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Frequency and Variance of Communication Characteristics in Aviation Safety Events

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Introduction
In the aviation sector communications plays a critical role, and training and education include communication theory and practice. Studies suggest that communication problems contribute into 70% to 80% of safety occurrences, but literature does not provide further information about the types and frequencies of the corresponding communication variables. Our objective was to develop a relevant tool to be used for post analyses of safety (investigation) reports. This way, the efforts of practitioners and scholars could be targeted to the weakest areas.

Methodology
We developed a tool which is based on literature and includes communication variables related to actors, distance, timing, flow of information, form, senses involved and media. After achieving an inter-rater agreement of 91.7%, 103 safety investigation reports from Australia, Canada, the Netherlands, United Kingdom and United States of America were analysed. In those reports, 256 communication problems were identified. In addition to frequency analysis, Chi-square and Fischer’s exact tests were used to test associations with Region, Time Period, Severity, and Type of Operation. The statistical significance level was set to p=0.05.

Results
On average 2 communication problems were recorded per report. No variance of the number of problems was found over time and across regions, event severity, and type of operation. The table below shows where significant associations were found, marked with “X”.

<table>
<thead>
<tr>
<th>Communication variable</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actors</td>
<td>Human, Technical, Representation Media</td>
</tr>
<tr>
<td>Signal</td>
<td>Visual, Audio, Force, Electrical</td>
</tr>
<tr>
<td>Coder</td>
<td>Verbal, Non-Verbal</td>
</tr>
<tr>
<td>Channel</td>
<td>Radio, Phone, Internet, Air, Force, Other-wire, Other-wireless</td>
</tr>
<tr>
<td>Decoder</td>
<td>Visual, Audio, Taste, Smell, Touch, Non-human</td>
</tr>
<tr>
<td>Distance</td>
<td>Local, Remote</td>
</tr>
<tr>
<td>Timing</td>
<td>Synchronous, Asynchronous</td>
</tr>
<tr>
<td>Predictability</td>
<td>Common, Uncommon</td>
</tr>
<tr>
<td>Interference</td>
<td>Yes, No</td>
</tr>
</tbody>
</table>

Indicative references
Fiske, J. (1990). INTRODUCTION TO COMMUNICATION STUDIES.

Applicability and future work
The tool can be used by all industry sectors to distil and analyse data from mandatory and voluntary reports, so that weak communication areas can be identified and improved. Depending on the findings we can alert designers, inform management, warn operators about the most frequent communication pitfalls, and also steer respective training programs. Also, the theoretical foundation of the tool might be used as an inclusive reference to communication theory and can comprise a basis for future academic research.