

Meeting Notes from the Third Technical Advisory Committee (TAC) Meeting for the Characterization of Unpaved Road Conditions Through the Use of Remote Sensing project.

*Lake Superior Conference Room, Michigan Tech Research Institute (MTRI)
3600 Green Court, Suite 100, Ann Arbor, MI
Thursday, March 24, 2015*

Attendees:

1. Colin Brooks, MTRI (PI)
2. Tim Colling, Michigan Technological University Center for Technology and Training (CTT) (Co PI)
3. Chris Roussi, MTRI (Co PI)
4. Valerie Lefler, Integrated Global Dimensions (IGD)
5. Nelda Buckley, Kansas DOT – Local Projects
6. Ken Skorseth, South Dakota Local Technical Assistance Program (LTAP)
7. Dave Huft, South Dakota DOT
8. Jay Carter, Road Commission for Oakland County (MI)
9. Ed Hug, Southeast Michigan Council of Governments (SEMCOG)
10. Richard Dobson, MTRI
11. David Dean, MTRI
12. Michelle Wienert, MTRI

Remote Attendees via GoToMeeting:

13. Caesar Singh, USDOT Office of the Assistant Secretary for Research and Technology (OST-R)
14. Mark Craft, Gratiot County (MI) Road Commission/National Association of County Engineers
15. Roger Surdahl, USDOT Federal Highway Administration (FHWA) - Central Federal Lands
16. Nick Verret, Parish of Natchitoches (Public Works), Louisiana

Summary of main points that came out of the TAC meeting:

1. An outreach system demonstration in Kansas is definitely of interest and could be completed this summer (2015).
2. Presenting at the 2015 NDLTAP Regional Local Roads Conference, and including an outreach system demonstration, is a good way to reach likely users in the upper Great Plains; last year's conference had 300 attendees from 11 states there and they were interested in K.Skorseth's initial overview. North and South Dakota have a strong need for this system's capabilities and we should continue to reach out to users in these states. The 2015 conference will take place October 21-22 in Rapid City, South Dakota in the western part of the state, also helping with reaching out to a new part of this state.
3. Louisiana is a better state for a 2016 demo; their TAC attendee is interested in the system but they have more trees over their roads so we would need to make sure we had places appropriate to demonstrating the strengths of our system.
4. There continues to be an interest in using the system for not only condition data, but also for other uses such as road intersection geometry assessment being of strong interest in South Dakota.

5. Improvements to the software system are worthwhile to getting the system more ready for practical commercial use. These include improvements to data flow, ease of use of processing scripts, and improvements to the ways that rut and washboarding data are evaluated.
6. Roadsoft GIS continues to be a good option for using the system's data for unpaved road asset management since the software is designed to fulfill this need, but the output XML data can be used in other GIS software as well, such as ArcGIS.
7. The AURA (Aerial Unpaved Road Assessment) system is a better acronym than URCAS, along with the tagline of "Effective unpaved road condition assessment and management" based on our TAC input. With the program manager's endorsement, the project team will move forward with this new name and tagline in our branding and outreach.
8. Finding a funded way to demonstrating this system to unpaved roads within Federal lands would be worthwhile.
9. Further documentation of costs for deployment is worthwhile to understand return on investment for potential users.
10. PI Brooks will work with the Kansas DOT representative (Nelda Buckley) and our South Dakota contacts (Ken Skorseth and Dave Huft) to complete the system outreach demonstrations planned for 2015.

Meeting minutes:

The meeting was called to order at 9:05 a.m. EDT, March 24, 2015, by PI Colin Brooks

Project Progress Overview – Colin Brooks

- Ken Skorseth and Doug Sherman presented "POTENTIAL FOR UNMANNED AERIAL VEHICLE (UAV) ASSESSMENT OF LOCAL ROADS" at the 2014 NDLTAP Conference in Rapid City SD, 300 people from 11 states attended conference (<http://www.ndltap.org/events/conference/>)
 - Ken is sending of attendees to Valerie Lefler
 - We are adding this to our list of the project's outreach presentations.
- Discussion about other output that may come from data collection for unpaved road condition:
 - Observation from Ken Skorseth and Dave Huft about increasing size of truck combinations on rural roads (as large as 2x48' combinations, may be as long as 130' total)
 - These large trucks are showing up on local roads
 - Turning radius a significant concern, particularly at:
 - Local road intersections
 - Farm entrances
 - Commercial entrances
 - Dave Huft added info about MAP-21 and South Dakota legislation
 - Local transportation plan required for funding of local roads

- Interested in intersection width and geometry
 - Both state and local roads
 - Also mentioned roadside hazards (road safety)
- Ken Skorseth added encroachment into road right of way as a significant concern that UAV-based remote sensing could help with.
 - Fences, landscaping, etc. locations relative to local roads – measure this.
- Dave Huft added that road surface condition is ephemeral, some of the other features that can be identified in imagery are slower to change
 - inventory/roadside furniture has a longer ‘life’
 - Inventory condition changes more slowly
 - bridge width, drainage slower to change
- Discussion held of possibility of flying under trees to collect data in areas with significant tree canopy over road surface.
 - Jay Carter noted that foliage/tree cover affect road condition particular during spring thaw
 - Shaded roads thaw later, hold more moisture
 - Can be soft when roads in the open are dry/dusty
 - Nick noted that canopy over roads is a concern in LA as well
 - Colin summarized that this would be a significant challenge with current technology, and the system developed for this project works best when flying over roads without major tree canopy over them.



Fig. 1: TAC members at MTRI sharing their input on project progress and next steps. Remote attendees were conferenced via web meeting software, including audio, video, and screen sharing. Pictured are (clockwise from left) Dave Huft, SD DOT; Valerie Lefler, IGD; Ed Hug, SEMCOG; Nelda Buckley, KS DOT; Chris Roussi, MTRI; Ken Skorseth, SD LTAP; Dave Dean, MTRI; Jay Carter, Road Commission for Oakland County (MI); Tim Colling, Michigan CTT; Michelle Wienert, MTRI.

Description of 2013 and 2014 Data Collections – Rick Dobson, MTRI, presented on the 2013 and 2014 data collections held in Michigan, Iowa, and Nebraska (2013) and South Dakota (2014).

- No comments from attendees.

Distress Data Algorithms, Results, & Improvements – Chris Roussi, MTRI, Associate PI

- Discussion about settings in algorithms and finding appropriate values in the ROC
 - How are criteria (ROC values) vs existing standards
- Ken Skorseth asked about the ability of the algorithms to differentiate between rutting and float aggregate. The algorithm can do both; float aggregate berms are just an inverse rut and can also be detected.
- Discussion about observer vs algorithm sensitivity – subjective vs objective analysis of road condition
 - Some want objective analysis to match subjective
 - ‘Ground truth’ is difficult, these data are more a partial ground observation data set vs. remote sensing that captures data on the entire surveyed area.
 - Results from quantitative measurement will be different from subjective
 - May not be productive to try and make objective data match subjective
 - Subjective data collection is a sampling methodology, objective data collection measures the entire road surface

Decision Support System Integration with GIS – Dr. Tim Colling, P.E., MTU CTT, Associate PI, presented on how the resulting geospatial distress data can be integrated with the RoadSoft GIS DSS tool, but can also be used with other GIS software. Using RoadSoft GIS as an unpaved road asset management tool means that agencies are getting the advantage of existing software available to do exactly this task – prioritize road maintenance efforts based on condition data.

- No additional comments from attendees.

Outreach & Demonstration Discussion for 2015 and 2016 –Valerie Lefler, Integrated Global Dimensions, & Colin Brooks, MTRI.

- Discussion on new system name/acronym and taglines
 - Three acronyms and taglines offered based on team discussions.
 - Attendees (in person and online) were asked to discuss and eventually vote on which they preferred.
 - Current acronym: **URCAS** – Unsurfaced Road Condition Assessment System
 - New acronyms under consideration:

- **RSAT** – Road Safety Assessment Tool
 - **AURA** – Aerial Unpaved Road Assessment
 - **ATTEST** – Aerial TransporTation Assessment Tool
- Tag Line Options – a quick description of the system that adds to the acronym-based name:
 - Rapid Road Safety Assessment Tool
 - Effective Rural Road Safety Assessment & Management
 - Affordable, Effective, Efficient Road Management
- *Selected Acronym and Tagline based on TAC feedback:*
 - **AURA** – (Aerial Unpaved Road Assessment) – The AURA system.
 - “Effective unpaved road condition assessment and management” (Tagline describing the system).
- Conversation came back to (as part of a future project) adding road geometry measurements to the algorithm
 - Road width, curvature, intersection geometry, slope and gradients were mentioned as geometric elements of interest. The project team is evaluating what technical steps would be needed to calculate and assess intersection geometry.
- Roger Surdah led discussion of the National Park Service, Fish and Wildlife Service, Bureau of Land Management, US Forest Service as potential customers for this kind of product; he thinks they would be interested in its capabilities.

Discussion time for information shared during morning sessions – Colin Brooks

- Ken Skorseth and Dave Huft came back to changes in traffic on local roads that affect condition of the roads
 - Dairy operations built on local roads cause a sudden increase in traffic (particularly trucks) on roads not built to support truck traffic volumes (this happened in eastern South Dakota)
 - Road geometry concerns an issue - large trucks’ turning radius causing changes to intersection geometry
 - It was suggested that MTRI attend the 2015 NDLTAP Conference in Rapid City SD
 - Fly a public UAV demo
 - Demo/Presentation/case study at NDLTAP conference

Lunch (including additional discussion time)/ Remote control hexacopter field demonstration



Fig. 2: Hexacopter flight demonstration at TAC Meeting in Ann Arbor. Attendees Nelda Buckley (Kansas DOT), Ed Hug (SEMCOG), and Jay Carter (RCOC) were able to see the system's platform and Nikon D800 collect data for their first time.

Discussion of next steps for outreach, demonstrations, and implementation.

- Colin asked about a potential site for a demo in Kansas, area around Salina KS may be appropriate, based on Kansas DOT's interest and similarity to less-tree covered areas where the system works best. Nelda Buckley indicated that several areas could be suitable, such as near Salina, KS, an agricultural area with few trees near roads.
- Nelda Buckley (KS DOT) mentioned County Safety Plans (in KS) potentially needing data that the project's system could provide.
 - 3 counties in KS pilot program, total 105 counties in KS
 - Change from a 'hotspot' to systemic road safety plan
 - Assess geometry, road width, roadside obstructions...
 - Applies to local roads, major collectors
 - Some paved, some not
 - Eventually applied to all roads in KS
 - KS Departments of Parks/Wildlife potential customers
 - Question about whether system would work on sand roads in SW KS
 - Consensus is that it probably could
- NDLTAP Conference in Rapid City SD (Local Roads Conference) October 21-22 2015. In 2014, 300 people from 11 states attended in 2014 (<http://www.ndltap.org/events/conference/>) – the TAC endorsed presenting at this major outreach opportunity.

- Ken Skorseth discussed things that could be seen from the air but were not necessarily visible from the ground
 - Pipe end/washout beside road in tall vegetation difficult to see from road, clearer in aerials (sample in presentation given at 2014 LTAP conference from South Dakota demonstration)
 - Dave Huft talked about emergency road assessment – can fly over and assess road segments from air that are not accessible by road because of damage.
- Roger Surdahl asked about an example of ROI/ Deployment cost question
 - Show ‘5x benefit’ on investment to potential users and they will want to use it.
 - PI Colin Brooks described the cost assessment included in Deliverable 7-B, the Phase I Performance Evaluation report, where the system can collect data at a cost of \$0.74 / mile vs. \$8.05/mile for less-detailed Michigan PASER data, \$10.26/mile for manned aircraft based data collection, and \$160/mile for equivalent detailed data based on Wyoming manual methods. The 7-B report is available on the www.mtri.org/unpaved project web page, at http://geodjango.mtri.org/unpaved/media/doc/deliverable_Deliverable_7_B_PerformanceEvaluation_Final_2013-11-27_updated_1.pdf.
- Ken Skorseth commented about the possibility of paved road condition assessment
 - Ken was impressed by the detail available in aerials. The system can do paved roads as well, but lower traffic unpaved roads were the focus for Phase I for practical testing and deployment of the system.

Meeting Concluded at 3:10 pm, EDT.

"The views, opinions, findings and conclusions reflected in this presentation are the responsibility of the authors only and do not represent the official policy or position of the USDOT/OST-R, or any State or other entity"

Original distributed agenda:

Characterization of Unpaved Road Conditions Through the Use of Remote Sensing

Agenda – Tuesday, March 24, 2015

Technical Advisory Committee (TAC) Meeting: Project Progress and Next Steps for Outreach & Implementation

Lake Superior Conference Room, Michigan Tech Research Institute, 3600 Green Court, Suite 100, Ann Arbor, MI

8:30 - 9:00 am: Sign-in time and continental breakfast

9:00 - 9:30 am: Project Progress Overview - Colin Brooks, MTRI, Principal Investigator

9:30 – 10:00 am: Description of 2013 and 2014 data collections – Rick Dobson, MTRI

10:00 – 10:30 am: Distress data algorithms, results, & improvements – Chris Roussi, MTRI, Associate PI

10:30 - 11:00 am: Decision support system integration with GIS – Dr. Tim Colling, P.E., CTT, Associate PI

11:00 – 11:30 am: Outreach & Demonstration Discussion for 2015 and 2016 – Colin Brooks, MTRI & Valerie Lefler, MPA, Integrated Global Dimensions

11:30am – 12:00 pm: Discussion time for information shared in the morning.

12:00 - 1:00 pm: Lunch (including additional discussion time)

1:00 – 2:00 pm: Remote control hexacopter demonstration in the field (*weather permitting*)

2:00 – 3:00 pm: Discussion of next steps for outreach, demonstrations, and implementation.

Teleconference Call-In Information: Tuesday, Mar 24, Starting 9:00 AM Eastern Daylight Time

- Please join the meeting from your computer, tablet or smartphone using this link:
<https://global.gotomeeting.com/join/280279157>
- You can also dial in using your phone (but you should still connect to the GoToMeeting link to see slides):
United States (Long distance): +1 (213) 493-0622
Access Code: 280-279-157

Project reports are available at <http://www.mtri.org/unpaved/> under “Tasks and Deliverables”; TAC members are encouraged to review these ahead of the meeting, especially the Phase I final report (Deliverable 8-B).



www.mtri.org/unpaved

