Applying Human Factors Heuristic Evaluation Tools to Improve Aviation Weather Displays: A Mismatch

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Background. Weather-related accidents have one of the highest fatality rates among General Aviation (GA) accidents. Pilots obtain graphical and textual weather information from aviation weather displays during both preflight planning and while inflight. Interpretation scores of weather products remain low regardless of pilot certification/rating. Previous research identifies poor usability as one cause of weather displays' low interpretability. Given the frequency of updates to weather displays, a rapid usability assessment technique is needed. Heuristic evaluations are a common method for quickly identifying usability problems. Heuristics evaluations entail expert reviewers evaluating an interface using a validated set of heuristic guidelines. This paper examined using current heuristic tools to evaluate aviation weather displays. **Method.** Human Factors (HF) specialists identified 14 published heuristic sets and subsets. This included heuristics designed to evaluate information visualizations, user interfaces, and online documentation. The research team applied the heuristic tools to evaluate several types of aviation weather displays (e.g., Graphical Forecast for Aviation and Low-Level Significant Weather Chart). **Results.** The evaluation identified numerous characteristics of the tools that yielded them unusable for aviation weather displays. Mismatches include limitations to color usage, error prevention/recognition, and auditory elements. **Discussion.** The inspection of heuristic evaluations found no suitable sets for the use of evaluating aviation weather display. Current heuristic sets often include recommendations that are either not applicable to the aviation weather domain or do not match well with the domain's characteristics. Future research is needed to develop a validated set of heuristics specific to the domain of aviation weather.