

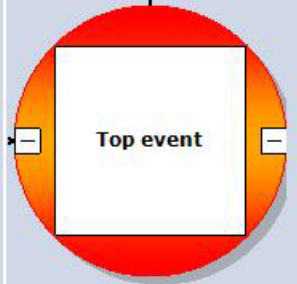
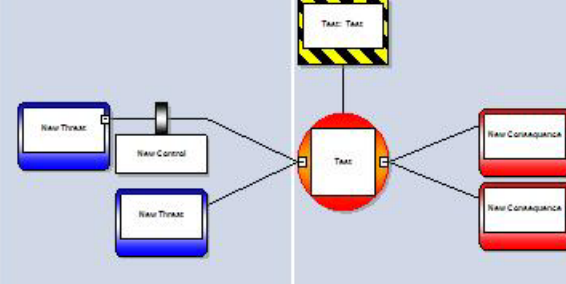
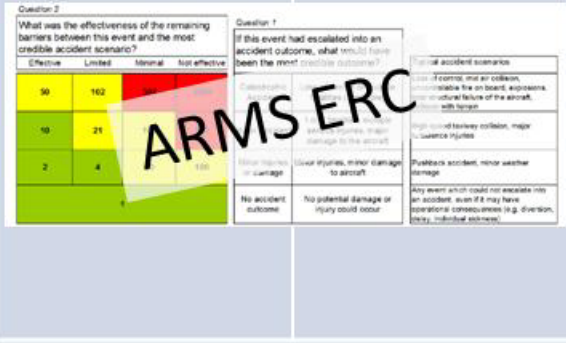
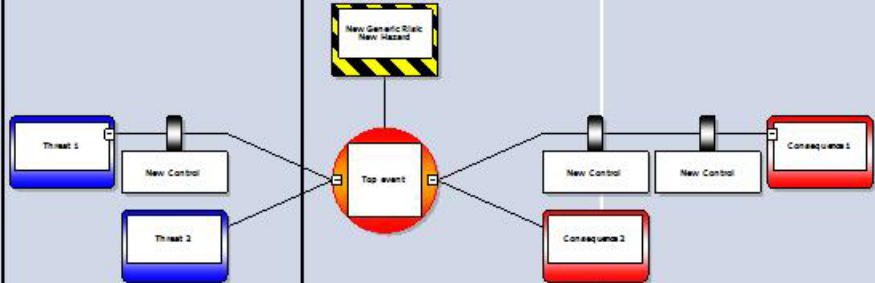


| Hazard   | Outcome  | Severity of Outcome   | Likelihood | Risk   | Mitigation  | Severity of outcome  | Likelihood | Risk |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
|--|--|---|------------|--------|-------------|----------------------|------------|------|--|---|---|---|---|---|---|--------------|---|---|----|----|----|----|---|-----------|---|---|---|----|----|----|---|-------|---|---|---|---|----|----|---|-------|---|---|---|---|---|----|---|------------|---|---|---|---|---|---|--|--|----------------------|------------|--------|------------|----------|--|---|---|--|--|--|--|
| <p>List of bowtie threats</p>  | <p>The worst credible outcome linked to the particular threat via the top event within the bowtie</p>   | <p>Using ICAO (5x5) or ARMS (ERC) matrix considering the severity of the outcome</p> <table border="1"> <tr> <th rowspan="2">SEVERITY</th> <th rowspan="2"></th> <th colspan="5">PROBABILITY</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> <tr> <td>A</td> <td>Catastrophic</td> <td>5</td> <td>5</td> <td>10</td> <td>15</td> <td>20</td> <td>25</td> </tr> <tr> <td>B</td> <td>Hazardous</td> <td>4</td> <td>4</td> <td>8</td> <td>12</td> <td>16</td> <td>20</td> </tr> <tr> <td>C</td> <td>Major</td> <td>3</td> <td>3</td> <td>6</td> <td>9</td> <td>12</td> <td>15</td> </tr> <tr> <td>D</td> <td>Minor</td> <td>2</td> <td>2</td> <td>4</td> <td>6</td> <td>8</td> <td>10</td> </tr> <tr> <td>E</td> <td>Negligible</td> <td>1</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td></td> <td></td> <td>Extremely improbable</td> <td>Improbable</td> <td>Remote</td> <td>Occasional</td> <td>Frequent</td> <td></td> </tr> </table>  | SEVERITY   |        | PROBABILITY |                      |            |      |  | 1 | 2 | 3 | 4 | 5 | A | Catastrophic | 5 | 5 | 10 | 15 | 20 | 25 | B | Hazardous | 4 | 4 | 8 | 12 | 16 | 20 | C | Major | 3 | 3 | 6 | 9 | 12 | 15 | D | Minor | 2 | 2 | 4 | 6 | 8 | 10 | E | Negligible | 1 | 1 | 2 | 3 | 4 | 5 |  |  | Extremely improbable | Improbable | Remote | Occasional | Frequent |  | <p>Considering the barriers/control s within the appropriate bowtie - how likely is the threat to cause the outcome?</p>  | <p>Calculate the score based on the chosen matrix</p> | <p>If the score is unacceptable and requires mitigation, refer to the bowtie for possible changes to the system – remember to consider transfer of risk which is easily identifiable on a bowtie</p>  | <p>Consider the effectiveness of the new or improved mitigations (controls) for reducing the severity of the outcome</p> | <p>Consider the effectiveness of the new or improved mitigations (controls) for likelihood of the threat escalating into the outcome</p> | <p>Calculate the new risk score based on the new or improved mitigations</p> |
| SEVERITY   |  | PROBABILITY   |            |        |             |                      |            |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
|  |  | 1   | 2          | 3      | 4           | 5                    |            |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
| A  | Catastrophic   | 5   | 5          | 10     | 15          | 20                   | 25         |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
| B  | Hazardous  | 4   | 4          | 8      | 12          | 16                   | 20         |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
| C  | Major  | 3   | 3          | 6      | 9           | 12                   | 15         |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
| D  | Minor  | 2   | 2          | 4      | 6           | 8                    | 10         |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
| E  | Negligible   | 1   | 1          | 2      | 3           | 4                    | 5          |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
|  |  | Extremely improbable  | Improbable | Remote | Occasional  | Frequent             |            |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |
| <b>Inherent Risk</b>   |  |   |            |        |             | <b>Residual Risk</b> |            |      |  |   |   |   |   |   |   |              |   |   |    |    |    |    |   |           |   |   |   |    |    |    |   |       |   |   |   |   |    |    |   |       |   |   |   |   |   |    |   |            |   |   |   |   |   |   |  |  |                      |            |        |            |          |  |   |   |  |  |  |  |

Question 2: What was the effectiveness of the remaining barriers between this event and the most credible accident scenario?

|           |         |         |               |
|-----------|---------|---------|---------------|
| Effective | Limited | Minimal | Not effective |
| 90        | 102     | 10      | 10            |
| 10        | 21      | 4       | 10            |
| 2         | 4       |         |               |

Question 3: If this event had escalated into an accident outcome, what would have been the most credible outcome?

|                          |   |                                 |   |
|--------------------------|---|---------------------------------|---|
| Controlled landing       | Controlled flight into terrain            | Controlled flight into obstacle | Loss of control, mid air collision, controlled flight into terrain, runway excursion, loss of control, loss of the aircraft, with longer        |
| Minor damage to aircraft | Minor damage to aircraft                  | Minor damage to aircraft        | High speed runway collision, major damage to aircraft, loss of life   |
| Minor damage to aircraft | Minor damage to aircraft                  | Minor damage to aircraft        | Runway excursion, minor weather damage  |
| No accident outcome      | No potential damage or injury could occur | No accident outcome             | Any event which could not escalate into an accident, even if it may have operational consequences (e.g. diversion, delay, substituted aircraft) |

**ARMS ERC**