The Compass Alliance Pathways: Safety

FIRST takes a very serious position on safety. They award teams who spread knowledge and tactics for safety, and encourage all students, mentors, and volunteers to use common sense and safety throughout their FIRST journeys. Whether in your daily shop routine, at competition, or anywhere in between, all team members should understand safety fundamentals. It will keep your mentors happy, your school happy, and will ensure that you can spend the most time doing what you love on your robotics team.

Level 0: Stepping Stones

1. FRC Resources
    a. FIRST provides core safety guidelines for all teams, including safety for accidents and injuries, as well as youth protection and safety for all FIRST members.
    b. FIRST Safety Manual: https://www.firstinspires.org/sites/default/files/uploads/frc/Blog/2018-FIRST-Robotics-Competition-Safety-Manual.pdf
    c. FIRST Youth Protection Program (USA and Canada Teams Only): https://www.firstinspires.org/sites/default/files/uploads/about/FIRST-YPP-ProgramGuide.pdf
2. Common Sense
    a. The simplest and most effective safety management is using common sense. A robotics workshop most likely has power machinery, hardware and metal stock, and many other things that can potentially cause injury. At all times, be aware of your surroundings, keep workspaces clean, and keep paths clear. If you are struggling to carry a large or heavy object, ask for help. Lastly, think before you do any action: is the object you are working on secure? Are you about to drill a hole through you material, and then your workbench? Or an electrical wire? Common sense and awareness of your surroundings will save you from 90% of any potential injuries and mistakes.
3. Safety Basics
    a. Each team should appoint a safety captain: one student who will oversee the safety principles, create guidelines for team members, and prepare any required safety equipment for the workshop.
    b. Personal Protective Equipment:
        i. Use safety glasses when operating machinery or working on your robot. Chips of metal/wood/etc can be thrown from the machine, or can fall from the corners of your robot.
        ii. Use ear protection in noisy areas - proper earplugs, not just headphones or loud music.

iii. Work gloves - for handling sharp or hot materials, the most common injuries in workshops are simple knicks and cuts that can be prevented by a good pair of gloves.

c. If you see something problematic: report it or remove the issue (if you can do so safely). If you see fluid spilled on the floor, or see metal scraps with sharp edges in a common area: report it to a mentor or safety captain and follow-up to make sure that the problem is properly handled.

4. Shop Safety
   a. Ensure that you are trained on a machine before using it. This applies to everything from hand-tools to upright mills and lathes. Proper training on a piece of equipment will not only keep you safe, it will also reduce the chance of making a mistake while manufacturing or fabricating.
   b. Equipment should have “danger areas” marked, and kept clear when the machine is in operation. Teams will generally put yellow and black tape on the floor to mark safety zones around machinery.
   c. When operating and testing your robot, ensure that your testing area is clear, and be vocal when the robot will move. If you are testing the drivetrain, a good practice is to set the robot on wood blocks, and perform the test with the wheels in the air.
   d. Keep work areas clean. Follow a normal cleaning schedule to ensure that work areas and machines are clean. A clean work space is a safe work space!
5. Competition Safety
   a. At competition, it is mandatory to wear safety glasses when on or near the competition field, practice field, or in the pit areas.
   b. Your pit will be a confined space either 10 ft x 10 ft [3m x 3m] or 8 ft x 8 ft [2.4m x 2.4m] (depending on the venue). The fewer people in your pit, the better. Ensure you pit has proper lighting, ventilation, and solid working spaces. Most wheeled tool-chests will have flat top that work well for pit use.
   c. Manage your electrical use. Most teams will be running a laptop and lights, and charging batteries. Do not connect multiple power bus strips to one another, and do not overload the circuits accessible to your pit. If possible, use LED’s for lighting, and do not charge more than 3 batteries at a time.
6. Competition Safety Award
   a. FIRST works hard to promote safety, and has developed an award alongside Underwriters Laboratories to recognize teams that demonstrate exemplary safety-first cultures. Each team has one student representative, the Safety Captain, who communicates out their safety program to other teams, parents, guests, and judges.
   b. UL sends representatives to FRC competitions all over the world to talk to Safety Captains about their teams, and specifically how safety is incorporated into their teams.
   c. Generally, the Safety Captain will be asked questions on the following:

i. Safety Items in their pit - are they accessible, in good condition, are people trained to use them, are they functional for themselves and other teams?
ii. Safety Binder - does it contain Safety Data Sheets for chemicals used by the team, emergency contact information, records of incidents, causes, resolutions and preventive steps?
iii. The teams home workshop - what rules are in place to keep people safe, how are the rules enforced?

d. Over the course of the competition, the UL representatives will be taking notes and identifying their 3 teams to be recognized as leaders in safety. The two runner up teams will receive commemorative 'hard hat' pins, and the top team will win the UL Safety Award and pins.
e. Through the course of the competition, safety captains will be asked to nominate other teams for the outstanding safety performance. These nominations are done through forms handed out at the safety captain's meeting.

7. FRC Team Safety Manuals
   a. Teams will often create their own safety training programs and manuals that outline all of the above, plus any additional topics relevant to their team.
   b. 971 Safety Training: https://docs.google.com/presentation/d/19UN1jBLI1Gqolu0b1oKpHjOpn2LEoSBMdd0zLXP1HYY/edit#slide=id.i0
   c. 1816 Safety Presentation: http://www.edinarobotics.com/sites/default/files/2018%20Season%20Safety%20Seminar.pdf
   d. 4911 Safety Manual: http://cyberknights4911.com/wp-content/uploads/2017/04/2017SafetyGuide_Revision1_Online.pdf
   e. 2465 Safety Guidelines: https://drive.google.com/file/d/0B9pZ54SkA1YQZDMwYzg2ZGMtZGIzNS00ZjgxLWE2ZDctN2QyZDhmZDJmY2Y1/view?ddrp=1&hl=en#
   f. 1389 Safety Culture whitepaper: https://team1389.com/knowledge/safety/

Level 1: Venturing Onwards

1. CPR
   a. CPR can be useful for all members of your team to learn.
   b. Be sure to check with your school/governing organization regarding CPR. Many schools will require at least one CPR-trained supervisor to be present during all school functions, including robotics meetings!
2. SDS
   a. Alongside the tools and machines in a workshop, there are many fluids, adhesives, and lubricants, all of which have different properties and can result in different injuries. Safety Data Sheets (SDS, formerly MSDS) are publicly available

documents written by the manufacture that cover injuries and remedies for their product: what steps to take if the product gets on you skin, is inhaled, swallowed, etc.

b. Regularly check to make sure that if an SDS exists for a material/chemical in your facility, you have that SDS printed and in an SDS binder.

3. Documenting Safety Issues
    a. Even with proper planning and preparation, accidents can still occur. The team safety captain should have a form for recording incidents, and, after the injury is handled, be able to research and make new guidelines or recommendations to prevent any repeat issues.

Level 2: Forging New Paths

1. Machine Training
    a. Teams can perform training in a number of ways: some teams will train all members on all equipment. Other teams may prefer one-on-one training and certification, where only fully trained members may operate certain machinery.
2. Help and Evacuation
    a. Additional safety planning can revolve around evacuation plans for emergencies such as flooding or earthquakes. Knowing the route to the nearest hospital can be helpful at times, especially if you are traveling to an event outside of your town or city.
    b. All safety information should be known by multiple students and mentors, ensuring there will always be someone available to handle any incident.
3. Encourage Safety in your Community
    a. Do things for teams in your area. Host a CPR training session and invite other teams. Share your incident reports with other teams to help them remove potential problems before they happen.
    b. Learn commercial safety practices from parents or mentors.
    c. When starting, mentoring or working with other teams, FRC, FTC, or FLL, make sure that safety is a core discussion point alongside mechanics and software.
4. Think Beyond the Bounds of Equipment Safety
    a. Many teams are identifying issues of student and mentor stress, and starting to incorporate quiet rooms, healthy foods, breaks for people to stretch out and relax, and more. Happy and healthy can lead to awareness and safety.

Appendix A - Revision History

Revision #	Revision Date	Revision Notes
1.0	Sept. 2018	Initial Release