LO4: Evaluate the limitations of a given testing process, using statistical methods where appropriate, and summarise outcomes

4.1 Identifying Gaps and Omissions in the Testing Process

While simulation and testing provide control and repeatability, they may not capture all real-world variables, such as unpredictable weather conditions or varying customer behaviors. There was a challenge in adequately testing system availability due to difficulties in replicating the diverse operational conditions the drones might encounter. Limited by time and resources, the testing might not fully assess the long-term reliability and maintenance needs of the drones. The tests might not have sufficiently simulated extreme conditions like hardware failures or drone accidents. Mutation testing was not utilized, which could have helped in estimating the number of residual faults by deliberately introducing faults into the system and checking if the tests detected them.

4.2 Identifying Target Coverage/Performance Levels for Different Testing Procedures

Reaching 70% code coverage to ensure most functionalities are tested. Setting specific benchmarks for response times and system throughput under peak load conditions. Reaching uptime close to 99.9% over an extended period. The system can handle at least 150% of the expected peak load without significant performance degradation.

4.3 Discussing How the Testing Carried Out Compares with the Target Levels

Achieved high code coverage but may have missed edge cases in complex operational scenarios. Met most benchmarks but lacked extensive testing under unpredictable real-world conditions. Demonstrated high reliability in controlled environments but untested for long-term real-world operations. Successfully handled peak load simulations, but extreme stress conditions (beyond 150% of peak load) were not thoroughly tested.

4.4 Discussion of What Would Be Necessary to Achieve the Target Levels

Implement more extensive field testing in various real-world conditions and over extended periods. Employ mutation testing to better estimate and reduce the number of residual faults. Conduct long-duration tests to better assess the reliability and maintenance needs over time. Test the system under more extreme conditions than currently simulated, including hardware failures or network outages. With a statistical increase of 10% monthly, analyzing test results, identifying patterns or weaknesses, predicting potential failure points, and reaching coverage close to 100% in April 2024 see Figure 1.

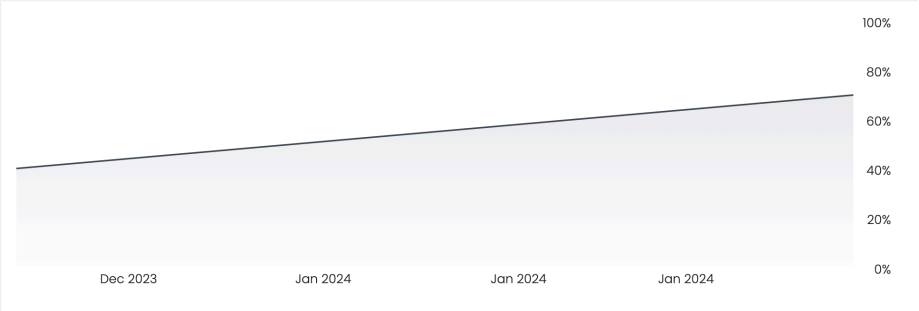

Figure 1. An increase of 10% monthly in code coverage