

# MASW APPROACH TO HMA QUALITY MANAGEMENT Project Schedule

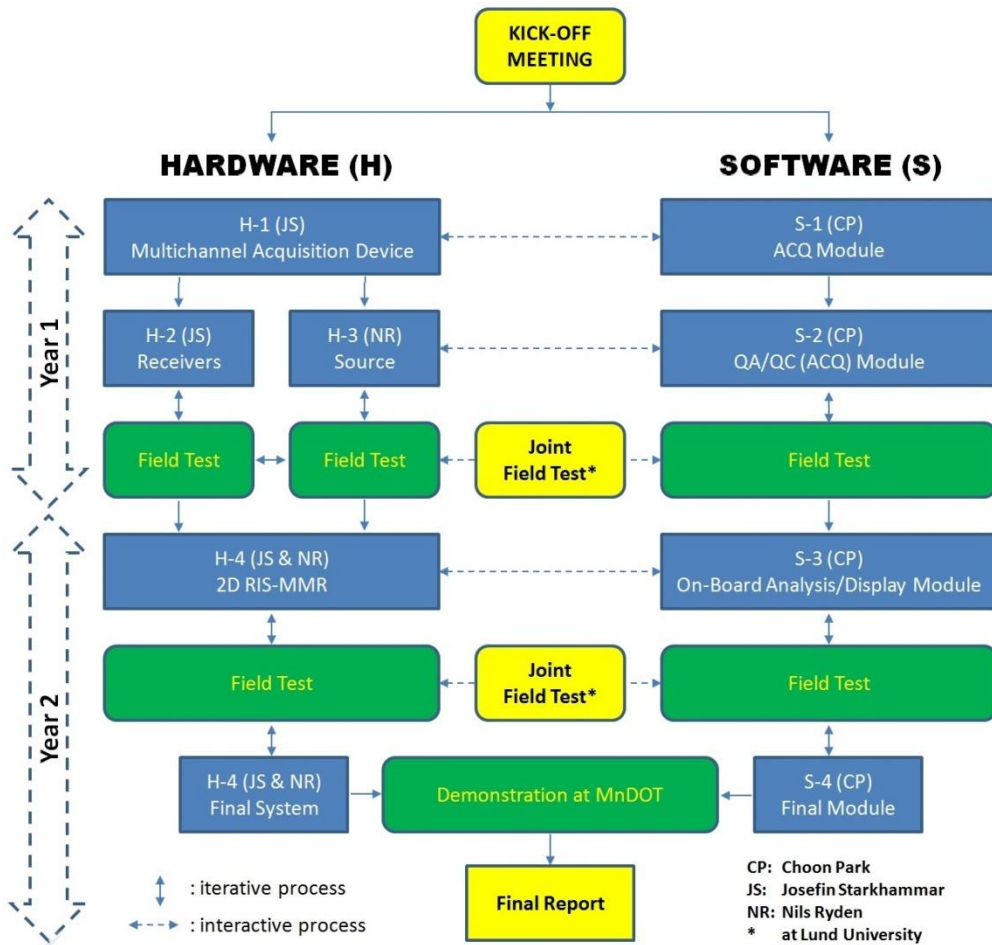
## Quarterly Breakdown Table

| Task Plan Schedule |                                     | Quarters/Months after Notice to Proceed |   |   |    |   |   |     |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
|--------------------|-------------------------------------|---|---|---|----|---|---|-----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|
|                    |                                     | Q1                                      |   |   | Q2 |   |   | Q3  |   |   | Q4 |    |    | Q5 |    |    | Q6 |    |    | Q7 |    |    | Q8 |    |    |   |
|                    |                                     | 1                                       | 2 | 3 | 4  | 5 | 6 | 7   | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |   |
| 1                  | Project Management & Administration | K                                       |   | Q |    |   |   | P,Q |   |   | Q  |    |    | Q  |    |    | Q  |    |    | Q  |    |    | Q  |    |    | P |
| 2                  | Hardware Development & Testing      |   |   |   |    |   |   | H   |   |   | H  |    |    | J  |    |    |    |    | H  |    |    | J  |    |    | HD |   |
| 3                  | Software Development & Testing      |   |   |   |    |   |   | S   |   |   |    |    |    |    |    |    |    | S  |    |    |    |    |    |    | SD |   |
| 4                  | Delivery & Demonstration            |   |   |   |    |   |   |     |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    | D  |   |
| 5                  | Final Report                        |   |   |   |    |   |   |     |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    | R  |   |

|                |   |                                  |      |                                    |   |                          |
|----------------|---|----------------------------------|------|------------------------------------|---|--------------------------|
| <b>Legend:</b> | K | Kick-off Meeting                 | H/HD | Hardware - Field Test/Deliverable  | D | Delivery & Demonstration |
|                | Q | Quarterly Reports                | S/SD | Software - Field Test/Deliverable  | R | Final Report             |
|                | P | Oral Presentation (NRRR Meeting) | J    | Joint Hardware/Software Field Test |   | Task Duration            |

## General Flowchart



## Deliverables

**Table 1: Timeline and Schedule of Tasks and Deliverables (Hardware)**

| TASKS   | I <sup>†</sup> | Deliverables   | Year 1 |    |    |    | Year 2 |    |    |    |  |
|---|----------------|--|--------|----|----|----|--------|----|----|----|--|
|   |                |  | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |  |
| <b>H-1. Multichannel Acquisition Device (MAD)</b> | JS             | <u>Quarterly Report* (Q1/Y1)</u><br>✓ photo of prototype system, initial performance evaluation, points to add/improve/modify, etc.  |        |    |    |    |        |    |    |    |  |
| <b>H-2. Receivers</b>                             | JS             | <u>Quarterly Report (Q2/Y1)</u><br>✓ photo of prototype longitudinal array (LA), initial multichannel data set with LA, points to add/improve/modify, etc.   |        |    |    |    |        |    |    |    |  |
| Field Test  |                | ✓ video clip and photo for outdoor testing, output data sets under different conditions (e.g., none, medium, and strong wind/traffic conditions) obtained by using a small hammer, points to add/improve/modify, etc.  |        |    |    |    |        |    |    |    |  |
| <b>H-3. Source</b>                                | NR             | <u>Quarterly Report (Q3/Y1)</u><br>✓ photo of prototype, brief description of operation principle, etc.  |        |    |    |    |        |    |    |    |  |
| Field Test  |                | ✓ video clip and photo of outside test, initial evaluation result with recorded data sets, points to add/improve/modify, etc.  |        |    |    |    |        |    |    |    |  |
| Joint (Hardware & Software)<br>Field Test**       | JS<br>NR<br>CP | <u>Quarterly Report (Q4/Y1)</u><br>✓ video clip and photo of outdoor test of hardware (single RI and single LA) and software system, initial evaluation result with obtained data sets (different wind, traffic, and moving speed), points to add/improve/modify, etc. |        |    |    |    |        |    |    |    |  |
| <b>H-4. 2D-RIS-MMR</b>                            | JS             | <u>Quarterly Report (Q1/Y2)</u><br>✓ photo of prototype, brief description of structure and configuration, etc.  |        |    |    |    |        |    |    |    |  |
| Field Test  | NR             | ✓ video clip and photo of outdoor test, initial evaluation result with recorded data sets under different rolling speeds (e.g., 1 MPH, 3 MPH, 5 MPH, 10 MPH, etc.).  |        |    |    |    |        |    |    |    |  |
| Joint (Hardware & Software)<br>Field Test**       | JS<br>NR<br>CP | <u>Quarterly Report (Q2/Y2)</u><br>✓ video clip and photo of outdoor test with combined system (2D-RIS-MMR and software), evaluation result with obtained data sets, points for finalization.  |        |    |    |    |        |    |    |    |  |
| <b>H-4. 2D-RIS-MMR (Final System)</b>             | JS<br>NR       | <u>Quarterly Report (Q3/Y2)</u><br>✓ video clip and photo of outdoor test of the finalized system (2D-RIS-MMR), evaluation result with obtained data sets for the points designated from previous joint field test.  |        |    |    |    |        |    |    |    |  |
| MnDOT Demonstration                               | ALL            | <u>Quarterly Report (Q4/Y2)</u><br>✓ Demonstration and delivery of finalized system (MAD & 2D-RIS-MMR)   |        |    |    |    |        |    |    |    |  |
| <b>Final Report</b>                               | ALL            | Compilation of all term reports with summary, conclusions, and recommendations.  |        |    |    |    |        |    |    |    |  |

\*Each investigator reports to PI (Choon Park) and PI reports to MnDOT every quarter.

<sup>†</sup>Investigator; CP (Choon Park), JS (Josefin Starkhammar), NR (Nils Ryden), \*\*in Lund, Sweden (or TBD)

**Table 2: Timeline and Schedule of Tasks and Deliverables (Software)**

| TASKS   | CI <sup>+</sup> | Deliverables  | Year 1 |    |    |    | Year 2 |    |    |    |
|---|-----------------|---|--------|----|----|----|--------|----|----|----|
|   |                 |   | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |
| <b>S-1. Acquisition Control Module</b>                | CP              | <u>Quarterly Report* (Q1/Y1)</u><br>✓ Flowcharts for this and final software package, and data-format prototype.<br>✓ Screen capture of module components and user's manual.<br>✓ Video clip – control test with multichannel acquisition device (MAD).                               |        |    |    |    |        |    |    |    |
| <b>S-2. QA/QC Module</b>                              | CP              | <u>Quarterly Report (Q2/Y1)</u><br>✓ Screen capture of module components and user's manual.   |        |    |    |    |        |    |    |    |
| <b>Field Test</b>                                     | CP              | <u>Quarterly Report (Q3/Y1)</u><br>✓ Video clip – field test (through simulation by using actual MAD data sets).<br>✓ Summary of AUTO performance (wind, traffic, and moving speed).  |        |    |    |    |        |    |    |    |
| Joint (Hardware & Software)<br>Field Test**           | CP<br>JS<br>NR  | <u>Quarterly Report (Q4/Y1)</u><br>✓ Video clip – pseudo-real-time analysis performance during outdoor execution.<br>✓ Summary of performance evaluation in accuracy, computing speed, and S/N for different data sets (wind, traffic, and moving speed).<br>✓ Points of improvement. |        |    |    |    |        |    |    |    |
| <b>S-3. On-board Pseudo-Real-Time Analysis Module</b> | CP              | <u>Quarterly Report (Q1/Y2)</u><br>✓ Screen capture of module components and user's manual.   |        |    |    |    |        |    |    |    |
| <b>Field Test</b>                                     |                 | ✓ Summary of AUTO performance with actual field data sets (wind, traffic, and rolling speed) in accuracy, computing speed, and graphical display of results.<br>✓ Points of improvement.  |        |    |    |    |        |    |    |    |
| Joint (Hardware & Software)<br>Field Test**           | CP<br>JS<br>NR  | <u>Quarterly Report (Q2/Y2)</u><br>✓ Video clip – outdoor execution with 2D-RIS-MMR.<br>✓ Summary of AUTO performance (wind, traffic, and rolling speed).<br>✓ Points to finalize the package.  |        |    |    |    |        |    |    |    |
| <b>S-4. Post-Acquisition Extended Analysis Module</b> | CP              | <u>Quarterly Report (Q3/Y2)</u><br>✓ Screen capture of module components and user's manual.<br>✓ Summary of performance evaluation (comparison of results and speed).   |        |    |    |    |        |    |    |    |
| <b>MnDOT Demonstration</b>                            | ALL             | <u>Quarterly Report (Q4/Y2)</u><br>✓ Demonstration and delivery of finalized software package on USB dongle and full user's manual.   |        |    |    |    |        |    |    |    |
| <b>Final Report</b>                                   | ALL             | Compilation of all term reports with summary, conclusions, and recommendations.   |        |    |    |    |        |    |    |    |

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