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| Artifact ID:  S-001 | Artifact Title:  Concept Selection Report | |  |
| Revision:  1.0 | Revision Date:  14/NOV/2019 | |
| Prepared by:  Nick | | Checked by:  Checker |
| Purpose:  Summarize the process used to select the chosen concepts for each subsystem. | | |

# Revision History

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| Revision | Revised by | Checked by | Date |
| 1.0 | Nick | Checker | 14 Nov 2019 |

# References

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| Artifact ID | Revision | Title |
| DT - 001 | 1.2 | Decision Tracking Artifact |
| CD-001 | 1.0 | Processor Concept Definition |
| CD-002 | 1.0 | User Interaction Concept Definition |
| CD-004 | 1.0 | Reactive Tracking Concept Definition |
| CD-006 | 1.1 | Predictive Tracking Concept Definition |
| XXXXX | 1.X | Decision Justification |
| GUIC-001 | 1.0 | GUI Concept 1 |
| GUIC-002 | 1.0 | GUI Concept 2 |
| GUIC-003 | 1.0 | GUI Concept 3 |
| GUIC-004 | 1.0 | GUI Concept 4 |

The purpose of this document is to summarize the process used to generate and select the chosen concepts throughout the concept development stage. For detailed information on concepts for each subsystem see the documents associated with it as referenced. To begin concept development the team met together and divided the project into three distinct subsystems. The subsystems were identified as the GUI, tracking method, and system architecture. Concepts were then brainstormed for each of subsystem.

The concepts were recorded, and feasibility analyses were performed. Many concepts were determined to be infeasible or outside the scope of the project. For a detailed description of the analysis see the decision tracking artifact (DT-001). After determining feasible concepts research was done to determine which should be pursued. The team divided into groups to work on concepts for each of the subsystems. Due to the varying nature of each subsystem different approaches were used to evaluate concepts for each subsystem.

For the GUI subsystem an initial layout was created. The layout went through several iterations with improvements made as more was figured out about required functionality and feedback was received. After several iterations the layout was shown to Mark Cataznaro and Daniel Gunyan of IMSAR for more feedback. They were impressed with the layout and identified minor areas of improvement. After implementing their feedback XX people were surveyed to assess how intuitive the GUI is. Fore more detail on the GUI design process see artifacts GUIC-001,-002, -003, -004, and XXX Based on the feedback received we are confident that the GUI will meet all related requirements and key success measures.

After the feasibility analysis was performed for the tracking method, we were left with two main approaches. A reactionary approach where we point the antenna at the last known location of the aircraft, and a predictive method where we determine the velocity of the aircraft and predict where it will be. To test the reactionary method a python script was developed to visualize the movement of the aircraft and the communication link’s field of view. With the field of view being updated at a rate of 2 Hz, the aircraft was easily maintained within the field of view. Additionally, IMSAR’s existing system uses a similar approach and maintains a communication link 100% of the time. Due to this and our own testing we are confident that this method will meet all relevant requirements and key success measures. For more details see CD-004 and CD-006.

The concepts relating to the system architecture dealt mainly with selecting which computer will run the software. Ideas such as hosting a web server to run the GUI were also discussed. The system architecture also defines how the various subsystems will interface with each other. To make a selection several computers were researched and compared. After researching several options, we decided to use a Raspberry Pi 3. It has all the necessary functionality for the purposes of this project. To test the Raspberry Pi, we hosted a server on it and tested the latency. The latency was found to be consistently below 3ms, which is sufficient for this application. See CD-001 and XXX for more information.