U.S. Department of Transportation

COMPLETE TRIP

ITS4US

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

February 24, 2021

Welcome Back and USDOT Presenters

Elina Zlotchenko
ITS4US Program Manager
ITS JPO

Kate Hartman
Chief - Research, Evaluation, and Program Management
ITS JPO

Deborah Curtis
Highway Research Engineer
FHWA - Office of Operations, Research, and Development

Karen Timpone
ITS Safety Program Manager
FHWA - Office of Safety

Murat Omay
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FTA - Office of Research, Demonstration, and Innovation (TRI)

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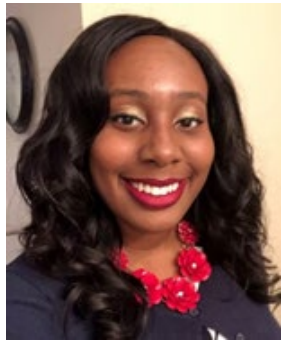
Multimodal ITS Research and Deployment
ITS JPO

Dawn Sweet
Director of Headquarters Operations
FTA - Office of Civil Rights

Shari Schaftlein
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!)

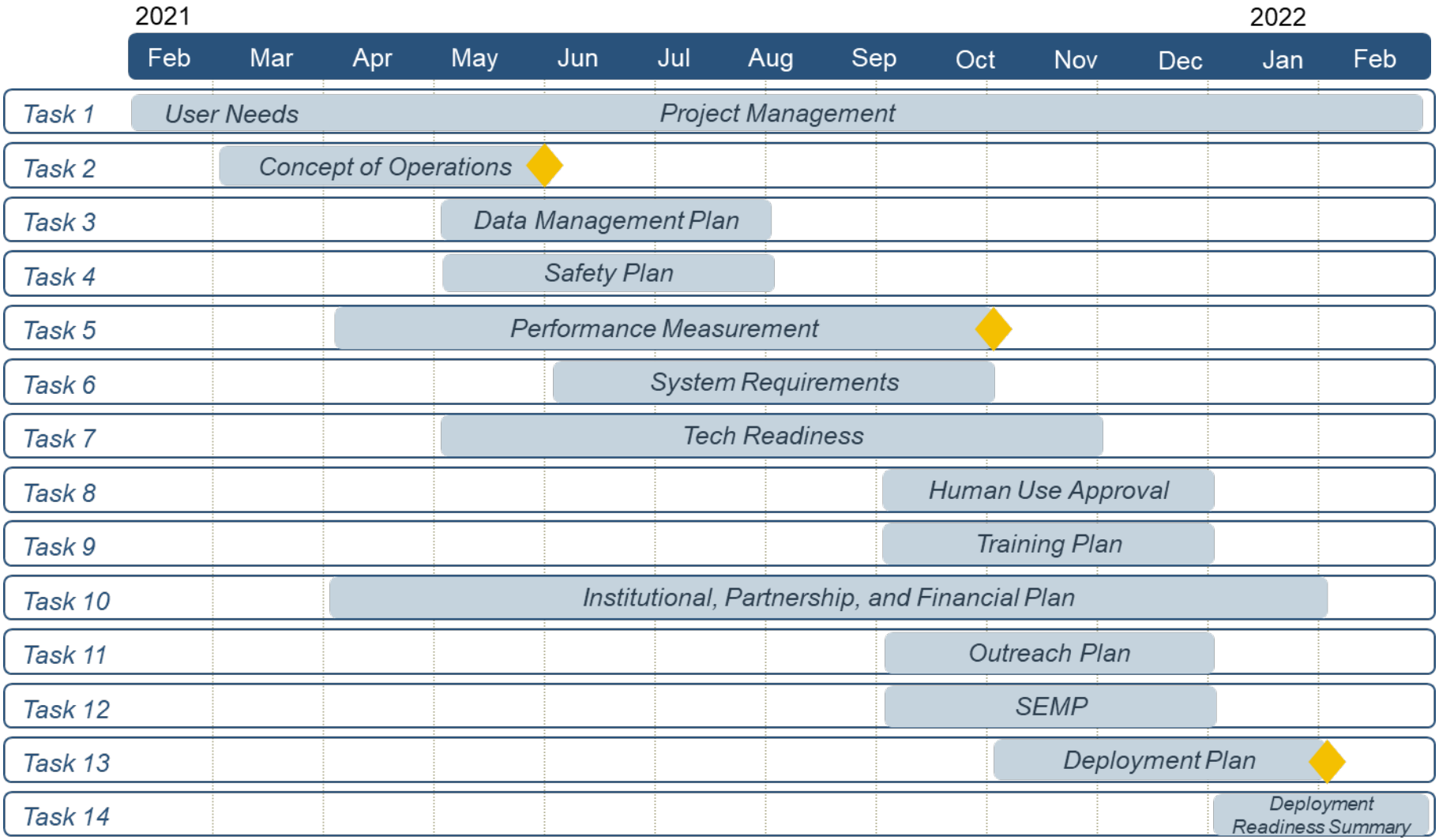
- **For each topic area, USDOT will provide:**
  - Training presentation
  - Annotated document template

  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



Deliverable Technical Support

- Annotated Template

- Live Training (Tuesdays 2PM ET)

- Draft Plan Review

- Final Plan Acceptance

Near-Term Look Ahead (First 8 Weeks)

- March 2nd 2:00-3:30 ET- User Needs ID and Requirements Training

- March 15th – Draft PMP is Due

- March 22nd - Draft User Needs ID and Requirements Plan Due

- March 16th 2:00-3:30 ET- Concept of Operations Training

- April 5th - Final PMP is Due

- April 6th 2:00-3:30 ET- Perf. Measurement and Eval Plan Training

- April 12th – Final User Needs ID and Requirements Plan Due

- April 13th 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.

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Task 1A: Project Management

Project Management

Task 1A

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

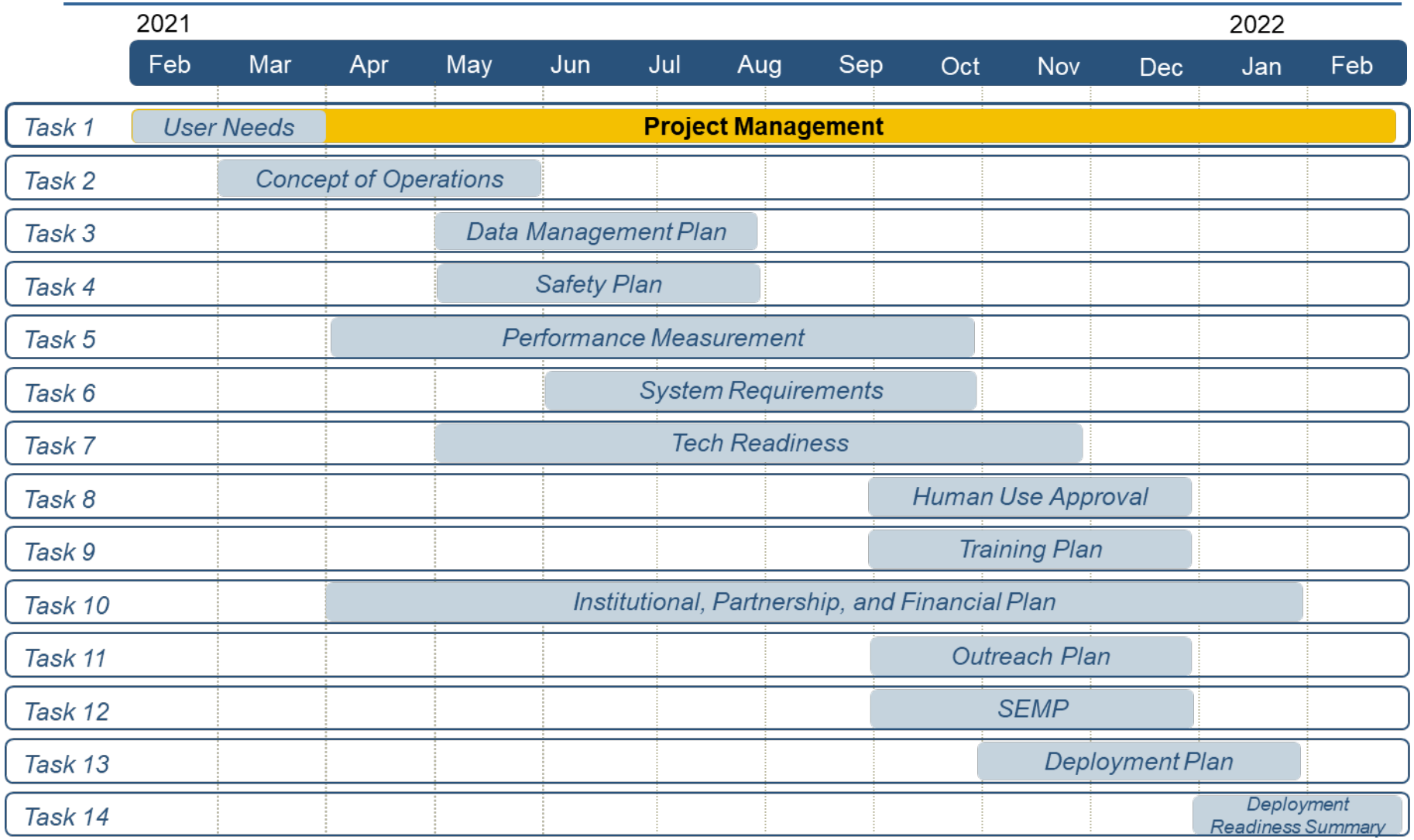
PMP Major Components

Task 1A

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

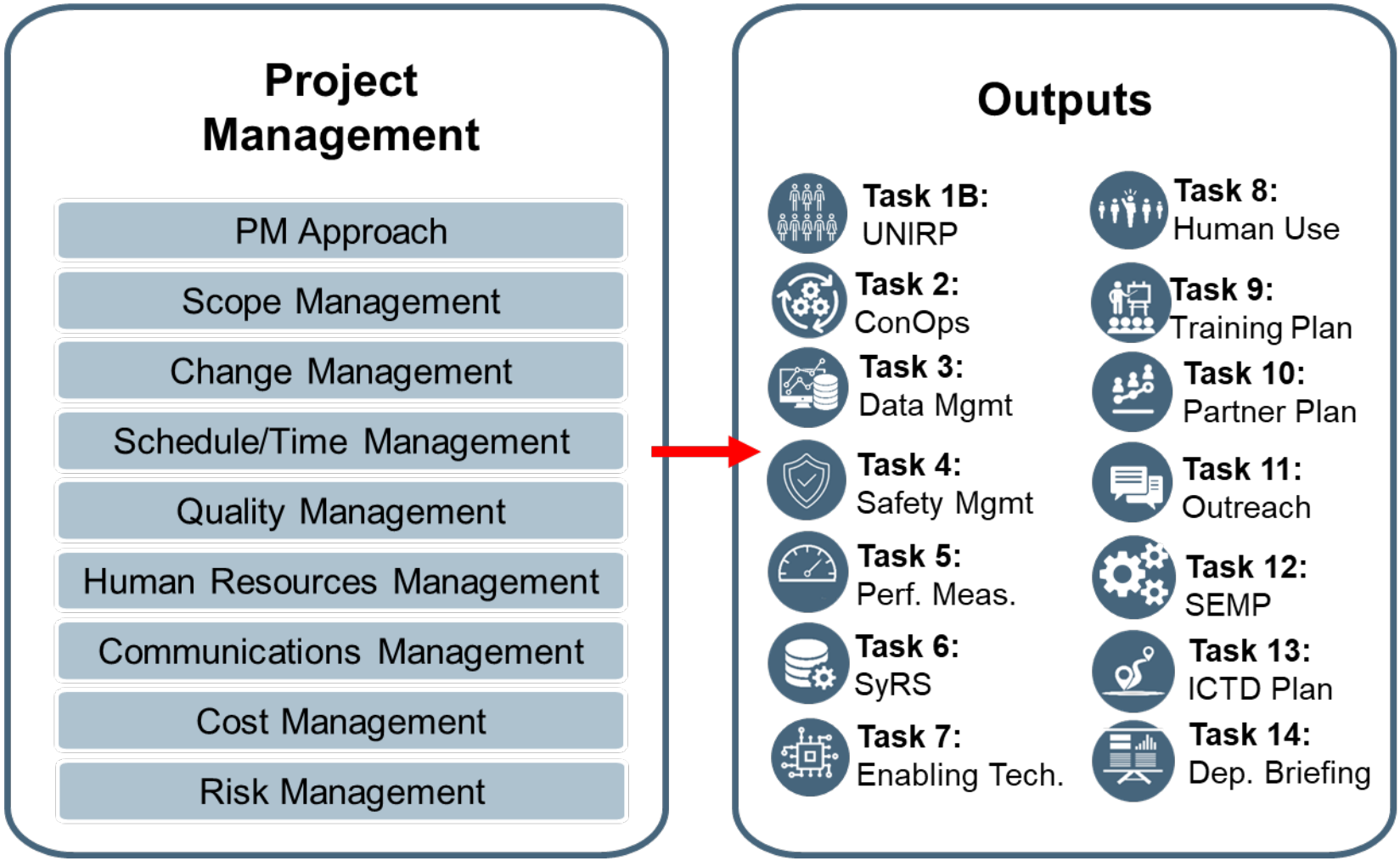
Project Management Schedule

Task 1A



Project Management Interdependencies

Task 1A



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.

Project Management Technical Support Summary

- Proposed Technical Support Materials

Schedule Item	Date
USDOT-provided Task 1A Deliverable Template	**01/06/21**
ITS JPO PMO Monthly Status Report, Schedule and Risk Register Templates	**01/06/21**

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

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Task 1B: User Needs Identification and Requirements Planning (UNIRP)

User Needs Identification and Requirements Planning (UNIRP) Document

Task 1B

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 22nd)
2. Final UNIRP Document – Kick-Off + 7 weeks (April 12th)

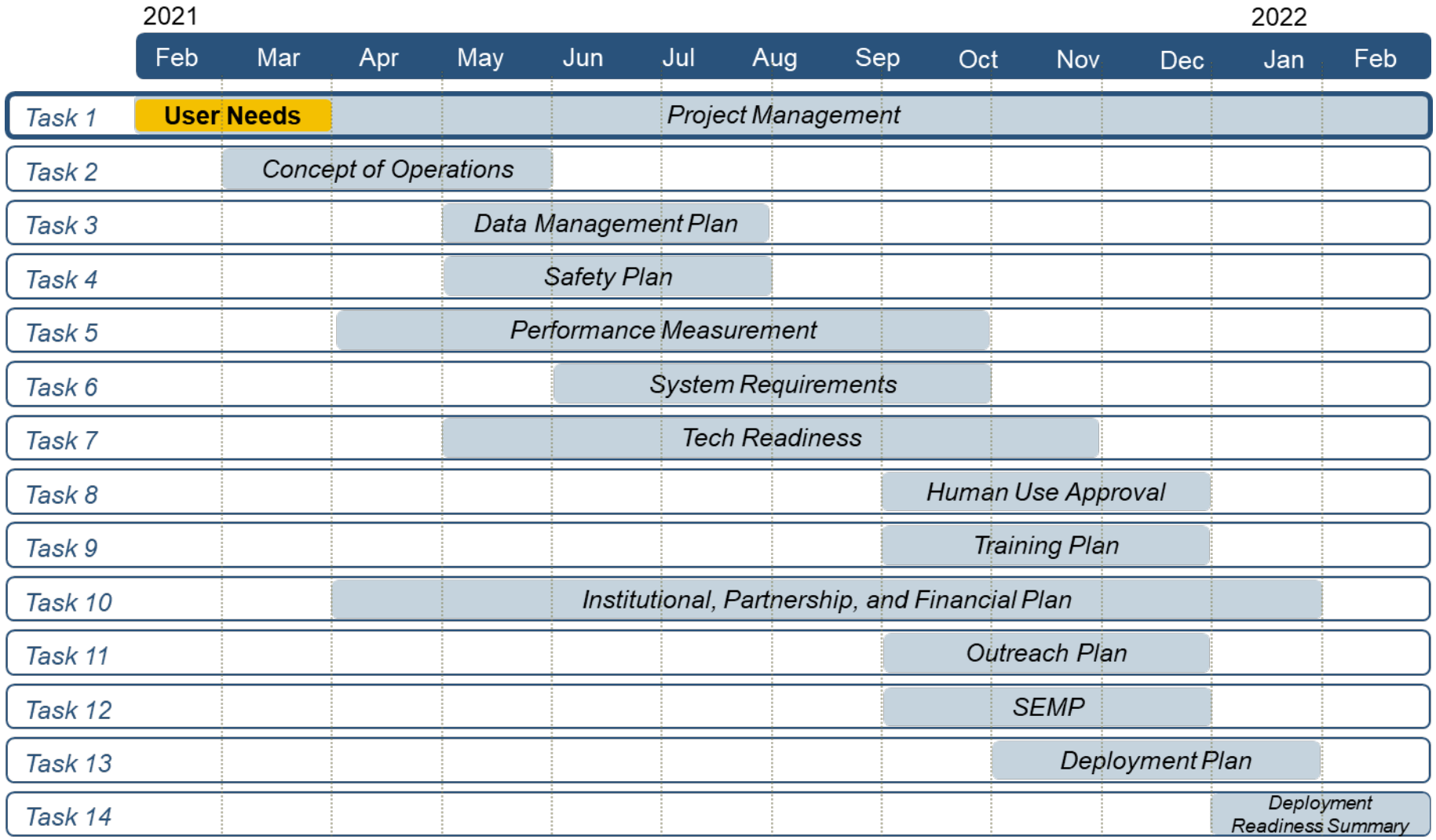
UNIRP Major Components

Task 1B

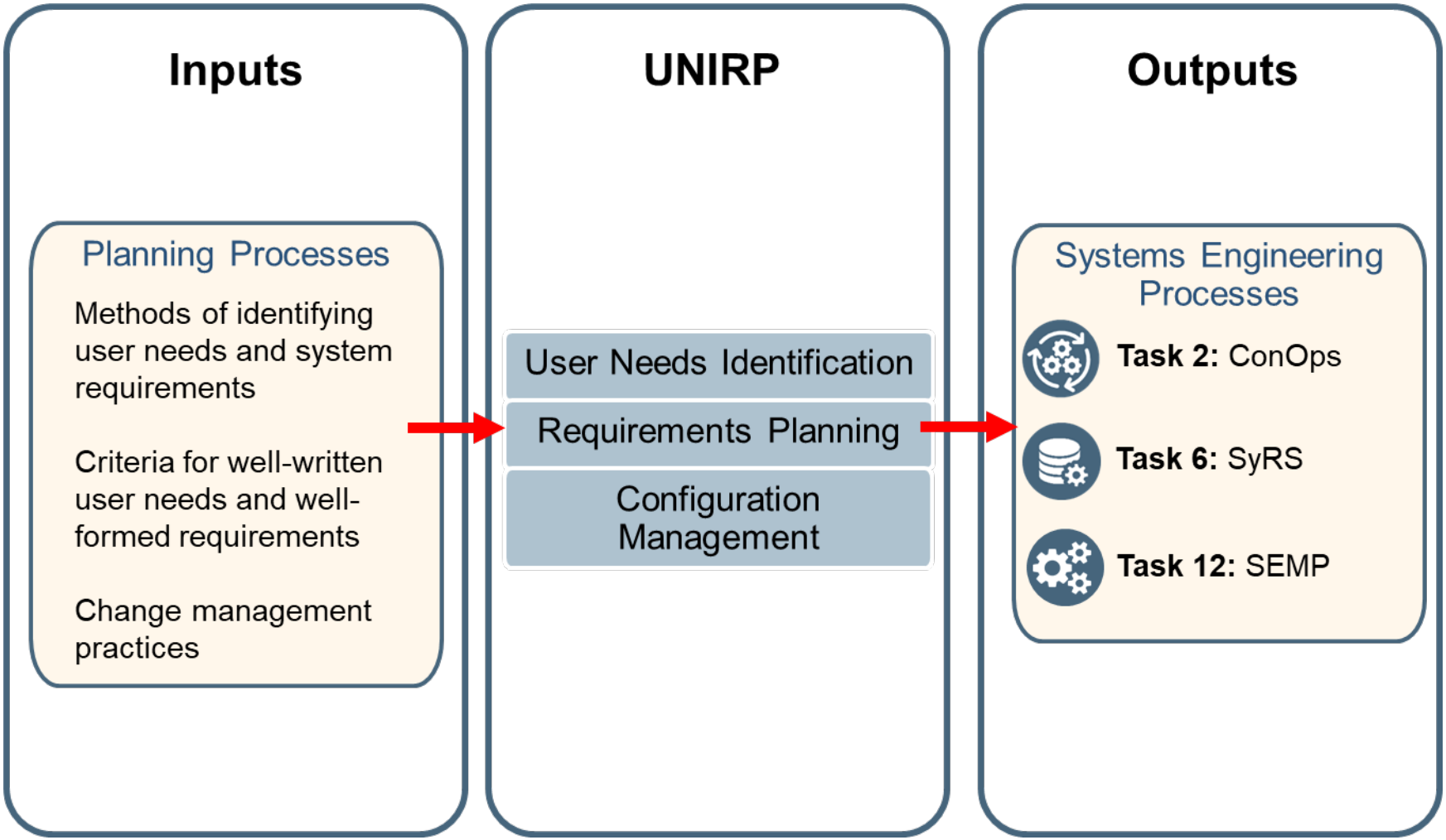
User Needs Identification	Process of how team will identify user needs.
Requirements Planning	Process of how team will identify system requirements.
Configuration Management	Process of how team will maintain configuration management.

UNIRP Schedule

Task 1B



UNIRP Interdependencies



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.

UNIRP Technical Support Summary

- Proposed Technical Support Materials

Schedule Item	Date
Task 1B Training	**03/02/2021**
USDOT-provided Task 1B Deliverable Template	**02/24/2021**
Cohort Roundtables – Technical Roundtable (focused on Tasks 1.B, 2, 3, 4, 6, and 12)	**TBD**

- 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:

- IEEE Guide for Information Technology - System Definition - Concept of Operations (ConOps) Document, IEEE Standard 1362, 1998, 10.1109/IEEESTD.1998.89424
- IEEE Guide for Software Reviews and Audits, IEEE Standard 1028-2008, 10.1109/IEEESTD.2008.4601584
- ISO/IEC/IEEE International Standard - Systems and Software Engineering -- Life Cycle Processes --Requirements Engineering, IEEE/ISO/IEC 29148-2018, https://standards.ieee.org/standard/29148-2018.html
- IEEE Guide for Developing System Requirements Specifications, IEEE Standard 1233, 1998, 10.1109/IEEESTD.1998.88826

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 incudes links to Agile resources.

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Task 2: Concept of Operations (ConOps)

Concept of Operations (ConOps)

Task 2

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)

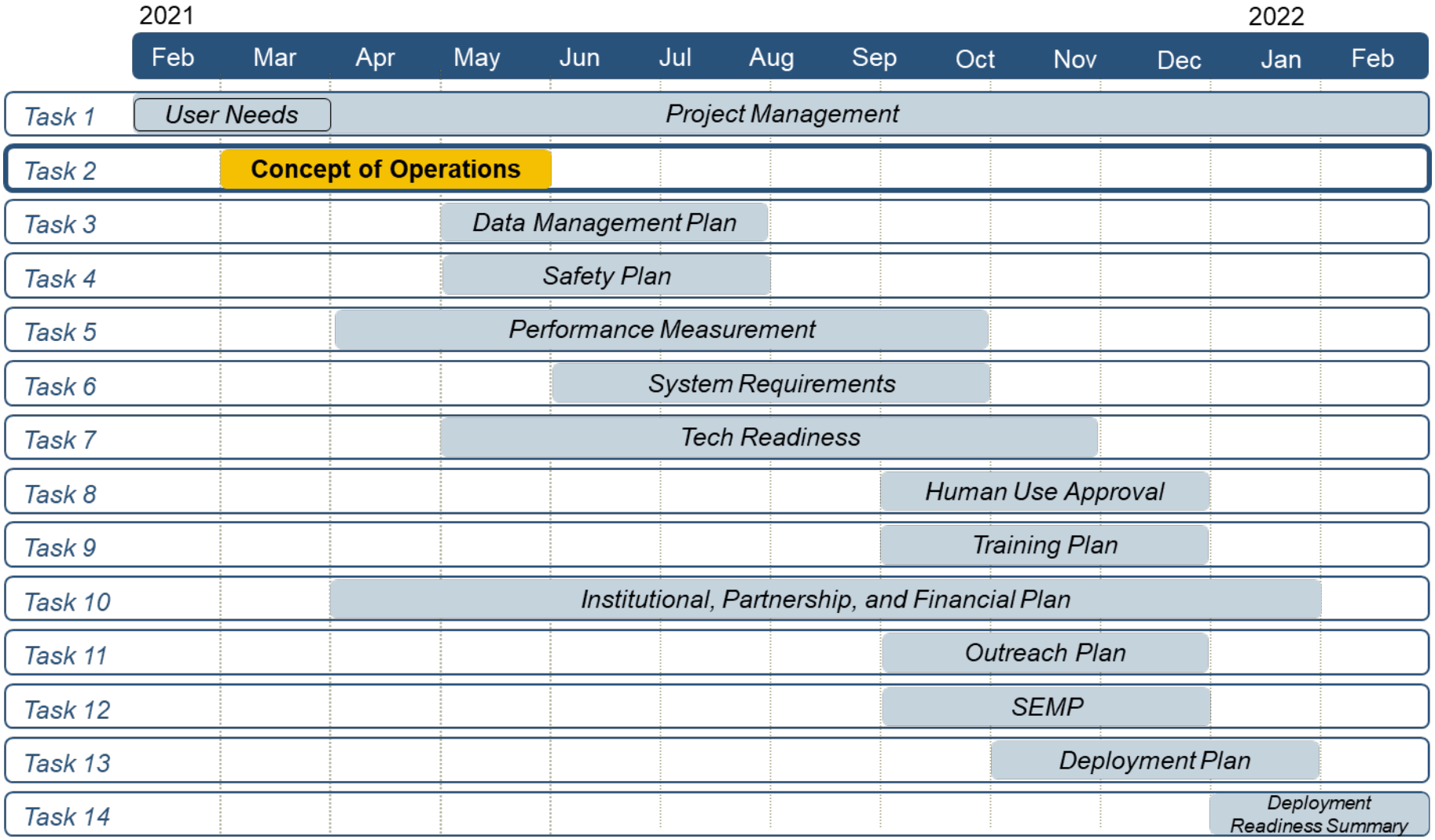
ConOps Major Components

Task 2

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

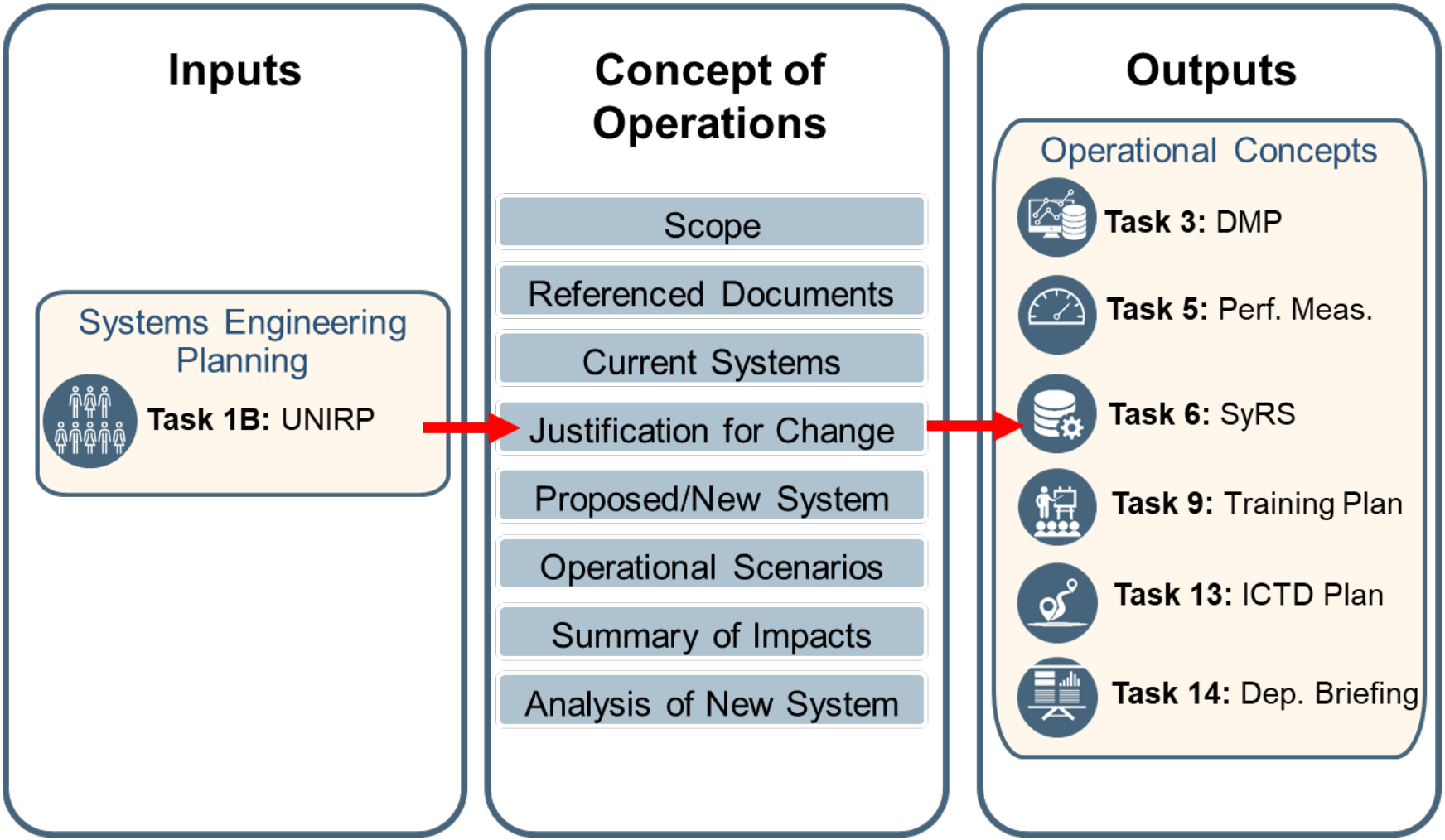
ConOps Schedule

Task 2



ConOps Interdependencies

Task 2



ConOps Challenges

- **Complicated Task**
  - Issue: Deriving a Concept of Operations is 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

Schedule Item	Date
Task 2 Training	**03/16/2021**
USDOT-provided Task 2 Deliverable Template	**03/09/2021**
Cohort Roundtables – Technical Roundtable (focused on Tasks 1.B, 2, 3, 4, 6, and 12)	**TBD**

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

ConOps Key References

IEEE Resources:

- IEEE Guide for Information Technology - System Definition - Concept of Operations (ConOps) Document, IEEE Standard 1362, 1998, 10.1109/IEEESTD.1998.89424
- IEEE Guide for Software Reviews and Audits, IEEE Standard 1028-2008, 10.1109/IEEESTD.2008.4601584
- ISO/IEC/IEEE International Standard - Systems and Software Engineering -- Life Cycle Processes --Requirements Engineering, IEEE/ISO/IEC 29148-2018, https://standards.ieee.org/standard/29148-2018.html

FHWA SE Resources:

- FHWA's Systems Engineering for Intelligent Transportation Systems http://ops.fhwa.dot.gov/publications/seitsguide/seguide.pdf
- FHWA Systems Engineering Guidebook for ITS, Concept of Operations Template http://www.fhwa.dot.gov/cadiv/segb/views/document/sections/section8/8_4_5.cfm
- North Dakota Department of Transportation Overview of Systems Engineering Process. http://www.dot.nd.gov/divisions/maintenance/docs/OverviewOfSEA.pdf
- FHWA Applying Scrum Methods to ITS Projects https://rosap.ntl.bts.gov/view/dot/32681

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Task 3: Data Management Plan (DMP)

Data Management Plan

Task 3

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

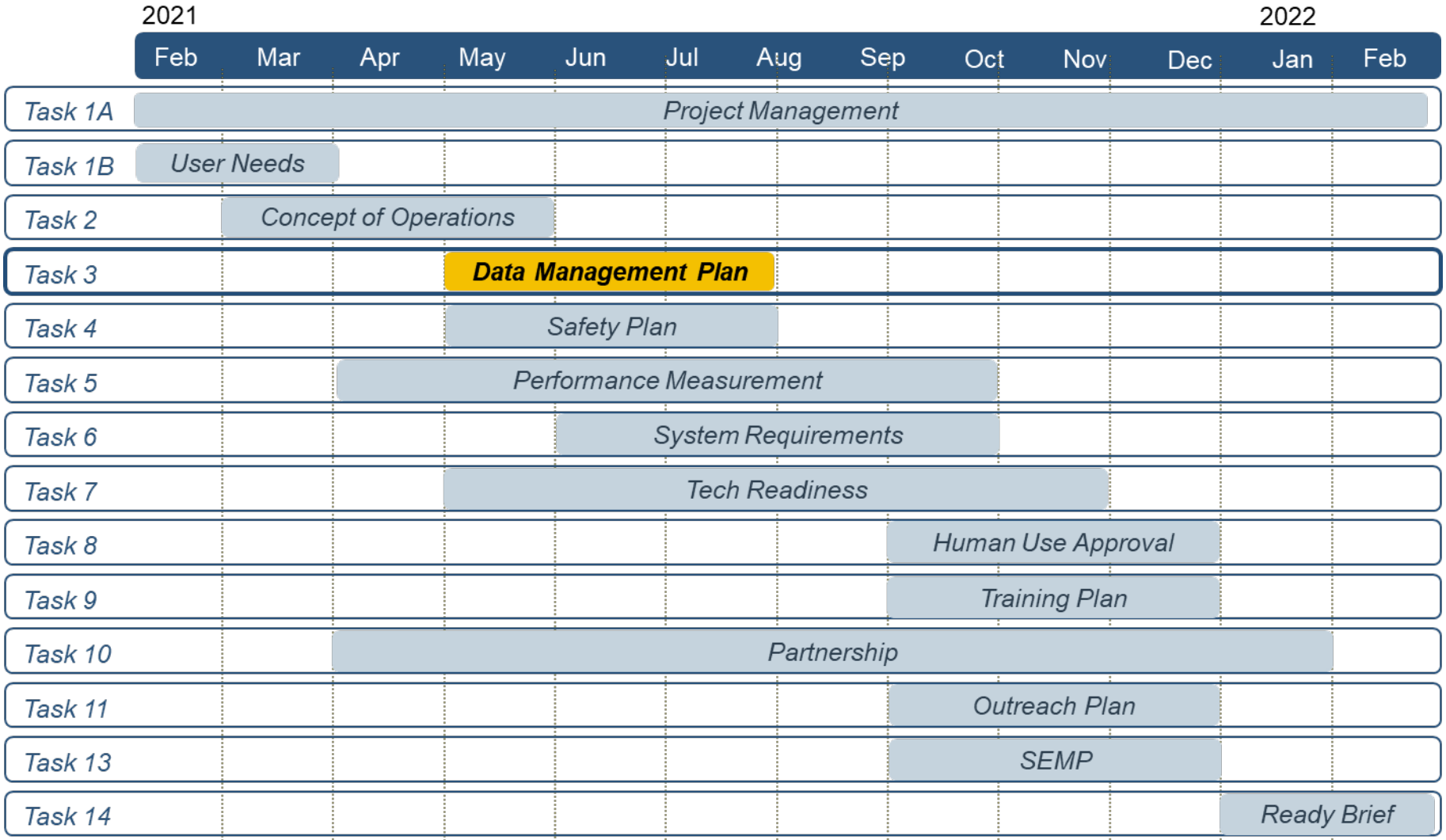
DMP Major Components

Task 3

Data Summary	Summary of the types and nature, scope and scale of data
PII Information	Document all PII data elements and how they will be handled during the task
System(s)	Document the system or systems that will be used for collecting, monitoring and storing data
Security	Document how the system will provide Security and Privacy controls
Context Diagram	Add to the Context Diagram from the ConOps with Data Flows
Standards	Document any standards used for collection, storage or transport of data
Metadata	Provide Metadata to address USDOT needs
Data License	The data created is covered under a documented license

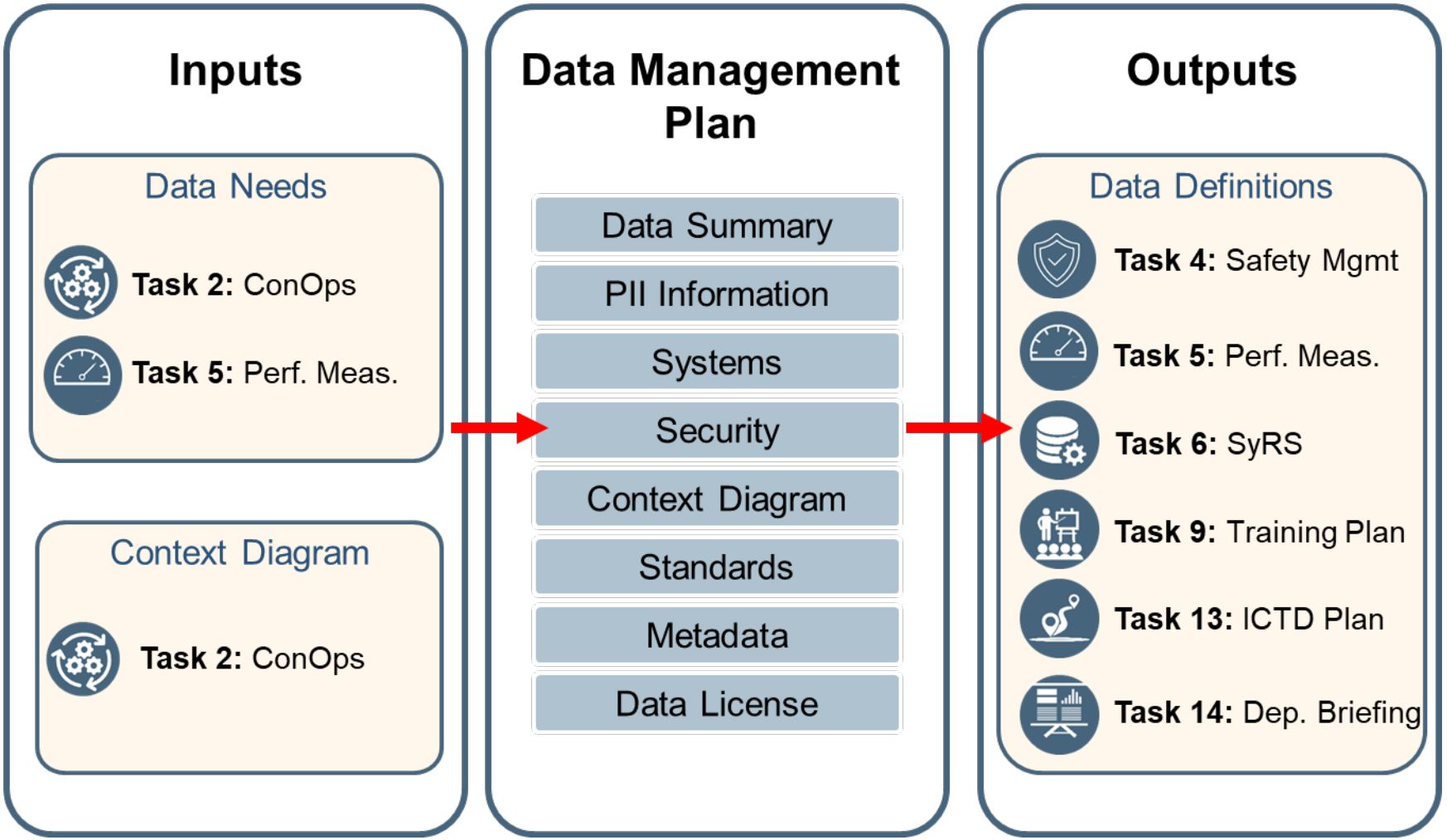
Data Management Plan Schedule

Task 3



Data Management Plan Interdependencies

Task 3



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

Task 3

- **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

Schedule Item	Date
Task 3 Training	**TBD**
USDOT-provided Task 3 Deliverable Template	**TBD**
Cohort Roundtables – Technical Roundtable (focused on Tasks 1.B, 2, 3, 4, 6, and 12)	**TBD**

- 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

Task 3

- Complete Trip Webinar #6: Privacy Security, and Open Data, April 2020 https://www.its.dot.gov/its4us/pdf/its4us_webinar_6.pdf
- National Institute of Standards and Technology Special Publication 800-122, April 2010 http://csrc.nist.gov/publications/nistpubs/800-122/sp800-122.pdf
- *Standards for Security Categorization of Federal Information and Information Systems,* FIPS PUBS 199, February 2004, http://csrc.nist.gov/publications/fips/fips199/FIPS-PUB-199-final.pdf
- *Minimum Security Requirements for Federal Information and Information Systems,* FIPS PUBS 200, March 2006, http://csrc.nist.gov/publications/fips/fips200/FIPS-200-final-march.pdf
- *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, http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r4.pdf
- ITS JPO DataHub (https://its.dot.gov/data/) and CodeHub (https://its.dot.gov/code/)
- *Security Credential Management System Proof-of-Concept: Interface Protocols,* October 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

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Task 4:
Safety Management Plan (SMP)

Safety Management Plan (SMP)

Task 4

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

1. Draft Safety Management Plan – Kick-Off + 22 weeks
2. Final Safety Management Plan – Kick-Off + 26 weeks

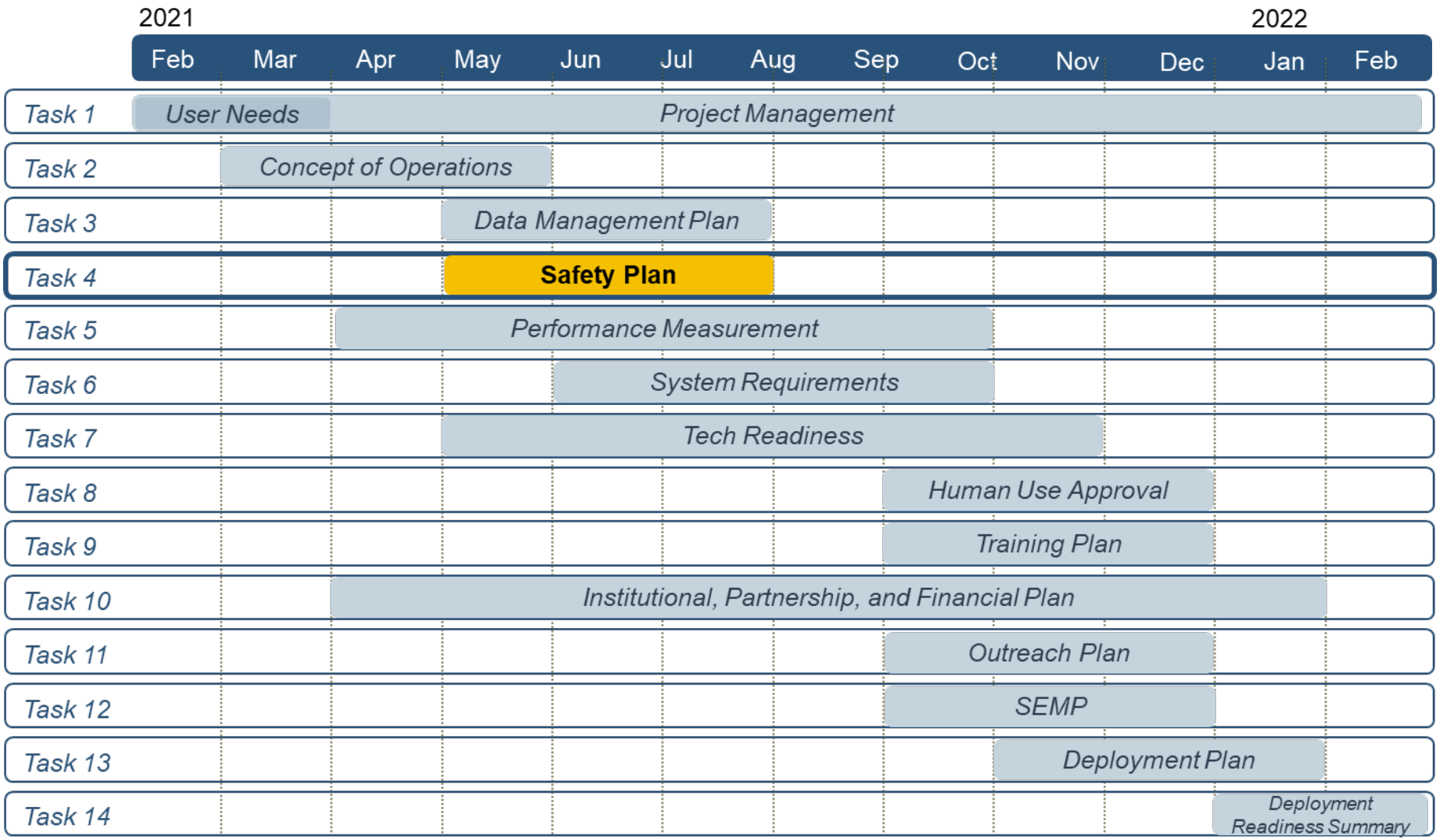
Safety Management Plan Major Components

Task 4

Safety Relationships	Safety-relevant stakeholders and processes to result in a tailored safety management approach
Safety Scenarios	Scenarios identified based on the applications and technologies selected for deployment
Safety Needs	Needs derived from an analysis of the scenarios, including likelihood and potential impact
Levels of Safety Risk	Levels of safety risk associated with the deployment, using established processes where possible
Safety Operational Concept	Requirements and actions to reduce the likelihood and impact in each safety scenario, and responses to safety-related events

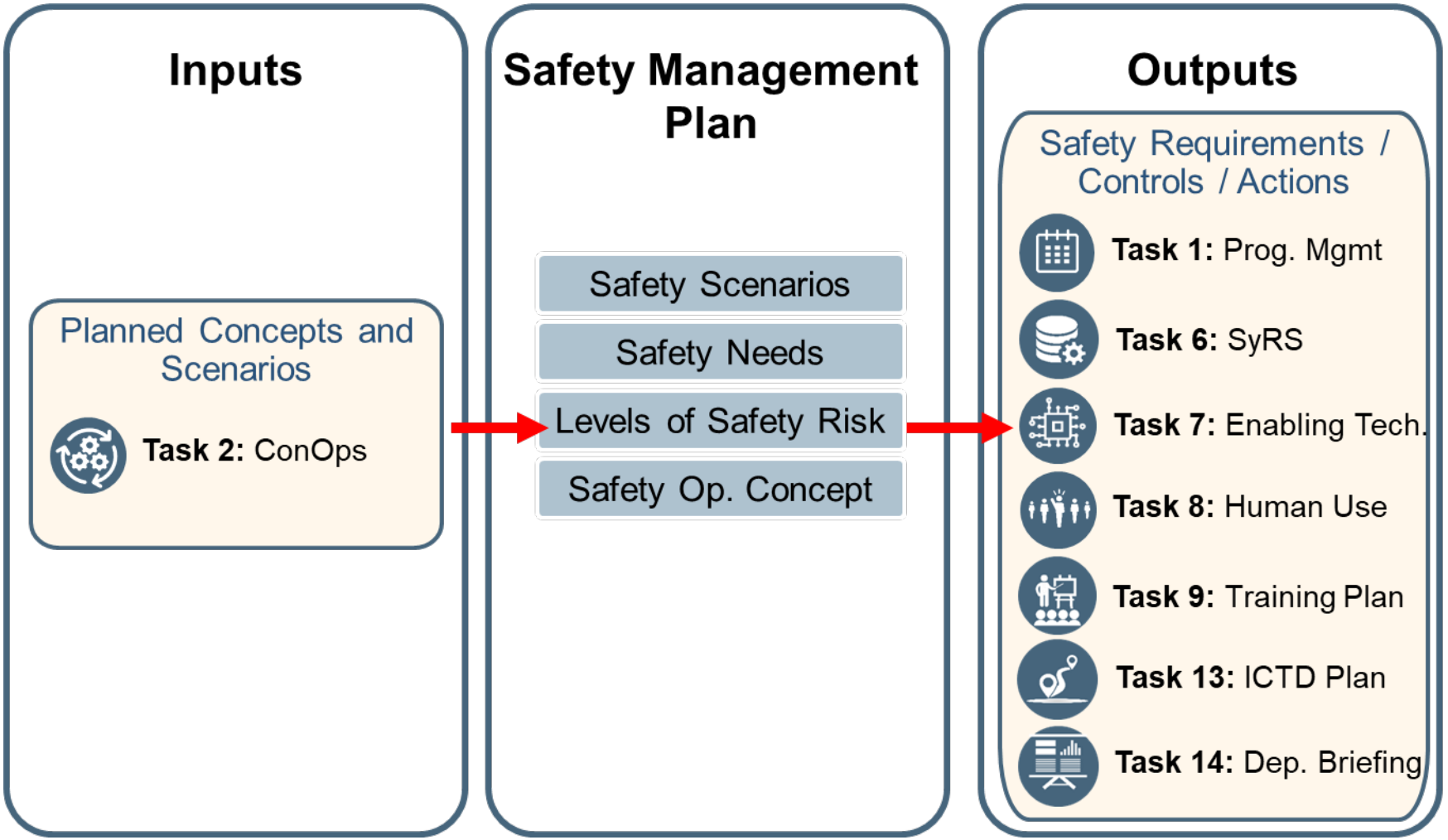
Safety Management Plan Schedule

Task 4



Safety Management Interdependencies

Task 4



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

Safety Management Plan Technical Support Summary

- Proposed Technical Support Materials

Schedule Item	Date
Task 4 Training	**TBD**
USDOT-provided Task 4 Deliverable Template	**TBD**
Cohort Roundtables – Technical Roundtable (focused on Tasks 1.B, 2, 3, 4, 6, and 12)	**TBD**

- Get help by contacting your federal site lead/site COR or reach the Safety Lead, Karen Timpone at karen.timpone@dot.gov

Safety Management Plan Key References

- USDOT, USDOT Guidance Summary for Connected Vehicle Deployments: Safety Management, July 2016 https://rosap.ntl.bts.gov/view/dot/31556
- International Organization for Standardization, *ISO 26262 Road Vehicles - Functional Safety,* 2018 https://www.iso.org/standard/68384.html
- FTA, National Public Transportation Safety Plan, January 2017 https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/National%20Public%20Transportation%20Safety%20Plan_1.pdf
- FTA, Hazard and Safety Analysis of Automated Transit Bus Applications, April 2020 https://rosap.ntl.bts.gov/view/dot/49126

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Task 5: Performance Measurement and Evaluation Support Plan

Performance Measurement and Evaluation Support Plan

Task 5

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
3. Performance Measurement Plan Public Webinar – Kick-Off + 38 weeks

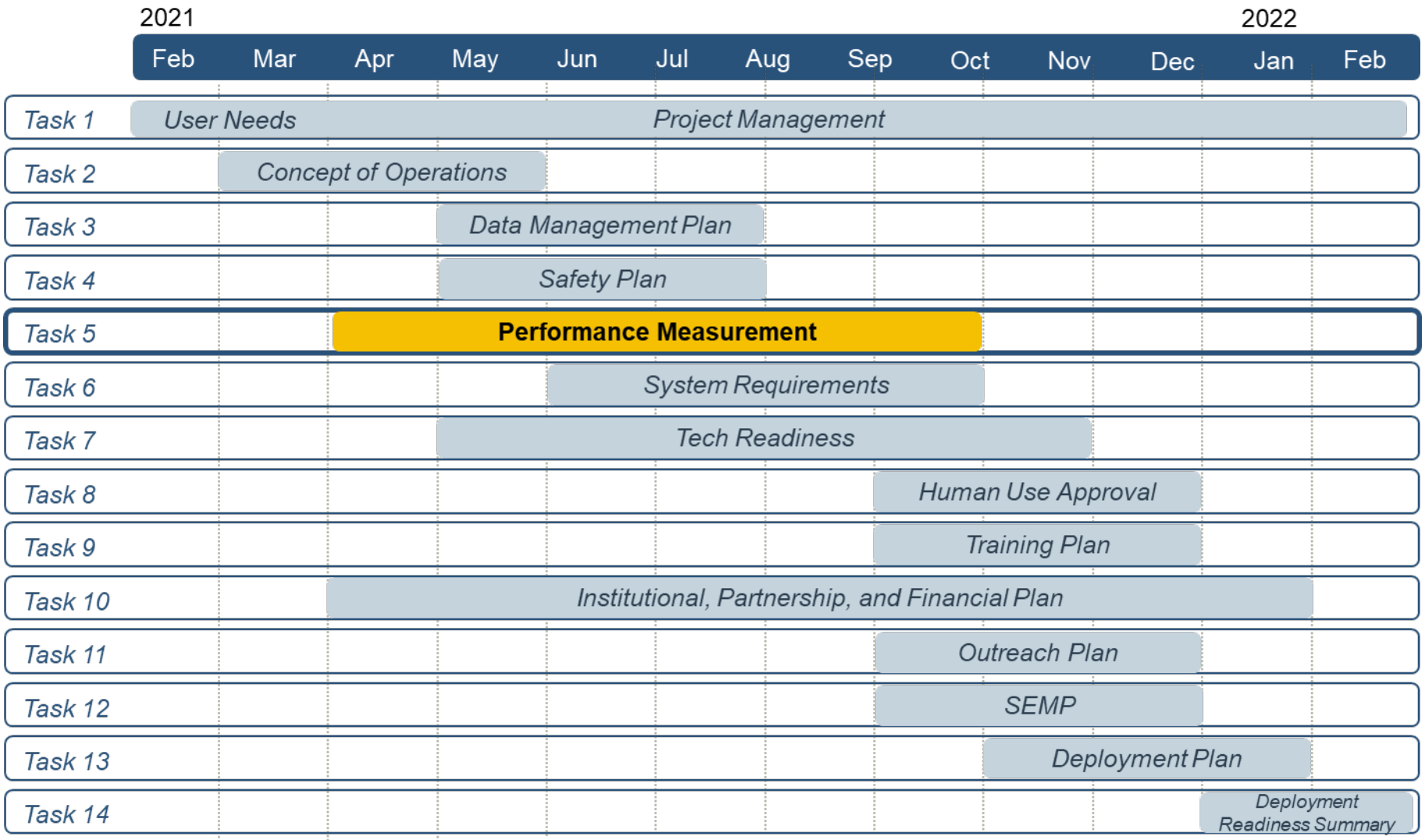
Performance Meas. Plan Major Components

Task 5

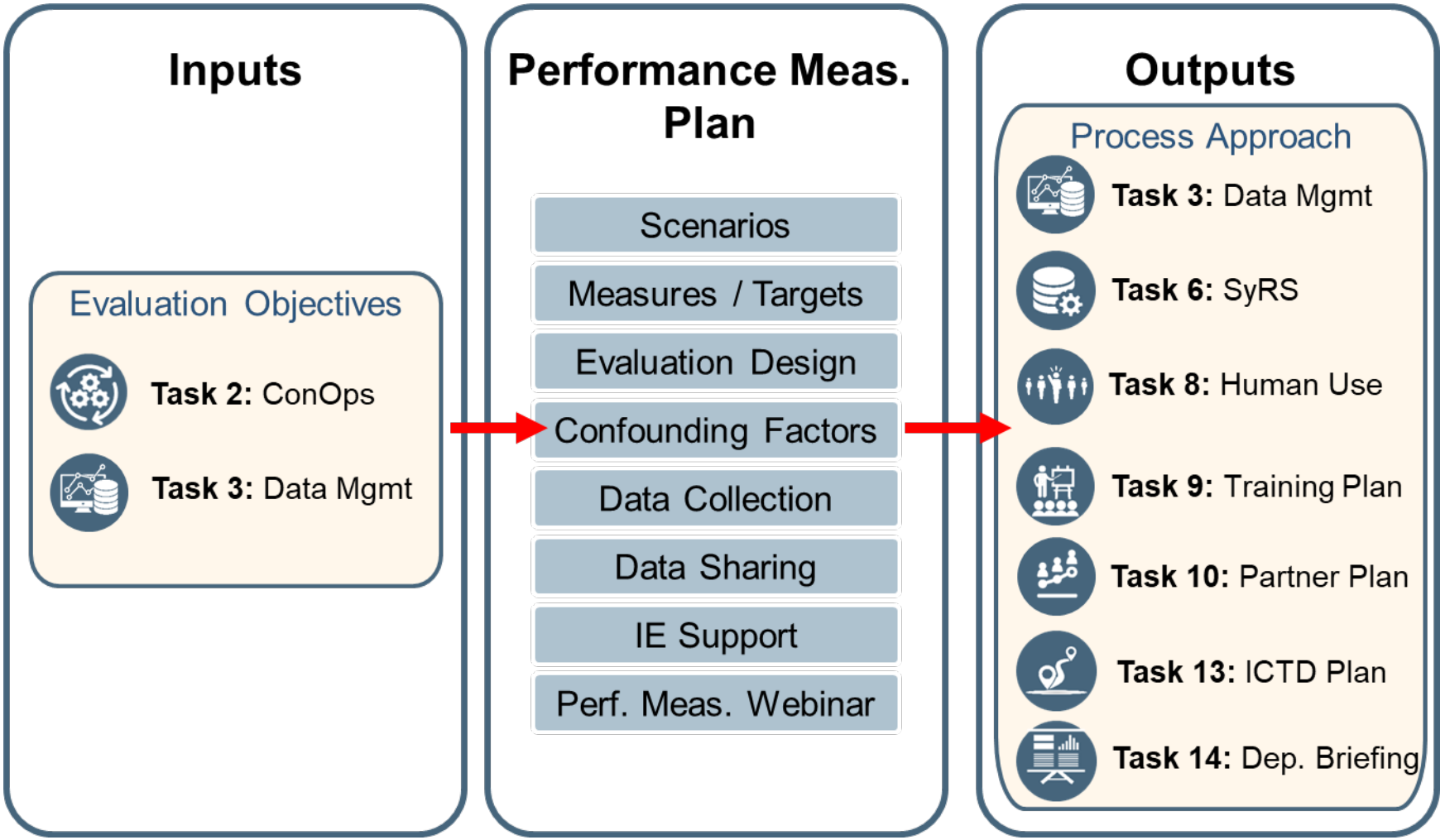
Use Cases/Scenarios	Identify the specific use cases where the deployment is expected to have the most impact in achieving target performance goals
Performance Measures & Targets	Define and describe measures and targets for assessing enhancements for communities (for both groups and system-wide)
Perf. Measurement / Evaluation Approach	Explain planned approaches to assess impacts including experimental designs and statistical methods for chosen measures
Confounding Factors	Identify expected confounding factors that might influence performance measurement and describe mitigation strategies
IE Support	Provide support and data for the Independent Evaluation effort
Data Collection	Discusses data needed to support the performance measures, including system and individual level, and timing / methods
Data Sharing Framework	Plans for sharing performance measurement data including processes, update frequency, and presentation / formats
Performance Measurement Webinar	Describes the performance measurement plan to engage the broader Complete Trip-ITS4US Deployment Program community

Performance Meas. Plan Schedule

Task 5



Performance Meas. Plan Interdependencies



Performance Measurement & Evaluation Purpose & Needs

Task 5

- **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.
  - **Independent Evaluation:** Assess site-specific performance measurement and financial and institutional factors. Conduct program and national-level evaluation of ITS4US-Complete Trips deployments.

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

Schedule Item	Date
Task 5 Training	**04/06/2021**
USDOT-provided Task 5 Deliverable Template	**03/30/2021**
Performance Measurement/Human Use Roundtable (focused on Tasks 5, 8, and 9)	**TBD**

- 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

Task 5

- USDOT, Methodology to Evaluate the Benefits of Cooperative System Applications, December 2016, [not published]
- USDOT, USDOT Guidance Summary for Connected Vehicle Deployments: Performance Measurement, July 2016, https://rosap.ntl.bts.gov/view/dot/31557
- USDOT, USDOT Guidance Summary for Connected Vehicle Deployments: Evaluation Support, July 2016, https://rosap.ntl.bts.gov/view/dot/31558
- 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
- USDOT, Performance Measurement & Evaluation: Overview and Example Case Study, April 2017, https://www.its.dot.gov/communications/pdf/SmartColumbusPerformanceMeasurementl.pdf

COMPLETE TRIP

ITS4US

Task 6: Deployment System Requirements (SyRS)

Deployment System Requirements (SyRS)

Task 6

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

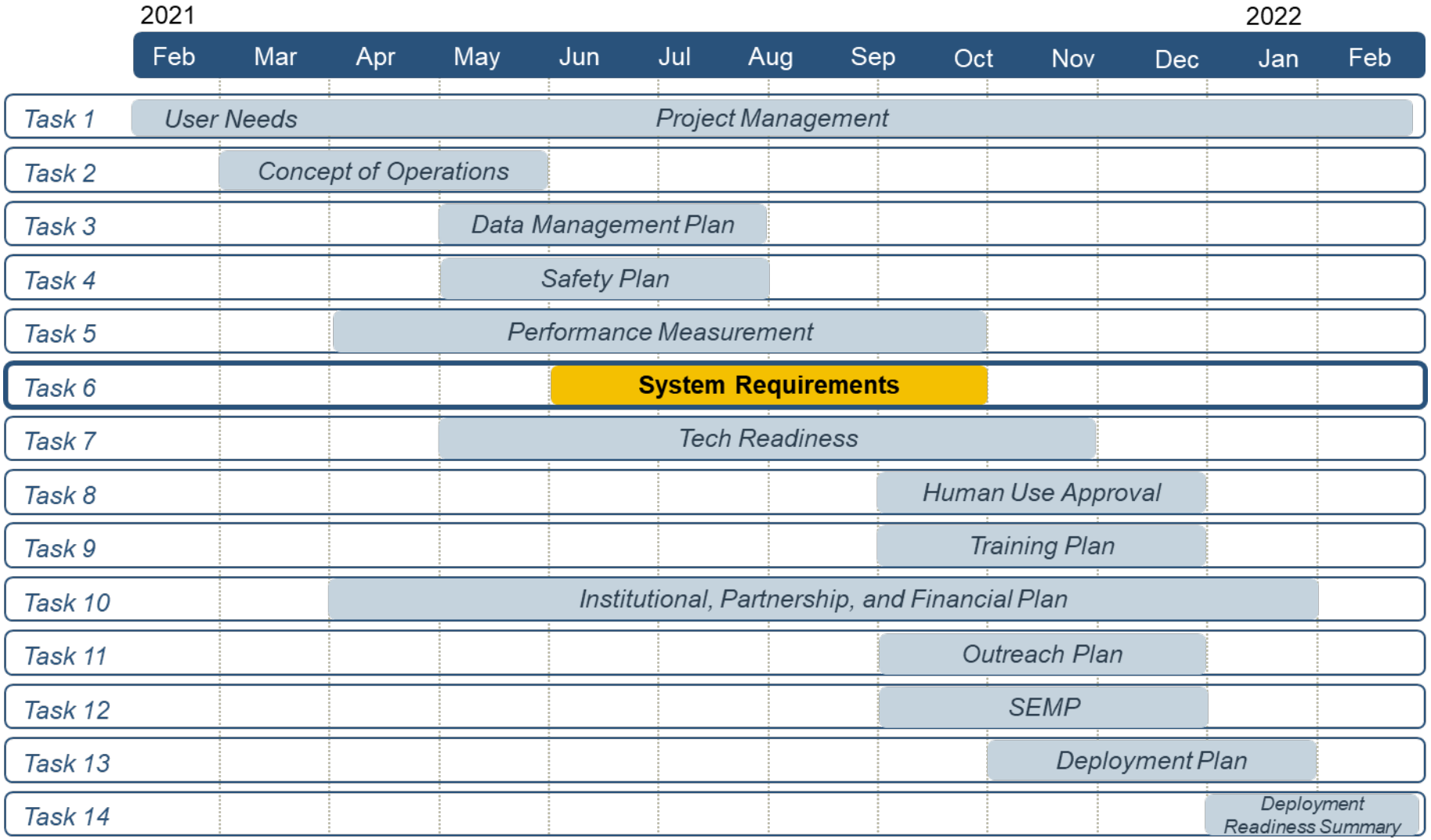
1. Draft Stakeholder SyRS Review Panel Roster – Kick-Off + 25 weeks
2. Final Stakeholder SyRS Review Panel Roster – Kick-Off + 27 weeks
3. Draft SyRS Document – Kick-Off + 30 weeks
4. SyRS Walkthrough Workbook – Kick-Off + 30 weeks
5. Draft SyRS Walkthrough Comment Resolution Report – Kick-Off + 32 weeks
6. Final SyRS Document – Kick-Off + 35 weeks
7. Final SyRS Walkthrough Comment Resolution Report – Kick-Off + 35 weeks

SyRS Major Components

Introduction	System purpose, system scope, acronyms/abbreviations, references, and system overview (from ConOps).
General System Description	Proposed system that results from the desired changes or user needs specified in the ConOps.
System Requirements	System requirements must define all of the functions that the system must perform at a technical level.
System Interfaces	Protocols, messages, frameworks and/or APIs used to communicate with internal and external elements within the system.
Needs To Requirements Matrix	The NTRM is a critical tool for ensuring that your system requirements cover all of the user needs.

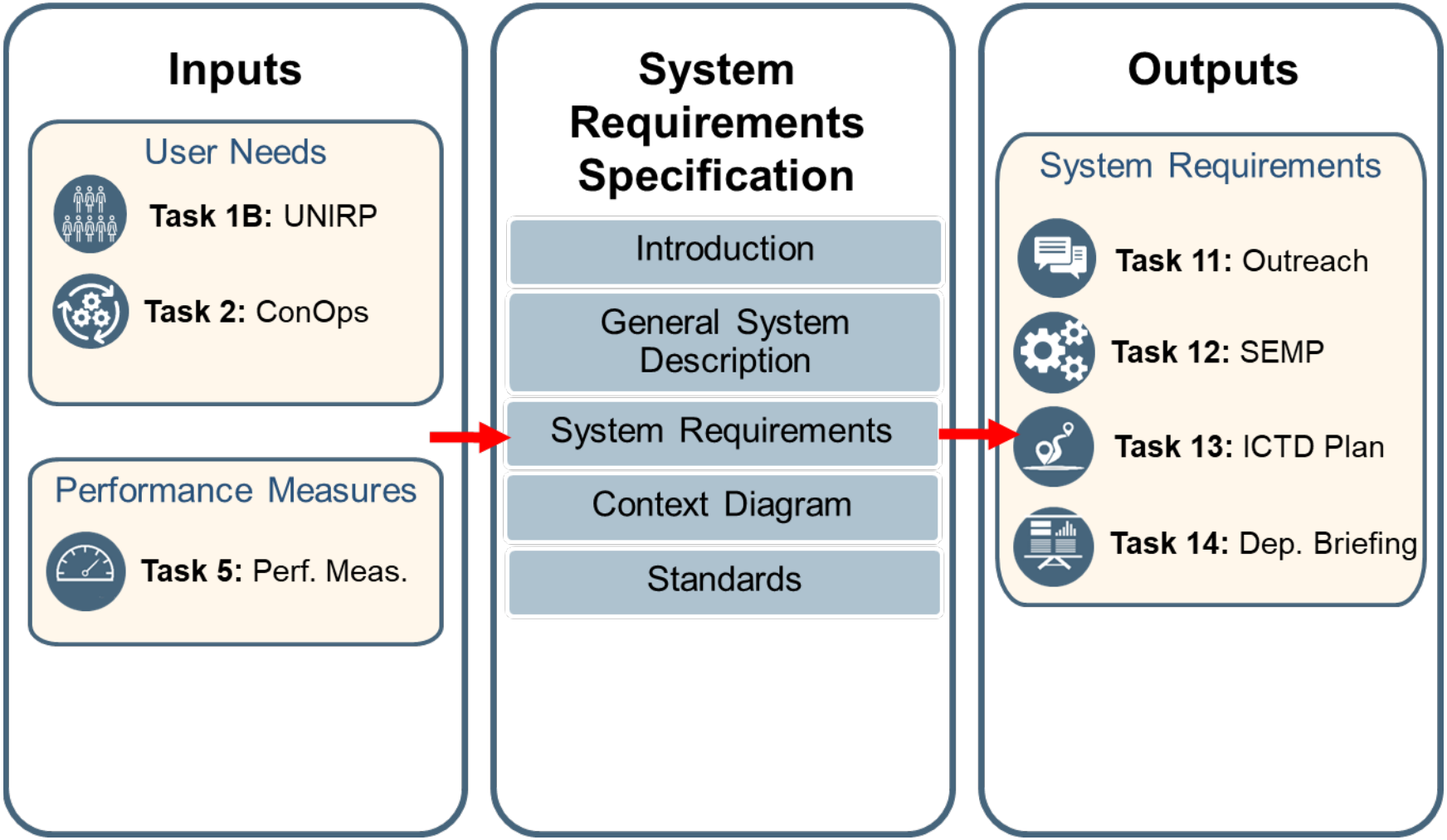
SyRS Schedule

Task 6



SyRS Interdependencies

Task 6



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

Schedule Item	Date
Task 6 Training	**TBD**
USDOT-provided Task 6 Deliverable Template	**TBD**
Cohort Roundtables – Technical Roundtable (focused on Tasks 1.B, 2, 3, 4, 6, and 12)	**TBD**

- 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

- IEEE Guide for Developing System Requirements Specifications, IEEE Standard 1233, 1998, 10.1109/IEEESTD.1998.88826
- IEEE Guide for Software Reviews and Audits, IEEE Standard 1028-2008, 10.1109/IEEESTD.2008.4601584
- ISO/IEC/IEEE International Standard - Systems and Software Engineering -- Life Cycle Processes --Requirements Engineering, IEEE/ISO/IEC 29148-2018, https://standards.ieee.org/standard/29148-2018.html
- FHWA's Systems Engineering for Intelligent Transportation Systems http://ops.fhwa.dot.gov/publications/seitsguide/seguide.pdf
- FHWA Systems Engineering Guidebook for ITS, Concept of Operations Template http://www.fhwa.dot.gov/cadiv/segb/views/document/sections/section8/8_4_5.cfm
- North Dakota Department of Transportation Overview of Systems Engineering Process. http://www.dot.nd.gov/divisions/maintenance/docs/OverviewOfSEA.pdf
- FHWA Applying Scrum Methods to ITS Projects https://rosap.ntl.bts.gov/view/dot/32681

Questions