

Telematics Framework for Federal Agencies



Fleet Feedback and Fleet Efficiency Metrics

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Agenda


- USMC Telematics User Feedback
 - Fleet Efficiency Metrics
 - VAM Support Metrics

USMC User Feedback

- USMC currently has telematics installed on over 8,000 vehicles ranging several providers
- NREL surveyed USMC personnel to understand how telematics are currently being used by the fleet.

Surveyed Operations		
Personnel	8	Fleet and Operations Managers
Locations	6	Across 4 states
Fleet Size	> 6,000	86 to 3,400 vehicles
Installed Devices	>2,300	40 to 1,000 vehicles

Survey Findings – Current Usage

- Most managers access telematics daily or at least weekly.
- Real time vehicle tracking is highly valued for safety and operations success.
- Behavior metrics are tracked monthly.
 - Safety is the primary concern and speeding events are a focus.
- Managers report improved driver behaviors – Speeding 
- Driver behavior improvement requires:
 - Leadership remaining engaged in driver coaching.
 - Maintaining the manpower resources for tracking behaviors.

Survey Findings – Feature Importance

Please rank the following telematics features by their importance to you

Relative Importance of Available Telematics Capabilities

First Tier (Safety)	Second Tier (Fleet efficiency)	Third Tier (Operational)
Speeding Identification	Excessive idling	Geofence violations
Collision notification	Mileage tracking	Maintenance notifications
Aggressive driving		GPS routing capabilities
Driver video reports		

Personnel are most concerned with safety features.

Survey Findings – Goal Importance

Please rank the importance of the ways in which you use telematics in fleet management

Relative Importance of Telematics in Meeting Fleet Goals

First Tier (Safety)	Second Tier (Operational)	Third Tier (Fleet efficiency)	Fourth Tier
Preventative safety enforcement	Required reporting (FMIS and FAST)	Fuel consumption	Routing
Accident reporting	Locating Equipment	Low-use vehicle analysis	Geo-fencing
Assessing driver behavior		Maintenance	Alternative fuel use
			Vehicle acquisition analysis

Personnel value support to safety efforts.

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Fleet Efficiency Metrics from Telematics

How can telematics services support fleet efficiency?

What should we ask for from telematics providers?

Notes:

- Developing telematics reporting capabilities will likely require close coordination between a telematics provider and internal information systems experts.
- Technologies will continue to evolve and capabilities will continue to expand.

Fleet Efficiency Metrics from Telematics

Fleet efficiency behavior change efforts benefit from *trip level* data summaries and reports.

Trip level data – summary data for a vehicle event beginning when keyed on (operated for some time) and ending when keyed off.

Allows for:

- Identifying individual driver and vehicle events and behaviors in support of driver coaching.
- Summarizing at higher levels (driver, vehicle, organizational, etc.) to determine broad impacts of potential corrective actions.

Note: Data captured at more frequent intervals (perhaps 1 Hz) can be summarized at the trip level.

Fleet Efficiency Metrics from Telematics

Reducing engine idling

Questions answered:

- Which drivers or vehicles idle most consistently?
- How much fuel is lost due to idling?

Beneficial trip level metrics:

- Engine run time
- Count of idling events
- Total idling time
- Fuel used while idling

Idling Impacts:

- Larger LD vehicles >1/3 gallon per hour.
- MD and HD vehicles can approach 1 gallon per hour.

<http://www.anl.gov/energy-systems/downloads/vehicle-idle-reduction-savings-worksheet>

Sample: Idling Report Fields

Trip ID	Vehicle ID	Driver ID	Org. ID	Start Date Time	End Date Time	Fuel Used	Engine Run Time	Idling Count	Total Idling Time	Fuel Used Idling
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Fleet Efficiency Metrics from Telematics

Reducing inefficient and aggressive driving

Questions answered:

- Which drivers or vehicles are top concerns?

Beneficial trip level metrics:

- Trip fuel used
- Extreme acceleration count
- Extreme braking count
- Speeding count
- Speeding duration

Aggressive Driving Impacts:

- Improving driving behavior can lead to a 5-10% savings.
- Reducing extreme behaviors can save 20%.

https://www.afdc.energy.gov/conserve/driving_behavior.html

Sample: Inefficient Driving Report Fields

Trip ID	Vehicle ID	Driver ID	Org. ID	Start Date Time	End Date Time	Trip Fuel used	Extreme Accel. Count	Extreme Braking Count	Speeding Count	Speeding Duration
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Fleet Efficiency Metrics from Telematics

Reducing vehicle miles traveled

Questions answered:

- Are drivers consistently driving farther than required?

Beneficial trip level metrics:

- Miles driven
- GPS calculated mileage
- Avoidable mileage → *GPS route mileage – driven mileage*
- Geofence alerts

Sample: VMT Reduction Fields

Trip ID	Veh. ID	Driver ID	Org. ID	Start Date Time	End Date Time	Trip Fuel Used	Miles Driven	GPS Calc. Mileage	Avoidable Mileage	Avoidable Mileage Fuel Saved	Campus Geofence Alerts
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Fleet Efficiency Metrics from Telematics

Choosing efficient vehicles

Questions answered:

- What fuel savings are possible with a more efficient vehicle?

Beneficial trip level metrics:

- Route/mission identifier – based on start and stop locations
- Miles driven
- Off-road geofence alert
- Fuel saved with downsized vehicle

Sample: Efficient Vehicle Choice Report Fields

Trip ID	Vehicle ID	Driver ID	Org. ID	Start Date Time	End Date Time	Trip Fuel Used	Route ID	Miles Driven	Off-road Geofence Alert	Fuel Saved With Downsize
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Fuel Saved with Downsize: Based on a comparison of the current vehicle's fuel usage and mpg rating versus expected fuel consumption from a more efficient vehicle.

Fleet Efficiency Metrics from Telematics

Organizational summaries can highlight success and areas for improvement.

Example:

Org ID	Driver ID	Idle Events Per Trip	Total Idling Time (mins)	Fuel Used Idling (Gallons)	Speeding Count	Speeding Duration (mins)	Avoidable Mileage	Avoidable Fuel Use (gallons)	Fuel Saved With Downsize
Org 1	Driver 1	0	0	0	2	5	0	0	13
Org 1	Driver 2	1	10	0.02	10	90	2	0.1	0
Org 1	Driver 3	4	90	1.5	1	1	50	1.7	0
Org 1	Driver 4	0	0	0	0	0	5	0.25	10
Org 1	Driver 5	1	7	0.01	0	0	100	3	5

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Telematics Support to VAM Processes

Telematics services can improve VAM processes:

- **Reduced manual effort** and total time to complete.
- **Improved accuracy** through automated data capture.

The VAM process includes utilization statistics which can be captured through summaries of trip level data:

- Numbers of trips
- Miles traveled
- Hours of use
- Fuel consumed

Note: VAM processes will always require manual input including estimates of criticality, changing missions, etc.

VAM Trip Count Summaries

Vehicle trip counts define how often a vehicle is used and can justify a vehicle need.

Example trip utilization metrics (prior 12 months):

- Number of trips
- Date of last trip
- Number of weeks with no trips
- Average trips per week (of weeks with at least one trip)

Lifetime				Prior 12 months			
Vehicle ID	Org. ID	Date Assigned	Date of Last Trip	Number of Trips	Days With No Trips	Weeks With No Trips	Average Trips Per Week

Days and weeks with no trips can help define periodic or seasonal vehicle usage patterns.

VAM Mileage Summaries

Vehicle mileage further defines vehicle utilization

Example mileage utilization metrics:

- Lifetime mileage
- Prior 12 months mileage
- Average miles per trip
- Average miles per week (of weeks with at least one trip)
- Weeks with low mileage (manually defined)

Lifetime				Prior 12 months			
Vehicle ID	Org. ID	Date Assigned	Miles	Miles	Average Miles per Trip	Average Miles per Week	Weeks with Low Mileage

VAM Processes – Other Metrics

Engine Runtime:

Lifetime				Prior 12 months				
Vehicle ID	Org. ID	Date Assigned	Engine Hours	Engine Hours	Average Hours Per Trip	Average Hours Per Week	Weeks With Low Hours	Time On-site

Time On-site: Mobile workstations may require a vehicle whose engine operates intermittently at a job site.

Fuel Consumption:

Lifetime				Prior 12 months				
Vehicle ID	Org. ID	Date Assigned	Fuel Use	Fuel Use	Average Fuel Per Trip	Average Fuel Per Week	Weeks with Low Fuel Use	Fuel Saved with Downsize

VAM Processes – Other Metrics

LSEV Opportunity:

Lifetime		Prior 12 months				
Vehicle ID	Org. ID	Trips	Trips Leaving Campus Geofence	Trips Per Week Leaving Campus	Trips With Max Speed Below 25mph	Trips Per Week with Max Speed Below 25mph

4X4 Requirement:

Lifetime			Prior 12 months	
Vehicle ID	Org. ID	Trips	Trips in Off-road Geofence	Trips Per Week in Off-road Geofence

Telematics Support to VAM Processes

Continuous updating of utilization statistics.

Example:

Vehicle ID	Org ID	Date Assigned	Prior 12 months				Time at Job Site (hrs)	LSEV Possible	4X4 Required	Mission Type
			Trips	Weeks w/ 0 Trips	Miles	Weeks With <10 Miles				
Veh 1	Org 1	5/1/2014	100	23	11,000	23	0	N	N	Commuter
Veh 2	Org 1	6/1/2015	50	2	3,000	30	200	N	Y	Mb Wk Stn
Veh 3	Org 2	3/1/2014	600	2	10,000	4	0	N	N	Regional
Veh 4	Org 2	4/1/2015	90	36	1,000	40	0	Y	N	Campus

Fleet specific business rules could be applied to highlight low and high use vehicles.

Other Telematics Support

Maintenance tracking and effects on efficiency

Vehicle acquisition planning

Alternative fuel deployment

Questions??

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