# Appendix B: Description of Engineering Design Challenge

The Swiss Seismological Service records 500 to 800 earthquakes per year. Recently, Switzerland was struck by a magnitude 6.0 earthquake on the Richter scale. A road near the epicenter in the Swiss Alps was heavily damaged, cutting off a town's supply line. Your engineering firm has been selected to help the Swiss to design a sled that can bring resources and supplies to the town while they repair the road. The government will select a sled design that optimizes speed, can go the farthest distance, and be durable enough to carry resources across rugged terrain. Each sled will be tested on a ramp and collide into a barrier to see whether the sled can hold the material safely. The sleds will also go through three separate tests to determine safety, speed, and distance. The safety test will be determined by a three-point scale. One point will be awarded to the sleds that hold the given material through the speed test. Two points will be awarded to the sleds that can hold material throughout the speed and distance test. Finally, three points will be awarded to the sleds that can hold material throughout each test combined. Since we will be designing our sled in the United States, we will need to convert our data (speed and distance), into the metric system for the Swiss government. Students will be put in groups of four for this engineering design project and will each be designated a specific role. Each group will produce a prototype and will test their sled at the end of the week.
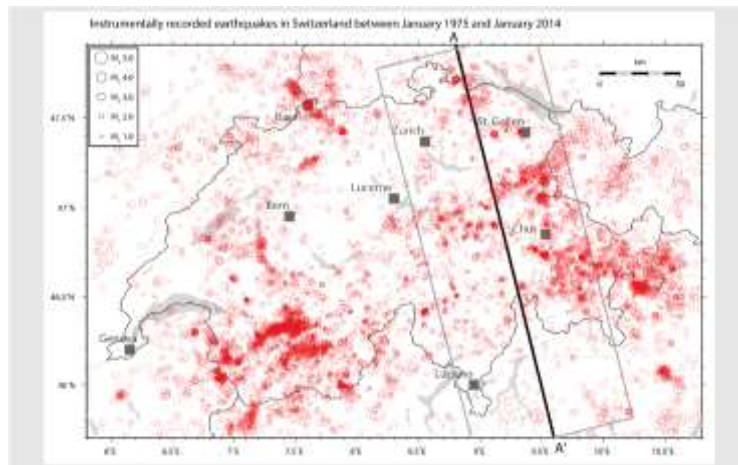
Resources:
You will be given simple everyday materials: recyclables, foil, plastic wrap, cotton balls, Popsicle sticks, and plastic disposable cups. You are welcome to bring in additional materials for your sled.

Testing: As a group, the class will decide on testing standards. Below is a checklist of different parameters per test:
Speed Test
        ✓Angle of ramp
        ✓Height of ramp
        ✓Length of ramp
        ✓Set distance the sled will travel

Speed test	Class decision
Angle of the ramp	
Height of the ramp	
Length of the ramp	
Set distance the sled will travel	

Safety Test
      ✓How much cargo (packing peanuts) will each sled be required to carry safely?
      ✓Where will the collision occur?
      ✓What will be the barrier used?

Safety test	Class decision
How much cargo (packing peanuts) will each sled be required to carry safely?	
Where will the collision occur?	
What will be the barrier used?	

Student grouping
Project Manager- Team member is responsible for keeping their team on task and ensuring their group completes the daily engineering report (through Google Docs).
Logistics- Team member is responsible for obtaining supplies within the room.
Statistician- Team member is responsible for recording data in the engineering log and sharing those results with all team members.
Project Mediator- Team member is responsible for solving any problems that may occur throughout the unit. Problems should be solved through communication and collaboration between group members. (This job is only to be used for groups of four students.)

At the end of the project, your team will be required to write a short technical paragraph listing how your sled performed under the given tests. You should include average speed of your sled after multiple trials, average distance traveled, and average safety rating. You will also plot your findings on a graph.