



Risks & Mitigations

For Design Reviews '18-'19

Considering risk:

Consider the reasonable risks that your subsystem presents to you, the rocket, and the mission.
Some thoughts:

E.g. are there 60+ lbs of propellant that could hurt you? If yes, there is a risk if it ignites near people.
What will you do to make sure that doesn't happen?

Do your parts put a large amount of load on the rocket? Could they break other things?

Are your parts sensitive to large loads/vibrations/vacuum/thermal/etc.? Are they exposed to any of the above?

Do your parts require certain chemicals to manufacture that require PPE? How toxic are they? How will we protect ourselves?

Are there interactions with your parts with other parts that might adversely affect you? (e.g. the motor gets hot and could melt nylon/3DP plastic?)

...and so on. Some parts/subsystems have more risks than others. **You will likely have 3-8.**

What to do:

- COPY SLIDES 4-6 INTO YOUR PRESENTATION
- When you think of some risks, **number them and add them to the table according to their probability of occurrence and impact.**
 - *These numbers will definitely feel hand-wavy at best.* Don't think too hard here - just use common sense and any data if you have it to make your best guess.
 - Probabilities -- choose whichever you think is closest (0.1%, 1%, 5%, 10%, 20%)
- Add them to the risk matrix.
- Discuss what actions (mitigations) you will take to reduce the probability or impact (or both)
- Put the approximate mitigated risk levels on the end of the table.
- **For bonus points**, copy the risk matrix again and add the risk numbers in their “mitigated” positions as a new slide with arrows showing movement
 - (Shown as 1M, 2M, 3M on the example, because I'm lazy)

Tips:

- When writing risks, please make sure it is clear what HAPPENS. **Destroy ambiguity.**
 - “Exposure to epoxy fumes causes injury” >> “Exposure to epoxy fumes”
 - “Igniter lights propellant prematurely” >> **“Igniter failure”**
 - “Igniter fails to light propellant” >> **“Igniter failure”**

Risk Matrix

Risk	20%					3
	10%				1	
	5%				1M	2
	1%					
	0.1%			3M		2M
		1	2	3	4	5
Subsystem		Impact				

Key			
Acceptable risk	RE / TL Decision	Exec Decision	Unacceptable

Impact Description

Impact	1	2	3	4	5
	Loss of margin. No mission impact.	Minor loss of data and/or minor damage to subsystem	Substantial loss of data or significant damage to subsystem(s)	Loss of critical data and/or loss of vehicle	Loss of mission, external parties adversely affected, or injury to team members

Example Risk table

#	Description	% / Impact	Mitigation	Mitigated % / Impact
1	Main parachute rips due to large, uncharacterized inflation forces	10% / 4	Increase FOS from 1.5 to 2.5 on nylon	5% / 4
2	Motor igniter does not light propellant	5% / 5	Bring 3 igniters	0.1% / 5
3	Exposure to epoxy fumes causes injury.	20% / 5	All members working on layup wear properly fitted respirators	0.1% / 3
4	Structural failure of bolts - shear-out	5% / 4	Structural analysis/testing, FOS 2 on bolt pattern and surrounding material	0.1% / 4