Testing Quick Reference Handbooks in Simulators

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1 Context

1.1 Introduction

Context

- Designing Emergency Checklists is difficult

- Checklists are usually carried out in high workload environments, especially emergency ones

Problem

- There are some checklists that may not be fit for certain scenarios

- Some checklists may make pilots "stuck"

- Checklists may take too long to carry out - Swissair 111

Rationale

- Test checklists in a simulated environment

- Results in being able to see where to improve checklists

1.2 Key Background Sources

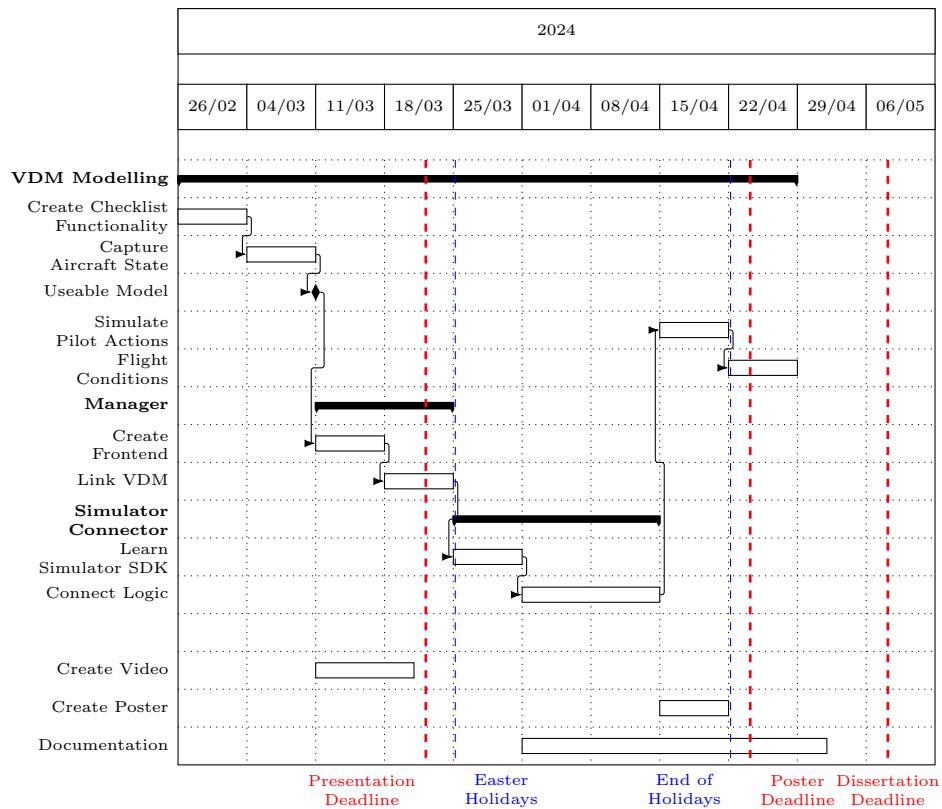| Resource	Info
US Airways 1549 NTSB Investigation [1]	**Description:** An investigation on an aircraft that suffered from a dual engine failure from a bird strike forcing the pilots to land on the Hudson River. **Reason:** The investigation found that the QRH was too lengthy and the pilots' used their experience to prioritize essential actions outside the QRH to keep the aircraft in control.

2 Aims and Objectives

Aims

1. Test Checklists

2. Test multiple conditions for that checklist

3. Find problems in the checklist

4. Find how reproducible the checklist is

Objectives

1. Checklist Manager

    (a) Input a checklist
    (b) Add conditions to test

2. Checklist Testing Logic

    (a) Capture state of aircraft
    (b) Simulate a pilot's actions
    (c) Simulate delay in actions

3. Simulator connector

    (a) Connect to the flight simulator
    (b) Set up conditions of flight
    (c) Monitor and take Logic's actions

3 Planning

3.1 Diagrammatic Work Plan

3.2   Brief Explanation

- Pretty much put how long each part of objectives should take.

- The deadlines for the Presentation, Poster, Dissertation will be done at the same time as the programming

- The work during the Easter Holidays is there with the expectation of taking a bit of a break, but to not lose momentum once the holidays are over.

- All the items on the gantt chart are more so the worst case scenario for how long each item will take

- The last part of VDM modelling is just in case I run out of time, and they aren't the most important

3.3   Risks

- Time management - that's why the last part of modelling is done after the simulator connector as it's not essential, can be done manually

- Simulator not being good enough?

- Simulator could be too complex to be able to link with model.

4 Ethics

4.1 Ethics Checklist

My project:

1. Will *not* involve working with **animals** or users/staff/premises of the **NHS**

2. Will be carried out **within the UK or European Economic Area**

3. Will *not* have any impact on the **environment**

4. Will *not* work with populations who do *not* have **capacity to consent**

5. Will *not* involve work with **human tissues**

6. Will *not* involve work with **vulnerable groups** (Children/Learning disabled/Mental health issues, etc.)

7. Will *not* involve any *potentially* **sensitive topics** (Examples include but are not exclusive to body image; relationships; protected characteristics; sexual behaviours; substance use; political views; distressing images, etc.)

8. Will *not* involve the collection of any identifiable personal data

4.2 Ethical Considerations

This project will involve referencing previous aviation accidents which had deaths involved, however, I will make sure to be respectful towards everyone involved in those accidents.

This project will also not involve the use of any users, so no data collection considerations will need to be taken into account for.

5 References

[1] National Tranportation Safety Board. *Loss of Thrust in Both Engines After Encountering a Flock of Birds and Subsequent Ditching on the Hudson River*. Technical Report PB2010-910403. May 2010. URL: https://www.ntsb.gov/investigations/Pages/DCA09MA026.aspx.

[2] Barbara Burian. "Design Guidance for Emergency and Abnormal Checklists in Aviation". In: *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 50 (Oct. 2006). DOI: 10.1177/154193120605000123.

[3] Atul Gawande. *The Checklist Manifesto: How To Get Things Right*. Main Edition. Profile Books, July 2010. ISBN: 9781846683145.