APPLYING NIST CSF TO A CV DEPLOYMENT

Transportation Research Board Annual Meeting 2018

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U.S. Department of Transportation
PROGRAM STRATEGY

**Purpose:** The program’s objective is to:

- Help organizations apply the principles and best practice of risk management to improving the cybersecurity and resilience of critical transportation infrastructure.
- The Privacy Research Analysis achieving freedom from conditions that can create problems for individuals with unacceptable consequences that arise from transportation systems that process PII.

**Strategic Direction:** By applying cybersecurity and privacy guidance in a systematic manner to a connected vehicle environment, USDOT and stakeholders have the opportunity to create a set of detailed guidelines and tools that are specific to connected transportation and those organizations that deploy, operate, and maintain the network and systems.
CYBERSECURITY TRANSPORTATION PROJECTS COORDINATION: 3 KEY PROJECTS

• Establishing a Roadway Transportation System Cybersecurity Framework and Tools
  - FHWA and ITS Joint Program Office
  - ITE

• Cybersecurity of Traffic Management Systems
  - NCHRP
  - Southwest Research Institute

• Application of the NIST Cybersecurity Framework
  - ITS Joint Program Office
  - NIST/MITRE
CRITICAL INFRASTRUCTURE

• Improve cybersecurity of 3 related but distinct parts of critical transportation infrastructure

• All implement NIST Framework Process

• All seek to develop tailored guidance

• NCHRP & ITE projects considering organizing ongoing response and recovery operations
NIST CYBERSECURITY FRAMEWORK

Outcome of Executive Order 13636, and result of collaboration between public and private sectors

- Manages cybersecurity risks in a cost-effective way, while protecting privacy and civil liberties
- References the globally accepted standards (COBIT, ISO/IEC, ISA, NIST, CCS) that are working well today
- Intended for worldwide adoption -- not US only
- Uses common terminology to discuss cybersecurity risk
- Ensures business drivers guide cybersecurity activities
- Considers cybersecurity risks as part of organization's overall risk management process
CYBERSECURITY FRAMEWORK COMPONENTS

- **Framework Profile**: Aligns industry standards and best practices to the Framework Core in an implementation scenario. Supports prioritization and measurement while factoring in business needs.

- **Framework Core**: Cybersecurity activities and informative references, organized around particular outcomes. Enables communication of cyber risk across the organization.

- **Framework Implementation Tiers**: Describes how cybersecurity risk is managed by an organization and degree the risk management practices exhibit key characteristics.
## CSF – FUNCTIONS

### Functions

<table>
<thead>
<tr>
<th>ID</th>
<th>Identify</th>
<th>Develop the <em>organizational understanding</em> to manage cybersecurity risk to systems, assets, data, and capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR</td>
<td>Protect</td>
<td>Develop and implement the <em>appropriate safeguards</em> to ensure delivery of critical infrastructure services</td>
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<tr>
<td>DE</td>
<td>Detect</td>
<td>Develop and implement the appropriate activities to <em>identify the occurrence</em> of a cybersecurity event</td>
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<tr>
<td>RS</td>
<td>Respond</td>
<td>Develop and implement the appropriate activities to <em>take action</em> regarding a <em>detected</em> cybersecurity event</td>
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<tr>
<td>RC</td>
<td>Recover</td>
<td>Develop and implement the appropriate activities to <em>maintain plans for resilience</em> and to <em>restore any capabilities or services</em> that were impaired due to a cybersecurity event</td>
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</table>
The alignment of the Framework core with an organizations business requirements, risk tolerance, and resources

- Describes the current state and desired future state
- Reveals gaps that can flow into action plan development
- Facilitates a roadmap for reducing cybersecurity risk
Reflect how an organization views cybersecurity risk and the processes in place to manage that risk.

- **Adaptive**: Practices fully established and continuously improved
- **Repeatable**: Practices approved and established by organizational policy
- **Risk Informed**: Practices approved but not completely established by policy
- **Partial**: Informal, ad hoc, reactive responses
ANN ARBOR CONNECTED VEHICLE TEST ENVIRONMENT

- Largest existing deployment of connected vehicles and connected infrastructure
- Expanding on Safety Pilot Model Deployment
- Covers 27 square miles
- Adding 1500 vehicles per year

- The Ann Arbor Connected Vehicle Test Environment was used as the initial test case for implementing the NIST Framework because it is the most extensive and mature environment available.
PROJECT STATUS

• A technical meeting was held in November to develop the cybersecurity profile and conduct a privacy risk assessment.

• Step One: Define the AACVTE Mission

  - Using communications between vehicles and the infrastructure to enable applications that improve safety, mobility and sustainability.
PROJECT STATUS

• Step Two: Define the AACVTE Mission Objectives
  - 16 Objectives identified
  - Grouped into 4 categories

• The Core Functions were then transposed to the categories and subcategories of the Cyber Framework. The group then prioritized the functions.

<table>
<thead>
<tr>
<th>Mission Objectives</th>
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<tbody>
<tr>
<td>Develop Requirements</td>
</tr>
<tr>
<td>a. Develop application requirements</td>
</tr>
<tr>
<td>Design and Build</td>
</tr>
<tr>
<td>a. Install devices</td>
</tr>
<tr>
<td>b. Specify components</td>
</tr>
<tr>
<td>c. Plan network architecture</td>
</tr>
<tr>
<td>d. Define Security architecture</td>
</tr>
<tr>
<td>e. Develop installation &amp; verification procedures</td>
</tr>
<tr>
<td>f. Procure components and select suppliers</td>
</tr>
<tr>
<td>Verification and validation</td>
</tr>
<tr>
<td>a. Test devices/certification</td>
</tr>
<tr>
<td>b. Evaluate performance and compliance</td>
</tr>
<tr>
<td>Operations and maintenance</td>
</tr>
<tr>
<td>a. Support data analysis</td>
</tr>
<tr>
<td>b. Maintain data</td>
</tr>
<tr>
<td>c. Manage assets</td>
</tr>
<tr>
<td>d. Operate and maintain system</td>
</tr>
<tr>
<td>e. Perform communications and marketing</td>
</tr>
<tr>
<td>f. Conduct education and outreach</td>
</tr>
<tr>
<td>g. Recruit subjects/users</td>
</tr>
</tbody>
</table>

Functions

- ID: Identify
- PR: Protect
- DE: Detect
- RS: Respond
- RC: Recover
PROJECT STATUS

• Developed the Privacy Risk Assessment Methodology (PRAM)
  - PRAM is a process to assess the risk to personally identifiable information (PII) in a system/organization.
  - Evaluated the data flows in the system to understand the use of PII.
LOOKING AHEAD

- The NIST team will use the information from the workshop to:
  - Develop the implementation tiers.
  - Develop guidance on handling PII in a connected vehicle environment.

- Coordinate with the CV Pilot sites

- Develop guidance adapted specifically for the connected vehicle environment.
STAY CONNECTED

For more information, contact...

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