

Based on the provided Concept of Operations (ConOps) for a commercial airliner, here is the first step of the System-Theoretic Process Analysis (STPA) which includes the identification of Losses, System-level Hazards, and System-level Constraints:

Losses

- 1. L-1: Loss of life or injury to passengers or crew**
- 2. L-2: Loss of or damage to the aircraft**
- 3. L-3: Loss of or damage to objects outside the aircraft**
- 4. L-4: Environmental harm due to fuel emissions or accidents**
- 5. L-5: Financial loss due to operational inefficiency or accidents**
- 6. L-6: Damage to the airline's reputation**
- 7. L-7: Loss of sensitive or proprietary information**

System-level Hazards

- 1. H-1: Airliner violates minimum separation standards in flight**
 - Linked to Losses: L-1, L-2, L-3, L-6
- 2. H-2: Loss of airframe integrity of the airliner**
 - Linked to Losses: L-1, L-2, L-4, L-6
- 3. H-3: Airliner leaves the designated taxiway, runway, or apron on the ground**
 - Linked to Losses: L-1, L-2, L-3, L-6
- 4. H-4: Airliner encounters propulsion system failure**
 - Linked to Losses: L-1, L-2, L-4, L-5, L-6
- 5. H-5: Cabin pressure loss**
 - Linked to Losses: L-1, L-5, L-6
- 6. H-6: Fire within the airliner**
 - Linked to Losses: L-1, L-2, L-4, L-6
- 7. H-7: Navigation system failure leading to airliner deviating from its planned route**
 - Linked to Losses: L-1, L-2, L-3, L-6
- 8. H-8: Airliner unable to communicate with air traffic control**
 - Linked to Losses: L-1, L-2, L-3, L-6
- 9. H-9: Breach of sensitive information systems**
 - Linked to Losses: L-7, L-5, L-6

System-level Constraints

- 1. SC-1: Airliner must satisfy minimum separation standards from other aircraft and objects**
 - Linked to Hazards: H-1
- 2. SC-2: Airframe integrity must be maintained under worst-case conditions**
 - Linked to Hazards: H-2
- 3. SC-3: Airliner must remain on designated taxiway, runway, or apron while on the ground**
 - Linked to Hazards: H-3

4. **SC-4: Propulsion system must be inspected and maintained to prevent failure**
 - Linked to Hazards: H-4
5. **SC-5: Ensure cabin pressurization is maintained and monitored continuously**
 - Linked to Hazards: H-5
6. **SC-6: Fire detection and suppression systems must be operational and regularly tested**
 - Linked to Hazards: H-6
7. **SC-7: The navigation system must have redundancy to prevent deviations from planned routes**
 - Linked to Hazards: H-7
8. **SC-8: Reliable and continuous communication systems must be in place to ensure contact with air traffic control**
 - Linked to Hazards: H-8
9. **SC-9: Implement robust cybersecurity measures to safeguard sensitive information systems**
 - Linked to Hazards: H-9

This STPA analysis identifies key losses, hazards, and constraints associated with the operation of a commercial airliner, helping to ensure safety, security, and efficiency in meeting the operational needs and business perspectives described in the ConOps.