Case Study: Malaysia Airlines Flight 370

Enhancing SAR Effectiveness through Joint Efforts

Incident Details

- On March 8, 2014, Malaysia Airlines Flight 370, a scheduled flight from Kuala Lumpur to Beijing, mysteriously disappeared from radar shortly after takeoff. The Boeing 777-200ER, carrying 239 passengers and crew members, lost contact with air traffic control just 38 minutes into its journey. The last communication indicated a routine flight before it vanished, prompting a search and rescue operation.

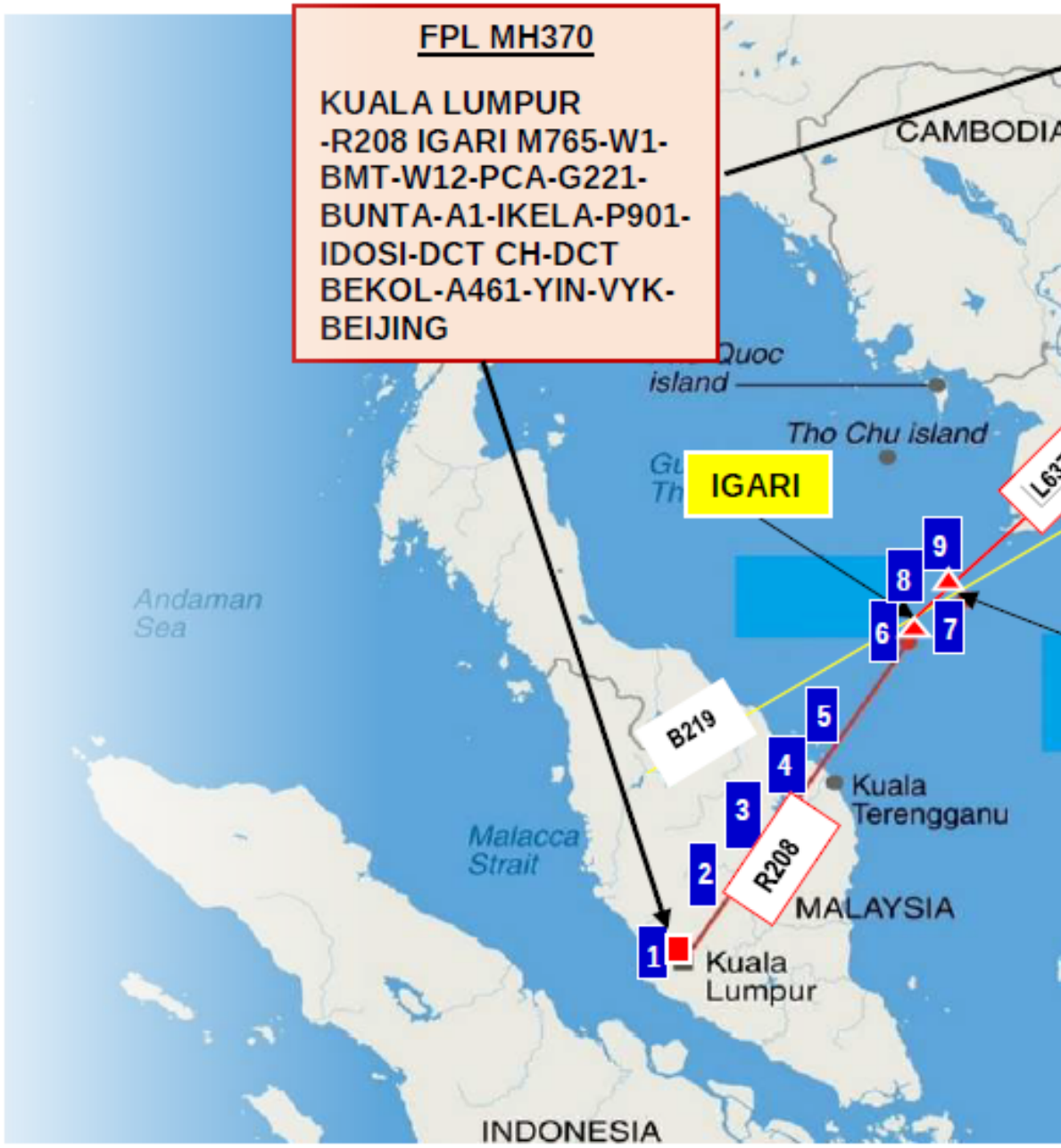

Figure 1.1A - Chronological Sequence of Events of Disappe
(in pictorial form and not to scale)

9	At 1721:13 UTC [0121:13 MYT], 3.2 nm after passing IGARI, the radar position symbol of MH370 dropped off
8	MH370 Mode S symbol dropped off at 1720:36 UTC [0120:36 MYT]
7	MH370 over waypoint IGARI at 1720:31 UTC [0120:31 MYT]
6	At 1719:26 UTC [0119:26 MYT], 8.6 nm to waypoint IGARI, KL ACC instructed MH370 to contact HCM ACC MH370 acknowledged with '*Good night Malaysian Three Seven Zero*' at 1719:30 UTC [0119:30 MYT]
5	MH370 maintaining FL350 at 1701:17 UTC [0101:17 MYT] MH370 reported again maintaining FL350 at 1707:56 UTC [0107:56 MYT]
4	MH370 climbing to FL350 at 1650:11 UTC [0050:11 MYT]
3	MH370 climbing to FL250 at 1647:03 UTC [0047:03 MYT]
2	MH370 climbing to FL180 at 1643:01 UTC [0043:01 MYT]
1	Lumpur Tower cleared for take-off at 1640:37 UTC [0040:37 MYT] and MH370 departed at 1642 UTC [0042 MYT]

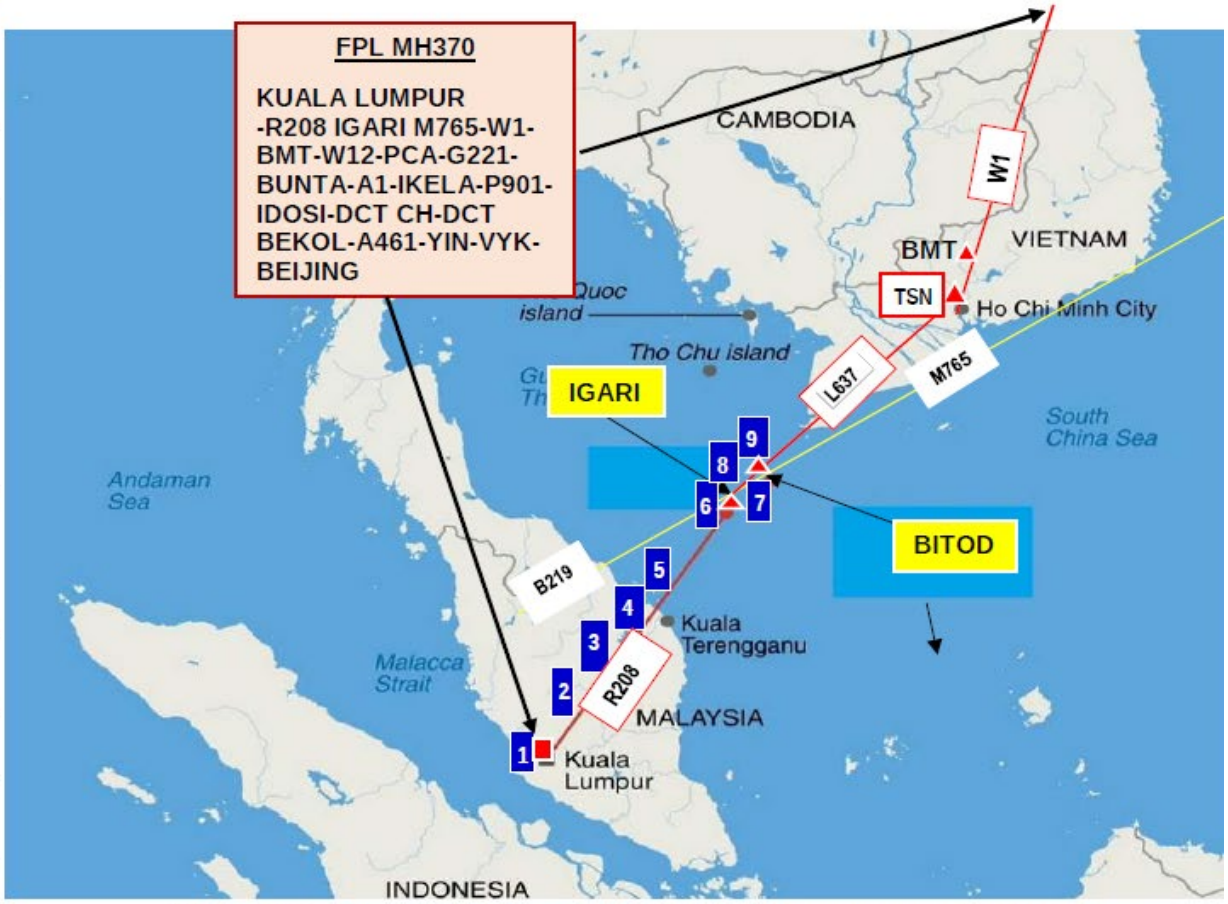

Figure 1.1A - Chronological Sequence of Events of Disappearance of MH370 (in pictorial form and not to scale)

Timeline of Events

Timeline of Events

- **1641 UTC: Malaysia Airlines Flight 370 takes off from Kuala Lumpur (KL) International Airport, bound for Beijing Capital International Airport, with 239 passengers and crew members on board.**
- **1707 UTC: The last voice communication occurs; the co-pilot responds to a routine message from air traffic control.**
- **1721 UTC: The aircraft makes its last known contact with radar.**
- **1730 UTC: The aircraft deviates from its planned flight path, heading west over the Malay Peninsula.**
- **1739 UTC: Ho Chi Minh (HCM) ACC first inquired about MH370 and informed KL ACC that verbal contact was not established with MH370 and the radar target was last seen at BITOD.**
- **1741-1818 UTC: There were multiple communication engagements between HCM and KL ACC attempting to re-aquire or determine MH370's location.**

Timeline of Events

- **1833 UTC: KL ACC inquired with Malaysia Airlines Operations Centre about the communication status with MH370.**
- **1837 UTC: KL ACC informed HCM ACC that MH370 was still flying and that the aircraft was continuing to send position reports to the airline, and relayed to HCM ACC the latitude and longitude as advised by Malaysian Airlines (MAS) Operations.**
- **1930 UTC: MAS Operations Centre informed KL ACC that the flight tracker information was based on flight projection and was not reliable for aircraft positioning.**
- **2214 UTC: KL ACC queried HCM ACC if SAR was activated.**
- **2232 UTC: KL ARCC issued a DETRESFA message. 01 hour and 02 minutes later. No activity was recorded in the RCC Logbook**

The Kuala Lumpur Aeronautical Rescue Co-ordination Centre Standard Operating Procedure

The search and Rescue Mission Co-ordinator (SMC) is the officer assigned to co-ordinate response to an actual or apparent distress situation. In aeronautical search and rescue operations, the SMC is usually in the best position to assess the circumstances of a particular case, and to take whatever steps necessary to promote the safety of life and prevent further loss of property.

The SMC must use his/her best judgment in initiating and coordination operations to ensure use of the most suitable method of planning with least possible delay.

The Kuala Lumpur Aeronautical Rescue Co-ordination Centre Standard Operating Procedure

Initial Actions: On receipt of information regarding aircraft in difficulties normally from the Watch Supervisor in the ATCC, or from request of assistance from RSCs, MRCC (vessel or person - maritime distress) or from any adjacent RCCs and is aware that assistance is required

From the recorded telephone conversations between the KL ACC Radar Controller and MAS Operations Centre, the Radar Controller indicated that he would inform the Watch Supervisor to check on when was the last contact with MH370.

Search and Rescue Coordination Failures

- **The disappearance of Flight MH370 was not immediately recognized as a significant emergency due to a failure to communicate the aircraft's deviation from its flight path effectively.**
- **Delayed Notification: Air Traffic Control (ATC) did not promptly notify SAR teams or neighboring countries about the unusual behavior of the aircraft, delaying the initiation of rescue efforts.**
- **The lack of a unified communication system between ATC and SAR teams caused confusion about the flight's last known position and course.**
- **Multiple Agencies Involved: The engagement of various international agencies complicated the flow of information. Each organization had different protocols, leading to inconsistent data sharing that hampered timely action.**

Search and Rescue Coordination Failures

- **Coordination with international SAR teams was slow, delaying the deployment of necessary resources and personnel when they were most urgently needed. This impacted Response Time**
- **The delayed response in initiating a proper search operation meant that crucial hours and days were wasted, significantly prolonging the timeline for potentially finding survivors or wreckage.**
- **The disorganized nature of initial efforts led to the inefficient use of manpower and equipment, as resources were not concentrated where they would have been most effective.**
- **The delays resulting from coordination failures contributed to prolonged uncertainty for the families of the passengers and crew, exacerbating their distress.**

Technology Gaps

- **Limited Real-Time Tracking:**
- **Inadequate Satellite Coverage:**
- **The lack of geostationary satellites for continuous tracking meant there were “blind spots” that could not be effectively monitored for flights in distress.**
- **Data Transmission Issues.**
- **Geolocation Limitations**
- **Long Search Timelines**

Lessons Learned and Future Recommendations

- **The coordination failures during the search and rescue operations for Malaysia Flight MH370 underline the critical need for robust communication protocols and collaborative frameworks in aviation emergencies.**
- **Emphasizing the importance of establishing a unified command structure for SAR operations, enhancing real-time communication technologies, and developing comprehensive international agreements to streamline response efforts in future incidents.**
- **By examining these coordination failures and their impact on response time, it becomes evident that improving communication and operational frameworks is essential to mitigate the consequences of similar tragedies in the future.**

Conclusion and Q&A

- **To date, the main wreckage of MH370 has still not been found despite a 4-year search in the South Indian Ocean. However, items of debris possibly from MH370, have been found as far north as the eastern coast of Tanzania and far south as the eastern coast of South Africa. This is in addition to several islands and island nations off the eastcoast of the African continent.**