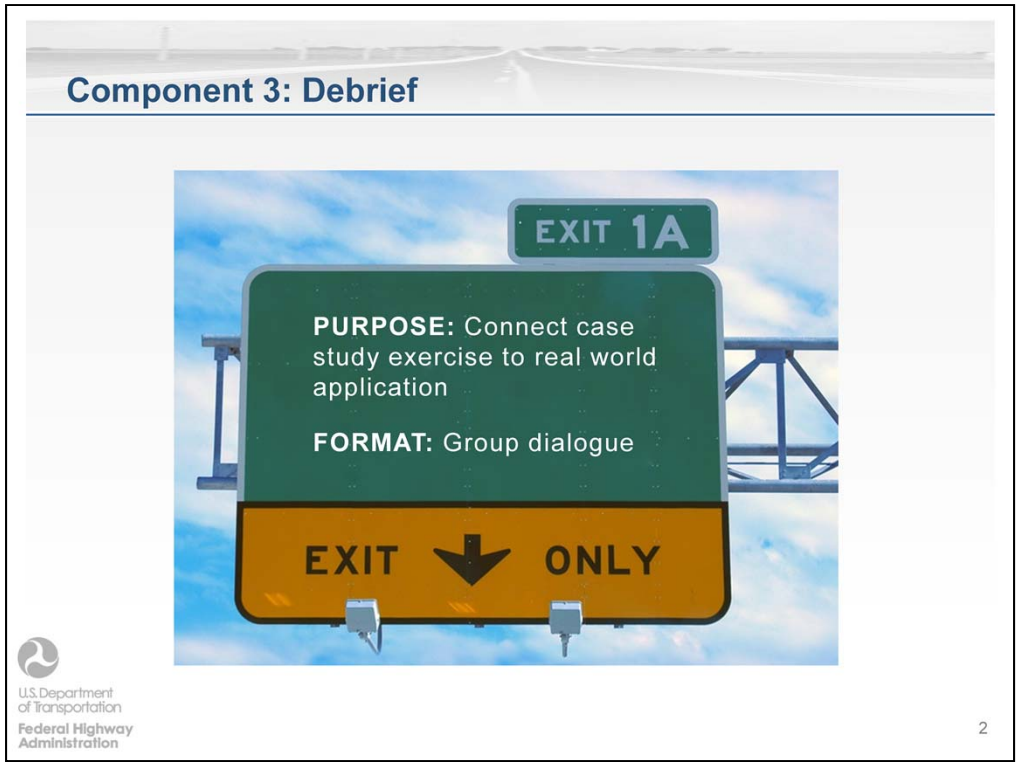
RITA Research and Innovative Technology Administration

Highway Transportation Engineering

ITS Case Study

Component 3 – Student Guide



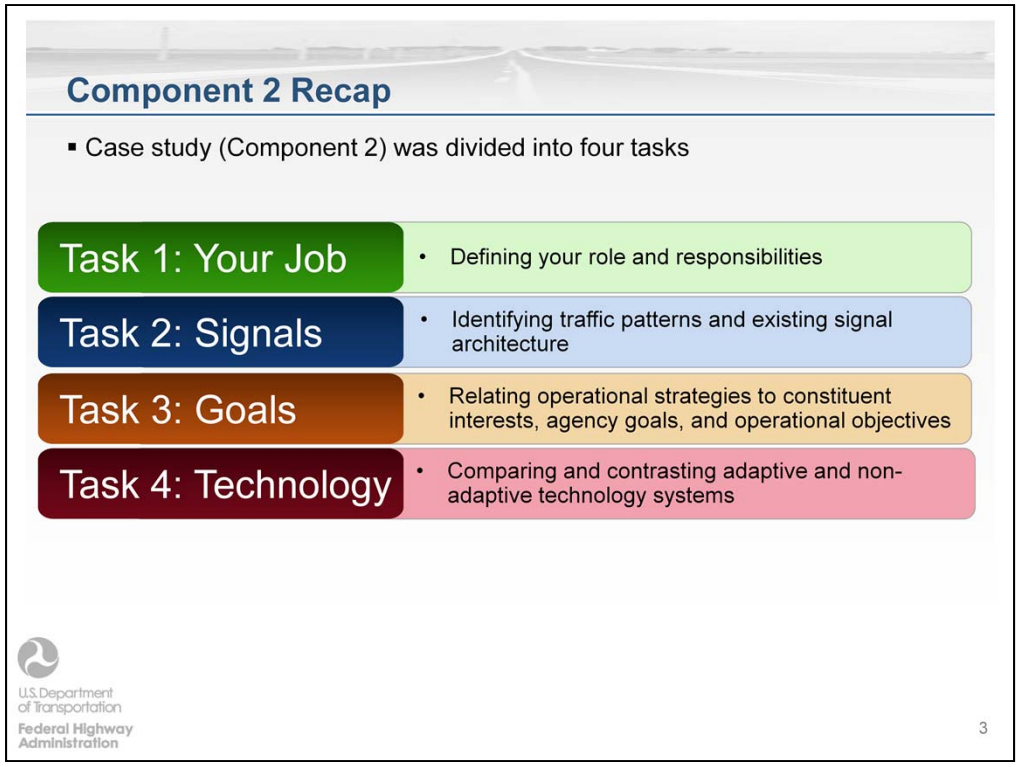
Component 3 Terminal Learning Objective:

- Connect case study exercise to real world application.

Component 3 Enabling Learning Objectives:

- ELO 1: Identify characteristics of successful transportation engineers.
- ELO 2: Explain how data can be used understand a situation.
- ELO 3: Explain why a systems engineering approach is used in transportation projects.
- ELO 4: Recognize the impact of Adaptive Signal Control.

Notes:


Component 2 Recap
Case study (Component 2) was divided into four tasks
Task 1: Your Job
Defining your role and responsibilities
Task 2: Signals
Identifying traffic patterns and existing signal architecture
Task 3: Goals
Relating operational strategies to constituent interests, agency goals, and operational objectives
Task 4: Technology
Comparing and contrasting adaptive and non-adaptive technology systems
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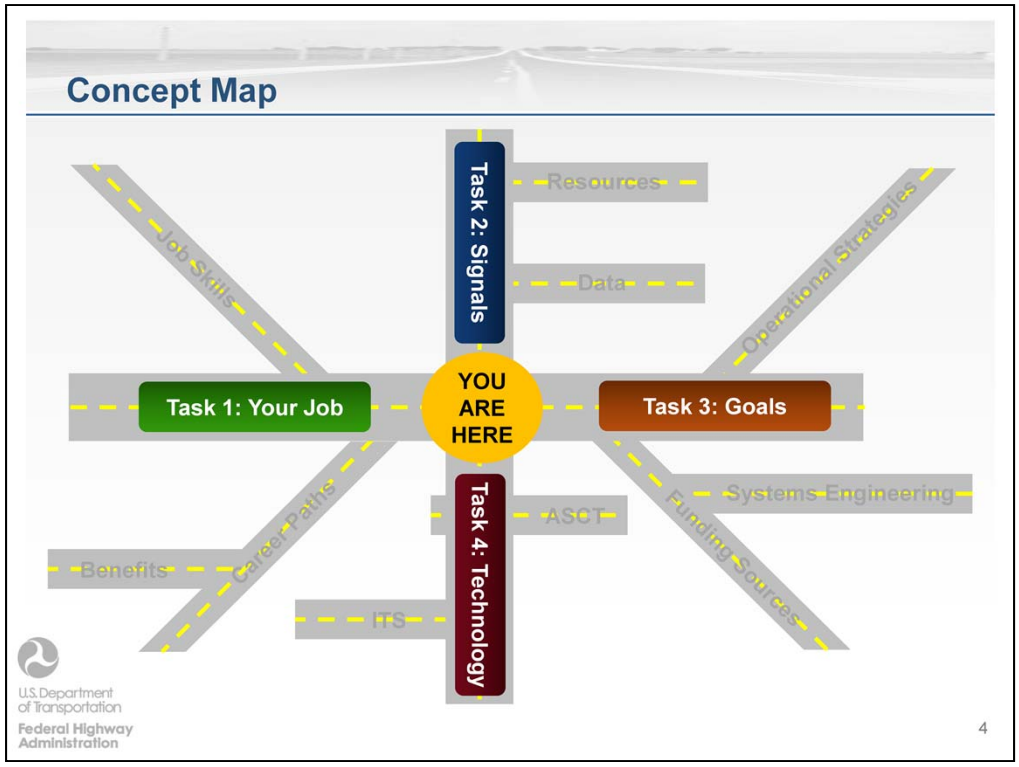
Concept Map
Task 2: Signals
Resources
Data
Job Skills
Operational Strategies
Task 1: Your Job
YOU ARE HERE
Task 3: Goals
Task 4: Technology
ASCT
Systems Engineering
Benefits
Career Paths
ITS
Funding Sources
U.S. Department of Transportation
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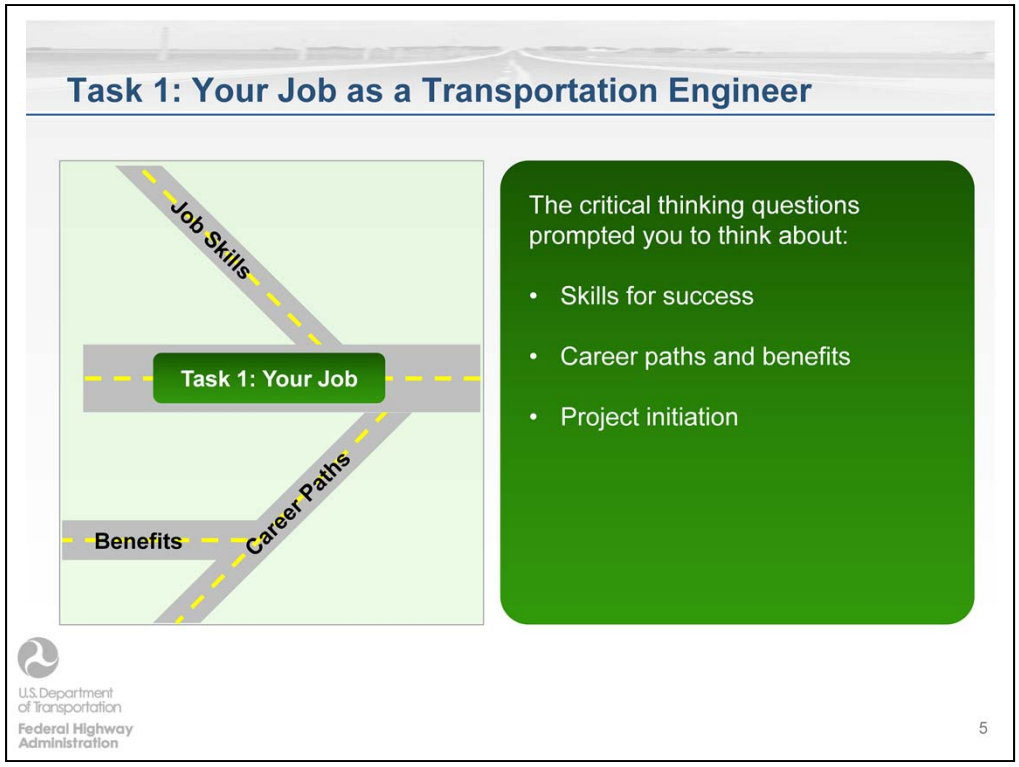
Task 1: Your Job as a Transportation Engineer
Job Skills
Task 1: Your Job
Career Paths
Benefits
The critical thinking questions prompted you to think about:
• Skills for success
• Career paths and benefits
• Project initiation
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Notes:

Transportation Engineers

What skills does a transportation engineer need to have to be successful in their career?

What made an impression on you as you went through the process of acting as a junior transportation engineer?

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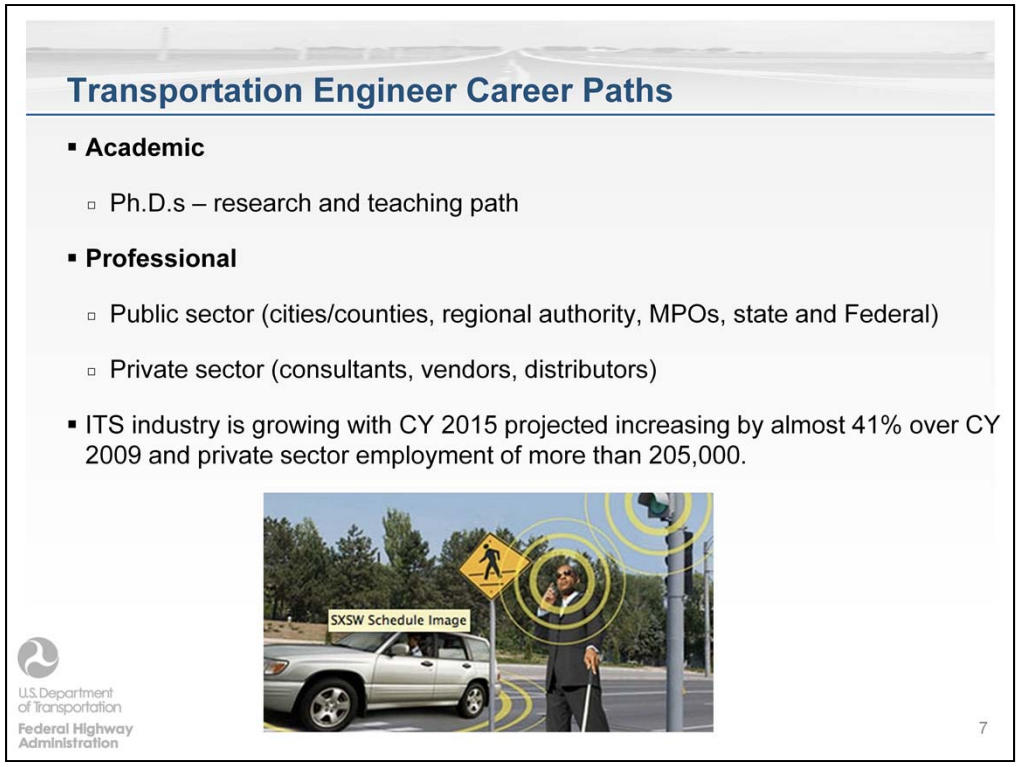
Notes:

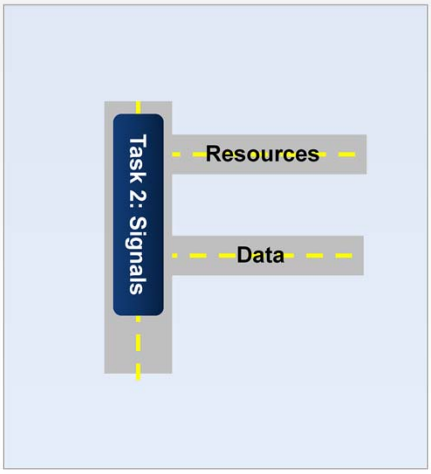


ITS comprises a large portion of the U.S. and North America market. North American ITS end-use product and services market of $52 billion. Almost 180,000 private sector jobs to the U.S. ITS end-use market alone. ITS end-use market alone, with a total of 445,000 jobs in the total industry value chain. U.S. ITS industry is growing with CY 2015 projected end-use revenue increasing by almost 41 percent (over CY 2009) and private sector employment of more than 205,000. Growth in the ITS market and jobs equates to greater deployment and operations of these technologies in the future.

Reference: ITS America 2011

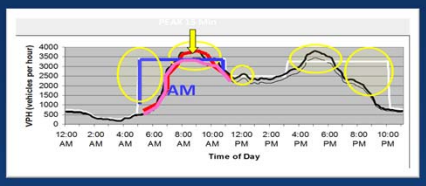
Notes:

Task 2: Traffic Patterns and Signal Architecture



The critical thinking questions prompted you to think about:

- What data can tell us about a situation
- How data is presented



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Notes:

What Does the Data Tell Us?

- What were the major problems on National Ave?
- What specific information did you use to come to these conclusions?
- What data most strongly indicates the need for ASCT?
- Where does the data come from?

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Notes:

Every Day Counts The vision of the Every Day Counts Adaptive Signal Control Technology (ASCT) Initiative is to mainstream the use of ASCT. “Their website has includes resources, webinars, and case studies. http://www.fhwa.dot.gov/everydaycounts/technology/adsc/

Traffic Signal Timing Manual is a guide to signal timing practitioners, focusing on the principals of traffic signal timing, identifying sound timing practices, and a practical and comprehensive tabletop resource. http://www.signaltiming.com/

MOST uses a new simulation environment to let you directly observe how the signal timing parameters that you select affect the quality of traffic operations at a signalized intersectionhttp://www.webs1.uidaho.edu/most/index.htm

Model Systems Engineering Documents for ASCT these model systems engineering documents support the process of exploring the need for ASCT and articulating a set of requirements that enable agencies to specify, select, implement and test ASCT.

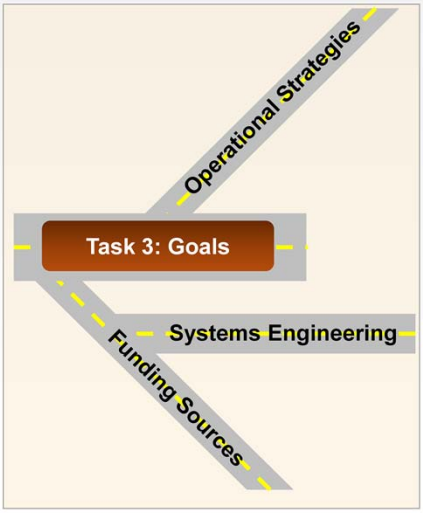
http://ops.fhwa.dot.gov/publications/fhwahop11027/mse_asct.pdf

Notes:

Task 3: Operational Strategies

The critical thinking questions prompted you to think about:

- Main problems to be addressed
- Which operational objectives aren't being met
- Stakeholders in this project and why they are important
- Difference between a goal, objectives, strategies and tactics
- Why its important to understand the different ways a project could be funded



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Notes:

Funding

Why was the City of Hamilton pursuing Federal funds for this project?

Why does it matter where the money comes from?

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Notes:

The Importance of Funding Sources

- Funding for transportation plans and projects comes from a variety of sources
- Federal funding transferred to state and metro areas is the primary funding source
- Funding is very competitive
- There is a formalized process for receiving Federal funds

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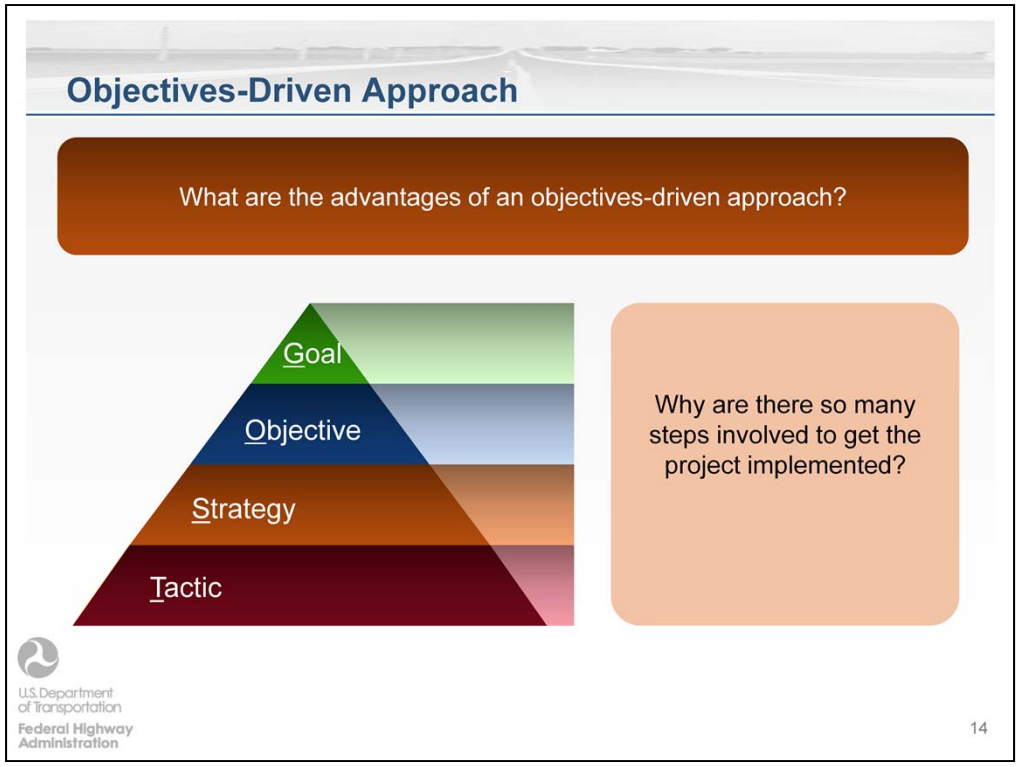
Notes:


Objectives-Driven Approach
What are the advantages of an objectives-driven approach?
Goal
Objective
Strategy
Tactic
Why are there so many steps involved to get the project implemented?
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Notes:

Purpose of Objectives-Driven Approach

- **Prioritize investments** to achieve operations objectives and improve transportation system performance
- Invest in strategies that provide **measurable results**
- **Demonstrate accountability** through performance measures

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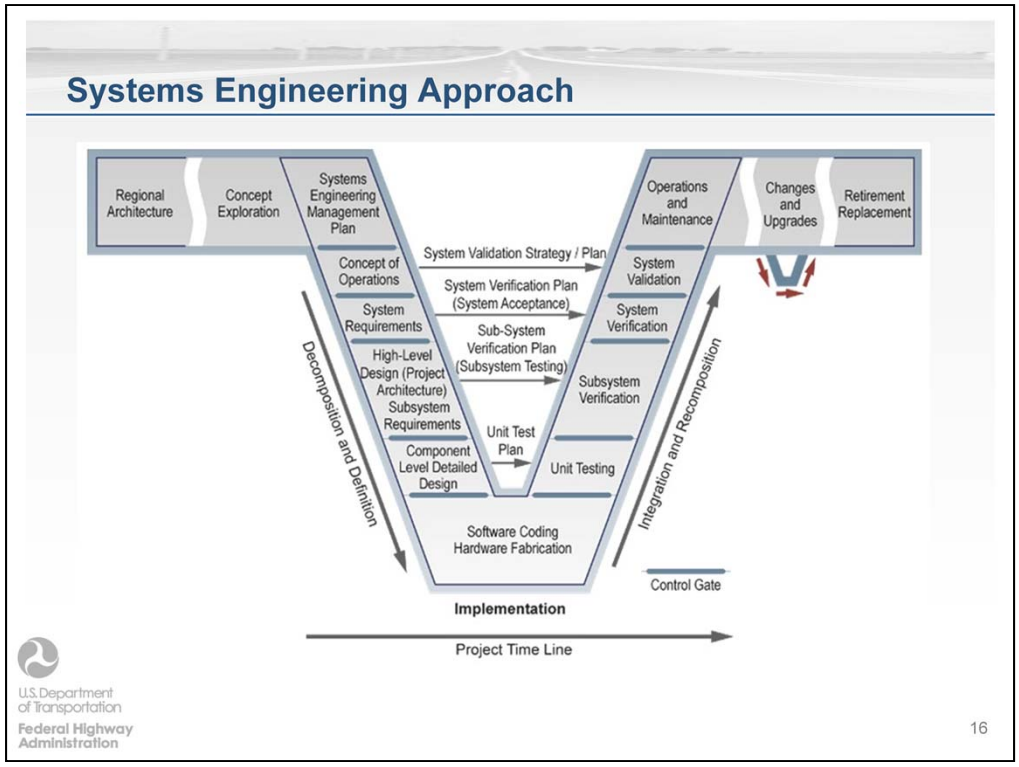
Notes:

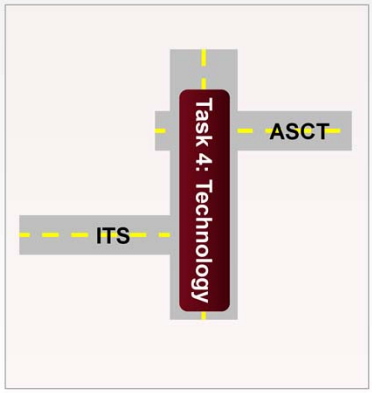


This figure represents the systems engineering process in the shape of the letter "V." The project timeline and process flow run from the upper left, down to the point of the V, and up to the right.

The steps of the actual process, which proceeds from the upper left and down towards the bottom point of the V, are as follows: concept exploration, system engineering management plans, concept of operations, system requirements, high level design (project architecture) and subsystem requirements, and component level detailed design. At the bottom-most point of the V is the next step: software coding hardware fabrication, and it is labeled implementation. From the lower part of the right leg and flowing up to the top of the right leg, the figure continues with: unit testing, subsystem verification, system verification, system validation, and operation and maintenance.

Notes:

Task 4: Adaptive Signal Control Technology



The critical thinking questions prompted you to think about:

- How to identify if signals are working effectively
- Why ASCT is the solution for this situation

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Notes:

Task 4: Innovations in Transportation

Why is ASCT the appropriate the solution for this situation?

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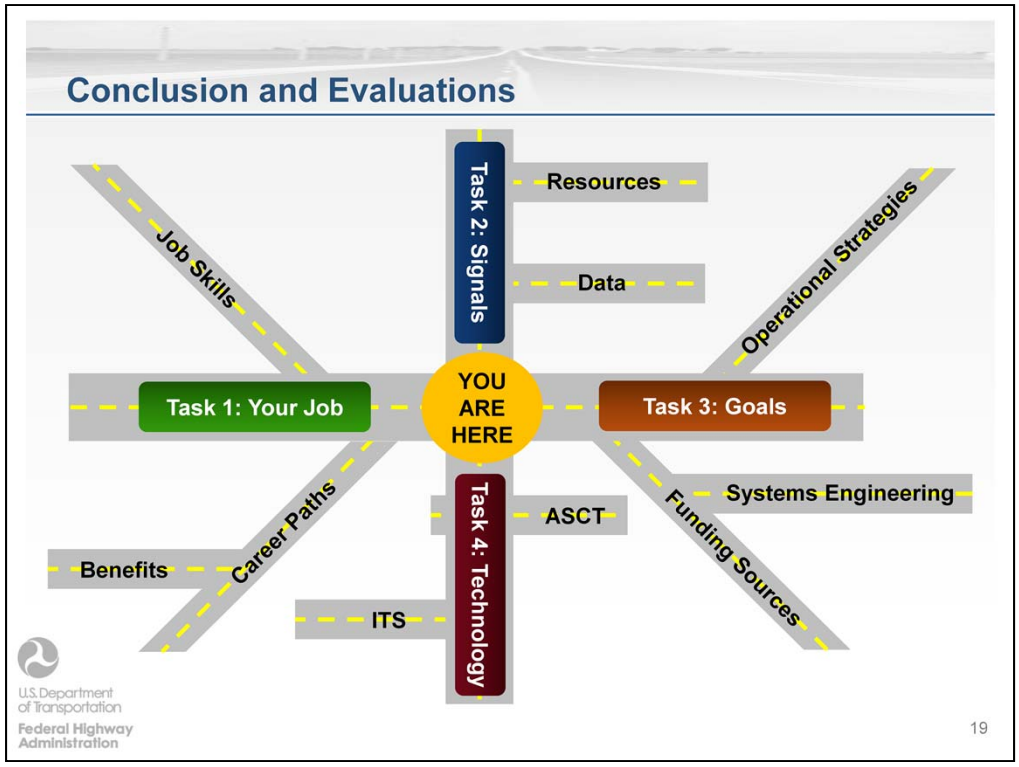
Notes:


Conclusion and Evaluations
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Resources
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Job Skills
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