

NCHRP 20-77

Operations Training Framework

The purpose of NCHRP 20-77 was to develop a training and capacity building framework for transportation operations technicians, engineers, and managers. The major outcomes of the project were to determine: (1) what training is needed, (2) what training is currently available, (3) what are the gaps between the training that is currently available and what is needed, and (4) what is the most effective way to deliver the training that is missing?

Detailed Information On Project Outcomes

1. Training that is Needed

The project team defined the detailed competencies that are required by personnel at various levels in an organization. Basically, the team needed to fill in the blank cells shown in the table below. The rows of the table represent a group of core functions required to carry out a state of the practice system operations and management (O&M) program ranging from broad policy down through technical development to field activities. Each column represents an agency position—from senior management to technician. The cell at the intersections of the rows and column define a set of competencies related to a position’s role related to a core function. Click on graph below to enlarge it.

2. Training that is Currently Available

The project team used the core competencies in each cell of the training matrix to search for existing training courses available to address those competencies. All the courses were compiled into an access database which, in the next few months, will be ported into the National Transportation Training Resource (NTTR) database found at www.nttr.dot.gov/.

3. Gaps Between the Training that is Currently Available and What is Needed

The project team compared the results of Outcome #1, which identified individual knowledge requirements with the existing training that was gathered in Outcome # 2. The difference between these two data sets represented the gaps in available training. View the gaps that were identified. ([View the Gaps](#) and add the link to the document)

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Gap Analysis

There are five (5) Operations & Management Core Functions for which available training was researched:

- Policy and Strategic Considerations (PSC)
- Program Planning (PP)
- Systems Development and Information Technology (SDIT)
- Project Management (PM)
- Real-time Operations (RTO)

Under each Core Function, there is a set of core competencies – see Operations Framework. The training required in each competency has been segmented into comprehensive, intermediate, and overview categories representing the importance of a particular subject to a specific job classification.

The gaps have been categorized according to (1) core competencies for which there is no existing training available and (2) core competencies for which very little or inadequate/incomplete training is available, and (3) university courses that should be made into professional development courses.

Number three (3) needs a bit of an explanation. These gaps occur because the courses that are available are offered by universities. This creates issues in terms of the cost of tuition at most universities and the availability of the course outside of a degree program.

1) Core Competencies for which there is No Existing Training available

Real-time Operations

- Operations Strategies
 - Real-time Traveler Information: Coordination (overview)
 - Archived data (overview)
 - Special event management (comprehensive)
- Systems Technologies:
 - Electronic Payment Systems (overview)
- Management of RTO Systems:
 - Plan Review of Construction Documents for Ops Considerations (overview)

2) Core Competencies for which very little training or inadequate/incomplete training is available include:

Policy and Strategic Considerations

- Business Process Management
 - Program definition, conops (intermediate, comprehensive)
 - In-house vs Outsourcing (overview, comprehensive)
 - Performance measurement (comprehensive)
 - Partnership development (overview, comprehensive)
- Organizational Change Management (intermediate, comprehensive)

Program Planning

- Organizational architecture (intermediate)
- Staff Development (intermediate)

Project Management

- Contract Management (overview)

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- Outsourcing Contract Management (overview)

Real-time Operations

- Operations Strategies
 - Road Weather Management (overview, intermediate)
 - Value (Congestion) Pricing Strategies (overview, intermediate & comprehensive)
 - Real-time Traveler Information (overview, intermediate, comprehensive)
 - 511 (overview, intermediate, comprehensive)
 - Distribution Devices (overview, intermediate, comprehensive)
 - Travel Times (overview)
 - Coordination (comprehensive)
 - Ramp metering (overview, comprehensive)
 - Arterial operations (intermediate)
 - Active traffic management (intermediate)
 - Archived data (intermediate, comprehensive)
 - Special event management (intermediate)
- System Technologies:
 - Planning/Funding for Maintenance and Asset Mgmt (overview, intermediate)
 - Electronic Payment Systems (overview)
 - AVL/AVI (overview)
 - Parking Management (overview)
 - CVO (overview, intermediate, comprehensive)
 - Electronic Payment Systems (comprehensive)
 - Traffic Monitoring & Surveillance (intermediate, comprehensive)
 - Telecommunications (intermediate, comprehensive)
 - Parking management systems (overview, intermediate comprehensive)
- Safety
 - Road Safety Audits (overview, intermediate)
 - Automated Enforcement (overview, intermediate, comprehensive)
- Management of RTO Systems
 - Customer Service (overview)
 - Legal and Institutional Issues (overview, comprehensive)
 - Funding-Resources? (overview)
 - Plan Review of Construction Documents for Ops Considerations (comprehensive)

(3) University Courses that should be made into Professional Development Courses

The project team found several university courses that address the core competencies in these areas however, there are two issues with using these courses. First, if the course is offered in person at a University in Texas, it could be a problem for someone from Maine trying to take the course. Second, for many of the courses, the student needs to be enrolled as part of a degree program at that University to obtain access to the course. Therefore, below is a list of competencies where university courses will fill the need but accessing the course is not always optimal for the student. The project team recommends that professional development courses should eventually be developed to cover the training needed for these competencies.

Policy and Strategic Considerations (PSC)

- Policy Development (PD)

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- Strategy Development
- Organizational Change Management (OCM)

Program Planning (PP)

- Business Process Management (BPM)
 - Data Management and Evaluation
 - Performance Measurement/Dashboards/Reporting
 - In-house vs Outsourcing
- Partnerships (PR)
 - Public-Public Partnerships
 - Public-Private Partnerships
- Organization & Staffing (OS)
 - Organizational Architecture
 - Staff Development
 - Staff Management
- Link Between Operations and Planning (OP)
 - Integrating Operations Into the Planning Process
 - Transportation Modeling/Simulation (Ops Planning Emphasis)

Systems Development and Information Technology (SDIT)

- Systems Architecture
- Database Management for Ops (Including RealTime Data)
- Programming Languages and Technologies (Web Apps, etc.)
- Visualization (Offline and Online) (*advanced level only*)
- Network Security (*advanced level only*)

Project Management (PM)

- Contract Management (Types)
- Outsourcing Contract Management

Real-time Operations (RTO)

- Operations Strategies (OS)
 - Transportation Modeling/Simulation (Operations Emphasis)
 - TMC Development (Staffing, Technology, Relationships)
 - Real-Time Traveler Information
 - Travel Times (Including 511) (*advanced level only*)
 - Traffic Signal Systems (*overview and intermediate levels only*)
 - Traffic Engineering
- Systems and Technologies (ST)
 - Traffic Monitoring/Surveillance (Detectors, Probes) (*intermediate and advanced levels only*)
 - Parking Management Systems (*intermediate and advanced levels only*)
- Security (SC)
 - Evacuation Planning and Tools
 - Critical Infrastructure
 - Continuity of Operations (*intermediate level only*)
- Management of RTO Systems (MT)
 - Legal and Institutional Issues
 - Funding Resources (*overview level only*)