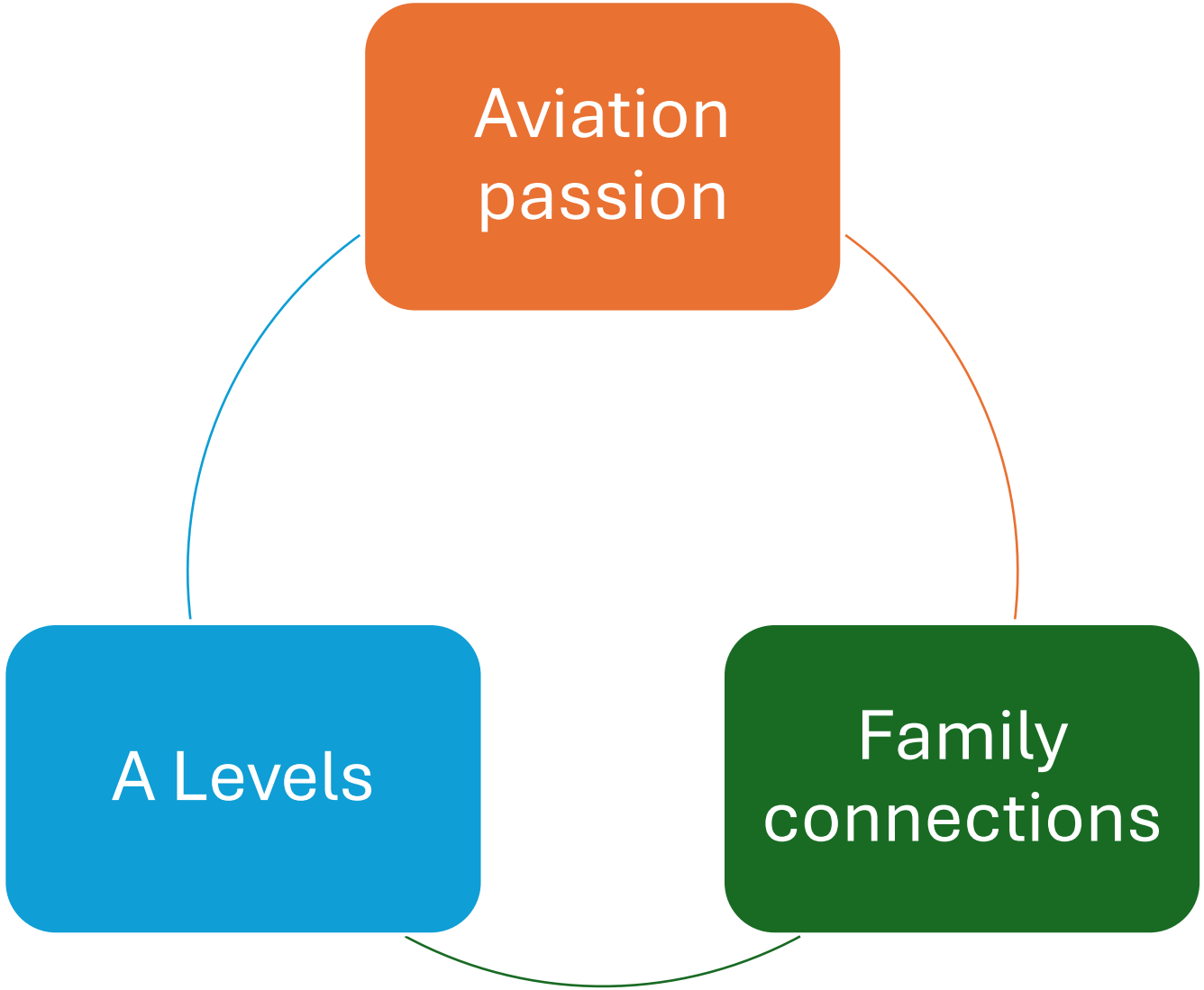
To what extent is it feasible to reintroduce commercial supersonic transatlantic passenger aircraft by the year 2040?

Boom Overture

Concorde

Image Credit: Boom Press, British Airways

Why this topic interests me



Resources Used

Journal Articles – A cost benefit analysis of Concorde

Newspaper Articles – Environmental Defense Fund

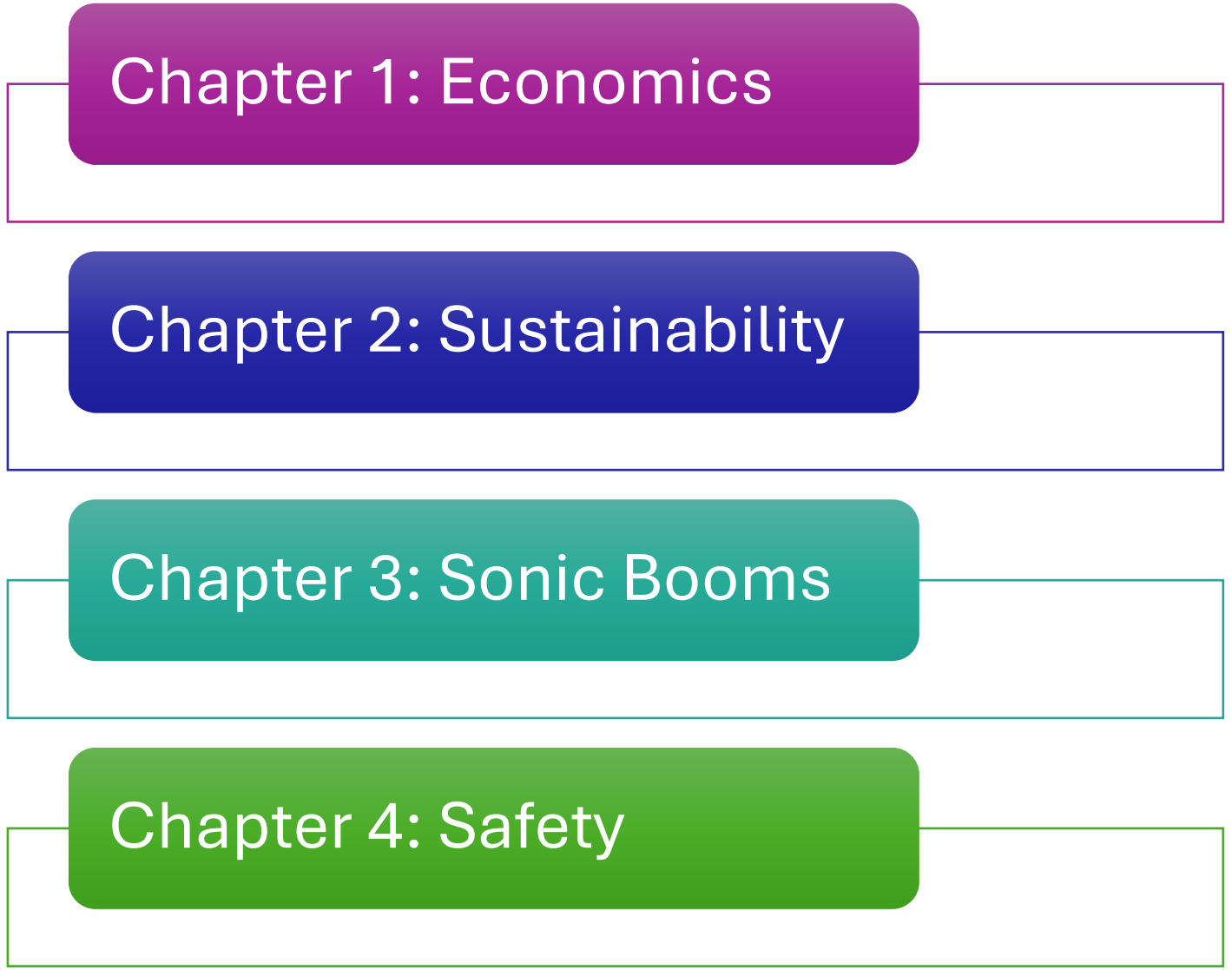
Journal Reports – Current Commercial Efforts

Documentary – Crash of Flight 4590 Smithsonian

Podcasts – Crash of Flight 4590

TedED Videos – The sonic boom problem

Chapter Structure



Methodology

Source Collection: I mostly relied on secondary research, bringing together both technical data and individual's analysis to assess the feasibility of supersonic travel returning by 2040.

Source Analysis: I critically evaluated sources for reliability and useability, paying attention to any political bias when talking about Concorde.

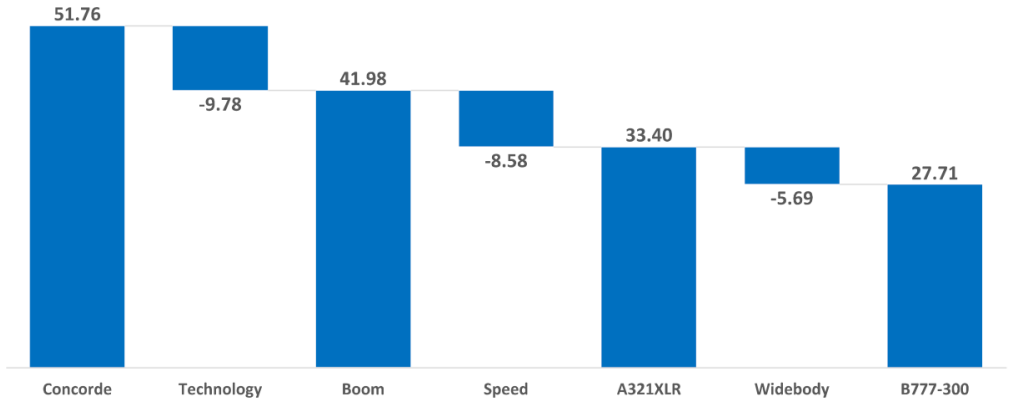
Organisation: I used my activity log to track my progress and set myself deadlines.

Chapter 1 - Economics

- **Concorde had very high R&D costs**
  - £12b for 20 units of Concorde, £4.7b for Boom

- **Concorde had very high operating costs**
  - Maintenance
  - Fuel - Very fast (Mach 2)
  - Boom is slower (Mach 1.7). Modern materials help with reducing maintenance costs.

Figure 1: Operating Cost, $USD cents per seat mile – *Profitability of Supersonic Transport*



- If Boom can control R&D costs, it should easily be able to sell, supporting economical feasibility.

Chapter 2 - Sustainability

- **Air Pollution:**
  - In the 1970s, early studies concluded that it would only take 40 SSTs to reduce stratospheric ozone by 0.5%.
  - NASA's recent studies show ozone depletion <0.04%
- **Noise Pollution:**
  - Concorde had an impact on local communities – loud afterburners
  - Engine advancements remove the need for afterburners
- Engine improvements and tight regulations strongly support the feasibility of reintroduction by 2040

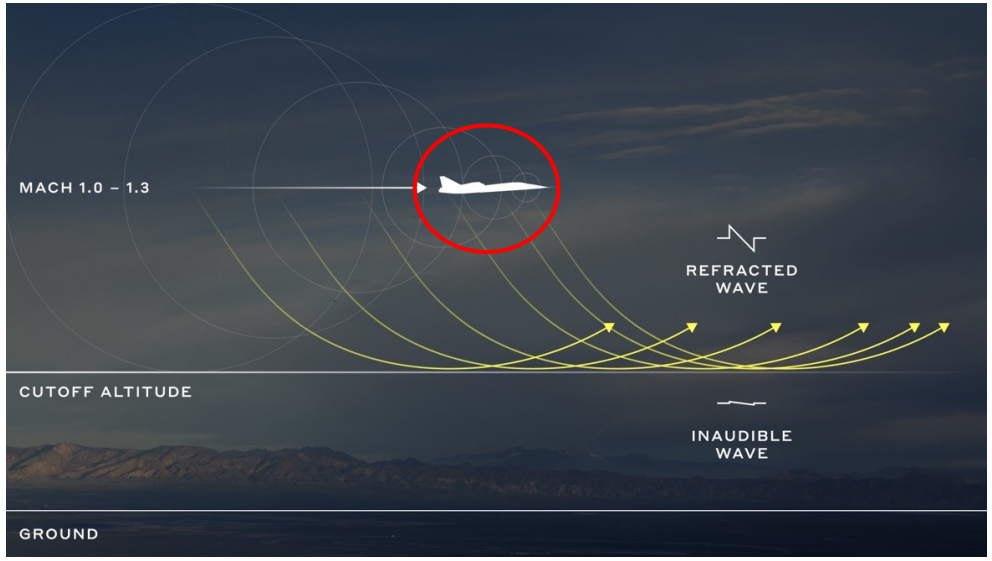
Image 3: Air France Concorde – *Associated Press*

Image 4: An Air France modern airliner (A350) - *Getty*

Chapter 3 – Sonic Booms

- **What are they?**
  - Sonic booms are explosive thunder-like sounds when aircraft travel above Mach 1
  - The sound is around 110db, and they cause shattered windows

Image 5: Boomless Boom – *Boom Supersonic Press*



- **The Law**
  - Overland flight is banned in most countries since the 1970s.
  - Technology advancements and AI have allowed faster prototyping of aircraft designs and the invention of Boomless cruise.

- This is the largest hurdle to supersonic flight reintroduction as the laws will only change if sonic booms can be prevented

Chapter 4 – Safety 1

- **Crash of Flight 4590**
  - Concorde hit debris on take-off, rupturing a fuel tank, uncovering design flaws such as the lack of fuel tank protection & high-speed take-off
  - Led to Concorde's grounding – ruined public perception

Image 6: AF4590 – *BEA final crash report*

Chapter 4 – Safety 2

- **Modern technologies**
  - Slower take-off speeds reduce the chance of debris problems – Overture has flaps and is lighter
  - Cockpit – real-time monitoring, FlyByWire
  - Kevlar tank linerers

- Technology has improved, regulations have tightened, and Overture is designed in hindsight of Concorde's safety issues. This certainly supports reintroduction by 2040.

Images 7&8: Concorde vs Boom Overture cockpit design – *Aviation Stack Exchange & Boom Supersonic Press*

Conclusion

I can confidently say that it is certainly feasible that commercial supersonic air travel can be reintroduced by 2040, it's initial operation will be small but will grow exponentially.

The largest hurdle to overcome is Sonic Booms and the legal restrictions currently in place; it is up to NASA and Boom to invent technologies to reduce sonic boom noise.

What went well

Literature review was comprehensive and had a large range of sources.

Activity Log was kept up to date and was detailed.

Even better if

Interviewed professionals

Better time allocation, particularly for the last chapter

Future areas of research

- I could investigate the economic viability of more case studies; other supersonic aircraft; Chinese supersonic aircraft and smaller business jets

- Further analyse market interest

Skills that I gained

- Research Skills

- Organisation / Time—keeping

Questions