High Level Design Review

- High Level Design v1.1 Release

Connected Corridors: I-210 Pilot
Integrated Corridor Management System

Core System High-Level Design

April 26, 2018
v 1.1 DRAFT

Partners for Advanced Transportation Technology works with researchers, practitioners, and industry to implement transportation research and innovation, including products and services that improve the efficiency, safety, and security of the transportation system.
Agenda

- **Scope**
- **Review**
  - Key Elements and Concepts
  - Design Walkthrough
- **Comments and Responses**
- **Questions?**
Scope
High Level vs. Detailed Design

- **High Level Design**
  - System Architecture
  - Primary Components
  - Data Flows
  - Processes
  - Databases
  - Primary Interfaces

- **Detailed Design**
  - Component Architecture
  - Interface Details/Design
  - DB Schemas
  - AWS Design
    - EC2
    - Security
    - Services
Key Elements
Key Elements

- Microservices Architecture
- Amazon Web Services
Microservices
Microservices

Apply resources only when needed,
Scale on demand
Scale only where needed
Speed - near real time performance
Independence of processes
Resiliency to failure – failure will occur, minimize impacts of failure
Security of individual processes, least privilege
Microservices

Upgrade system components with minimal impact to system
Microservices

Cost efficiency/optimization
Microservices

Flexible – add new services with limited impact
Amazon Web Services

- **Flexibility**
  - Scale as needed
  - Add new corridors
  - Add new components/functions

- **Ability to scale**
- **Security**
  - Certifications (https://aws.amazon.com/compliance/programs/)
  - Granular control

- **Large selection of production tested capabilities**
AWS Services

- **Strategy** – use commodity services available outside of AWS whenever possible, strategically use AWS specific services that provide significant development time savings

- **Compute** (EC2, EBS)

- **EMR** (Spark)

- **RDS** (Postgres)

- **Development Tools** (CodeCommit, CodeBuild, CodeDeploy, Code Pipeline)

- **Networking and Security**

- **Monitoring**

- **Deployment**
Objectives, Constraints, and Principles

- Real time operation
- Speed to decision
- Flexibility for future with incremental improvements
- Security
- Maintainable, operable by Caltrans
- Scalable
- Resilient, reliable
Core System High Level Design

- Data Sources/TMCs
- Data Hub
- Decision Support System (DSS)
- Corridor Management System (CMS)
- Caltans ATMS
- Control Targets/TMCs
Data Hub Functions

- Receive information
- Process information
  - Data Quality
  - Common Metrics/Analysis
  - Predictive Analytics
  - Standardized formatting/content
- Persist information
- Secure information
- Provide data communications bus
- Orchestration of services between the DSS and CMS
DSS Functions

- Provide response plans
- Evaluate response plans
- Provide one or more recommendations to corridor operators
- Provide response plan evaluation results to the Corridor Management System
- Recommend response plan updates when appropriate
Decision Support System Design
Corridor Management System

- **Primary Functions**
  - Capture or receive incident information
  - View corridor status – assets and traffic
  - Review response plans
  - Manage response plan lifecycle – receive, select, approve, execute, update, terminate
  - Send commands to execute response plan elements to local TMC systems
  - Reporting/Review/Analytics
Details
Details

- System Interface Design Specification

Connected Corridors: I-210 Pilot
Integrated Corridor Management System

System Interface Design Specification

April 27, 2018
Version 1.1 [DRAFT AS OF 4/27 11:08AM]
Information Resources

- Project information https://connected-corridors.berkeley.edu

- Documentation library
  https://connected-corridors.berkeley.edu/resources/document-library

- Team share drives available – released and pre-release development documentation

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Questions