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Validation of a hazard taxonomy with aviation maintenance experts

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Abstract

Our work is a part of a research project with the objective of understanding how aviation maintenance mechanics perceive risk when exposed to hazards from: aircraft design, Ground Support Equipment (GSE), and tools. The first step in our approach was to understand and identify hazards, whether to meet the requirements of regulatory agencies [1] or to measure risk perception [2]. Thus, proposing a taxonomy provides a clear representation of the hazards faced by mechanics. Nevertheless, because the objective is to better consider during the design phase the mechanics point of view and their real context of work, we defined hazard as "Anything that impacts the health and safety of the mechanic and/or impacts the airworthiness of the aircraft and is the result of a decision by the design office". Once the taxonomy has been built, we tested its validity with aeronautical mechanics and design engineers.

In this study, we present the methodology used to test the validity of our taxonomy, and the result obtained. The methodology consists of two phases: the pre-test and the test. The pre-test phase was carried out with 2 experts, former mechanics, and 1 mechanic in activity, for three objectives: 1) To validate the use of the open card sorting method for the creation of a hazard taxonomy. 2) To verify that the hazards identified are representative of those to which mechanics are exposed. 3) To verify that the list of hazards is comprehensive, and the vocabulary is correct. The results of the pre-tests allowed us to adjust the experimental protocol and to identify that one hazard was missing: "strong artificial light". The participants indicated that the list of hazards was sufficiently exhaustive, and that the vocabulary was correct. Following the pre-test phase, the test phase was conducted with the main objective of understanding how mechanics and engineers categorize hazards. It also aimed at checking again points 2) and 3) above of the pre-test phase. This was done to create a taxonomy of hazards that is representative of the maintenance activity and that corresponds to the representation of both engineers and mechanics. For the test phase, 14 mechanics and 5 engineers from the design office participated in this experimentation. From the first results, we observed that some of the hazards are almost systematically put together such as "Toxic liquid/solid/gas" or "Corrosive liquid".

The establishment of the taxonomy allows to provide a first representation of both vision of engineers and mechanics on hazards in aircraft maintenance activity

References

[1] ICAO. (2018). *Safety Management Manual*.

[2] 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>