Safety and Security in Remote Bridge Operations

- PI: Randall Sandone, UIUC
- Co-PIs: Matt Mowrer, ABS
  Blake Benson, ABS
  Scott Blough, Simple Cyber
- Students engaged in MSC research:
  Melissa Gabriele, TU
Research Project Overview

• **Problem:** Transitioning to remote bridge operations creates new safety and security concerns stemming from vulnerabilities of ICT/OT
Research Project Overview

- **Project objectives:** Enhance the safety, security, and resilience of remote bridge operations
  - Establish situational awareness
  - Inventory, categorize, taxonomy
  - Macro-level cybersecurity assessment
  - Annotated NIST RMF
  - NIST CSF Profile
  - Release SaaS application
  - Reduce cost and accelerate compliance
  - Improved security, safety, and resilience
# Milestones

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestone</th>
<th>Percentage completed</th>
<th>Completion Date</th>
<th>New Plans / Contingency</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Kickoff Meeting</td>
<td>100%</td>
<td>26 Sept 2019</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>Landscape &amp; Scoping Study</td>
<td>100%</td>
<td>24 Apr 2020</td>
<td></td>
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<tr>
<td>M3</td>
<td>Taxonomy/Inventory</td>
<td></td>
<td>30 May 2020</td>
<td></td>
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<tr>
<td>M4</td>
<td>Site Visits</td>
<td></td>
<td>30 Jun 2020</td>
<td>Delay visits to July. If July not feasible, replace test with virtual meetings</td>
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<tr>
<td>M5</td>
<td>RMF/CSF Profile</td>
<td></td>
<td>30 Sept 2020</td>
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<tr>
<th>No.</th>
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<th>% Complete</th>
<th>Completion Date</th>
<th>New Plans / Contingency</th>
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<tr>
<td>D1</td>
<td>Literature Review</td>
<td>100%</td>
<td>26 Sept 2019</td>
<td></td>
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<tr>
<td>D2</td>
<td>Landscape &amp; Scoping Study</td>
<td>100%</td>
<td>24 Apr 2020</td>
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<tr>
<td>D3</td>
<td>Taxonomy</td>
<td></td>
<td>30 May 2020</td>
<td></td>
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<tr>
<td>D4</td>
<td>Completion of Draft NIST RMF &amp; CSF Profile</td>
<td></td>
<td>30 Sept 2020</td>
<td></td>
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<tr>
<td>D5</td>
<td>Cyber Dashboard implementation of developed NIST CSF Profile</td>
<td></td>
<td>31 Oct 2020</td>
<td></td>
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Impact: Travel restrictions preventing/delaying site visits

Contingency Plan: Conduct Site Visits via remote mechanisms
  • Requires an engagement strategy and process that will deliver appropriate and adequate information
  • Results may lack the granularity we would prefer but should be adequate to achieve objectives of project
## End User Engagement

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Roll</th>
<th>Interaction date</th>
<th>Outcome</th>
</tr>
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<tbody>
<tr>
<td>Janet St. John</td>
<td>Director, Cyber Security Association of American RR</td>
<td>6 March 2020</td>
<td>Janet (AAR)-- Initial discussion to gauge interest, AAR is interested and willing to work with us but due to COVID, schedule is in flux. AAR’s intention is to take our project goals and brief them to railways as an opportunity to get involved from an industry perspective on regulatory authority.</td>
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<td>Jeff Hieb</td>
<td>Port Security Specialist, Milwaukee</td>
<td>13 March 2020</td>
<td>Jeff agreed to develop a list of key contacts within the City of Milwaukee and to help arrange and coordinate site visits either physical or virtual.</td>
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<tr>
<td>Kamal Elnahal, Ph.D., P.E.</td>
<td>Chief, Bridge Operations and Engineering Division (CG-BRG-1), Bridge Program, U.S. Coast Guard</td>
<td>30 Jan 2020 - 30 Apr 2020</td>
<td>USCG updated and satisfied with progress to date. USCG provided Office of Bridge Programs data for use in landscape study.</td>
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<tr>
<td>Christopher Barkan, Ph.D.</td>
<td>George Krambles Director, Rail Transportation &amp; Engineering Center, UIUC</td>
<td>7 May 2020</td>
<td>Initial discussion to map out engagement with RR owners and operators and rail industry associations</td>
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Research Work and Accomplishments

• Activities:
  • Kick-off Meeting
  • Literature review
  • Landscape study
  • COVID 19 contingency analysis/planning
  • Update briefing to USCG

• Outcomes to date:
  • Literature Review Complete—current state of remote bridge operations and challenges.
  • Landscape Study Complete—Provided detailed analysis of physical attributes of all remotely operated movable drawbridges including created a detailed risk scenarios.
  • Landscape Infographic Complete
Anticipated Project Impact and Transition

**Overall Impact**

- Enhanced safety, security, and resilience of our nation’s remote bridges
- Clarity regarding national bridge landscape (numbers, types, plans, etc.)
- Clarity regarding cyber threats and current security postures
- Tailored NIST Risk Management Framework
- Tailored NIST CSF Profile
- Tool to standardize and accelerate cyber security maturity

**Audience Impact**

- End users: standardized cyber risk management standard and process
- USCG: greater awareness of risk; cyber security standards to apply to policy and regulation

**Tech Transition**

- Published annotated Risk Management Framework & NIST CSF Profile
- Commercially available and sustainable SaaS application
Plans for the next year

• Promote use of annotated NIST Risk Management Framework
• Promote adoption of NIST CSF Profile for Remote Bridges

This material is based upon work supported by the U.S. Department of Homeland Security under Cooperative Agreement No. 2014-ST-061-ML0001. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Department of Homeland Security.