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Designing a hazard taxonomy: A key step in studying the risk perception of aviation maintenance mechanics

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Why building a hazard taxonomy?

- Identifying hazard is a crucial step before talking about risk perception. [1]
- There is no clear hazard taxonomy provided by regulatory agency in aeronautics [2].
- Only one hazards taxonomy applied to aircraft maintenance has been found [3].
- Measuring risk perception of mechanics regarding specific hazards in a specific category.

What hazard is ?

- Hazard is anything that can affect the mental or physical integrity of the employee [4].
- In aeronautics, a hazard is anything that can cause an incident or accident during flight operations [5].
- In aircraft maintenance, there is Hazards can fluctuate depending on the location of the maintenance, the maintenance organism or the individual.

Objective

Creating a hazard taxonomy that is representative of the reality of maintenance activity.

Method & results

To define hazard

- We focus on hazard that are the same independently of the location or organisational context of the maintenance activity.
- The definition is: "Anything that can injure the mechanic and/or damage the aircraft and is a result of the design of the aircraft or enabling products."

To select the hazards corresponding to the definition

We select* the hazards identified based on three criteria:

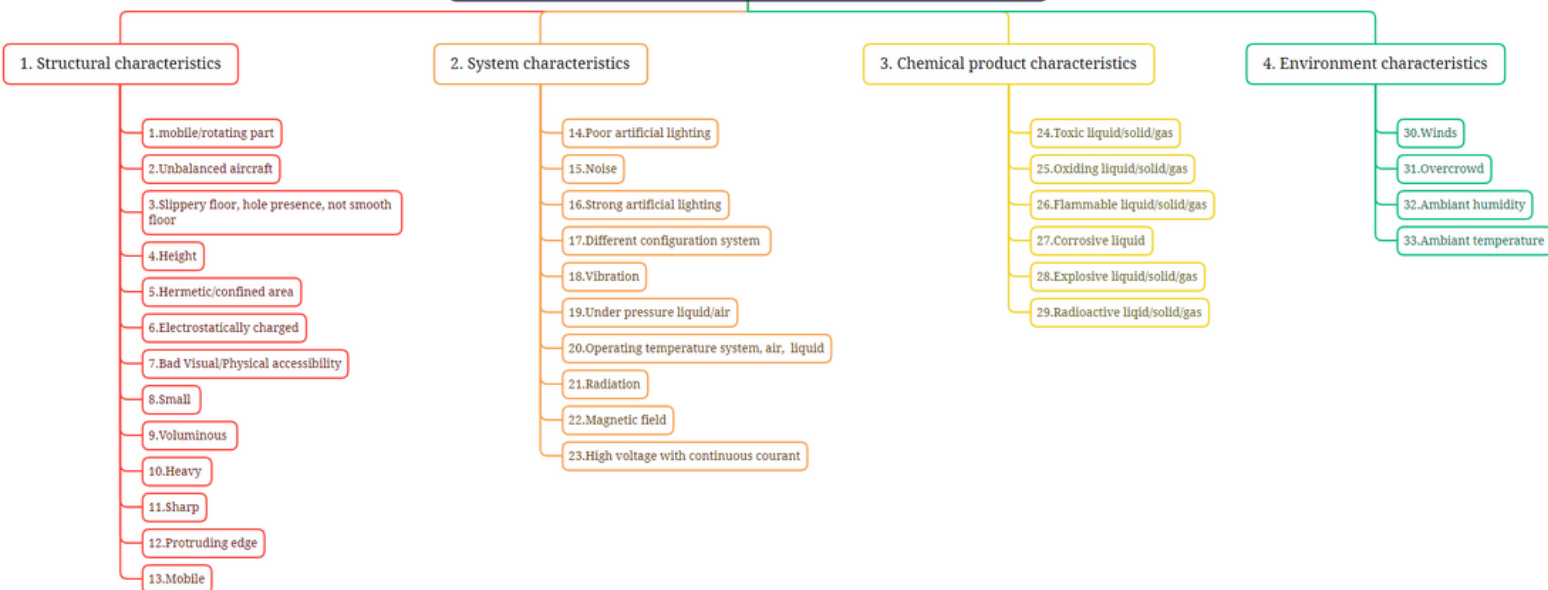
1. Impact on Health & Safety. (yes/no)
2. Impact on Airworthiness Safety. (yes/no)
3. Is coming from a design office decision. (yes/no)

*Based on a literature review [6-7] and expertise of authors.

To create the hazard taxonomy

- 33 hazards gathered in 4 dimensions.

Hazards in aircraft maintenance



Conclusion

- Creating a hazard taxonomy is a complex task due to the diversity of hazards linked to aircraft maintenance activity.
 - It is necessary to consider hazards that are consistent and stable regarding the location and the organisational context.
- Considering the engineers decision highlights the impact of the design on the aircraft maintenance activity in terms of hazards.

Limits

- The taxonomy does not consider the representation of mechanics and engineers but only the one of the authors.
 - We have to confirm it is representative of the way mechanics and engineers are categorizing hazards.

Bibliography

1. Pandit, B., Albert, A., Patil, Y., & Al-Bayati, A. J. (2019). Impact of safety climate on hazard recognition and safety risk perception. *Safety Science*, 113(March 2018), 44–53. <https://doi.org/10.1016/j.ssci.2018.11.020>
2. Zhang, Y., Sun, Y., Chen, Y., & Rong, M. (2017). Hazards taxonomy and identification methods in civil aviation risk management. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 10274 LNCS, 288–301. https://doi.org/10.1007/978-3-319-58524-6_24
3. Necula, F., & Zaharia, S.-E. (2015). CAPTURING HAZARDS AND ERADICATING HUMAN ERRORS IN AIRCRAFT MAINTENANCE. *Review of the Air Force Academy*, 13(3), 155–160. <https://doi.org/10.19062/1842-9238.2015.13.3.27>
4. Évaluation des risques professionnels. Évaluation des risques professionnels - Démarches de prévention-INRS.(2022).
5. ICAO. (2018). *Safety Management Manual*.
6. Yazgan, E., Ozkan, N. F., & Ullutas, B. H. (2022). A questionnaire-based musculoskeletal disorder assessment for aircraft maintenance technicians. *Aircraft Engineering and Aerospace Technology*, 94(2), 240–247. <https://doi.org/10.1108/AEAT-03-2021-0076>
7. Yiannakides, D. & Sergiou, C. (2019). *Human Factors in Aircraft Maintenance (1re éd.)*. CRC Press.