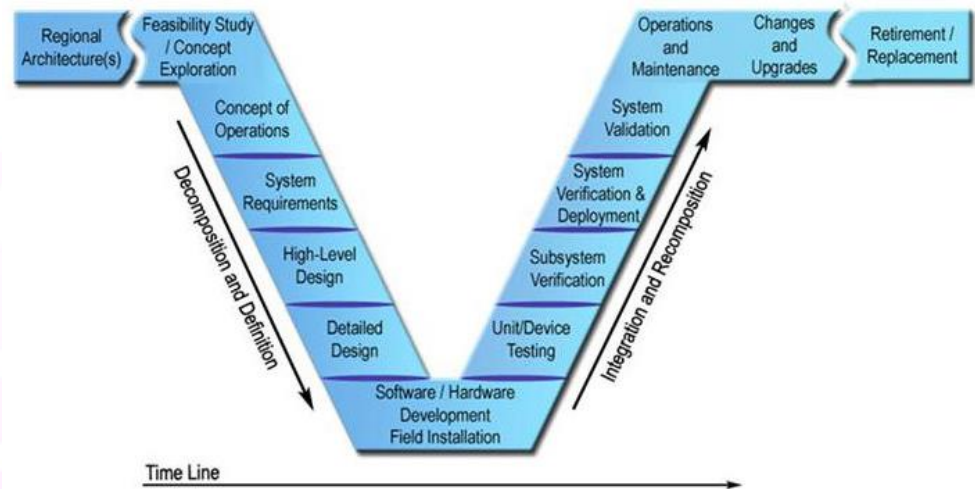# Systems Engineering

At ConSysTec, nearly everything we do involves the use of the Systems Engineering process.

All ITS projects involve risk. However, the Systems Engineering process provides a structured methodology for managing complex ITS systems. Our staff is highly qualified in the practice of Systems Engineering and have written guidance documents on applying systems engineering in ITS, developed systems engineering content for ITS standards, and performed systems engineering analysis for regional multi-modal systems.

By helping navigate the Systems Engineering process, ConSysTec helps our clients reduce the risk involved in the project while adhering to FHWA and FTA policies.

ConSysTec offers specific services related to Systems Engineering. Below are a few projects where ConSysTec provided systems engineering expertise.

Model Systems Engineering Guidance Document for Traffic Sensor Systems

ConSysTec developed this model document, which is intended to allow state and local agencies to develop systems engineering documents (Concept of Operations, Requirements, Verification Plan, and Validation Plan) for deploying traffic sensor systems without needing support from experts in systems engineering. As part of this project, ConSysTec is also developing outreach materials for FHWA for Model SE Guidance documents for dynamic message signs, and CCTV cameras.

City of Manchester, NH - CMAQ Granite Street & S Willow Street Signal Project

ConSysTec developed the systems engineering documentation for this proposed project to consider implementing adaptive signal control technology for 6 signalized intersections on one arterial; and signal performance measures to adjust signal timing along a second arterial with 18 signalized intersections. ConSysTec was responsible for developing the Concept of Operations, System Requirements document, verification and validation plan, and preparing the specifications for the system.

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NITTEC Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Concept of Operations (ConOps)

As task leader for development of the NITTEC ATCMTD ConOps, ConSysTec conducted interviews with Freeway, US/Canada International Border Crossings, Local Counties and Municipalities, Transportation Planning, Transit, Parking, and Public Safety organizations to identify user needs for the project. The user needs framed the scope of the project and laid the foundation for development of the system requirements. In addition, the ConOps included a preliminary context diagram to identify system interfaces and system integration opportunities for the various subsystems defined.

Roadside Unit Standard v1.0

ConSysTec led the systems engineering effort to develop the Roadside Unit (RSU) Standard v1.0, which supersedes USDOT's DSRC RSU Specification v4.1. Following the systems engineering process, the CI Implementation Guide contains a Concept of Operations, a Systems Requirements section, and a system design details section defining how to fulfill the requirements. The RSU Standard v1.0 is a non-proprietary, consensus standard that was developed by engaging the stakeholder community.

Independent Verification and Validation

ConSysTec has developed Verification and Validation Plans to test center-to-center implementations for TRANSCOM's Middleware Data Exchange Specification, Nevada DOT's Center-to-Center ITS Data Sharing System and San Diego Association of Government's (SANDAG) Integrated Corridor Management Systems (ICMS) C2C Interface.

ConSysTec has provided training for each implementation, witnessed the verification and validation tests, and reviewed the test documentation reports.

NTCIP 1202 Standard Testing

Compliance to a standard does not in itself guarantee interoperability across all devices. ConSysTec is developing standardized test procedures and leading the development of a NTCIP 1202 communications standards testing software that will test all the object definitions in NTCIP 1202 v02 and NTCIP 1202 v03A. The primary goal of this project is to identify gaps and ambiguities in the NTCIP 1202 standard so those gaps and ambiguities can be addressed by the vendors and the standard.

Apply Scrum Methods to ITS Projects

ConSysTec co-authored this USDOT guidance document that describes how to use Agile software development practices in the management of ITS projects and how to combine it with Vee lifecycle development model (systems engineering).

For more information about how ConSysTec can help your organization, visit us at www.consystec.com or scan the QR Code below.