Caltrans IRIS – T3 Webinar

T3 Webinars are brought to you by the ITS Professional Capacity Building Program (ITS PCB) at the U.S. Department of Transportation’s (USDOT) ITS Joint Program Office, Research and Innovative Technology Administration (RITA)
FHWA Perspective

- Support Knowledge and Technology transfer
- Share knowledge regarding open source software in transportation
- Encourage inter-agency cooperatives and initiatives
Agenda

- **IRIS Project Background**
  - (Stan Slavin, Caltrans Headquarters)

- **Stockton IRIS Demo**
  - Toni Moon, TMC Supervisor

- **Software Integration**
  - Michael Darter, AHMCT

- **Mn/DOT IRIS Demo**
  - Doug Lau, Mn/DOT
Caltrans IRIS: Project Background

Stan Slavin
ITS Projects & Standards
ATMS Deployment and Support
Caltrans
sslavin@dot.ca.gov
(916) 653-3068
Caltrans ATMS

- Proprietary, No license fees
- Nonexclusive ownership
  - Shared freely with any California agency
  - Maintained by developer or 3rd party
  - Nondisclosure Agreement
- Baseline version: Districts 3, 8, 12
- Advanced versions: Districts 4, 7, 11
- Commercial-Off-The-Shelf (COTS) Software
  - $250,000 onetime (per installation)
  - $50,000 annually (per installation)
- End of life components
The Search for Open Source

- High costs of COTS Software
- Flexibility in contracting software maintenance
- Research on open sourcing ATMS
What ‘open source’ means...

- Software is knowledge that is freely shared
  - Software distributed w/ source code
    - Linux, MySQL, Apache
  - Copyrighted, Perpetual free license
  - Maintained by a community
  - No warranty

Results in...

- Little or no acquisition costs
- Collaborative development model
  - Peer review of code
- Shared costs and risks
- Reduces customer “lock-in”
What is IRIS?

- Integrated Roadway Information System (IRIS)
  - Advanced Transportation Management System (ATMS)
- Developed in-house by Minnesota DOT
- Looking for partners to maintain and evolve
- Mn/DOT IRIS: GNU GPL version 2 (1991)
Project Team

- Mn/DOT
- FHWA
- Caltrans
  - District 10
  - HQ Traffic Operations
  - HQ Information Technology
  - Division of Research & Innovation (DRI)
  - UC Davis Advanced Highway Construction Maintenance Technology Program (AHMCT)
Caltrans IRIS Project Timeline

Scope 1: Develop open-source ATMS 02/2005

Scope 2: Open database 02/2006

Scope 3: IRIS Demonstration Study 07/2007

Mn/DOT releases IRIS source code 05/2007

IRIS live test begins in Caltrans D10 05/2008

Caltrans internal feasibility study begins for IRIS 7/2010

IRIS test drive in Caltrans D5 08/12/2009

IRIS test drive in Caltrans D5 08/12/2009

IRIS test drive in Caltrans D1 08/26/2009
The Caltrans Testbed

- District 10 Stockton
- Measures of Success
  - Portability
  - Knowledge transfer to 3rd party developers
  - Parity with existing functionality
  - One source tree in lock-step with Mn/DOT
IRIS Source Code Management Process

- A: AHMCT IRIS Development Repositories
- B: AHMCT Public IRIS Repository
- C: Caltrans IRIS Release
- D: Mn/DOT IRIS Development Repositories
- E: Mn/DOT Public IRIS Repository
- F: Mn/DOT IRIS Release

Stan Slavin
<table>
<thead>
<tr>
<th>Ticket</th>
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<th>Status</th>
<th>Created</th>
</tr>
</thead>
<tbody>
<tr>
<td>#349</td>
<td>Auto switch to/from backup server</td>
<td>Amber Alerts</td>
<td>9.0.6b</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>06/14/10</td>
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<tr>
<td>#329</td>
<td>Correct response to detection of power cycle events</td>
<td>CMS</td>
<td>9.0.6b</td>
<td>Defect</td>
<td>Design</td>
<td></td>
<td>12/15/09</td>
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<tr>
<td>#344</td>
<td>NPE displaying oversized message on model 520 CMS</td>
<td>IRIS Client</td>
<td>9.0.7</td>
<td>Defect</td>
<td>mdarter</td>
<td>new</td>
<td>06/01/10</td>
</tr>
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</table>

**Milestone 9.1**
(10 matches)

<table>
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<tbody>
<tr>
<td>#347</td>
<td>Change some of the terminologies in IRIS</td>
<td>IRIS</td>
<td>9.0.7</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>06/14/10</td>
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<tr>
<td>#336</td>
<td>Simultaneous use of multiple modems in terminal server</td>
<td>CMS</td>
<td>9.0.7</td>
<td>Defect</td>
<td>mdarter</td>
<td>new</td>
<td>03/23/10</td>
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<tr>
<td>#129</td>
<td>Ability to spell check messages, including abbreviations,</td>
<td>CMS</td>
<td>9.0.7</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>03/23/10</td>
</tr>
<tr>
<td>#117</td>
<td>Over-sized message warnings and enforcement</td>
<td>CMS</td>
<td>9.0.7</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>03/23/10</td>
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<tr>
<td>#359</td>
<td>Expand IRIS capabilities to collect D-10 MVDS (EIS) 30 second Data</td>
<td>Traffic</td>
<td>9.1</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>06/01/10</td>
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<tr>
<td>#358</td>
<td>Expand IRIS capabilities to collect D-10 30 second Loop Data.</td>
<td>Traffic</td>
<td>9.1</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>06/01/10</td>
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<tr>
<td>#351</td>
<td>Forward traffic data collected by IRIS to PEMS</td>
<td>Traffic</td>
<td>9.1</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>06/01/10</td>
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<tr>
<td>#357</td>
<td>Vertical line centering incorrect for 2 page 2 line message</td>
<td>CMS</td>
<td>9.0.7</td>
<td>Defect</td>
<td>mdarter</td>
<td>new</td>
<td>08/03/10</td>
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<tr>
<td>#358</td>
<td>Incidents are sometimes not clearing or updating</td>
<td>Incident Management</td>
<td>9.0.7</td>
<td>Defect</td>
<td>mdarter</td>
<td>new</td>
<td>08/20/10</td>
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<tr>
<td>#346</td>
<td>System attribute takes effects immediately after they are changed without rebooting IRIS server</td>
<td>IRIS</td>
<td>9.0.8</td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>06/03/10</td>
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<tr>
<td>#339</td>
<td>Merge w/ Mn/DOT releases for 9.1</td>
<td>General</td>
<td>9.1</td>
<td>Task</td>
<td>mdarter</td>
<td>new</td>
<td>05/21/10</td>
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<td>#340</td>
<td>Release 9.1 composite ticket</td>
<td>General</td>
<td>9.1</td>
<td>Task</td>
<td>mdarter</td>
<td>new</td>
<td>05/21/10</td>
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<tr>
<td>#345</td>
<td>Enable loading of bulk configuration information for RTMS stations to IRIS application</td>
<td>Traffic</td>
<td>9.0.8</td>
<td>Task</td>
<td>mdarter</td>
<td>new</td>
<td>06/02/10</td>
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**anonymous**
(55 matches)

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<thead>
<tr>
<th>Ticket</th>
<th>Summary</th>
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<tr>
<td>#101</td>
<td>Add integration with Weigh in Motion system.</td>
<td>WIM</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#165</td>
<td>Activate message start/stop time for travel time messages for a CMS w/ 5V170 V3.4</td>
<td>Travel Time</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#171</td>
<td>Enhance IRIS lane numbering so that it conforms to Caltrans convention, rather than Mn/DOT convention.</td>
<td>Traffic</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#177</td>
<td>Ability for operators to see content of the Lakes and Streams layers in IRIS.</td>
<td>Maps</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#180</td>
<td>Provide the ability for an operator to leave a note, per CMS, that other operators could see.</td>
<td>CMS</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#191</td>
<td>Provide recent event history, per CMS, inside the IRIS client.</td>
<td>CMS</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#318</td>
<td>Add ability for operators to see incidents from the restricted incident &quot;media feed&quot; rather than public CHP feed.</td>
<td>Incident Management</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#186</td>
<td>Use incident feed from future CAD system, which will be available in 3-5 years.</td>
<td>Incident Management</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#187</td>
<td>Add ability to generate AWS messages</td>
<td>CAWS</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#188</td>
<td>Add the ability to read real-time traffic data directly from detectors</td>
<td>Traffic</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
</tr>
<tr>
<td>#199</td>
<td>IRIS connects to TMCL for logging.</td>
<td>CMS</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#122</td>
<td>Improve IRIS mapping</td>
<td>Maps</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
</tr>
<tr>
<td>#128</td>
<td>Ability to edit Library/CMS group name; Or to copy group with new name</td>
<td>Maps</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#173</td>
<td>Add ability for operators to search for street names.</td>
<td>Maps</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
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<tr>
<td>#136</td>
<td>Display persistent map labels that can be turned on and off. Presently, users must hover over labels.</td>
<td>Maps</td>
<td></td>
<td>Enhancement</td>
<td>mdarter</td>
<td>new</td>
<td>02/24/09</td>
</tr>
</tbody>
</table>
Background

- Design state: Initial
- Description: Improve client mapping functionality
- Client or server or both: client
- Agency Visibility: Caltrans, MnDOT

Risk Assessment

- Regression risks: yes
- Testability: good

Description

Improve client mapping in the IRIS client. Define what this means in prioritized list.

Proposed Design:

The plan is to add a simple tiling raster layer to IRIS using UTM. This will be a lot less work than trying to mash two incompatible things together.

   a. Alternatively, use Google Earth Globe (CT has license). TSI can produce a "window" tiler.
   b. Already does tiling. Display IRIS as last layer (IRIS is already producing XMLs for T5 elements).
   c. Could display other OSM layers available (CT Roadways, incidents/signs/transport from other districts, rest stops, etc).

2. Use mapnik (http://mapnik.org) to generate tiles for each zoom level required. This is nice, because we can use Python to control how the tiles are created. It appears like UTM can be used to create a simple grid of tiles.

3. Store the map tiles on the apache web server which hosts the IRIS web start client files.

Done. See above.
MnDOT IRIS Release Notes

3.123.0 (28 September 2010)
- Added default font to DMS objects.
- Ins client and server must be upgraded together. Migrate script must be run to update database. `psql` -t `migrate-3.123.sql`.

3.122.0 (24 August 2010)
- Fixed a couple of minor problems with the variable speed advisory code.
- Fixed a problem with precipitation sample data files.
- Refactored AweStationsPanel widget.
- Added a couple of features to user properties file.
- Fixed a number of client bugs.
- Renamed `dmx_mws_read_time` system attribute to `dmx_mws_read_offset`.
- Fixed a rare SQL exception related to r_nodes.
- Fixed an exception with vehicle event logging.
- Ins client and server must be upgraded together. Migrate script must be run to update database. `psql` -t `migrate-3.122.sql`.

3.121.0 (5 August 2010)
- Added a weather sensor device abstraction.
- Added protocol to communicate with Optical Scientific OBG-815 precipitation sensor.
- Refactored sample data archiving code to allow sample periods other than 30 seconds.
- Added `sample_archive_enable` and `sample_archive_directory` system attributes.
- Added daily job which moves sample data into zip archives.
- Fixed a couple of minor problems with variable speed advisory algorithm.
- Added time abstraction to allow IRIS to be run in conjunction with a simulator.
- Started a new IRIS Administrator Guide.
- Ins client and server must be upgraded together. Migrate script must be run to update database. `psql` -t `migrate-3.121.sql`.

3.120.0 (13 July 2010)
- Made updates to variable speed advisory (VSA) algorithm.
- Fixed design problem with Completers and data polling. Now, one unresponsive operation won’t freeze the rest of the data collection.
- Fixed a rare problem with smart sensor IOT protocol.
- Fixed bug in XML output with unescaped quotes and apostrophes.
- Cleaned up map layer scaling code.
- Allow DMS to be used if less than half of the power supplies are failed.
- Updated scheduler, mapbeam, trainmap and sonar dependencies.
- Ins client and server must be upgraded together. Migrate script must be run to update database. `psql` -t `migrate-3.120.sql`.

3.119.0 (16 June 2010)
- Added capability abstraction for easier managing of user permissions in the "Users and Roles" form.
- Fixed various problems with the variable speed advisory (VSA) algorithm.
- Don’t replace proxy selector provided by Java Web Start if a proxy server is not specified in ins-client properties.
- Fixed a couple of bugs in the DMS and LCS interfaces.
- Fixed a bug which prevented LCS from being assigned to an LCS array.
- Fixed a client deadlock in the font editing form.
Functional Areas

D10 Focus:
- Changeable Message Signs
- Cameras
- Incidents
- Traffic Data

Deferred:
- Ramp meters
- Traffic signal data

Not Available
- RWIS monitoring
- HAR
Caltrans Plans for IRIS

- Proof of Concept for Stockton
  - Enhance Stockton with Automated Warning
  - Deploy to Districts 1, 2, 5
    - Feasibility Study for D1-2-5
    - Test Drive District 2 (Redding)
- Continued Collaboration & Partnership with Mn/DOT and other DOTs
- Third Party Integrators
Planned Functions for D-1-2-5

- Automated Warning
  - Generate Warning Messages
    - Visibility, Speed, Wind
  - Changeable Message Signs
    - portable
    - Travel Times

- Vehicle Detection Data
  - Radar stations
  - Loop stations

- Weather/Visibility data/interface

- Cameras
- Incident feed
- Performance Data Distribution
- “Lite” Mode for Field Work
- Enhanced Map Engine
Possible Future Enhancements

- Automated Speed Advisory
- Added video support MPEG4
- Arterial Signal Monitoring / Control
- Detection
  - Traffic Counters
  - Weigh-in-motion data
- Vehicle Transponder Info
  - Traffic Management Teams
  - Freeway Service Patrol
- Ramp Metering
- Highway Advisory Radio
- Extinguishable Message Signs

- Incident Response / Devices location
- Chain Control Info
- Avalanche advisory
- Sharing devices between centers
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The Stockton IRIS "Experience"

- D10 IRIS Demo
  - CMS Operations
    - Automated Warning Intervention
  - Cameras
  - Traffic Map
  - Incident feed

- Note: Use the Full Screen Mode to Maximize your viewing experience!
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MnDoT IRIS Demo

- Ramp Metering
- Incident Management
- Lane Control
- Travel Times
- Advisory Speed Limits
- Map Engine

- Note: Use the Full Screen Mode to Maximize your viewing experience!
Closing Statement

- Security of System and Protocols
- Software is Special
- Open source = Collaborative Development
- Other DOTs using IRIS – You are not alone!
Contacts

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