DEVELOPMENT OF A STATEWIDE CRASH MAP: INCORPORATING STATEWIDE CRASH MAPPING CAPABILITIES INTO PRACTICE

2013 GIS-T Symposium
Boise, ID
May 6 2013

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Topics Covered

- WI Local Government Overview
- What is the Wisconsin Information System for Local Roads (WISLR)?
- Program Overview
- WISLR / University of Alabama (UA) Process
- Safety Initiatives
- Crash Mapping Automation Tool (C-MAT)
WI Local Government Overview

- **Counties**: 72
- **Cities**: 190
- **Villages**: 403
- **Towns**: 1,258
What is WISLR?

- **WISLR** is the WEB-based GIS system
  - Supports Section 86.302(1) of the Wisconsin Statutes
    - Local Road Inventory and Certification

- **WISLR** is maintained by WisDOT
  - Mileage in WISLR used in General Transportation Aids (GTA) computations
WEB Access

- **Statewide** local road data and linework
- Multiple Years (2002):
  - WISLR Reports
  - CVT Maps
- WisDOT Inventory & Cert Forms
  - Construction Report Form
  - Roadway Data Collection Information
  - Related Local Road Statutes
Over 5,800 internal and external users

Users range from:
- WisDOT
- Other State Agencies
- Counties
- Local Governments
  - Mayors, Village Presidents, Town Chairs
  - Clerks
  - Treasurers
- MPO\RPC
WISCONSIN DEPARTMENT OF TRANSPORTATION

- Establish new dept policy
- Training
- Provide Hardware/Software
- Identify Locations
- Communication with UA Tech Lead

University of Alabama

- Check out/in process
- Remove STN linework
- Add new STN linework
- Reshape
- Monitor routes

WISCONSIN DEPARTMENT OF TRANSPORTATION

- Perform QA / QC
- Troubleshoot data/application
- Monitor status
- Included in LR & HPMS programs

WISLR / UA Process
• HPMS Submittal - LRS
• TraCS 10
• Incident Locator Tool (ILT)
• MV4000 Revision
• Federal and Department Safety analysis
• Crash Map
• Locate state and off-state crashes on a single map

• Display multiple years of crash data

• Perform location-specific, GIS-enabled safety analysis

Crash Mapping Scope
Improve data and decision support for highway safety analysis by providing a statewide crash map.

The goal can be achieved through the following objectives:

1. Develop an ESRI shape file of crash locations on WISLR
2. Develop QA/QC processes implemented in C-MAT
3. Automate and expedite the mapping process using programming languages (Java, Oracle, and ArcGIS)
Crash Location Description in the Motor Vehicle Accident Report

<table>
<thead>
<tr>
<th>14 - On Hwy No.</th>
<th>14 - On Street Name</th>
<th>14 - Bus/Fmt/Rmp</th>
<th>15 - Est. Dist</th>
<th>Ft/Mi</th>
<th>15 - Hwy, Dir</th>
</tr>
</thead>
<tbody>
<tr>
<td>N PARK ST</td>
<td>238</td>
<td></td>
<td></td>
<td></td>
<td>WEST</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>16 - Fri/At Hwy No.</th>
<th>16 - From/At Street Name</th>
<th>16 - Business/Frontage/Ramp</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANGDON ST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Crash Data**

[Table of crash data]

**TraCS**

**WisDOT Crash Data**
Flowchart of crash mapping

Raw crash data

Set SpellingchkCnt = 0

MP case?

Use same pty & WISLR table

Found?

N

Bridge table?

Y

Use adj. pty & WISLR table

Found?

N

Spellingchkcnt < 2?

Y

Can’t find

Spelling check
SpellingchkCnt += 1

Use same pty & MP table

Found?

N

Use adj. pty & MP table

Found?

Y

Milepost

Bridge

Same Municipality

Different Municipality

Crash map
Intersection-level Crash Mapping

Parsing
- Validation
- Standardization

Matching
- Spelling check
- Adj. muni check
Segment-level Crash Mapping
• If termini link node = FROM, link offset = INTDIS-\((\sum_{i=1}^{n-1} L_i)\)
• If termini link node = TO, link offset = \((\sum_{i=1}^{n} L_i)\)-INTDIS
Visual & system checks
- Compared with other map sources (Google map, digitized crash map)

Debugging & flagging
- debugging details
- feedback about source data
- manual cleanup

Confidence level
- sum of weighted flags
- 8-point scale

Quality Check / Assurance
## Results

### Map outcome summary statistics.

<table>
<thead>
<tr>
<th></th>
<th>Uniquely mapped</th>
<th>Duplicates</th>
<th>Not mapped</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local roads</strong></td>
<td>258,114 (82.59% of state wide crashes on local roads)</td>
<td>22,217 (7.11% of state wide crashes on local roads)</td>
<td>32,182 (10.30% of state wide crashes on local roads)</td>
<td><strong>312,513</strong> (53.26% of total crashes are on local roads)</td>
</tr>
<tr>
<td><strong>Total state wide</strong></td>
<td>280,311 (89.70% of the local road crashes mapped)</td>
<td>55,973 (20.41% of state wide crashes on state routes)</td>
<td>55,566 (20.26% of total crashes are on state routes)</td>
<td><strong>371,850</strong></td>
</tr>
<tr>
<td><strong>State routes</strong></td>
<td>162,672 (59.32% of state wide crashes on state routes)</td>
<td>78,190 (13.33% of state wide crashes mapped to duplicate locations)</td>
<td>87,748 (14.96% of state wide crashes did not map)</td>
<td>274,411 (46.74% of total crashes are on state routes)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>420,786 (71.72% of state wide crashes mapped uniquely)</td>
<td>78,190 (13.33% of state wide crashes mapped to duplicate locations)</td>
<td>87,748 (14.96% of state wide crashes did not map)</td>
<td><strong>586,724</strong> (total mappable crashes)</td>
</tr>
</tbody>
</table>

**498,976 (85.04% of the mappable crashes or 82.71% of the total crashes were mapped)**

### Segment related crashes

<table>
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<tr>
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<th>Uniquely mapped</th>
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<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local roads</strong></td>
<td>156,499 (81.67% of segment crashes on local roads)</td>
<td>15,230 (7.95% of segment crashes on local roads)</td>
<td>19,883 (10.38% of segment crashes on local roads)</td>
<td><strong>191,612</strong> (52.64% of total segment crashes are on local roads)</td>
</tr>
<tr>
<td><strong>State routes</strong></td>
<td>94,819 (55.01% of segment crashes on state routes)</td>
<td>36,293 (21.06% of segment crashes on state routes)</td>
<td>41,247 (23.93% of segment crashes are on state routes)</td>
<td><strong>172,359</strong> (47.36% of total segment crashes are on state routes)</td>
</tr>
</tbody>
</table>

### Intersection related crashes

<table>
<thead>
<tr>
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<th>Not mapped</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local roads</strong></td>
<td>101,615 (84.05% of intersection crashes on local roads)</td>
<td>6987 (5.78% of intersection crashes on local roads)</td>
<td>12,299 (10.17% of intersection crashes on local roads)</td>
<td><strong>120,901</strong> (54.28% of total crashes are on local roads)</td>
</tr>
<tr>
<td><strong>State routes</strong></td>
<td>67,853 (66.62% of intersection crashes on state routes)</td>
<td>19,680 (19.32% of intersection crashes on state routes)</td>
<td>14,319 (14.06% of intersection crashes on state routes)</td>
<td><strong>101,852</strong> (45.72% of total crashes are intersection related)</td>
</tr>
</tbody>
</table>

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*a* Of the 603,267 crashes in Wisconsin between 2005 and 2009, only 586,724 had complete location information reported.
City of Madison Crashes 2012
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