“Risk” in Functional Safety

Explanation: The concept of risk in functional safety always has two elements:

1. The frequency or probability at which a hazard occurs &
2. The consequences of the hazard event.

Hazard here refers to a potential source of harm.

Now let’s understand risk with an illustrative example.

Riding a bicycle always comes with the possibility of getting into an accident (hazard). The risk of an accident can be mitigated, for instance by having properly inflated tires (decreasing the accident probability) or by wearing proper protective gear such as a helmet (reducing the consequences of a potential accident).

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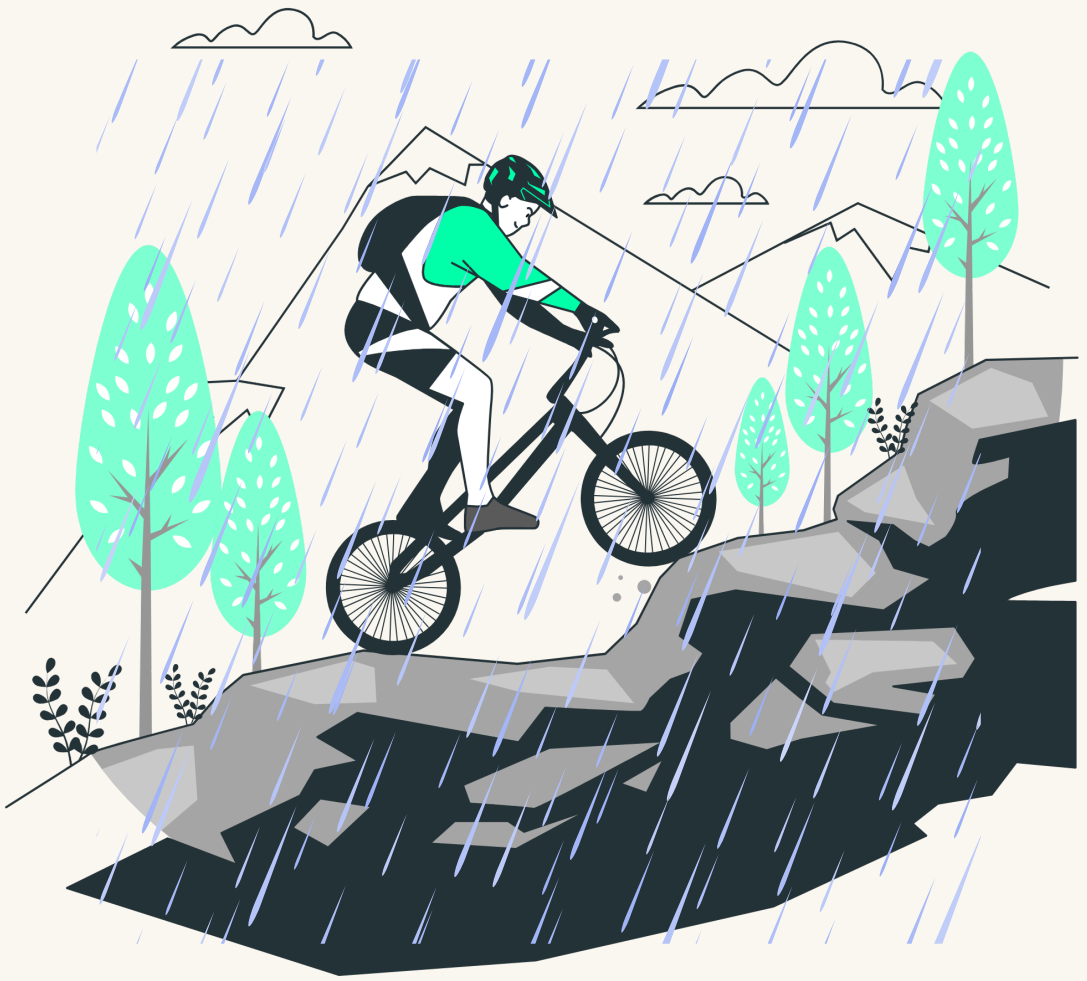
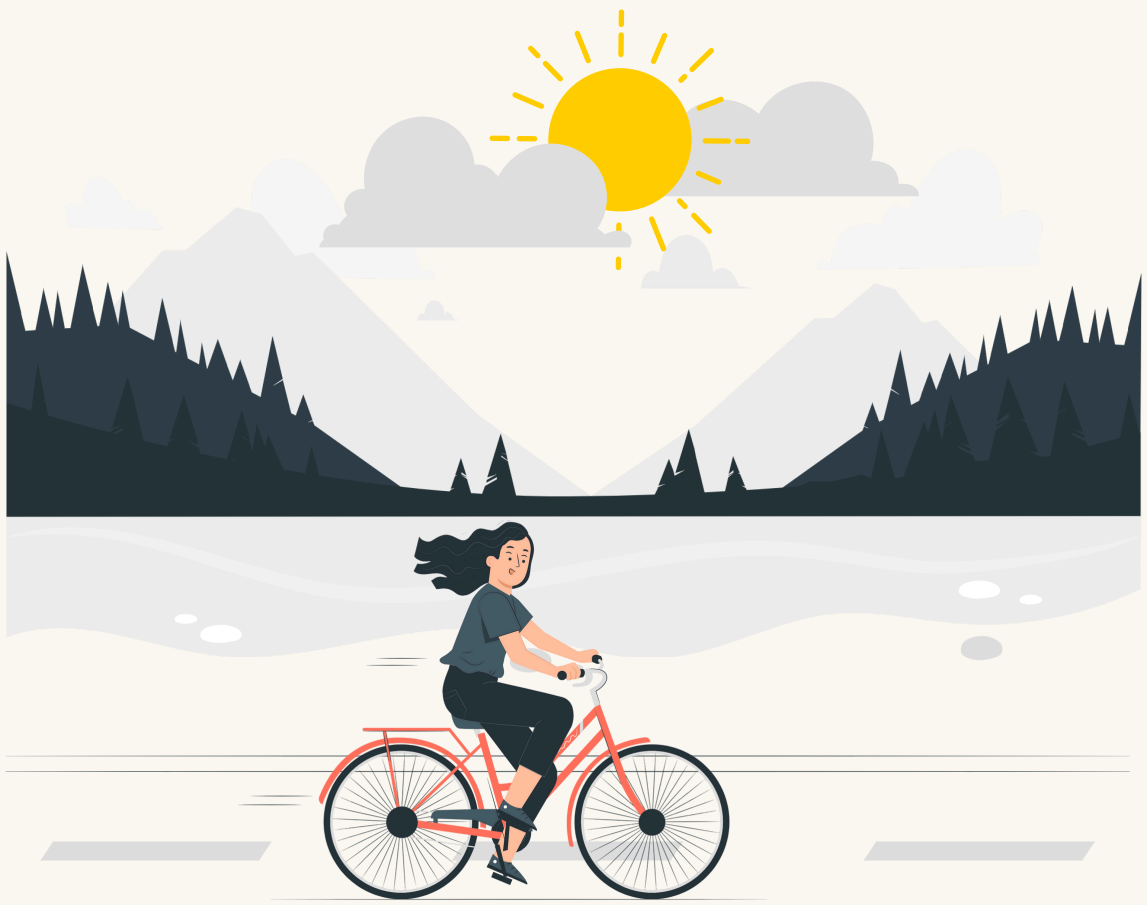
Illustrative Scenario #1: Mountain Biking

Picture a daring individual tackling rugged mountain trails on their mountain bike as rain pours down. The challenging terrain, coupled with slippery surfaces & reduced visibility, significantly increases the probability of accidents. Since accident probability is high, wearing protective gear reduces the consequences, bringing the overall risk to a medium level.



Illustrative Scenario #2: Leisurely Countryside Cycling

Now, imagine a person leisurely riding a bicycle on a dedicated bike path under sunny weather conditions in the countryside along well-maintained paths. With clear visibility & minimal traffic, the probability of an accident is low. However, without wearing any protective gear, the consequences of any potential accidents become high, resulting in an overall medium risk level.



Understanding Risk

It's not just the probability of accidents that determines risk; the consequences also play a crucial role.

While mountain biking in challenging terrain under rain poses a high accident probability, leisurely countryside cycling without protective gear can lead to significant consequences, equally elevating the risk level. It is, therefore, essential to consider both aspects when assessing risk.

To mitigate risk effectively in the leisurely countryside cycling scenario, protective gear thus becomes essential. Wearing it brings the overall risk to a minimum level.

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A possible way to represent the different risk levels is by using a risk matrix, where one axis represents the probability of the hazard & the other axis represents the consequences. The matrix helps categorize risks into varying levels, for instance from low to high.

Probability \ Consequences	Scratch injuries	Moderate injuries	Severe injuries	Critical injuries	Fatal injuries
Very likely	Low Med	Medium	Med Hi	High	High
Likely	Low	Low Med	Medium	Med Hi	High
Possible	Low	Low Med	Medium	Med Hi	Med Hi
Unlikely	Low	Low Med	Low Med	Medium	Med Hi
Very unlikely	Low	Low	Low Med	Medium	Medium

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Key takeaways:

- Understanding risk involves assessing both the frequency or probability & the consequences of potential hazard.
- A possible way to represent the different risk levels is by using a risk matrix.

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