COMPLETE TRIP

IT'S 4 US

Kick-Off Session 2:
Concept Development Overview
Tasks 1-6

February 24, 2021
Welcome Back and USDOT Presenters

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ITS JPO

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Program Manager
Multimodal ITS Research and Deployment
ITS JPO

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Director of Headquarters Operations
FTA - Office of Civil Rights

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Director
FHWA - Office of Human Environment

Danielle Blackshear
Transportation Specialist
FHWA - Office of Human Environment
Q&A from Day 1 Presentations
Objectives of Day 2 and 3

- Provide sites with the USDOT perspective on the ITS4US-Complete Trips Deployment Project Phase 1 Deliverables
  - Organized by Tasks outlined in the BAA
  - Review of the BAA directions in each topic area
  - Assessment of how each topic may influence multiple tasks/deliverables
  - Note top challenges and potential strategies to address issues
  - Identify key references and resources for USDOT technical assistance

- Help sites to consider where help is most needed—and to direct USDOT technical assistance resources to these areas

- Our Tactics For Today:
  - USDOT will track issues/challenges, but our schedule does not allow for long technical discussions
  - Issues/challenges list brought to first bi-weekly meeting for disposition
Overview of Agenda

- Walkthrough Tasks 1-14 in order
  - Wednesday, February 24 - Tasks 1-6
  - Thursday, February 25 - Tasks 7-14

- In each Task, address one or more topic areas
  - USDOT provides 15 minutes of perspective in each topic area
  - Structured Q&A for 10 minutes for each task
    (might cover multiple topics, so remember your questions!)

- For each topic area, USDOT will provide:
  - Training presentation
  - Annotated document template

These documents do not replace or alter the work statements defined in the Broad Agency Announcement; rather they provide technical assistance to the deployers in completing the tasks and deliverables described in the BAA.
Keeping On Track

- **Our agenda is packed, we cannot permit long digressions**
  - Clarifications are OK
  - More complex issues will be surfaced and noted to be dealt with offline

- **Everyone should consider this kickoff as an informal working meeting**
  - Breaks are built into agenda
  - We understand the challenges of lengthy virtual meetings while working from home. Participants should come and go as they need

- **Moderators will ensure that we stay on schedule in our agenda**

- **The key take-away from today:**
  - *Understanding* the Concept Development tasks
  - *Identifying issues* and challenges
  - *How to get help* on a key issues through your COR
  - *NOT* how to resolve the issue
## Phase 1 Task Dependencies

<table>
<thead>
<tr>
<th>Task 1</th>
<th>User Needs</th>
<th>Project Management</th>
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<tbody>
<tr>
<td>Task 2</td>
<td>Concept of Operations</td>
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<tr>
<td>Task 14</td>
<td>Deployment Readiness Summary</td>
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*COMPLETED TRIP*
Deliverable Technical Support

- Annotated Template
- Live Training (Tuesdays 2PM ET)
- Draft Plan Review
- Final Plan Acceptance
Near-Term Look Ahead (First 8 Weeks)

- March 2\textsuperscript{nd} 2:00-3:30 ET- User Needs ID and Requirements Training
- March 15\textsuperscript{th} – Draft PMP is Due
- March 22\textsuperscript{nd} - Draft User Needs ID and Requirements Plan Due
- March 16\textsuperscript{th} 2:00-3:30 ET- Concept of Operations Training
- April 5\textsuperscript{th} - Final PMP is Due
- April 6\textsuperscript{th} 2:00-3:30 ET- Perf. Measurement and Eval Plan Training
- April 12\textsuperscript{th} – Final User Needs ID and Requirements Plan Due
- April 13\textsuperscript{th} 2:00-3:30 ET- Institutional, Partnership & Financial Plan Training
Deployment Sites Collaboration

- Sites selected for deployments are not in competition.
- All sites should be prepared to collaborate.
- Collaboration among sites can be a powerful force in making all sites successful.
- Collaboration extends to other agencies considering similar deployments.
COMPLETE TRIP
ITS4US

Task 1A: Project Management
Task 1A extends over the entire Phase 1 period. A key activity is the kickoff meeting. Key documents are the Program Management Plan (PMP) and monthly progress reports. The PMP describes the activities required to perform the work described in all identified Concept Development task areas, per current Project Management Body of Knowledge (PMBOK) guidance.

**Deliverables**

1. Kickoff Briefing
2. Draft Program Management Plan – Kick-Off + 3 weeks (March 15th)
3. Final Program Management Plan – Kick-Off + 6 weeks (April 5th)
4. Monthly Reports – Monthly
# PMP Major Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM Approach</td>
<td>Approach to overall task management; organization and team directory, and system to manage client work.</td>
</tr>
<tr>
<td>Scope Management</td>
<td>Approach to overall scope management to include WBS, deliverable development process, and scope control and verification.</td>
</tr>
<tr>
<td>Change Management</td>
<td>Approach for change management including impacts to scope, budget and schedule, and approval process.</td>
</tr>
<tr>
<td>Schedule/Time Management</td>
<td>Plan for project schedule to be created, reviewed, and maintained; relationship to the WBS; and who is responsible.</td>
</tr>
<tr>
<td>Quality Management</td>
<td>Approach for managing the quality of deliverables produced, from planning to delivery.</td>
</tr>
<tr>
<td>Human Resources Management</td>
<td>Plan for staffing and human resources required to successfully accomplish the goals of the project.</td>
</tr>
<tr>
<td>Communications Management</td>
<td>Plan for internal team communications, communications with the COR, and external stakeholder communications.</td>
</tr>
<tr>
<td>Cost Management</td>
<td>Approach to managing project costs and budget for this firm-fixed price contract.</td>
</tr>
<tr>
<td>Risk Management</td>
<td>Roles and responsibilities for addressing risk identification, risk assessment, risk response planning, and risk mitigation.</td>
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</tbody>
</table>
## Project Management Schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>2021</th>
<th>2022</th>
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<tbody>
<tr>
<td>1</td>
<td>User Needs</td>
<td>April</td>
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<td>2</td>
<td>Concept of Operations</td>
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<td>3</td>
<td>Data Management Plan</td>
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<td>14</td>
<td>Deployment Readiness Summary</td>
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</tbody>
</table>

### Notes
- Project Management Schedule
- U.S. Department of Transportation
- ITS Joint Program Office
Project Management Interdependencies

**Project Management**
- PM Approach
- Scope Management
- Change Management
- Schedule/Time Management
- Quality Management
- Human Resources Management
- Communications Management
- Cost Management
- Risk Management

**Outputs**
- Task 1B: UNIRP
- Task 2: ConOps
- Task 3: Data Mgmt
- Task 4: Safety Mgmt
- Task 6: SyRS
- Task 7: Enabling Tech.
- Task 8: Human Use
- Task 9: Training Plan
- Task 10: Partner Plan
- Task 11: Outreach
- Task 12: SEMP
- Task 13: ICTD Plan
- Task 14: Dep. Briefing
Meeting Guidelines

- **Meeting Platform:**
  - Microsoft Teams

- **Agenda:**
  - Order of Events
  - Action Item Tracking
  - Information on Upcoming Meetings
  - Deliverable/Schedule Updates

- **Notes:**
  - Taken in real-time
  - Sent to teams for confirmation

- **Schedule:**
  - Bi-weekly Site Meetings: Varies by Site
  - All Sites Coordination Meeting, Cohort Roundtables and Trainings: Tuesdays at 2:00 PM ET
Challenges

- **Developing a Stakeholder Registry**
  - **Issue:** A stakeholder refers to an organization or individual potentially impacted by the deployment itself, regardless of whether they are team members (partners) or not.
  - **Possible Strategy:** Registry should be comprehensive and include a variety of end users and potential caregivers, personnel from disability organizations, advocacy organizations and specialized service organizations for the populations of focus in the deployment.

- **Maintaining PMP**
  - **Issue:** The PMP needs to be maintained throughout the life of the project and updated accordingly.
  - **Possible Strategy:** Contractor may propose modifications to the PMP. All modifications shall go through the cycle of draft submission, COR review and comment, comment resolution, and submission of a “final” version.
Proposed Technical Support Materials

<table>
<thead>
<tr>
<th>Schedule Item</th>
<th>Date</th>
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<tbody>
<tr>
<td>USDOT-provided Task 1A Deliverable Template</td>
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<tr>
<td>ITS JPO PMO Monthly Status Report, Schedule and Risk Register Templates</td>
<td>01/06/21</td>
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</tbody>
</table>

USDOT Program Management Templates provided attached to your welcome email and also available at:
http://www.its.dot.gov/project_mang/index.htm
- Monthly Status Report
- Schedule
- Risk Register

Get help by contacting your federal site lead/site COR or reach the ITS4US Program Manager Elina Zlotchenko at elina.zlotchenko@dot.gov
BREAK

12:25PM – 12:45PM ET
Task 1B: User Needs Identification and Requirements Planning (UNIRP)
User Needs Identification and Requirements Planning (UNIRP) Document

Defines the processes that will be used to generate, coordinate, approve, and support the configuration control of user needs and system requirements. Forms the foundation of the Systems Engineering Management Plan (SEMP) that will be delivered later in Task 12.

**Deliverables**

1. Draft UNIRP Document – Kick-Off + 4 weeks (March 22\textsuperscript{nd})
2. Final UNIRP Document – Kick-Off + 7 weeks (April 12\textsuperscript{th})
<table>
<thead>
<tr>
<th>UNIRP Major Components</th>
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<tbody>
<tr>
<td><strong>User Needs Identification</strong></td>
<td>Process of how team will identify user needs.</td>
</tr>
<tr>
<td><strong>Requirements Planning</strong></td>
<td>Process of how team will identify system requirements.</td>
</tr>
<tr>
<td><strong>Configuration Management</strong></td>
<td>Process of how team will maintain configuration management.</td>
</tr>
</tbody>
</table>
# UNIRP Schedule

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### Task 1B

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<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<tr>
<td>Feb 2021</td>
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<td>Mar 2022</td>
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<td>Apr 2022</td>
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<td>May 2022</td>
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<td>Jun 2022</td>
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<td>Jul 2022</td>
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<td>Aug 2022</td>
<td>Tech Readiness</td>
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<td>Sep 2022</td>
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<td>Oct 2022</td>
<td>Training Plan</td>
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<td>Nov 2022</td>
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<td>Dec 2022</td>
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<td>Jan 2023</td>
<td>SEMP</td>
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<tr>
<td>Feb 2023</td>
<td>Deployment Plan</td>
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<tr>
<td>Mar 2023</td>
<td>Deployment Readiness Summary</td>
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</table>
UNIRP Interdependencies

**Inputs**

Planning Processes
- Methods of identifying user needs and system requirements
- Criteria for well-written user needs and well-formed requirements
- Change management practices

**UNIRP**

User Needs Identification
Requirements Planning
Configuration Management

**Outputs**

Systems Engineering Processes
- Task 2: ConOps
- Task 6: SyRS
- Task 12: SEMP
UNIRP Challenges

- Developing Plan
  - **Issue:** Resist the temptation to begin development of user needs, use cases, and system requirements. That comes later!
  - **Possible Strategy:** Focus on the process and approach the team will use. Focus on what is a well-written need and a well-formed requirement. Document how your team will incorporate this information (and other information, best practices) into their development, documentation, and configuration management.
Proposed Technical Support Materials

<table>
<thead>
<tr>
<th>Schedule Item</th>
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<td>Cohort Roundtables – Technical Roundtable (focused on Tasks 1.B, 2, 3, 4, 6, and 12)</td>
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</table>

Get help by contacting your federal site lead/site COR or reach the Systems Engineering Lead Deb Curtis at deborah.curtis@dot.gov
UNIRP Key References

IEEE Resources:


FHWA SE Resources:

- Systems Engineering for Intelligent Transportation Systems - provides an introduction to systems engineering and leads the reader step by step through the project life cycle and describes the systems engineering approach at each step.
- Systems Engineering Guidebook for Intelligent Transportation Systems - provides a more in-depth reference for ITS practitioners applying systems engineering to plan, implement, manage, and operate ITS.
- Applying Scrum Methods to ITS Projects – provides information for those interested in learning about Scrum Methods, one of the Agile Methodologies, and how to incorporate Scrum into ITS project development. Also includes links to Agile resources.
Task 2: Concept of Operations (ConOps)
Concept of Operations (ConOps)

The purpose of the task is to refine the proposed deployment concept and document in a Concept of Operations that describes the specific combination of applications to be deployed, and how operational practice will be altered based on the introduction of these applications.

**Deliverables**

1. Draft Stakeholder ConOps Review Panel Roster – Kick-Off + 8 weeks (April 19th)
2. Draft Needs Summary – Kick-Off + 8 weeks (April 19th)
3. Final Stakeholder ConOps Review Panel Roster – Kick-Off + 10 weeks (May 3rd)
4. Final Needs Summary – Kick-Off + 10 weeks (May 3rd)
5. Draft ConOps – Kick-Off + 13 weeks (May 24th)
6. ConOps Walkthrough Briefing Deck – Kick-Off + 13 weeks (May 24th)
7. Draft ConOps Comment Resolution Report – Kick-Off + 15 weeks (June 7th)
8. Final ConOps – Kick-Off + 18 weeks (June 28th)
9. Final ConOps Comment Resolution Report – Kick-Off + 18 weeks (June 28th)
10. Public ConOps Webinar – Kick-Off + 21 weeks (Week of July 19th)
## ConOps Major Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Scope</strong></td>
<td>Provide an overview of the ConOps document and the system to which it applies.</td>
</tr>
<tr>
<td><strong>Reference Documents</strong></td>
<td>List the document number, title, revision, and date of all documents referenced in the ConOps document.</td>
</tr>
<tr>
<td><strong>Current System and Environment</strong></td>
<td>Describe the system or situation as it currently exists. Introduce the problems that have motivated</td>
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<td>the development of the new system.</td>
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<tr>
<td><strong>Justification for and Nature of Changes</strong></td>
<td>Describe shortcomings of current system/situation, which helps to bridge the gap between sections 3</td>
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<td>and 5. User needs are identified.</td>
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<tr>
<td><strong>Concept for Proposed Environment</strong></td>
<td>Describe the new system that is a result of the justification of changes and user needs in section 4.</td>
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<tr>
<td><strong>Operational Scenarios</strong></td>
<td>Document operational scenarios/use cases for the new system. Use cases provide a description of how</td>
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<tr>
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<td>the new system should operate.</td>
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<tr>
<td><strong>Summary of Impacts</strong></td>
<td>Describe the operational impacts of the new system on users, developers, maintainers, and other</td>
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<tr>
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<td>agencies and stakeholders.</td>
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<tr>
<td><strong>Analysis of the Proposed System</strong></td>
<td>Provide an analysis of the benefits, limitations, advantages/disadvantages, and alternatives/trade-</td>
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<td>offs considered.</td>
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<tr>
<td>Task 1</td>
<td>User Needs</td>
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</table>
ConOps Interdependencies

Inputs

Systems Engineering Planning
Task 1B: UNIRP

Concept of Operations

Scope
Referenced Documents
Current Systems
Justification for Change
Proposed/New System
Operational Scenarios
Summary of Impacts
Analysis of New System

Outputs

Operational Concepts
Task 3: DMP
Task 6: SyRS
Task 9: Training Plan
Task 13: ICTD Plan
Task 14: Dep. Briefing
ConOps Challenges

- **Complicated Task**
  - **Issue:** Deriving a Concept of Operations is a multilayered task requiring input from many systems.
  - **Possible Strategy:** Get an experienced Systems Engineer involved from the start of the project who has a background in large project deployments.

- **Problem Based**
  - **Issue:** What is the problem I am trying to solve?
  - **Possible Strategy:** Don’t get involved in the design too soon. First ask the question: “What is the problem I am trying to solve?” and write the ConOps to solve the problem in every step.

- **Input from Stakeholders**
  - **Issue:** How do I know which problem is the most important?
  - **Possible Strategy:** Involve stakeholders from a representative cross-section of the users of the system. What do they believe needs to be solved?
ConOps Challenges Continued

- **Accessible Outreach**
  - **Issue:** It is critical that members of the underserved communities that will be addressed by these deployments are included within these structured stakeholder interactions.
  - **Possible Strategy:** All materials for needs gathering must be available in a variety of accessible formats and multiple languages to accommodate all stakeholders and potential caregivers.
ConOps Technical Support Summary

- Proposed Technical Support Materials

<table>
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<th>Schedule Item</th>
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<tbody>
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<td>03/16/2021</td>
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<tr>
<td>USDOT-provided Task 2 Deliverable Template</td>
<td>03/09/2021</td>
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ConOps Key References

IEEE Resources:

FHWA SE Resources:
- FHWA Applying Scrum Methods to ITS Projects [https://rosap.ntl.bts.gov/view/dot/32681](https://rosap.ntl.bts.gov/view/dot/32681)
Task 3: Data Management Plan (DMP)
Data Management Plan

Describes the underlying data-related needs of the Deployment Concept. Further, the document shall describe needs related to protecting the privacy of users, ensuring secure operations, and outlining a high-level approach that addresses these needs.

**Deliverables**
1. Draft Data Management Plan – Kick-Off + 22 weeks
2. Final Data Management Plan – Kick-Off + 26 weeks
## DMP Major Components

<table>
<thead>
<tr>
<th>Component</th>
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<tbody>
<tr>
<td><strong>Data Summary</strong></td>
<td>Summary of the types and nature, scope and scale of data</td>
</tr>
<tr>
<td><strong>PII Information</strong></td>
<td>Document all PII data elements and how they will be handled during the task</td>
</tr>
<tr>
<td><strong>System(s)</strong></td>
<td>Document the system or systems that will be used for collecting, monitoring and storing data</td>
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<td>Document how the system will provide Security and Privacy controls</td>
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<td>Add to the Context Diagram from the ConOps with Data Flows</td>
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# Data Management Plan Schedule

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## Schedule

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<td>Task 14</td>
<td>Ready Brief</td>
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**2021**

- Feb: Task 1A
- Mar: Project Management
- Apr: Task 1B
- May: User Needs
- Jun: Task 2
- Jul: Concept of Operations
- Aug: Task 3
- Sep: Data Management Plan
- Oct: Task 4
- Nov: Safety Plan
- Dec: Task 5
- Jan: Performance Measurement
- Feb: Task 6

**2022**

- Mar: Task 7
- Apr: System Requirements
- May: Task 8
- Jun: Tech Readiness
- Jul: Task 9
- Aug: Human Use Approval
- Sep: Task 10
- Oct: Training Plan
- Nov: Task 11
- Dec: Partnership
- Jan: Task 12
- Feb: Outreach Plan
- Mar: Task 13
- Apr: SEMP
- May: Task 14
- Jun: Ready Brief
Data Management Plan Interdependencies

**Inputs**
- Data Needs
  - Task 2: ConOps
- Context Diagram
  - Task 2: ConOps

**Data Management Plan**
- Data Summary
- PII Information
- Systems
- Security
- Context Diagram
- Standards
- Metadata
- Data License

**Outputs**
- Data Definitions
  - Task 4: Safety Mgmt
  - Task 6: SyRS
  - Task 9: Training Plan
  - Task 13: ICTD Plan
  - Task 14: Dep. Briefing
Data Management Plan Challenges

- **Developing Strategies for PII**
  - **Survey Data**
    - **Issue:** Can include PII data such as name, home address, etc.
    - **Possible Strategy:** Get IRB approval and keep data separate from research data.
  - **GPS Trajectories**
    - **Issue:** Trajectories can identify an individual and where they live/work.
    - **Possible Strategy:** De-identify sensitive locations.
  - **Personally Identifiable Information**
    - **Issue:** Tracking an individual or stealing their identity can be accomplished through stolen PII.
    - **Possible Strategy:** All data collection needs to be justified and protected.
  - **Agreements Covering 3rd Parties Data**
    - **Issue:** It is often unclear how much or at what level a 3rd party's data will be shared for a project.
    - **Possible Strategy:** Discuss data sharing up front and make sure to have a written agreement with the 3rd party early in the project.
Data Management Plan Challenges
Continued

- **Ensuring Proper Amount of Data is Collected**
  - **Issue:** Data collection can be disrupted by various items reducing the amount of data collected.
  - **Possible Strategy:** Provide data buffering for both the before and after case data to ensure adequate data is collected. Monitor data processes for changes or disruptions.

- **Ensure Current Data Information is Shared**
  - **Issue:** Sometimes data documentation lags behind collection which can cause costly redo when end users don’t properly used it.
  - **Possible Strategy:** Have a set plan for updating the DMP and other data related documentations which includes notification to users working with the data.
DMP Technical Support Summary

- Proposed Technical Support Materials

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- Get help by contacting your federal site lead/site COR or reach the Data Lead Kate Hartman at Kate.hartman@dot.gov
DMP Key References

- Complete Trip Webinar #6: Privacy Security, and Open Data, April 2020

- National Institute of Standards and Technology Special Publication 800-122, April 2010

- Standards for Security Categorization of Federal Information and Information Systems, FIPS PUBS 199, February 2004,

- Minimum Security Requirements for Federal Information and Information Systems, FIPS PUBS 200, March 2006,

- Security and Privacy Controls for Federal Information Systems and Organizations, NIST Special Publication 800-53 Revision 4, April 2013 includes updates as of 01-22-2015,


*Note: FIPS PUBS and NIST Special Publications provide invaluable guides for use by state and local governments as well as the private sector, but their use is not mandatory for non-Federal systems.*
BREAK

2:05PM – 2:25PM ET
Task 4: Safety Management Plan (SMP)
Safety Management Plan (SMP)

Describes the underlying needs associated with the safety of all travelers, caregivers, service providers, and all other individuals potentially impacted by the Complete Trip Concept Deployment.

**Deliverables**

2. Final Safety Management Plan – Kick-Off + 26 weeks
<table>
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<tr>
<th>Safety Management Plan Major Components</th>
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<td><strong>Safety Relationships</strong></td>
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<td>Safety-relevant stakeholders and processes to result in a tailored safety management approach</td>
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<td><strong>Safety Scenarios</strong></td>
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<td>Scenarios identified based on the applications and technologies selected for deployment</td>
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<td><strong>Safety Needs</strong></td>
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<td>Needs derived from an analysis of the scenarios, including likelihood and potential impact</td>
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<td><strong>Levels of Safety Risk</strong></td>
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<td>Levels of safety risk associated with the deployment, using established processes where possible</td>
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<td><strong>Safety Operational Concept</strong></td>
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<td>Requirements and actions to reduce the likelihood and impact in each safety scenario, and responses to safety-related events</td>
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# Safety Management Plan Schedule

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Safety Management Interdependencies

Inputs

Planned Concepts and Scenarios

Task 2: ConOps

Safety Management Plan

Safety Scenarios
Safety Needs
Levels of Safety Risk
Safety Op. Concept

Outputs

Safety Requirements / Controls / Actions

Task 1: Prog. Mgmt
Task 6: SyRS
Task 7: Enabling Tech.
Task 8: Human Use
Task 9: Training Plan
Task 13: ICTD Plan
Task 14: Dep. Briefing
Safety Management Challenges

- **Risk Assessment**
  - **Issue:** Overestimate / underestimate the risk
  - **Possible Strategy:** Validate risk estimates using risk assessment approach with knowledgeable stakeholders outside design/vendor team (including stakeholders representing the underserved population(s) of interest)

- **Site-Specific Safety Plan**
  - **Issue:** Safety scenarios vary depending on deployment sites / applications
  - **Possible Strategy:** Focus on identified safety-relevant scenarios for each planned deployment component considering all affected individuals

- **Identify Local Support**
  - **Issue:** Coordinate with various local emergency response agencies
  - **Possible Strategy:** Review relevant scenarios and procedures with safety manager and local agencies for monitoring and response

- **Reaction of Participants**
  - **Issue:** Participants are not aware of their actions in the safety scenarios
  - **Possible Strategy:** Ensure participants have adequate understanding of actions and responses in training
Proposed Technical Support Materials

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Safety Management Plan Key References

Task 5: Performance Measurement and Evaluation Support Plan
Performance Measurement and Evaluation Support Plan

Describes the definition and planned assessment of quantitative and qualitative performance measures, at the individual, community population, and system level. Plan includes approach to mitigate impacts of confounding factors, evaluate use cases/scenarios with most impact, and provide independent evaluation support.

**Deliverables**

1. Draft Performance Measurement Plan – Kick-Off + 26 weeks
2. Final Performance Measurement Plan – Kick-Off + 35 weeks
## Performance Meas. Plan Major Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use Cases/Scenarios</td>
<td>Identify the specific use cases where the deployment is expected to have the most impact in achieving target performance goals</td>
</tr>
<tr>
<td>Performance Measures &amp; Targets</td>
<td>Define and describe measures and targets for assessing enhancements for communities (for both groups and system-wide)</td>
</tr>
<tr>
<td>Perf. Measurement / Evaluation Approach</td>
<td>Explain planned approaches to assess impacts including experimental designs and statistical methods for chosen measures</td>
</tr>
<tr>
<td>Confounding Factors</td>
<td>Identify expected confounding factors that might influence performance measurement and describe mitigation strategies</td>
</tr>
<tr>
<td>IE Support</td>
<td>Provide support and data for the Independent Evaluation effort</td>
</tr>
<tr>
<td>Data Collection</td>
<td>Discusses data needed to support the performance measures, including system and individual level, and timing / methods</td>
</tr>
<tr>
<td>Data Sharing Framework</td>
<td>Plans for sharing performance measurement data including processes, update frequency, and presentation / formats</td>
</tr>
<tr>
<td>Performance Measurement Webinar</td>
<td>Describes the performance measurement plan to engage the broader Complete Trip-ITS4US Deployment Program community</td>
</tr>
<tr>
<td>Task</td>
<td>2021</td>
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<tr>
<td></td>
<td>Feb</td>
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<tr>
<td>Task 1</td>
<td>User Needs</td>
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<tr>
<td>Task 2</td>
<td>Concept of Operations</td>
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<tr>
<td>Task 3</td>
<td>Data Management Plan</td>
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<tr>
<td>Task 4</td>
<td>Safety Plan</td>
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<tr>
<td><strong>Task 5</strong></td>
<td><strong>Performance Measurement</strong></td>
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<tr>
<td>Task 6</td>
<td>System Requirements</td>
</tr>
<tr>
<td>Task 7</td>
<td>Tech Readiness</td>
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<td>Task 8</td>
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<td>Task 9</td>
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<tr>
<td>Task 10</td>
<td>Institutional, Partnership, and Financial Plan</td>
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<td>Task 11</td>
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<td>Task 12</td>
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<td>Task 13</td>
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<tr>
<td>Task 14</td>
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</table>
Performance Meas. Plan Interdependencies

**Inputs**
- Evaluation Objectives
  - Task 2: ConOps
  - Task 3: Data Mgmt

**Performance Meas. Plan**
- Scenarios
- Measures / Targets
- Evaluation Design
- Confounding Factors
- Data Collection
- Data Sharing
- IE Support
- Perf. Meas. Webinar

**Outputs**
- Process Approach
  - Task 3: Data Mgmt
  - Task 6: SyRS
  - Task 8: Human Use
  - Task 9: Training Plan
  - Task 10: Partner Plan
  - Task 13: ICTD Plan
  - Task 14: Dep. Briefing
Performance Measurement & Evaluation Purpose & Needs

- **Purpose**
  - Inform stakeholders and prospective deployers of benefits, impacts, costs.
  - Inform USDOT on effectiveness of the project and ITS4US program in creating demonstrating measurable impacts. Support transferability of successful applications and sharing of lessons learned.

- **Needs**
  - **Complete Trips Project:** Develop performance measures and evaluation design associated with use cases / scenarios and targets. Collect quantitative / qualitative data, conduct analyses and document lessons learned. Support data sharing and engagements for Independent Evaluation.
Performance Measurement Challenges

- **Targeting Meaningful Measurements**
  - **Issue:** Only gathering easy-to-measure and readily available information
  - **Possible Solution:** Focus on performance measures relating to key scenarios of high stakeholder interest (specially for the underserved community(s) of interest) and expected impact.

- **Confounding Factors / Ambiguous Findings**
  - **Issue:** Difficulty in reliable measurement of system-level measures
  - **Possible Solution:** Include experimental design and statistical expertise in team. Develop evaluation design that provides for controls and assess for sufficient statistical power.

- **Coordination with other activities**
  - **Issue:** Inconsistency in expectations and plans across tasks and time
  - **Possible Solution:** Involve key personnel from other related tasks in performance measurement inputs and outputs. Develop change management strategy to ensure project changes are reflected in evaluation approach and plans and vice versa.
Performance Measurement Challenges Continued

- **PII Data / Access**
  - **Issue:** Performance measurement data may include potential sensitive data or Personally Identifiable Information (PII).
  - **Possible Solution:** Consider methods to minimize unnecessary PII, and use subject identifiers to support analyses needed for performance measurement, including controlled access for Independent Evaluation (IE)

- **Data Sharing for Evaluation**
  - **Issue:** If project involves external private-sector partnerships, external parties may be reluctant to share data.
  - **Possible Solution:** Ensure project agreements with 3rd parties include required data access and sharing for evaluation (including IE). Apply data transformation techniques to convert data to suitable sharable format.
Performance Measurement Plan
Technical Support Summary

- Proposed Technical Support Materials

<table>
<thead>
<tr>
<th>Schedule Item</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 5 Training</td>
<td>04/06/2021</td>
</tr>
<tr>
<td>USDOT-provided Task 5 Deliverable Template</td>
<td>03/30/2021</td>
</tr>
<tr>
<td>Performance Measurement/Human Use Roundtable (focused on Tasks 5, 8, and 9)</td>
<td>TBD</td>
</tr>
</tbody>
</table>

- Get help by contacting your federal site lead/site COR or reach the Performance Measurement / Evaluation Lead Murat Omay at Murat.Omay@dot.gov
Performance Measurement Plan Key References

- USDOT, Methodology to Evaluate the Benefits of Cooperative System Applications, December 2016, [not published]
- USDOT, Comparison of Evaluation Tools and Methods Used in the United States (U.S.) and Japan, April 2016, https://rosap.ntl.bts.gov/view/dot/31319
Task 6: Deployment System Requirements (SyRS)
Deployment System Requirements (SyRS)

The purpose of the SyRS is to identify what the deployment must accomplish; identify the subsystems; and define the functional and interface requirements among the subsystems.

Deliverables
2. Final Stakeholder SyRS Review Panel Roster – Kick-Off + 27 weeks
3. Draft SyRS Document – Kick-Off + 30 weeks
4. SyRS Walkthrough Workbook – Kick-Off + 30 weeks
5. Draft SyRS Walkthrough Comment Resolution Report – Kick-Off + 32 weeks
6. Final SyRS Document – Kick-Off + 35 weeks
7. Final SyRS Walkthrough Comment Resolution Report – Kick-Off + 35 weeks
**SyRS Major Components**

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>System purpose, system scope, acronyms/abbreviations, references, and system overview (from ConOps).</td>
</tr>
<tr>
<td>General System Description</td>
<td>Proposed system that results from the desired changes or user needs specified in the ConOps.</td>
</tr>
<tr>
<td>System Requirements</td>
<td>System requirements must define all of the functions that the system must perform at a technical level.</td>
</tr>
<tr>
<td>System Interfaces</td>
<td>Protocols, messages, frameworks and/or APIs used to communicate with internal and external elements within the system.</td>
</tr>
<tr>
<td>Needs To Requirements Matrix</td>
<td>The NTRM is a critical tool for ensuring that your system requirements cover all of the user needs.</td>
</tr>
<tr>
<td>Task 1</td>
<td>User Needs</td>
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<td>Task 2</td>
<td>Concept of Operations</td>
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<td>Task 8</td>
<td>Human Use Approval</td>
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<tr>
<td>Task 9</td>
<td>Training Plan</td>
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<td>Task 10</td>
<td>Institutional, Partnership, and Financial Plan</td>
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<td>Task 11</td>
<td>Outreach Plan</td>
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<td>Task 12</td>
<td>SEMP</td>
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<tr>
<td>Task 13</td>
<td>Deployment Plan</td>
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<tr>
<td>Task 14</td>
<td>Deployment Readiness Summary</td>
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</tbody>
</table>
SyRS Interdependencies

**Inputs**

- User Needs
  - Task 1B: UNIRP
  - Task 2: ConOps

- Performance Measures

**System Requirements Specification**

- Introduction
- General System Description
- System Requirements
- Context Diagram
- Standards

**Outputs**

- System Requirements
  - Task 11: Outreach
  - Task 12: SEMP
  - Task 13: ICTD Plan
  - Task 14: Dep. Briefing
SyRS Challenges

- **Measurement**
  - **Issue:** Difficult to measure system requirements
  - **Possible Strategy:** Reference Performance Measures. Tie data collection requirements into System Requirements.

- **Stakeholder Input**
  - **Issue:** Input from stakeholders may not cover all issues to solve
  - **Possible Strategy:** Be sure to get a representative sample from multiple organizations (including representatives of the underserved community(s)) and different public private sector spheres.

- **Data Requirements**
  - **Issue:** Unclear what requirements to put into system
  - **Possible Strategy:** Derive requirements directly from stakeholder needs. Make sure they match up and are not being derived from other means.

- **Testing**
  - **Issue:** How will the requirements be tested later on in the project?
  - **Possible Strategy:** Take into account system testing early in the system requirements process.
SyRS Technical Support Summary

- Proposed Technical Support Materials

<table>
<thead>
<tr>
<th>Schedule Item</th>
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<tr>
<td>Task 6 Training</td>
<td>TBD</td>
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<tr>
<td>USDOT-provided Task 6 Deliverable Template</td>
<td>TBD</td>
</tr>
<tr>
<td>Cohort Roundtables – Technical Roundtable (focused on Tasks 1.B, 2, 3, 4, 6, and 12)</td>
<td>TBD</td>
</tr>
</tbody>
</table>

- Get help by contacting your federal site lead/site COR or reach the Systems Engineering Lead Deb Curtis at deborah.curtis@dot.gov
SyRS Key References

- FHWA Applying Scrum Methods to ITS Projects [https://rosap.ntl.bts.gov/view/dot/32681](https://rosap.ntl.bts.gov/view/dot/32681)
Questions