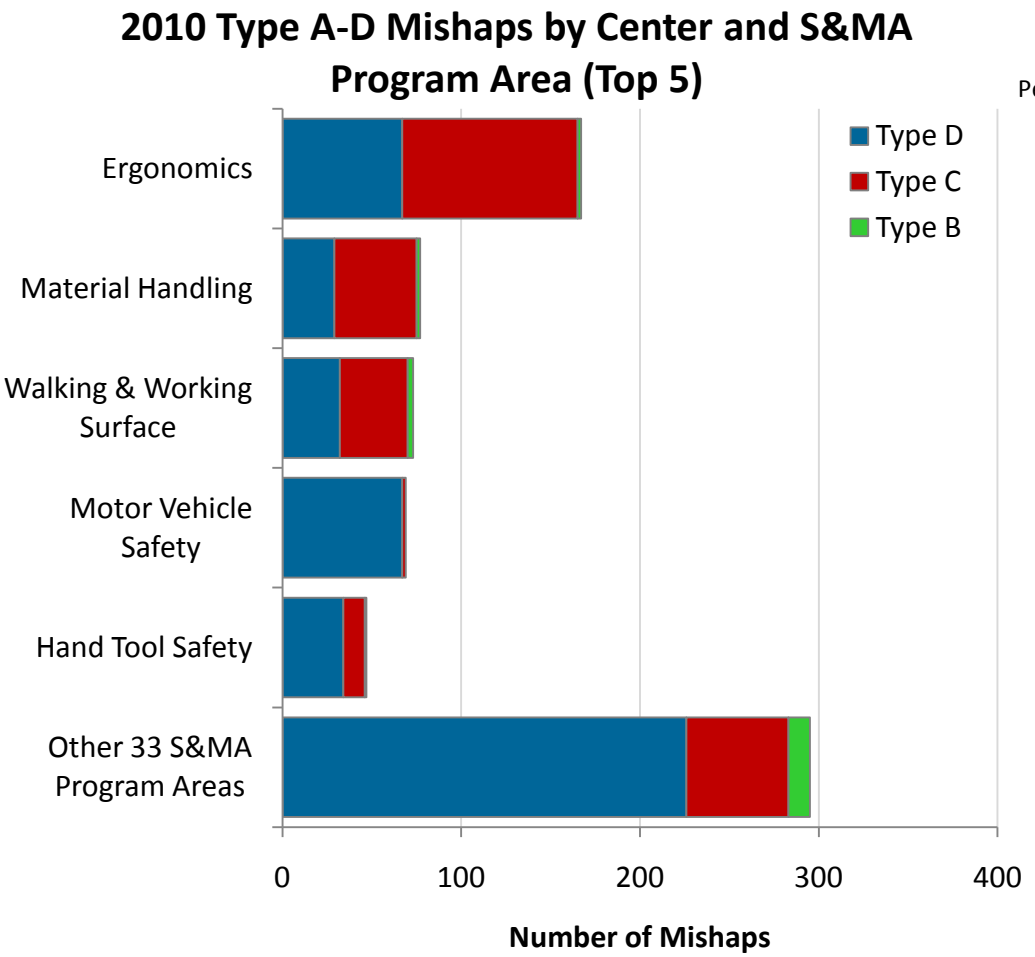


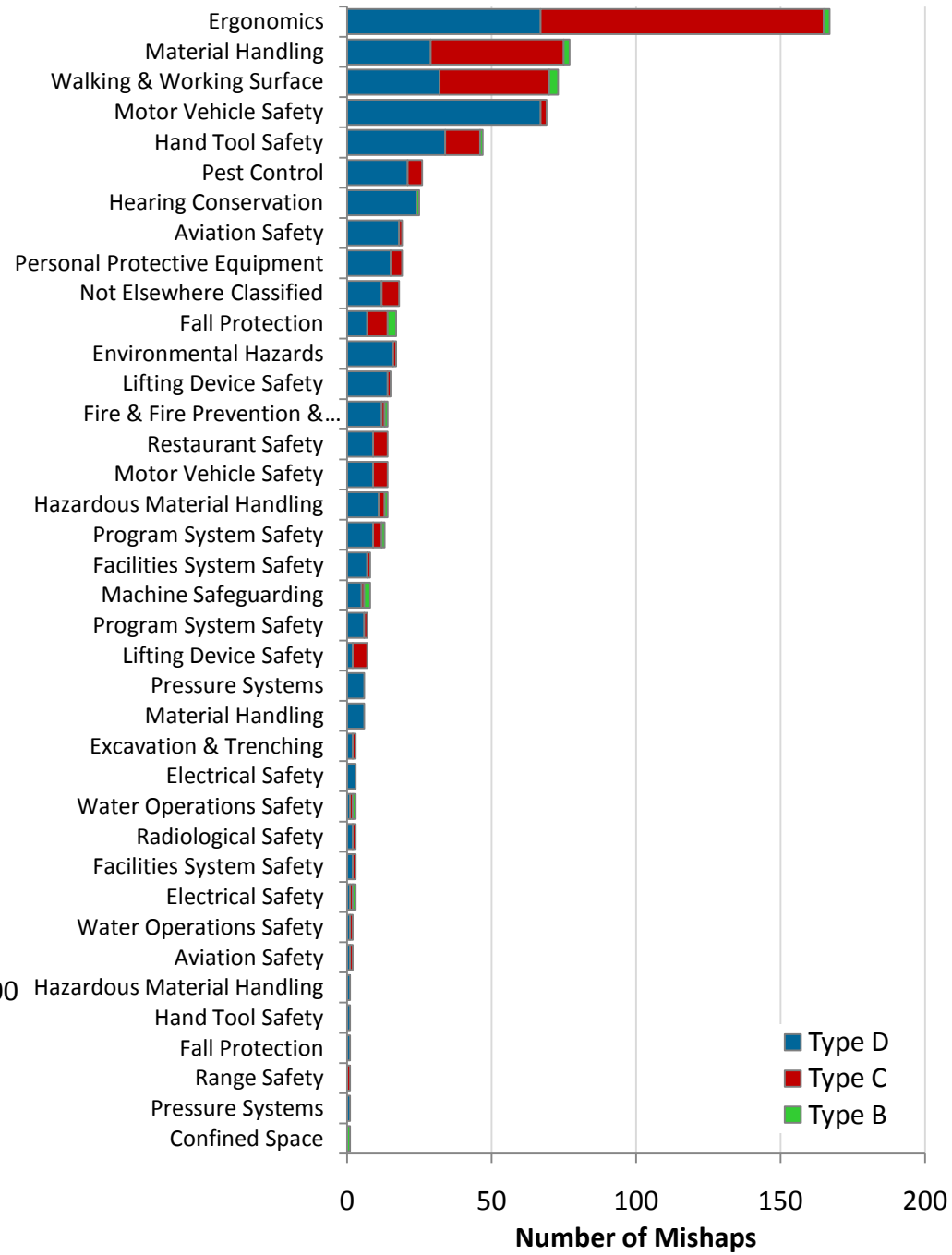
Activity at Time of Mishap (Type A-D) for Damage Mishaps (Count vs. Cost)

Jan 1-Dec 31, 2010



S&MA Program Areas (Type A-D Mishaps)
Jan 1-Dec 31, 2010

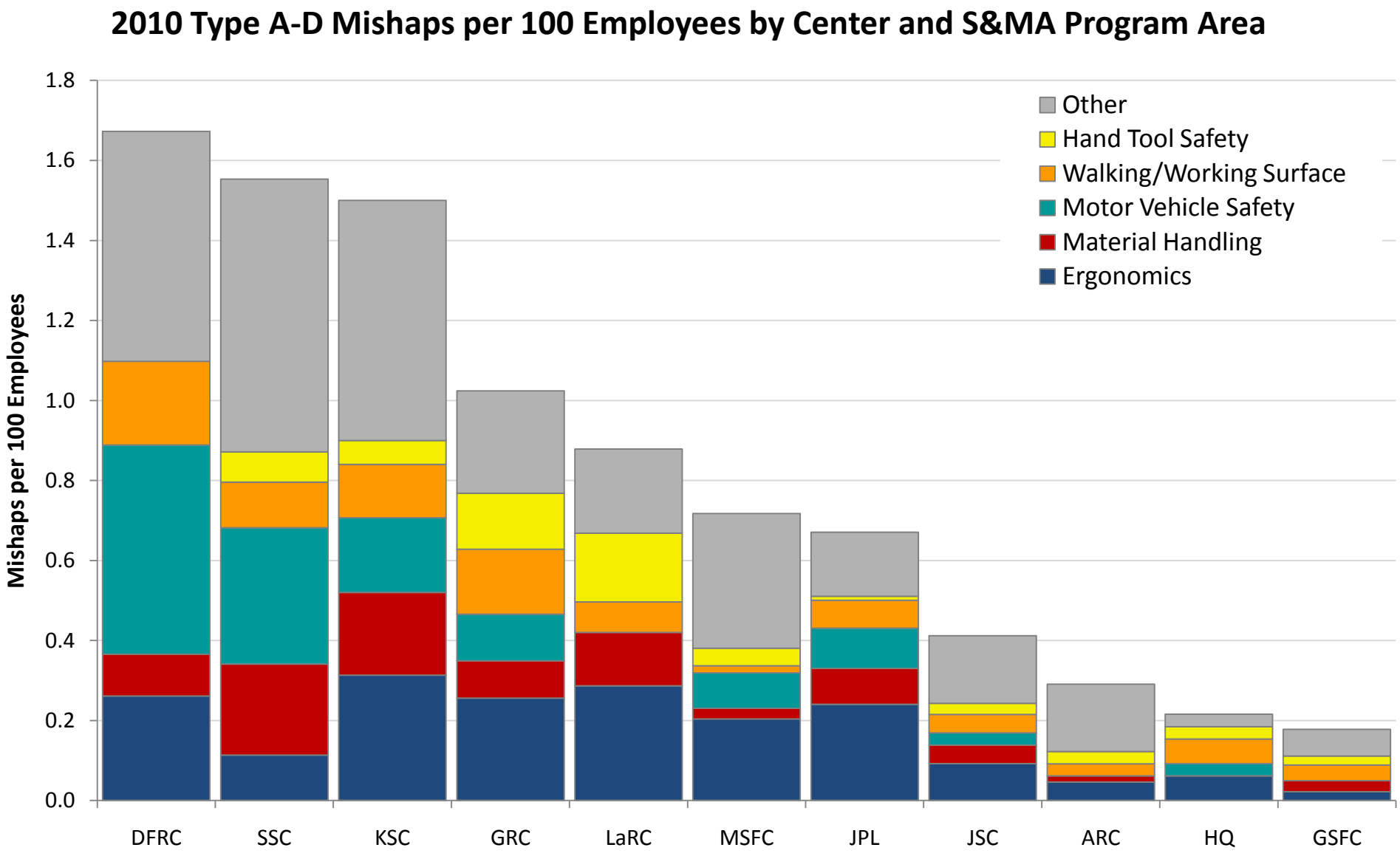




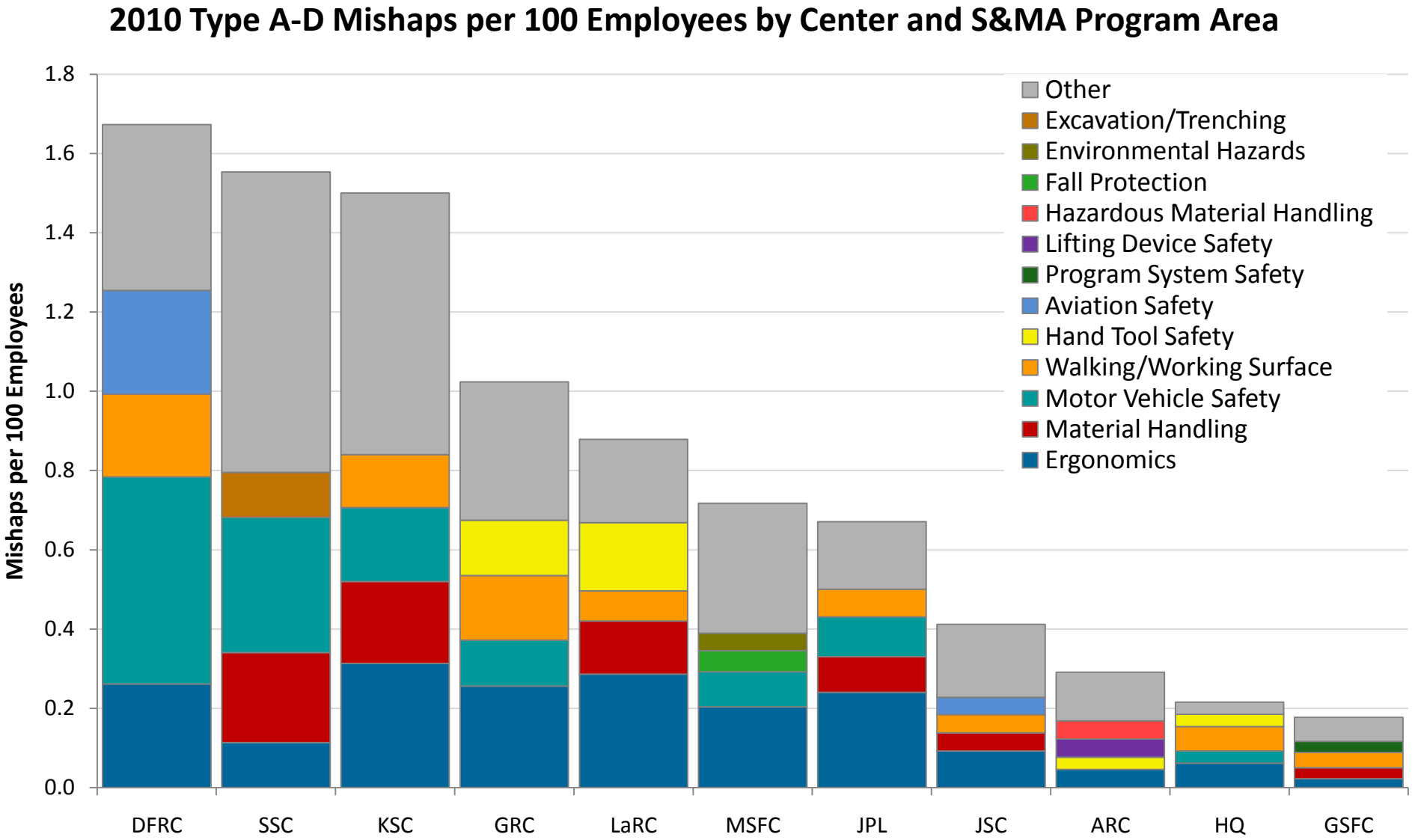
S&MA Program Area: The Federal or Agency-mandated safety or health program providing applicable mishap-preventive control options.

728 Total Type A-D Mishaps

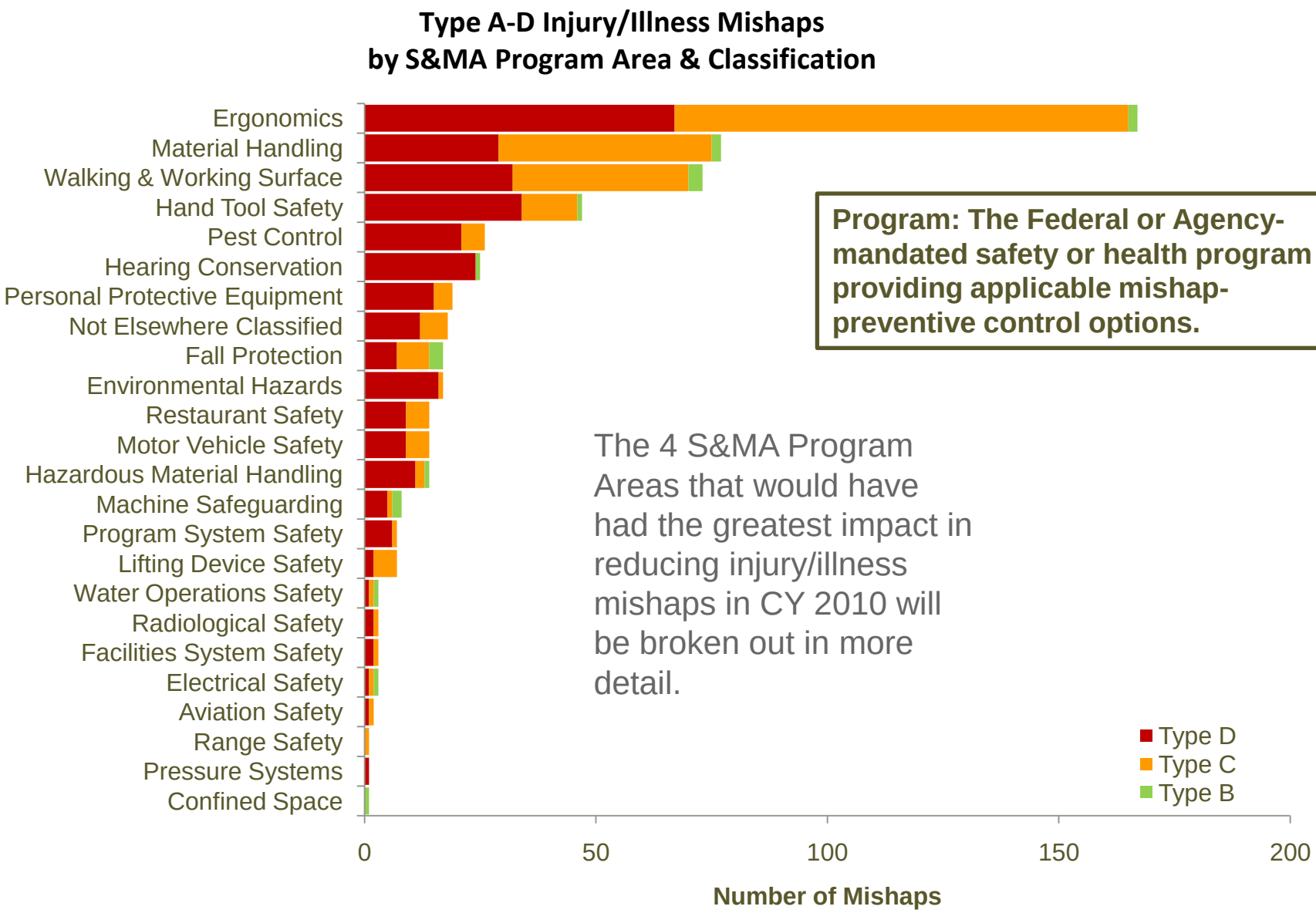
Mishap Rates by NASA Center for Most Frequent Mishaps per Agency S&MA Program Area
Jan 1-Dec 31, 2010



Mishap Rates for NASA Centers Highlighting Most Frequent Program Areas for Mishap at Each Center Jan 1-Dec 31, 2010



Injury/Illness Mishaps by Program Area
Jan 1-Dec 31, 2010

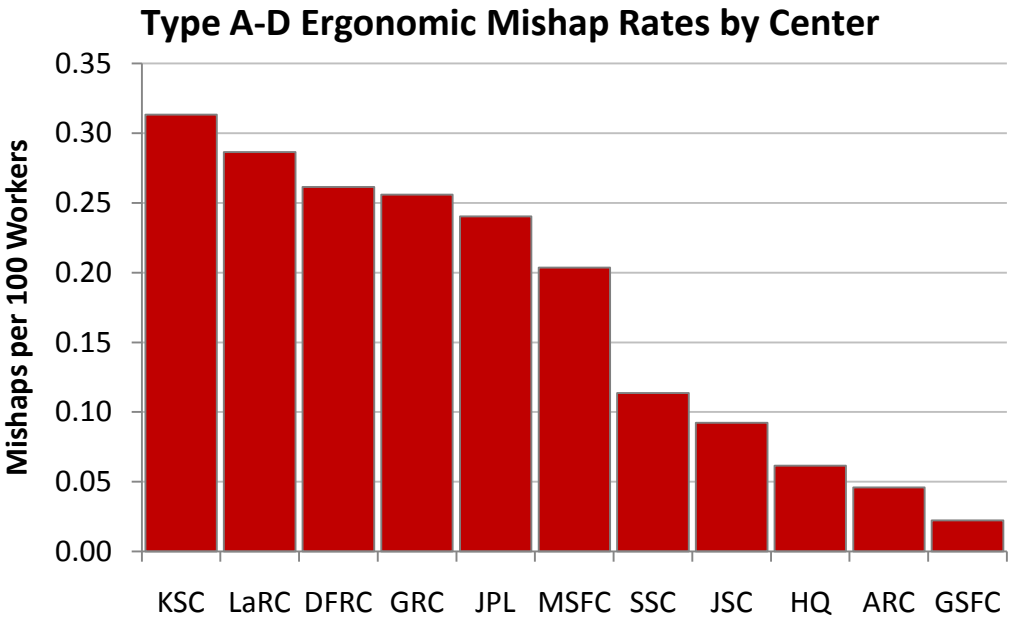


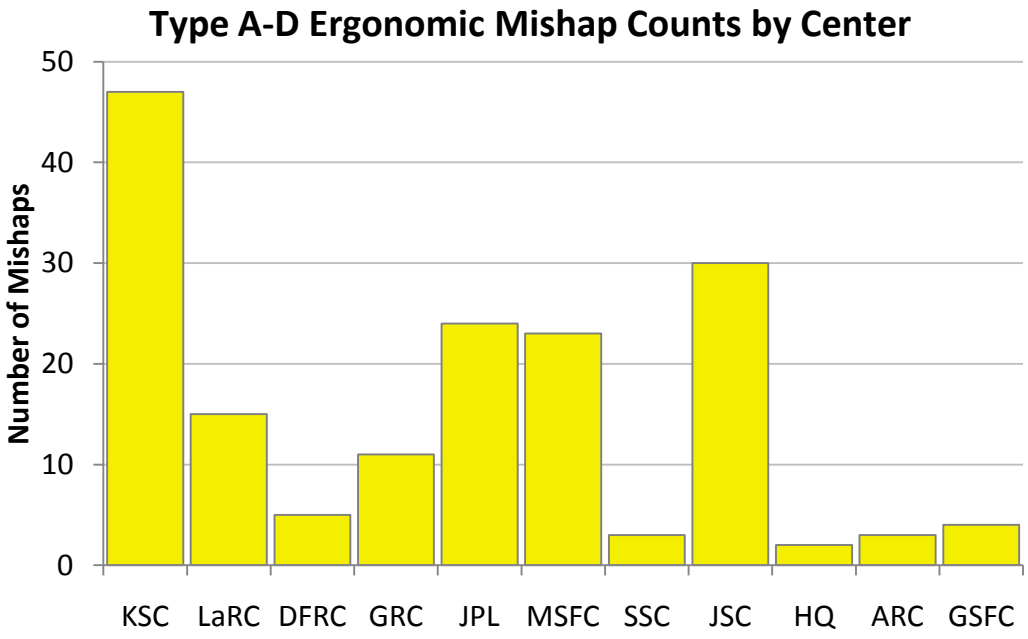
Program: The Federal or Agency-mandated safety or health program providing applicable mishap-preventive control options.

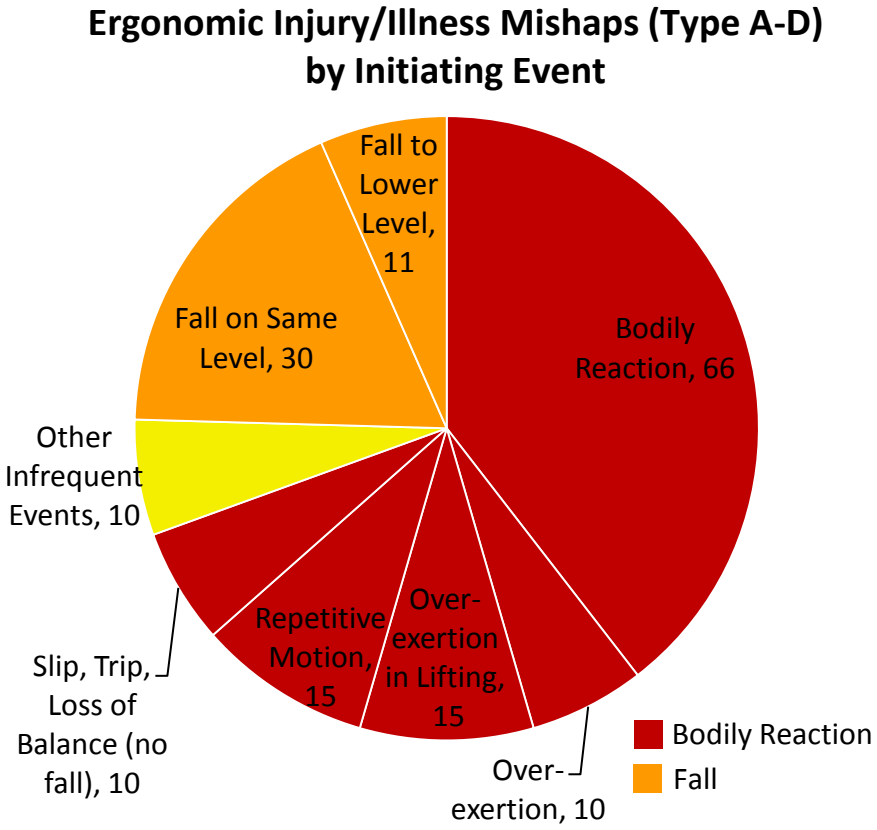
The 4 S&MA Program Areas that would have had the greatest impact in reducing injury/illness mishaps in CY 2010 will be broken out in more detail.

Ergonomics

Includes reported mishaps that involve body movement and the interaction of people and the environment around them.





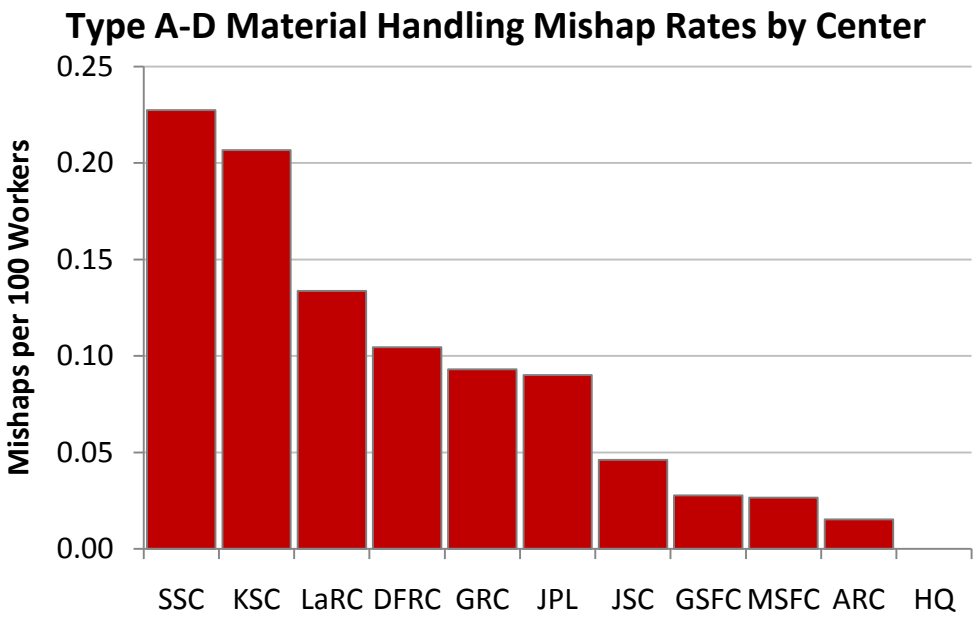


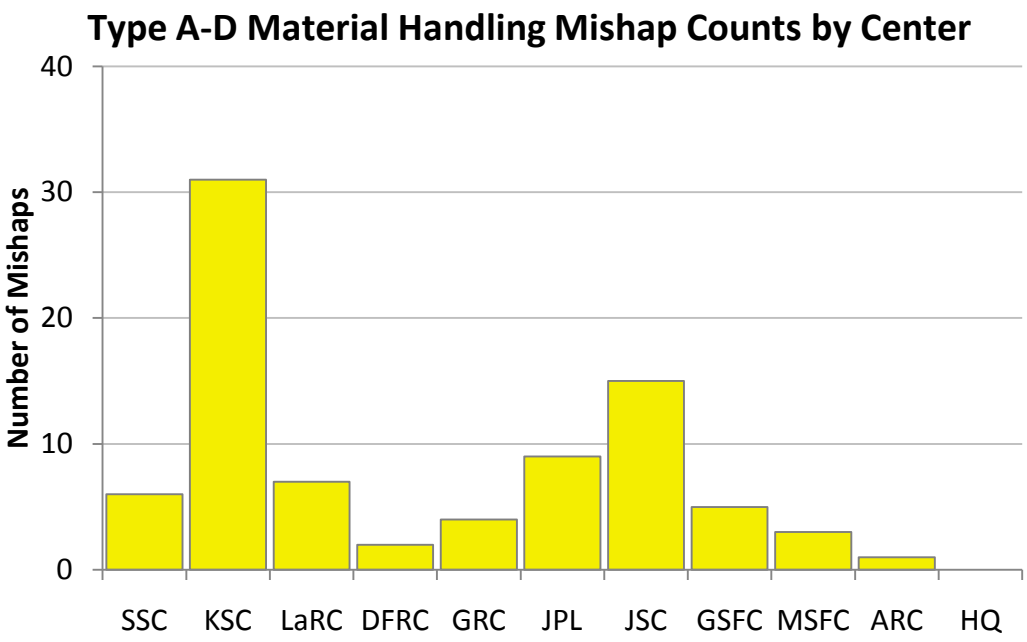
Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

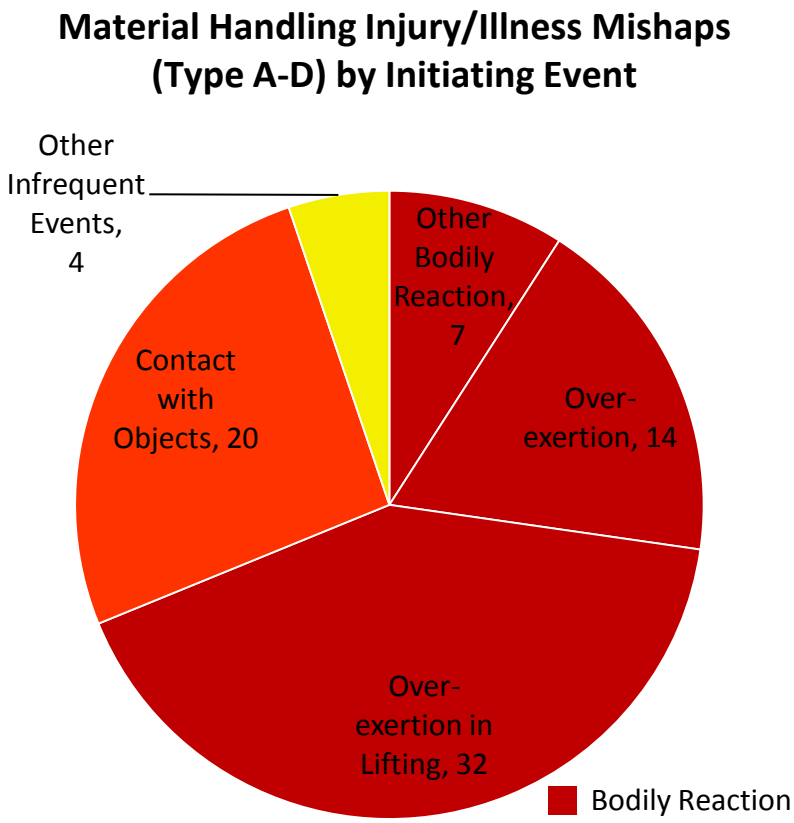
- Of the 66 mishaps related to bodily reaction, 41 were specifically related to bending, climbing, reaching, and twisting.
- Falls on the same level and falls to a lower level were the result of the person's individual movement or action that caused them to fall rather than the result of a particular hazard on the walking surface.

Material Handling

Includes reported mishaps that involve moving or transferring equipment and materials.







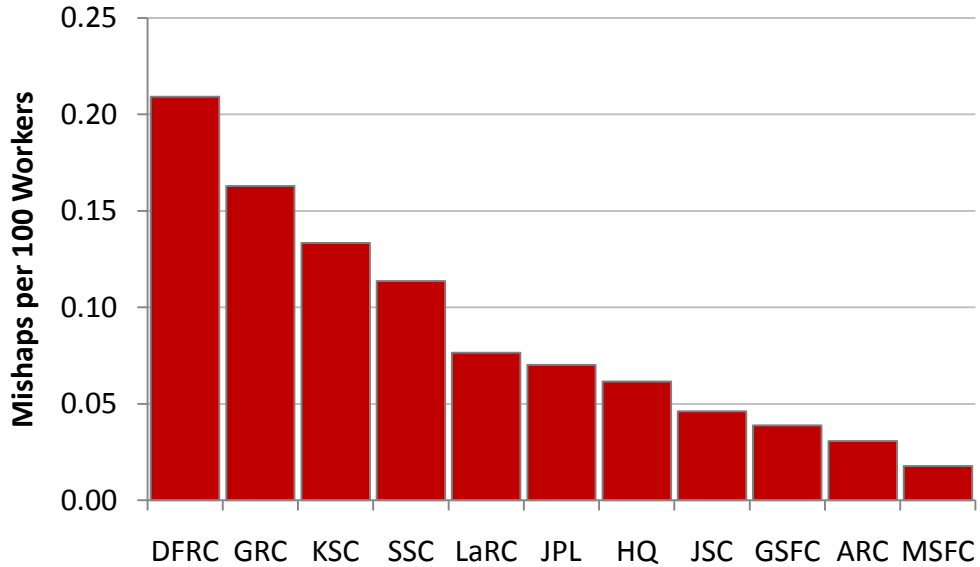
Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

- Of the 20 mishaps involving contact with objects, 12 were situations where the person was either struck by or struck against the material they were handling or the surrounding work environment as a result of material handling, while in the other 8, the was caught in or between objects.
- Other infrequent events include falls related to handling of material.

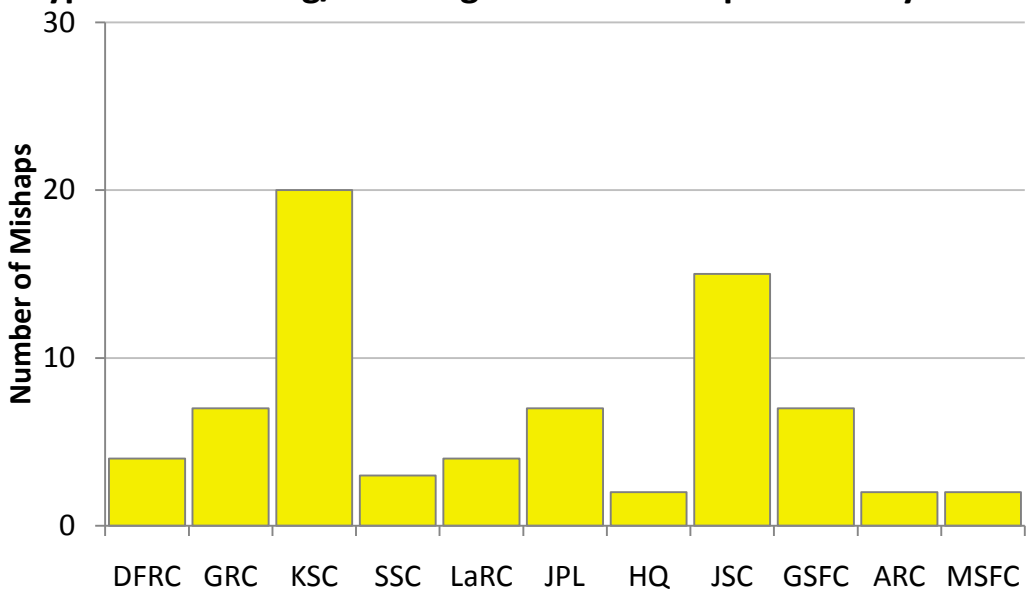
Walking/Working Surfaces

Includes reported mishaps that involve the condition of the walking or working surface, where the condition of the surface contributed to the injury.

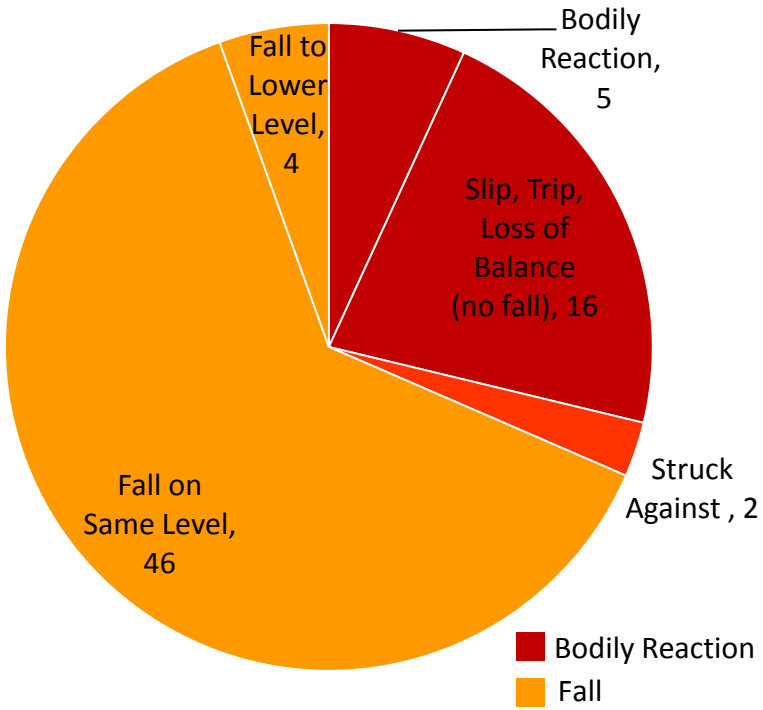
Type A-D Walking/Working Surface Mishap Rates by Center



Type A-D Walking/Working Surface Mishap Counts by Center



Walking & Working Surface Injury/Illness Mishaps (Type A-D) by Initiating Event

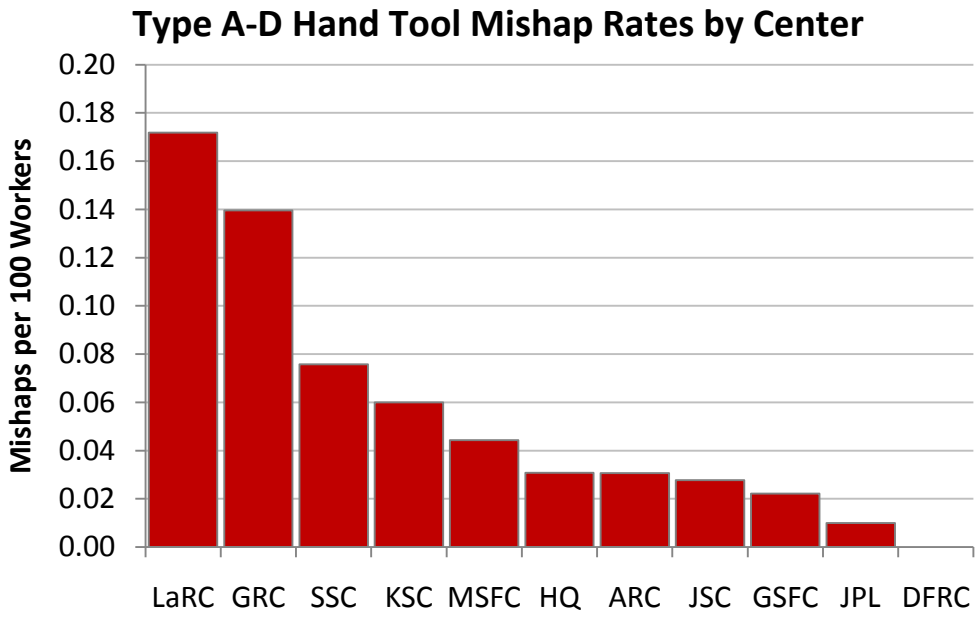


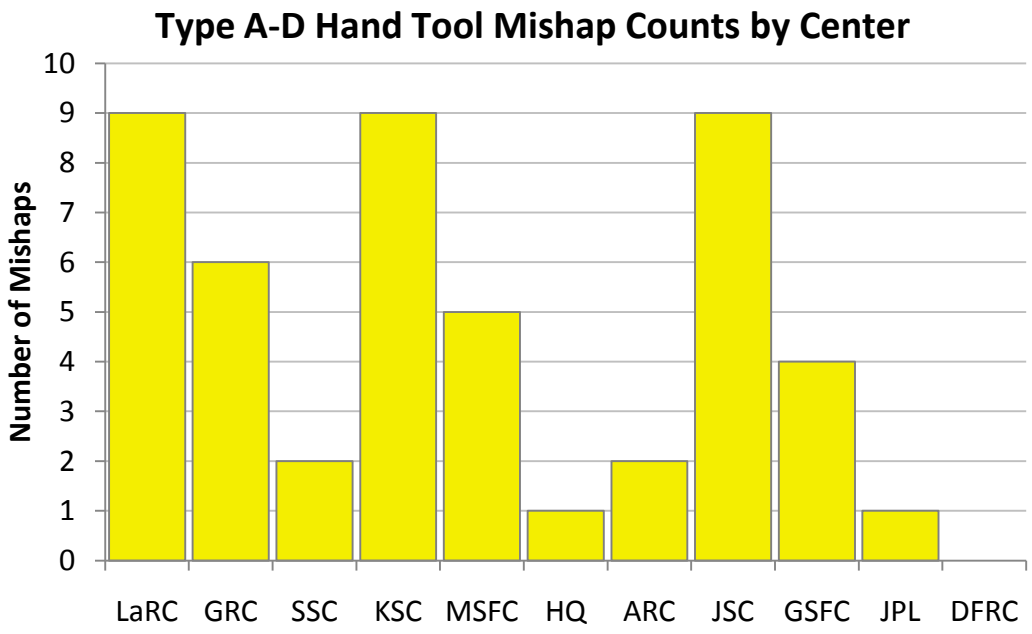
Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

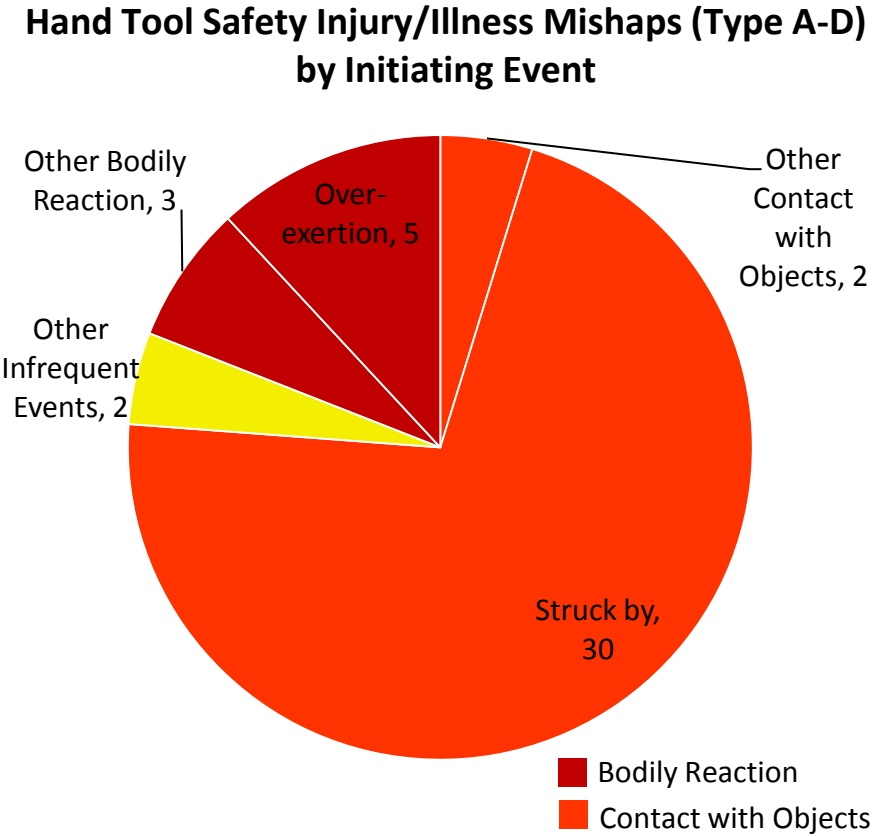
- The 50 falls were related to conditions of the walking surface or stairs such as water, ice, obstructions, or an uneven surface.
- In 16 cases, the conditions of the surface resulted in a slip, trip, or loss of balance, but the person did not fall, so the injury resulted from sudden movement rather than contact with the ground. Injuries in this category were more likely to be musculoskeletal in nature.

Hand Tool Safety

Includes reported mishaps that involve any kind of hand tool whether powered or non-powered.



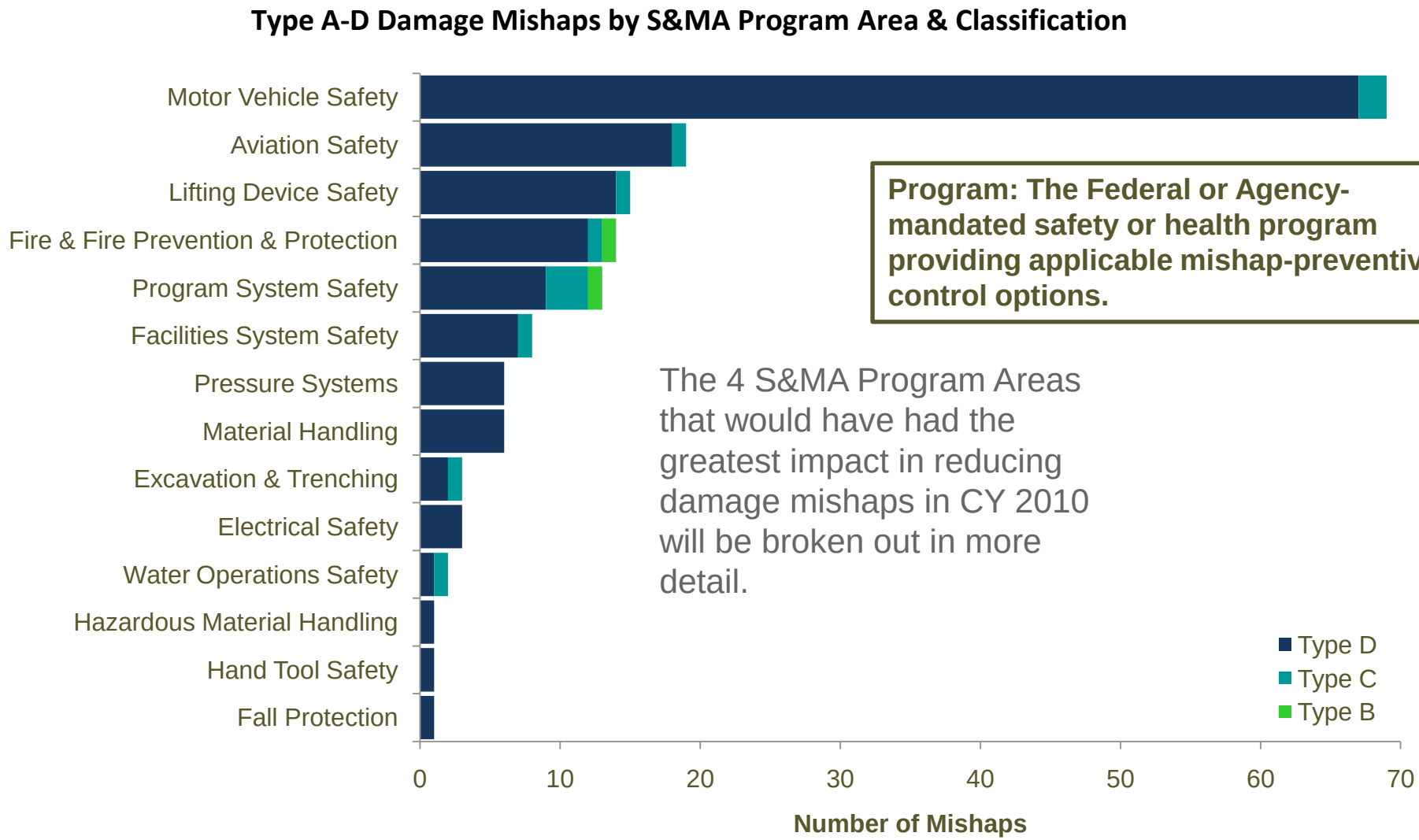




Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

Of the 30 injuries where a person was struck by a hand tool, 24 resulted in a laceration when the tool was a razor, knife, or other tool with a sharp edge.
The overexertion and bodily reaction injuries were related to tools slipping off, kicking back, or the use of excessive force.

Damage Mishaps by Program Area
Jan 1-Dec 31, 2010

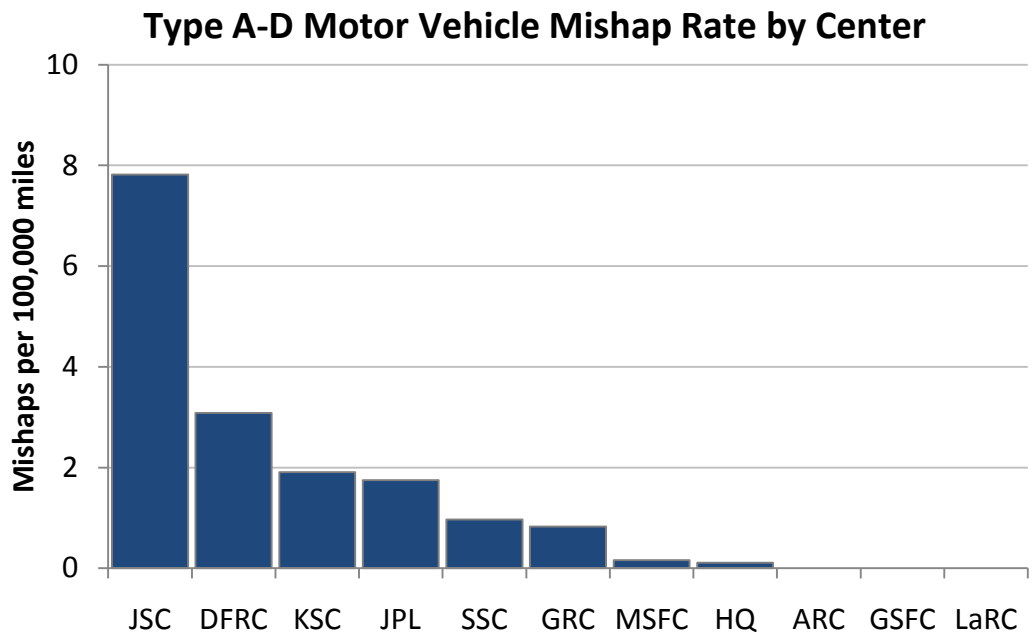


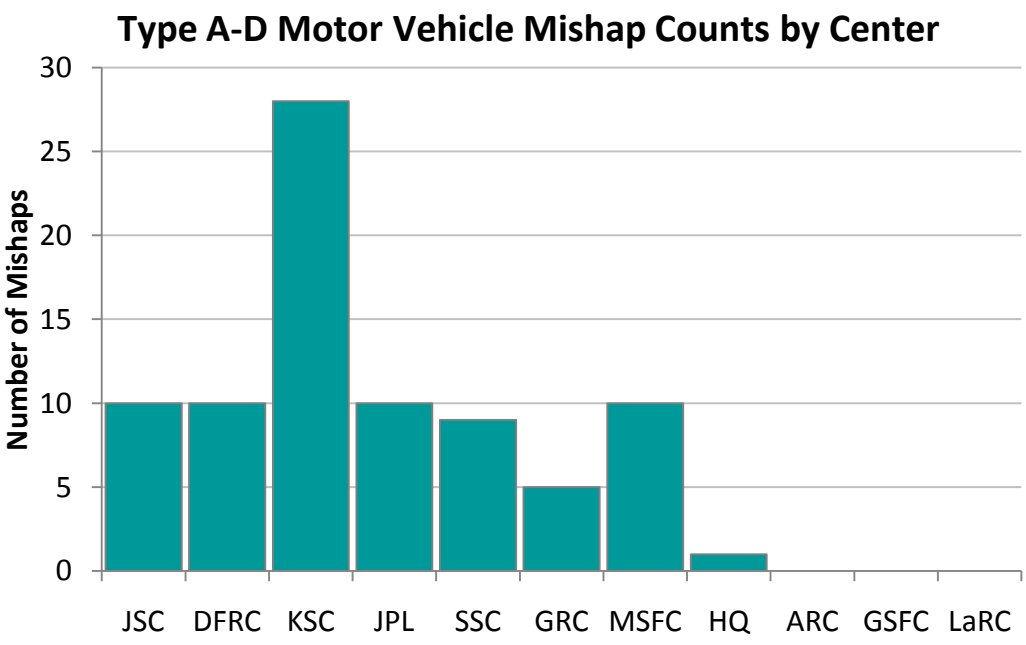
Program: The Federal or Agency-mandated safety or health program providing applicable mishap-preventive control options.

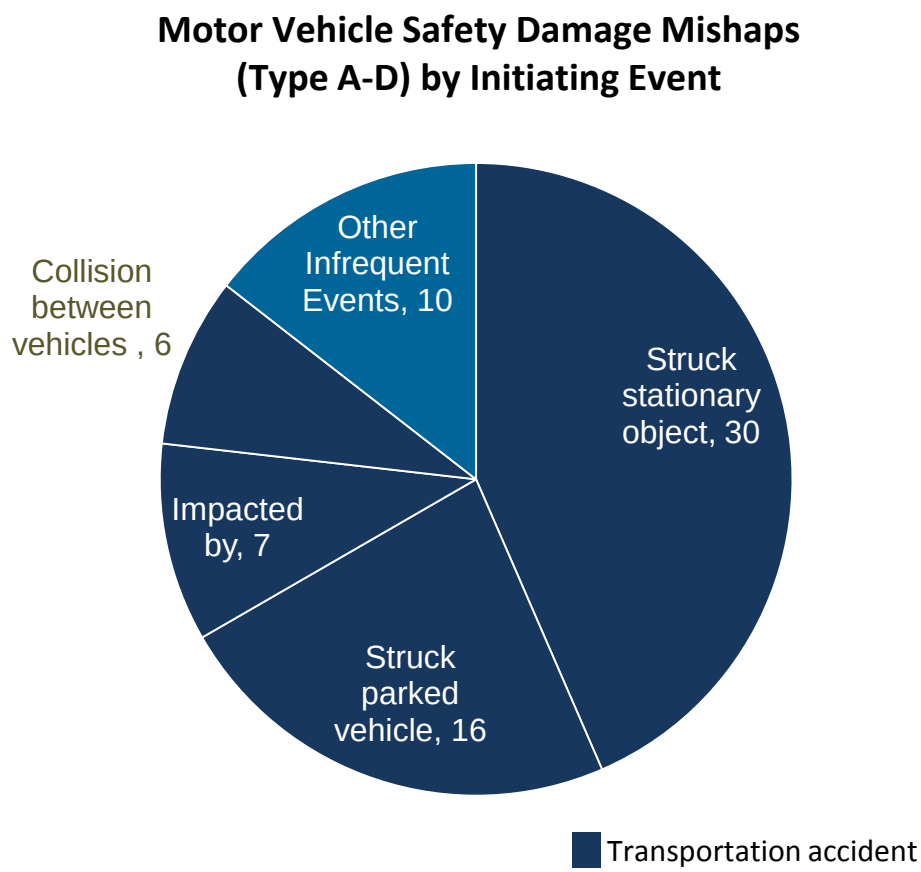
The 4 S&MA Program Areas that would have had the greatest impact in reducing damage mishaps in CY 2010 will be broken out in more detail.

Motor Vehicle Safety

Includes reported mishaps that involve motor vehicles. Does not include spacecraft, aircraft or marine vehicles.





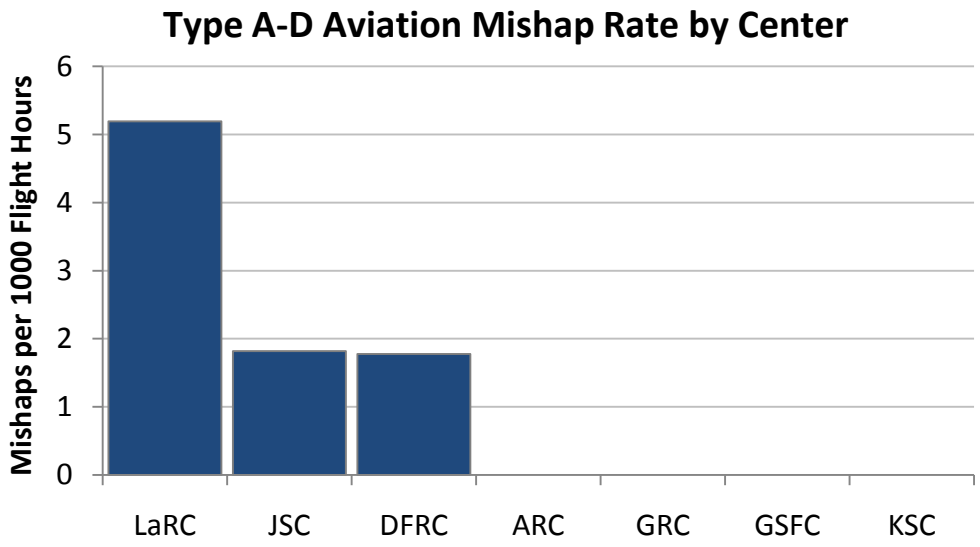


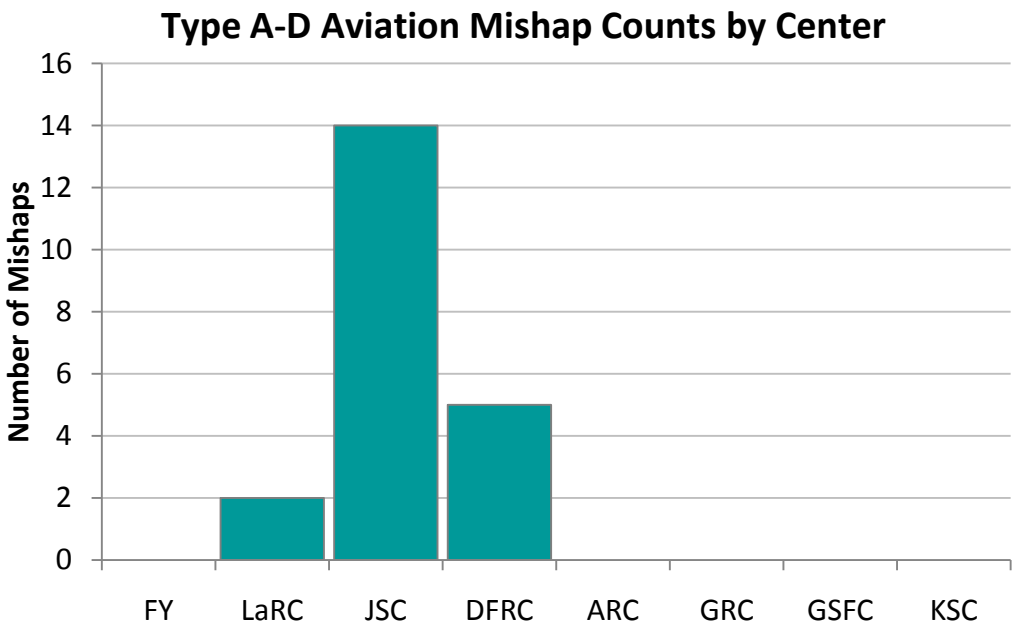
Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

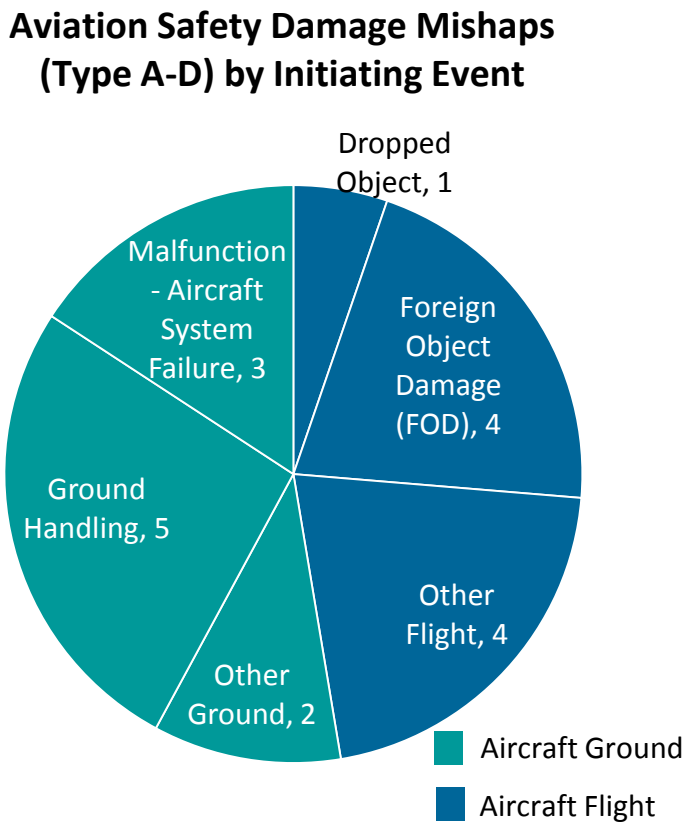
- In 46 mishaps, a vehicle either struck a stationary object or another vehicle that was parked.
- Wildlife struck vehicles in 4 of the 7 mishaps where the vehicle was impacted by something.
- The 10 other infrequent events included, equipment sliding off a flatbed, vehicles getting stuck in ditches, and unknown damage found to vehicles when not in use.

Aviation Safety

Includes reported aviation-related mishaps, whether in flight or on the ground.





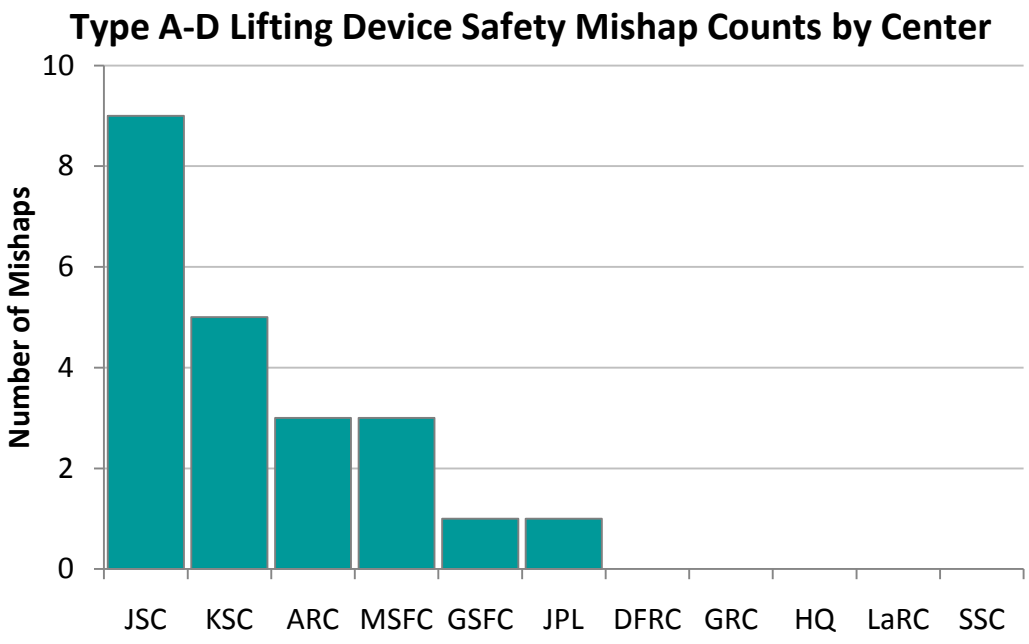


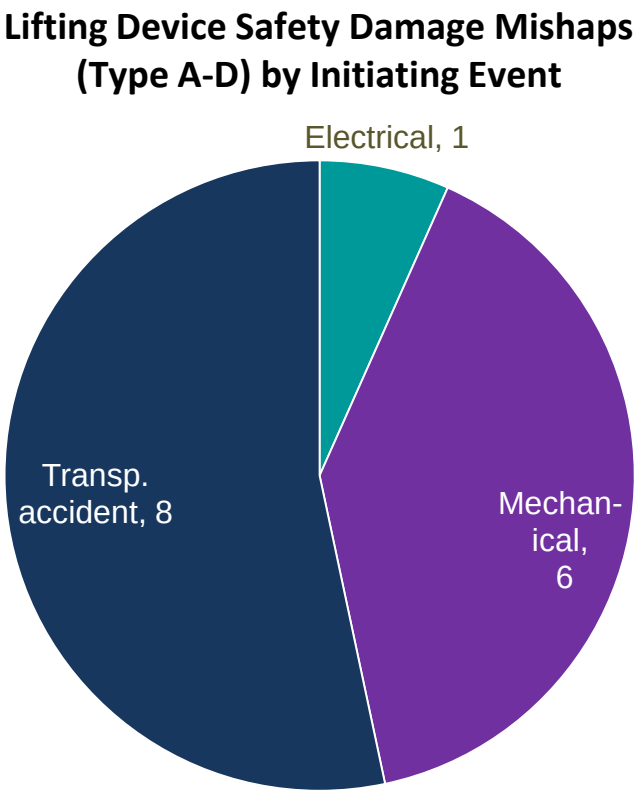
Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

- The 3 aircraft malfunction mishaps included a hot start, electrical problems, and bleed air leak.
- 2 of the 4 FOD damages were due to bird strikes.
- Ground handling and other ground mishaps were related to maintenance activities, including towing and movement of aircraft.
- Other flight mishaps included other failures of equipment on the aircraft during landing, takeoff, or flight.

Lifting Device Safety

Includes reported mishaps that involve any kind of lifting devices such as cranes, hoists, powered industrial trucks, aerial lifts, and powered platforms. Mishaps involving improper rigging would be included.





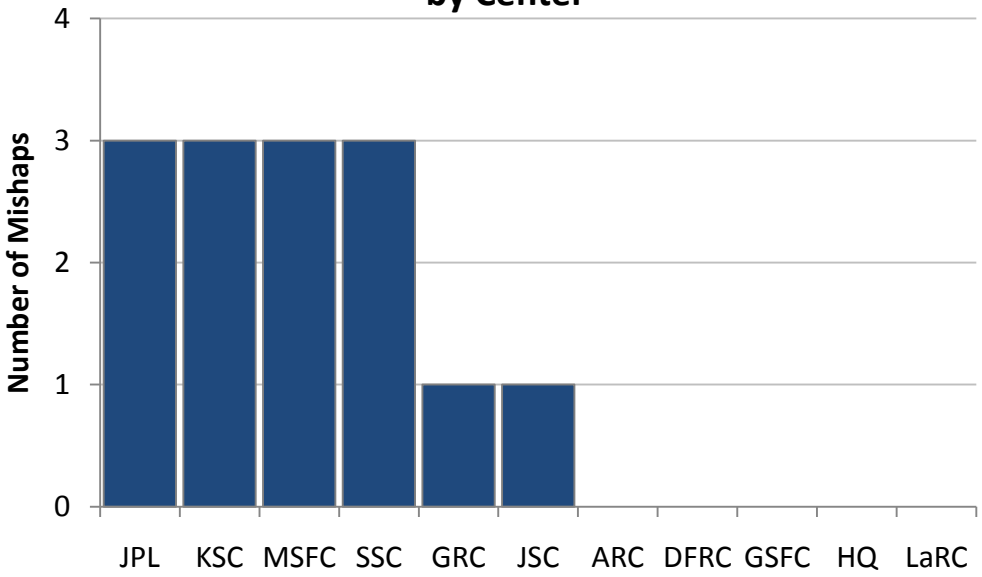
- A crane turned over in one mishap.
- 7 mishaps involved forklifts or aerial lifts striking objects or vehicles.
- 4 of the 6 mechanical damage mishaps were related to improper rigging or rigging failures.

Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

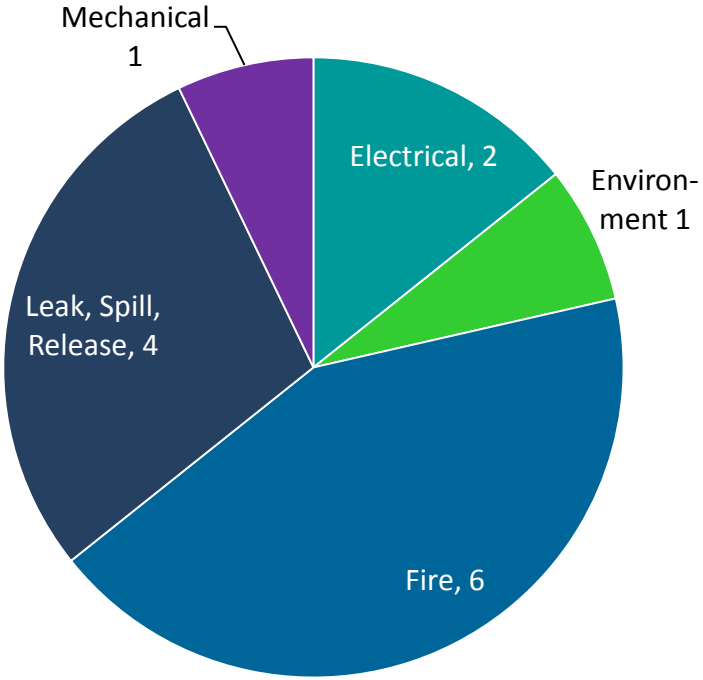
Fire & Fire Prevention/Protection

Includes reported mishaps where there was evidence of smoke, fire, or melting that could lead to fire. Electrical failures and failures of fire protection or suppression systems are also included.

Type A-D Fire & Fire Prevention/Protection Mishap Counts by Center



Fire & Fire Prevention/Protection Damage Mishaps (Type A-D) by Initiating Event



- In three of the six fires, the actual fire classification was not confirmed. Two were electrical and one involved a flammable liquid.
- In three of the four water leaks from the fire suppression systems, there was a failure in the system. In one situation, the sprinkler head was struck.
- In exposure to high temperature, there was equipment that was damaged due to hot welding slag.
- Smoke of unknown origin was reported in three incidents: electrical failures in two, and one mechanical failure.

Initiating Event: the proximate causal event that transfers energy to release a hazard upon a target.

Benefits of Trending Approach

- **S&MA Directors - Overview of trends for Safety & Mission Assurance Programs at their sites.**
- **Responsible S&H Program Leads - Overview trends across all Centers for their area of responsibility.**
- **Traceability of NASA requirements is possible via S&MA Program coding.**
- **NSC Outreach – Target Program Coordinators (i.e. Pressure Systems, Lifting Devices) to focus efforts for awareness campaigns and outreach.**
- **Audit – S&MA Program Areas match IFO audit areas.**
- **Corrective Action – Target Areas to focus for determining effectiveness of corrective actions.**
- **Benchmarking – Activity, Initiating Event, and S&MA Program allow benchmarking against industry.**