

B.5 DOT QUESTIONNAIRE

GUIDELINES FOR THE USE OF MOBILE LIDAR IN TRANSPORTATION APPLICATIONS

Dear survey participant,

Your organization has been identified as an important contributor to this project. As part of NHCRP15-44 "Guidelines for the Use of mobile LIDAR in Transportation Applications" the research team needs to acquire information related to the following objectives:

1. Determining the current and planned use of mobile LIDAR to support survey, project planning, project development, construction, operations, maintenance, safety, research and asset management.
2. Understanding the implications associated with the use of mobile LIDAR on design, construction, contracting practices, data management, and other related issues within your organization.

Your organization's expertise and experience is critical to the success of this important project. The survey is organized into two parts based on the objectives listed above. The survey should take approximately 15 minutes to complete. Once again we thank your organization in advance for your time and thoughtful consideration.

Please pass this survey onto others who could add value to this effort. Should you have any questions or concerns, or if you would like more information regarding this project, please contact:

Michael Olsen, Ph.D.
Assistant Professor of Geomatics
School of Civil and Construction Engineering
Oregon State University
Email: michael.olsen@oregonstate.edu
Phone: (541)-737-9327
<http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2972>

1) Please provide the name of your organization/DOT

2) Within your unit of your organization, what types of services does your unit provide?

Multiple selections ok

- | | | |
|---|--|---|
| <input type="checkbox"/> Asset Management/Inventory | <input type="checkbox"/> Construction | <input type="checkbox"/> Engineering Design |
| <input type="checkbox"/> Geomatics/Surveying | <input type="checkbox"/> Maintenance | <input type="checkbox"/> Operations |
| <input type="checkbox"/> Project Planning | <input type="checkbox"/> Project Development | <input type="checkbox"/> Research |
| <input type="checkbox"/> Safety | <input type="checkbox"/> Other | |
-

3) How familiar are members of your department with 3D laser scanning and/or LIDAR?

Unfamiliar Expert
() Not Sure () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10

4) How familiar are members of your department with mobile LIDAR/laser scanning systems?

Unfamiliar Expert
() Not Sure () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10

5) How important are these technologies to the future operations within your organization?

Not Important Very Important
() Not Sure () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10

6) Additional comments?

7) Does your organization currently have published surveying and/or quality control standards?

() Yes () No

How familiar are members of your department with the current field surveying and related quality control standards within your organization?

Unfamiliar Expert
() Not Sure () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10

Do your organization's current published surveying standards cover the use of static laser scanning?

() Yes () No

Do your organization's current published survey standards cover the use of mobile LIDAR/laser scanning?

() Yes () No

8) Additional comments?

9) Currently what percent of surveying work/data acquisition is performed in-house vs. contracted out to private firms?

() 0% () 10% () 20% () 30% () 40% () 50% () 60% () 70% () 80% () 90% () 100% () Not Sure

10) What percent of the design work in your organization is performed in-house vs. contracted out to private firms?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not Sure

11) Additional comments?

12) Over the past 12 months approximately how many projects within your department have involved the use of (If not sure, number of projects may be left blank):

	Yes	Number of projects
Mobile LIDAR	<input type="checkbox"/>	_____
Static laser scanning	<input type="checkbox"/>	_____
Airborne LIDAR	<input type="checkbox"/>	_____
Not sure	<input type="checkbox"/>	_____

13) Over the next 5 years, how important will the use of mobile LIDAR become in your organization?

Not Important Very Important
 Not Sure 1 2 3 4 5 6 7 8 9 10

14) Additional comments?

15) Does your organization have any direct experience with the use of mobile LIDAR/laser scanning?

Yes No

If so, for what applications?

- | | | |
|---|---|---|
| <input type="checkbox"/> Engineering survey | <input type="checkbox"/> Mapping | <input type="checkbox"/> Digital Terrain Modeling |
| <input type="checkbox"/> Earthwork quantities | <input type="checkbox"/> Drainage analysis | <input type="checkbox"/> Pavement analysis |
| <input type="checkbox"/> Intersection upgrade | <input type="checkbox"/> Clearance surveys | <input type="checkbox"/> Sign inventory |
| <input type="checkbox"/> Urban modeling/GIS | <input type="checkbox"/> Safety projects | <input type="checkbox"/> Construction |
| <input type="checkbox"/> Accident investigation | <input type="checkbox"/> Slope stability/Landslides | <input type="checkbox"/> Emergency response |
| <input type="checkbox"/> Other | | |
-

Which of the following mobile laser scanning applications might your organization pursue in the next 5 years?

- | | | |
|---|---|---|
| <input type="checkbox"/> Engineering survey | <input type="checkbox"/> Mapping | <input type="checkbox"/> Digital Terrain Modeling |
| <input type="checkbox"/> Earthwork quantities | <input type="checkbox"/> Drainage analysis | <input type="checkbox"/> Pavement analysis |
| <input type="checkbox"/> Intersection upgrade | <input type="checkbox"/> Clearance surveys | <input type="checkbox"/> Sign inventory |
| <input type="checkbox"/> Urban modeling/GIS | <input type="checkbox"/> Safety projects | <input type="checkbox"/> Construction |
| <input type="checkbox"/> Accident investigation | <input type="checkbox"/> Slope stability/Landslides | <input type="checkbox"/> Emergency response |
| <input type="checkbox"/> Other | | |
-

16) What challenges has your organization experienced when performing mobile LIDAR surveys

- Accuracy Cost Availability Weather related
 Technical expertise Traffic Size and complexity of datasets
 Software interoperability/data exchange Organizational
 No challenges Don't perform mobile scans Other challenges

17) In what areas would guidelines be most helpful to your organization regarding the use of mobile LIDAR/laser scanning?

- Survey accuracy QA/QC procedures Data interoperability
 Data management Software integration Other

18) Additional comments?

19) Where is your organization in terms of the transition from 2D to 3D?

- We use only 2D CAD and GIS software
 We are currently transitioning to 3D workflows
 We have transitioned to 3D workflows in software such as CAD and GIS
 Not sure

20) Additional comments?

21) Currently, what percent of the technical workflows in your organization use 3D data?

- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not Sure

22) What percent of the overall technical workflows in your organization would benefit from the use of 3D data and/or visualization?

- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not Sure

23) What is holding back the adoption of 3D workflows?

- Technical expertise Value proposition Software
 Inertia Funding Organizational issues
 Not Sure Other

24) Additional comments?

25) What is the level of accuracy and resolution required to support each of your departments' daily workflows?

	Accuracy	Resolution
mm level	<input type="checkbox"/>	<input type="checkbox"/>
cm level	<input type="checkbox"/>	<input type="checkbox"/>
dm level	<input type="checkbox"/>	<input type="checkbox"/>
m level	<input type="checkbox"/>	<input type="checkbox"/>

- 26) How is geospatial/survey data currently managed within your organization?
() Centrally located and updated by each department
() Differently within each individual department

27) Additional comments?

28) Can you recommend other individuals in your organization that would have an interest in responding to this survey?

29) Who is the primary contact for geospatial technology in your organization, and what is that individual's contact information?

Thank You!

Thank you for participating in our survey. Your response is very important to us.
If you are interested in the results of the project please contact:

Dr. Michael Olsen
Assistant Professor of Geomatics
School of Civil and Construction Engineering
Oregon State University
Email: michael.olsen@oregonstate.edu
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B.6 SERVICE PROVIDER QUESTIONNAIRE

GUIDELINES FOR THE USE OF MOBILE LIDAR IN TRANSPORTATION APPLICATIONS

Hello. Your company has been identified as a potential contributor to an important Transportation Research Board –TRB project. As part of NCHRP 15-44, entitled “Guidelines for the Use of mobile LIDAR in Transportation Applications” the research team is in the process of acquiring information from all of the DOTs, transportation related agencies, and the service provider community here in the US. The primary objectives of these surveys and interviews are to:

1. Determine the current and planned use of mobile LIDAR within the DOTs in support of survey, project planning, project development, construction, operations, maintenance, safety, research and asset management.
2. Understand the implications associated with the use of mobile LIDAR by the DOTs for design, construction, contracting practices, data management, and other related activities.

In addition to the DOTs the research team is also interviewing a limited number of service providers that are involved with the use of mobile LIDAR. We are seeking input from the service provider community concerning how the DOTs can make the transition to the use of mobile LIDAR data acquisition as streamlined as possible.

Your organization's expertise and experience is critical to the success of this important project. The interview is organized into two parts based on the objectives listed above. The interview should take approximately 30 minutes to complete.

Should you have any questions or concerns, or if you would like more information regarding this project, please contact:

Michael Olsen, Ph.D.

Assistant Professor of Geomatics

School of Civil and Construction Engineering

Oregon State University

<http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=2972>

PLEASE NOTE: At the top of every page there is a link that allows you to save your work and continue the survey at a later time.

1) Company Name

2) Department Name (if applicable)

3) How long has your company been involved with 3D laser scanning and/or static LIDAR?

Not Sure

Years: _____

4) How long has your company been involved with mobile LIDAR/laser scanning systems?

Not Sure

Years: _____

5) On a scale of 1 to 10, where 10 is extremely important, how important are LIDAR-based acquisition technologies to future DOT survey operations?

Not Important

Very Important

Not Sure 1 2 3 4 5 6 7 8 9 10

6) Do most DOTs currently have published surveying and/or quality control standards?

Yes No

Please Identify DOTs with Standards

7) Do most DOTs current published surveying standards cover the use of static laser scanning?

Yes No

Please Identify DOTs with Standards

8) Do most DOTs current published survey standards cover the use of mobile LIDAR/laser scanning?

Yes No

Please Identify DOTs with Standards

9) Does your company recommend that each DOT develop their own static laser scanning and/or mobile LIDAR standards?

Yes No

10) If not, would a single standard that all DOTs adopt be preferred?

Yes No

11) Additional Comments?

12) Currently what percent of your company's mobile LIDAR- related business involves a DOT?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not Sure

13) What percent of the DOTs your company is tracking, or are currently working with, are investigating the use of mobile LIDAR?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not Sure

14) What percent of the DOTs your company is tracking or are currently working with are using mobile LIDAR?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not Sure

15) What percent will be working with mobile LIDAR within the next 5 years?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100% Not Sure

16) For the mobile LIDAR projects that your company has been involved in what applications have the data been acquired for?

Choose all that apply

- | | | |
|---|---|---|
| <input type="checkbox"/> Engineering survey | <input type="checkbox"/> Mapping | <input type="checkbox"/> Digital Terrain Modeling |
| <input type="checkbox"/> Earthwork quantities | <input type="checkbox"/> Drainage analysis | <input type="checkbox"/> Pavement analysis |
| <input type="checkbox"/> Intersection upgrade | <input type="checkbox"/> Clearance surveys | <input type="checkbox"/> Sign inventory |
| <input type="checkbox"/> Urban modeling/GIS | <input type="checkbox"/> Safety projects | <input type="checkbox"/> Construction |
| <input type="checkbox"/> Accident investigation | <input type="checkbox"/> Slope stability/Landslides | <input type="checkbox"/> Emergency response |
| <input type="checkbox"/> Other | | |

17) Over the next 5 years which of the following mobile LIDAR applications would your company expect to support?

Choose all that apply

- | | | |
|---|---|---|
| <input type="checkbox"/> Engineering survey | <input type="checkbox"/> Mapping | <input type="checkbox"/> Digital Terrain Modeling |
| <input type="checkbox"/> Earthwork quantities | <input type="checkbox"/> Drainage analysis | <input type="checkbox"/> Pavement analysis |
| <input type="checkbox"/> Intersection upgrade | <input type="checkbox"/> Clearance surveys | <input type="checkbox"/> Sign inventory |
| <input type="checkbox"/> Urban modeling/GIS | <input type="checkbox"/> Safety projects | <input type="checkbox"/> Construction |
| <input type="checkbox"/> Accident investigation | <input type="checkbox"/> Slope stability/Landslides | <input type="checkbox"/> Emergency response |
| <input type="checkbox"/> Other | | |

18) In what areas would DOT guidelines be most helpful to your company regarding the procurement of mobile LIDAR/laser scanning products and/or services?

Check all that apply.

- | | | |
|--|---|--|
| <input type="checkbox"/> Survey accuracy | <input type="checkbox"/> QA/QC procedures | <input type="checkbox"/> Data interoperability |
| <input type="checkbox"/> Data management | <input type="checkbox"/> Software integration | <input type="checkbox"/> Other |

19) What percent of DOTs that your company works with are:

Percentages must add to 100%

	%
Only using 2D/2.5D CAD and GIS software	_____
Currently transitioning from 2D/2.5D to 3D model-based workflows	_____
Have transitioned from 2D/2.5D to 3D model-based workflows in software such as CAD and GIS	_____

Not sure

20) What are the top 3 issues holding back the adoption of 3D model-based workflows in the DOTs?

- Technical expertise
- Inertia
- Not Sure
- Value proposition
- Funding
- Other
- Software
- Organizational issues

21) What are the top 3 factors delaying the adoption of mobile LIDAR by the DOTs?

- Technical expertise
- Misinformation
- Funding
- Size and complexity of datasets
- No challenges
- Value proposition
- Software
- Organizational issues
- Software interoperability/data exchange
- Cost
- Lack of standards
- Inertia
- Requirement for 2D deliverables
- Other challenges

22) What could the DOTs do to streamline the adoption of mobile LIDAR?

23) What can the DOTs do to streamline the procurement process for mobile LIDAR?

24) What is the maximum level of horizontal and vertical accuracy that your company specifies is achievable with mobile LIDAR?

25) What order of survey control is needed to achieve this? Please specify methods used.

26) What level of accuracy and minimum point density would your company specify as being required for each of the following:

	Accuracy	Minimum Point Density
Engineering survey	_____	_____
Bridge Clearance	_____	_____
Paving	_____	_____
Drainage	_____	_____
Utility	_____	_____
Pavement management	_____	_____
Sign inventory	_____	_____
Highway construction	_____	_____
Bridge construction	_____	_____
Asset inventory	_____	_____

27) Is it necessary for a mobile LIDAR service provider to report on their survey methodology as part of the project deliverable, or just certify as to the final accuracy? Please explain.

28) What does your company think should be included as part of the final deliverables from a mobile LIDAR survey?

29) How do you see the use of mobile LIDAR fitting in with the increasing use of performance-based specifications?

30) How is your company integrating airborne/static and mobile LIDAR data?

31) How does your company perceive that geospatial/survey data is currently managed within the DOTs in general?

- Centrally located and updated by each department
- Differently within each individual department

32) Can you recommend other individuals that might have an interest in responding to this survey?

33) Is there a primary contact for mobile LIDAR in your organization, and what is that individual's contact information?

34) Any additional comments or concerns?

Thank You!

Thank you for participating in our survey. Your response is very important to us. If you are interested in the results of the project please contact:

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