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PROPOSED TIME SCHEDULE

The proposed time schedule is based on the research strategy described in Section 10.5 and the verification and validation process described in Section 11.3. The total time that has to be spent on the thesis project is 1176 hours, or approximately 30 weeks. This schedule does not include any specific dates yet but describes the work that will have to be done per week up to the 30th week of the thesis project. It is assumed that a day has an effective work time of 8 hours. The schedule is presented in Table 12.1. The workload is split up into different work-packages or WP.

Table 12.1: Proposed time schedule thesis project

Task	Task description	Days	Date
WP 1	**Goal:** Acquire all the required software and get familiar with them **Input:** List of required software packages **Tasks:** • Acquire the required software • Install the software onto the computer • Familiarise myself with the software **Output:** Knowledge on the different software packages	 2 2 2 	08-02 till 25-02
WP 2	**Goal:** Learn C++ **Input:** Current programming experience **Tasks:** • Familiarise myself with the programming language • The different possibilities • The different functions • Write some simple scripts **Output:** Knowledge on C++ and C++ programming skills	 3 2 2 1 	08-02 till 25-02
WP 3	**Goal:** Design the detailed simulation and optimisation program architectures **Input:** Theoretical knowledge of the to be developed tools **Tasks:** • Design the detailed architecture of each of the software tools that have to be developed **Output:** Detailed architectures of the to be developed software tools	 8 	26-02 till 08-03

WP 4	**Goal:** Test the interpolation tool **Input:** The Mars-GRAM program and the multi-linear interpolation software tool from Tudat **Tasks:** • Verify the interpolation tool using using Mars-GRAM data • Document everything **Output:** Verified interpolation tool and documentation on the tool	 1 1 	09-03 till 10-03
WP 5	**Goal:** Test the RK4 integration tool **Input:** The RK4 integration tool from Tudat **Tasks:** • Verify the RK4 integration tool • Document everything **Output:** Verified RK4 integration tool and documentation on the tool	 1 1 	11-03 till 14-03
WP 6	**Goal:** Test the RKF45 integration tool **Input:** The RKF45 integration tool from Tudat **Tasks:** • Verify the RKF45 integration tool • Document everything **Output:** Verified RK4 integration tool and documentation on the tool	 1 1 	15-03 till 16-03
WP 7	**Goal:** Write the TSI integration tool **Input:** Theoretical knowledge on the TSI method and the detailed architecture of the TSI integration tool **Tasks:** • Write the TSI integration tool • Verify it • And validate • Document everything **Output:** TSI integration tool and documentation on the tool	 10 5 3 2 	17-03 till 14-04
WP 8	**Goal:** Include trajectory propagation **Input:** The RK4 integration tool, the interpolation tool, Mars-GRAM and the detailed architecture of the trajectory propagation tool **Tasks:** • Write the trajectory propagation tool • Verify it • Document everything **Output:** Trajectory tool, verified ascent simulation program, and documentation on the trajectory and ascent simulation program	 3 2 2 	15-04 till 25-04

WP 9	**Goal:** Validation of the ascent simulation program **Input:** Apollo flight data, Mars ascent simulation reference data, verified ascent simulation program **Tasks:** • Validate for the Moon • Validate for Mars • Document everything **Output:** Validated ascent simulation program and documentation on the ascent program	5 7 3	26-04 till 24-05 (Holiday included)
WP 10	**Goal:** Write the optimisation tool **Input:** The MBH tool from PaGMO, the SNOPT software and the detailed architecture of the optimisation tool **Tasks:** • Include SNOPT in the MBH tool from PaGMO • Verify it • And validate • Document everything **Output:** Validated optimisation tool and documentation on the tool	2 1 1 1	25-05 till 01-06
WP 11	**Goal:** Finish the complete ascent simulation and optimisation program **Input:** Mars ascent simulation reference data, validated ascent simulation program and the detailed architecture of the optimisation and simulation program **Tasks:** • Integrate optimisation tool into the ascent program • Verify it • And validate • Document everything **Output:** Validated ascent simulation and optimisation program and documentation on the ascent program	2 2 10 3	02-06 till 24-06
WP 12	**Goal:** Obtain optimised RKF45 ascent trajectory **Input:** MAV baseline data, initial conditions, target orbit and validated ascent simulation and optimisation program **Tasks:** • Optimise the ascent trajectory using RKF45 • Document everything **Output:** Optimised RKF45 ascent trajectory and documented results	7 4	27-06 till 12-07

WP 13	**Goal:** Obtain optimised TSI ascent trajectory **Input:** MAV baseline data, initial conditions, target orbit and validated ascent simulation and optimisation program **Tasks:** • Optimise the ascent trajectory using TSI • Document everything **Output:** Optimised TSI ascent trajectory and documented results	 7 4	13-07 till 21-07
WP 14	**Goal:** Analysis and comparison of results **Input:** Optimised RKF45 ascent trajectory, optimised TSI ascent trajectory **Tasks:** • Analyse the different trajectories • Compare the performance of both integrators • Document everything **Output:** Analysis and comparison of results and documentation on the results	 8 7 5	22-07 till 26-08
WP 15	**Goal:** Finish complete thesis report **Input:** All documentation of the previous work-packages and the results of the analysis **Tasks:** • Write the thesis report • Draw conclusions • Write recommendations **Output:** Finished draft thesis report	 5 1 1	29-08 till 07-09
Delay buffer	Have a few days as a buffer in case any delays occur	5	08-09 till 15-09
Draft thesis hand-in	Hand-in of the draft thesis report	1	16-09
WP 16	**Goal:** Finish final version of thesis report **Input:** Feedback and draft thesis report **Tasks:** • Implement all feedback into the draft thesis report **Output:** Finished final thesis report	 10	26-09 till 10-09
Final thesis hand-in	Hand-in of the final thesis report	1	12-09
Thesis defence	**Goal:** Graduate **Input:** Final thesis report and experience **Tasks:** • Defend my thesis **Output:** MSc title	 1	14-09