TriMet Operations Command Center Assessment

Observations & Findings

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Submitted to: TriMet

Executive Summary

The intent of this assessment, and its background, were laid out in November 2015's TriMet Request for Proposal that initiated this engagement. As the result of an intense rainstorm on October 31st 2015, TriMet identified a need to assess the Rail portion of its Operations Command Center (OCC) and Field Operations, including communications, protocols, procedures and responsibilities, as part of its program to improve service reliability for its customers.

This goal of the assessment was to help TriMet clarify the role of the OCC and identify possible improvements in structure, management, procedures, response, customer service, staffing levels, employee training and the tools (technology) necessary to be effective.

At the time of the assessment (January-March 2016), TriMet was made up of 2544 employees; half are bus or rail operators. The Rail network's front line employees were made up of roughly 190 Rail Operators, 25 Rail Controllers in an Operations Command Center (OCC), and 35 Rail Supervisors who work in the field. Due to normal attrition and growth in Light Rail and Streetcar service, about one-third of Rail Operators had less than 24 months' rail experience and 40% of Controllers had less than 18 months' experience in their role.

A team from North Highland Consulting was engaged by TriMet to perform an external assessment of the Rail Operations Command Center (OCC), Field Operations, and Rail Operator Training. This external team conducted over 50 interviews with employees directly involved in the regular operations of the OCC and its stakeholders. We reviewed relevant documentation and spent time observing the OCC work environment.

From the onset, we found TriMet's employees to be incredibly dedicated, proud, and committed to the organization. This resulted in a candid and open dialogue during the interviews. This information, along with our ability to review available data and observe the work environment, allowed us to identify some opportunities for improvement.

In general, as TriMet has grown in recent years, employees do not feel training and documentation have been able to sufficiently keep pace, and this gap has led to a heavy reliance on individuals' experience and availability. Our recommendations relate to providing Rail Controllers with adequate training and sufficient authority and resources to effectively plan for and react to incidents using information that is relevant, accurate, and easily available. We recommend additional resources in OCC's training and management functions, the development of formal programs and processes for incident management and training, and that TriMet improve its prevention and mitigation of incidents.

Key Recommendations

Rail OCC Training and Recruiting

1. Ensure a minimum of two OCC & Field Operations trainers are available to support the existing OCC training and to deliver new Controller and Field Operations training curriculums that focus on ongoing training/coaching.

2. Document a robust and formal OCC Controller & Rail Supervisor Training Program consisting of clear expectations, a workable training schedule, accurate tracking against the schedule, appropriate certifications, and measures of success.
3. Reinstate Controller ride-alongs and OCC/Operator shadowing, which are opportunities to improve communications and morale between Controllers and Operators.
4. Create incentives for the Controller role relative to other Transportation Supervisor career paths.

Rail OCC Roles & Responsibilities, Staffing

5. Undertake efforts to staff a minimum of five OCC assistant managers, to provide a staffing level that allows at least 20 hours per day of OCC on-site managerial coverage while also covering vacations, projects and unplanned absences. Assess afterwards if a sixth Assistant Manager is necessary. (This staffing assumes a schedule of four days per week, 10 hours per day).
6. Create and document the expectations and professionalism of Controllers on shift when they have downtime or excess capacity, i.e. what activities they could be doing when there is available time.
7. Increase the preventive efforts of the OCC organization at all levels, including the development of standardized mitigation plans and post-incident reviews.
8. Empower Controllers and Assistant Managers to make decisions to resolve incidents without escalating all incident communications to Director and Executive levels by defining three incident roles per shift and the availability of a technical or experienced resource available.

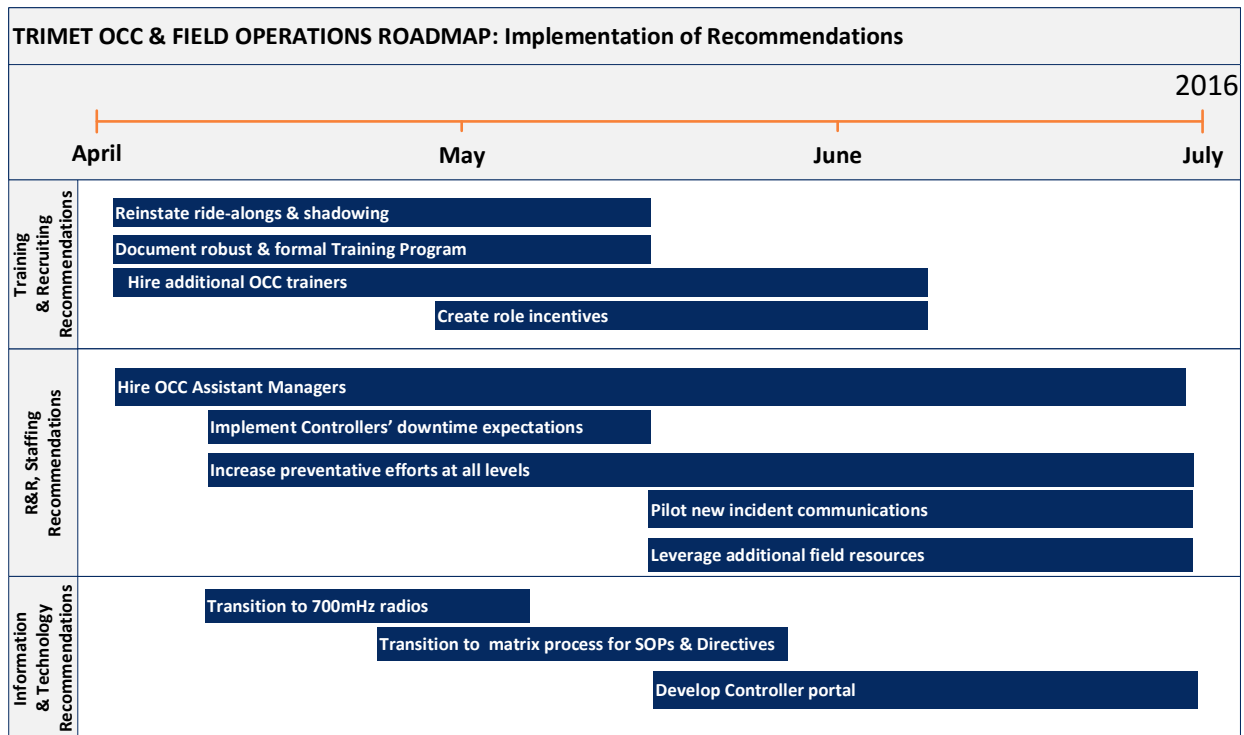*Rail OCC Information Management & Technology*

9. Accelerate the transition from the 800 MHz radio system to the 700 MHz radio system to ensure clarity of radio communication.
10. Remove OCC's procedures from the existing approval and release cycle of the Transit Change Review Committee, in favor of a process approval matrix for Standard Operations Procedures (SOPs) and Directives to accelerate the deployment of information.
11. Develop a robust Controller portal and standardize how Controllers access the most up-to-date information.

Rail Supervisors' Operations

12. Have Controllers leverage other existing Field Operations staff and contractors to help mitigate incidents.

The implementation of these recommendations can be commenced in the next 90 days, as outlined in the TriMet OCC Recommendations Roadmap below.

Although our focus was on Rail Operations, many of these opportunities may also apply to Bus Operations, where similar opportunities could exist. Additionally, the assessment's scope did

TRIMET OCC & FIELD OPERATIONS ROADMAP: Implementation of Recommendations

	2016
April	May	June	July

Training & Recruiting Recommendations
- Reinstate ride-alongs & shadowing
- Document robust & formal Training Program
- Hire additional OCC trainers
- Create role incentives

R&R, Staffing Recommendations
- Hire OCC Assistant Managers
- Implement Controllers' downtime expectations
- Increase preventative efforts at all levels
- Pilot new incident communications
- Leverage additional field resources

Information & Technology Recommendations
- Transition to 700mHz radios
- Transition to matrix process for SOPs & Directives
- Develop Controller portal

not include a detailed review of ways to optimize cross-organizational communications during significant service disruptions, but is essential to enhanced and effective customer service. TriMet may also benefit from the implementation of a Continuous Improvement program that engages employees across multiple functions and organizational layers and establishes a culture of consistent performance management.

Background

TriMet, more formally known as the Tri-County Metropolitan Transportation District of Oregon, is a public agency that operates mass transit in a region that spans the Portland metropolitan area and three countries, in the state of Oregon. TriMet started operating a light rail system named MAX in 1986, which has since been expanded to 5 lines that now cover 59.7 miles (96.1 km), as well as a commuter rail line in 2009. There are 145 light rail trains of five general types.

The Rail network's front line employees include roughly 190 Rail Operators, 25 Rail Controllers in an Operations Command Center (OCC), and 33 Rail Supervisors who work in the field. At the time of the assessment, roughly one-third of Rail Operators had less than 24 months' experience in their role and 40% of Controllers had less than 18 months' experience in their current role.

Rail Controllers are in charge of daily transit operations serving as the main point of contact for all coordination of rail service and incident/emergency response when service is interrupted. They communicate directly with Rail Operators, Field Supervisors, Maintenance and others along with and 3rd parties such as Police and Fire Departments. There are three shifts that

draw from a pool of 29 possible Controllers, although at the time of our assessment, there were only 25 Controllers. Rail Controllers and Bus Dispatchers work in the same room, half occupied by Dispatch and half occupied by Control. The OCC is staffed 24 hours a day, 7 days a week, 365 days a year.

The Controllers are managed by two assistant managers, who in turn are managed by a Director who at the time of our assessment reported to the Executive Director of Transportation. The OCC Assistant Managers also cover bus operations, and the Director is also responsible for Field Operations (bus and rail supervisors).

Rail Operators at TriMet must first have been a TriMet Bus Operator for at least six months or until their probation is complete. Experience at another equivalent municipal rail system may not be substituted to qualify.

The Transportation training function within TriMet reports into one position, which is responsible for both rail and bus operator training. Rail Operations training has five trainers supporting 190 operators or roles. The department of Field Operations and OCC had one on-loan trainer, responsible for bus dispatchers, controllers, rail supervisors, bus supervisors, lead supervisors, and their management.

The intent of this assessment, and its background, were laid out in November 2015's TriMet Request for Proposal that initiated this engagement. Significant issues during an intense rainstorm on October 31st 2015 underscored a need to assess OCC Rail's communications, protocols, procedures and responsibilities.

This goal of the assessment is to help TriMet refine the role of the OCC and identify possible improvements in structure, management, procedures, response, customer service, staffing levels, employee training and the tools (technology) necessary to be effective.

Approach

A team from North Highland Consulting was engaged by TriMet to perform an external independent assessment of the Rail Operations Command Center (OCC). From Jan 4, 2016 through March 31, we conducted more than 50 interviews with employees directly involved in the regular operations of the OCC and stakeholders, reviewed relevant documentation and spent time observing the OCC work environment.

This representative group included Rail Operators, OCC Controllers on all three shifts, OCC Assistant Managers, Field Operations Assistant Managers, OCC and Field Operations Director, Rail Transportation Director, Transportation Executive Director, Maintenance Directors and Managers, PIO Director of Communications and Marketing, Director of Safety, IT Systems Manager, Enterprise Systems Manager, Field Operations Coordinator, Rail Operations Trainers, Rail OCC Trainer, Training Manager, Rail Yard Managers, Director of Business Initiatives and the CIO. Interviews were conducted onsite at the Center St facility, Harrison Square offices, and the Elmonica, and Ruby Junction train yard locations.

We evaluated and analyzed the OCC in several areas and looked particularly at the organizational dynamics that led to the events during the October 31st 2015 rainstorm,

including: role/work priorities, staffing levels and organization, leadership & management, tools & technology, training, procedures, and recruiting.

Review of Findings & Observations

Our findings and observations can be broken down into four operational areas: 1) Rail OCC Recruiting and Training; 2) Rail OCC Roles & Responsibilities/Staffing; 3) Rail OCC Information Management and Procedures/Tools; and 4) Rail Supervisors' Operations. These areas are detailed below, along with corresponding recommendations.

1. Rail OCC Recruiting & Training

Findings & Observations

Rail Operators we spoke with did not view the Controller role as an attractive career path and cited several reasons.

- Training. As TriMet's rail network has increased to five lines and to five train types, Controllers and Operators alike indicated the available Controller formal training has not been able to keep pace. Controllers receive an annual one-day Initial Operator Certification training. At the time of the assessment, the OCC Controller training program did not include a planned set of classes nor dedicated training resource after initial training and the annual one-day Rail Operator recertification.
- Wages. Prior to 2000, Controllers earned more than either Fare Inspectors or Rail Supervisors. In 2000, all three roles had their wages equalized and today are equal to all Transportation supervisory level positions.
- Regulations. In 2015, TriMet's new Federal Railroad Administration rules regarding the number of hours a Controller could work per 24 hours reduced the opportunities for Controllers to easily work overtime except for on their scheduled days off, further limiting the financial incentives of this role relative to other supervisor roles.
- Communication. Three years ago, the OCC moved from the Ruby Junction train yard to the new Operations Headquarters at the Center Street facility, and removed the opportunity for Controllers and Rail Operators to get to know each other. This coupled with the elimination of Controller ride-alongs with Rail Operators after 2006, has minimized the chances for these two groups to interface to gain a better understanding of both roles. Some suggested reinstatement of these could improve radio communication between the two groups.

Working with the Training Groups, we outlined opportunities for enhancing the Controllers' training curriculum. These proposed modules are listed in *Figure 1*.

To address the resources needed, we evaluated the OCC trainer-to-employee ratio relative to others within TriMet. The OCC's is 60% higher than Bus Operations' training ratio and 3x higher than Rail Operations' training ratio *(Figure 2)*. The OCC also has more roles to train, and more technical components, than the other groups (i.e. Controllers, Bus Dispatchers, Rail supervisors, and Road Supervisors). To better align trainer:employee ratios and to deliver Controllers' an enhanced training curriculum will require additional training resources.
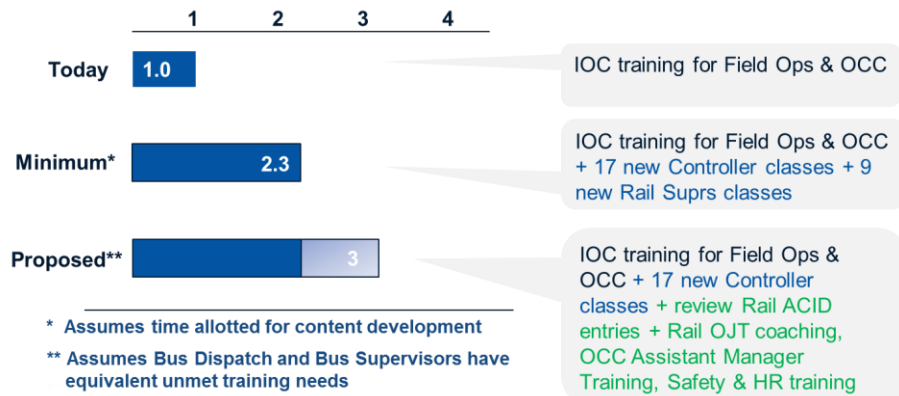
We calculated a minimum of two trainers would be needed in the near term, and ideally a minimum of three. Above and beyond delivering training, having three trainers allows for the activities of reviewing issues that would flag a need for follow-up training, 1-on-1 training/coaching as needed, and more robust management training.

Figure 1: An Enhanced Controller Training Curriculum

Category	Module
Tools & Procedures	Troubleshooting
	Yard Management
	Service Restoration
	ACID
	Policy Tech
	SOPs (New & Updates)
	FRA Rules
	Tunnel Safety Systems
	Drug & Alcohol Training
Communications	Professional Communications
	Radio Communications
	Stress Management
Scenario Planning & Review	Incident Response
	OCC Simulations for Rail
	Post Mortems
Teaming & Leadership	Us vs. Them Mitigation
	Emotional Intelligence
	Supervisory/Management Training

Figure 2: Ratio of Trainers to Employees Across Groups

Group	# Trainers	Ratio
Bus Operations	25	1:80
Rail Operations (current)	5	1:38
Rail Operations (proposed)	9	1:21
OCC & Field Operations	1	1:130

The additional trainers and curriculum should be considered part of a broader, more formal training program that would include performance based training , a well-planned training schedule, accurate tracking against that schedule, keeping current with needed certifications. See accompanying *Figure 3*.

Figure 3: Assessment of the Number of OCC Trainers Needed

Today 1.0 — IOC training for Field Ops & OCC

Minimum* 2.3 — IOC training for Field Ops & OCC + 17 new Controller classes + 9 new Rail Suprs classes

Proposed** 3 — IOC training for Field Ops & OCC + 17 new Controller classes + review Rail ACID entries + Rail OJT coaching, OCC Assistant Manager Training, Safety & HR training

* Assumes time allotted for content development

** Assumes Bus Dispatch and Bus Supervisors have equivalent unmet training needs
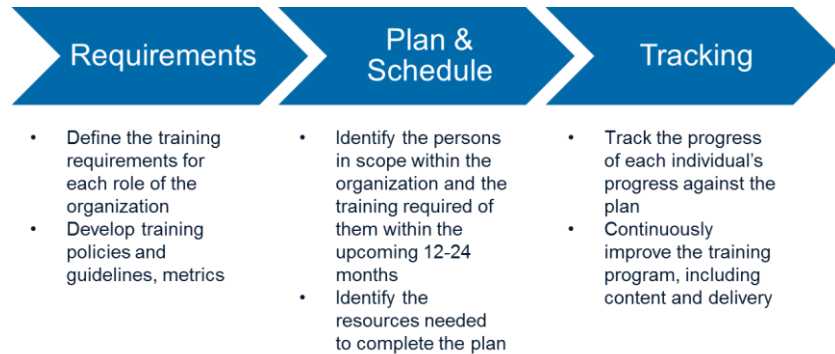
Beginning in the first quarter of 2016, the Rail Operations Training Group began overhauling the nine-week Initial Rail Operator training content and module sequence. Our review of these changes is positive, and there are mechanisms in place to receive continuous improvement feedback on the new material.

Top Recommendations: Recruiting and Training

1. Create incentives for the Controller role relative to other available Rail Operations career paths.
2. A minimum of two OCC & Field Operations Trainers are needed to support the existing OCC training and to develop new content and deliver a more comprehensive Controller Training Program.
3. Document a robust and formal OCC Controller Training Program consisting of clear expectations, a workable training schedule, accurate tracking against the schedule, needed certifications, and measures of success. *(Figure 4)*

Figure 4: Formalizing a Training Program

Requirements
- Define the training requirements for each role of the organization
- Develop training policies and guidelines, metrics

Plan & Schedule
- Identify the persons in scope within the organization and the training required of them within the upcoming 12-24 months
- Identify the resources needed to complete the plan

Tracking
- Track the progress of each individual's progress against the plan
- Continuously improve the training program, including content and delivery

4. Reinstate controller ride-alongs and OCC/Operator shadowing as an easy way to improve communications and morale.

2) Roles & Responsibilities, Staffing

Findings and Observations

The OCC staff supporting Rail Operations engage in a variety of tasks that diminish the OCC's ability to focus on room management and efficient incident resolution.

- Tasks. Controllers' tasks include managing radio communications, publishing train orders, answering inquiries about fare violations, covering for the lunchtime of others controllers, entering Facilities Repair Orders, and now ensuring trains leave the train yards on time. Foremost, they manage the trains and rail network, including mitigating and resolving incidents. When incidents don't occur, Controllers have downtime that isn't presently directed or pre-planned. A Controller's shift may have anywhere from 3-6 controllers and based on the number, there are tasks and responsibilities that can be assigned for each shift. One possible proposal is in *Figure 5*.

- <u>On-Site Management</u>. Assistant Managers work on customer complaints, timesheets, one-time projects (e.g. the radio conversion), and incident management. The Director position works on incident management, along with long term projects (e.g. 7/9 Crossover), Transit Change Review Committee (TCRC), Special Events planning, and incident management. In 2015, the two OCC Assistant Managers and the OCC Director worked on 900 customer comment responses. The Director worked on the most, 370. In 2014, those figures were

Figure 5: Directing Controllers' Downtime

	If 3/shift:	If 4/shift:	If 5/shift:	If 6/shift:
Controller 1-3	East, Central, West air	East, Central, West air	East, Central, West air	East, Central, West air
Controller # 4		Maintenance / Yard Train Orders Special Instructions Lunch relief OCC Admin relief	Maintenance / Yard Train Orders Special Instructions Lunch relief OCC Admin relief	Maintenance / Yard Train Orders Special Instructions Lunch relief OCC Admin relief
Controller # 5			Training, Revenue Rides ACID cleanup Projects	Training, Revenue Rides ACID cleanup Projects
Controller # 6				Training, Revenue Rides ACID cleanup Projects

15% higher, with a similar breakdown. Controller feedback consistently indicated Assistant Managers were too busy elsewhere to be in the OCC.

- <u>Preventative Management.</u> OCC's management is involved in Incident management, on the immediate horizon, while the projects and special events OCC's management focuses on is much further out, as long as a year. Numerous interviewees' feedback indicated a gap between these two horizons, a lack of focus on preventive or standardized mitigation actions.

- <u>Communication</u>. In 2015, there were 1943 reported incidents involving rail operations, an average of 5 incidents per day related to security, collisions, or cars stuck in a train's right of way (TriMet 2015 Summary Data- Field Operations/Operations Command Center, page 2). During an incident, a controller managing a territory is responsible for all facets of incident management, including mitigating an individual train or situation while maintaining communications with multiple internal and external individuals, and managing the impact to the overall alignment. At the same time, incident communications generally occurs across up to ten roles within TriMet via pager, email, cell phone, and radio (e.g. Transportation, OCC Assistant Managers, Rail Operations management, Field Operations management, Safety, and Maintenance). Several levels of interviewees expressed a lack of clarity during incidents of roles and authority, and that communications to customers were not always prioritized.

When not on site in the OCC, assistant managers are accessible and aware of the status of rail operations via a pager, cell phone, radio, and email. But, two assistant managers cannot provide on-site management to cover the 168 hours per week of controller coverage.

Evaluating staffing models to provide coverage, we found five assistant managers, each working on a rotation of 4 days per week, ten hours per day, provided coverage for 20 hours per day, including coverage for sicknesses, vacations, or projects. Five Assistant Managers may not be adequate so, following the implementation of five Assistant Managers, TriMet can evaluate whether it would benefit from a long-term staffing plan of six Assistant Managers.

Figure 6: OCC Assistant Managers' Workload & Tasks
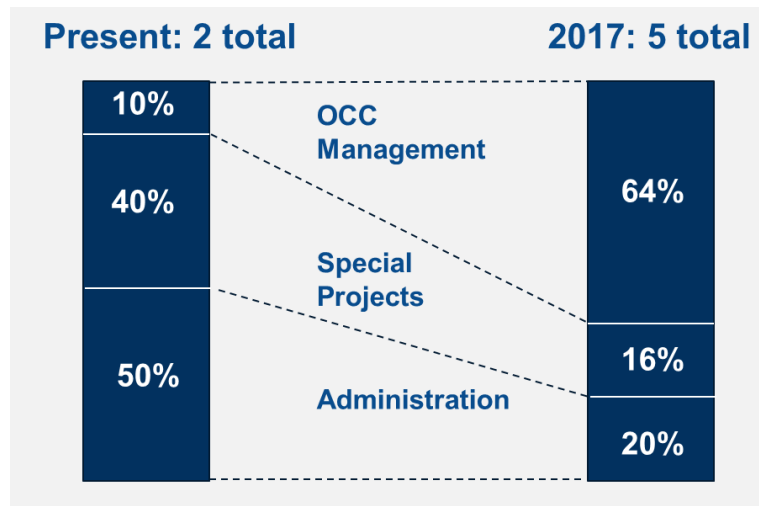
Figure 6 is an estimate of how the increased number of assistant managers will enable the assistant managers to be present in the OCC, if there is no change in the current number of special projects this group works on overall. This increase will also positively impact bus operations, which the assistant managers stated takes up roughly 30% of their time.

Figure 7: Incident Roles

Figure 7 is a proposal for an efficient set of roles that retains decision making authority at the OCC level. This assumes that a controller has had adequate training on preventive actions and mitigation plans, and that the information is accurate and available.
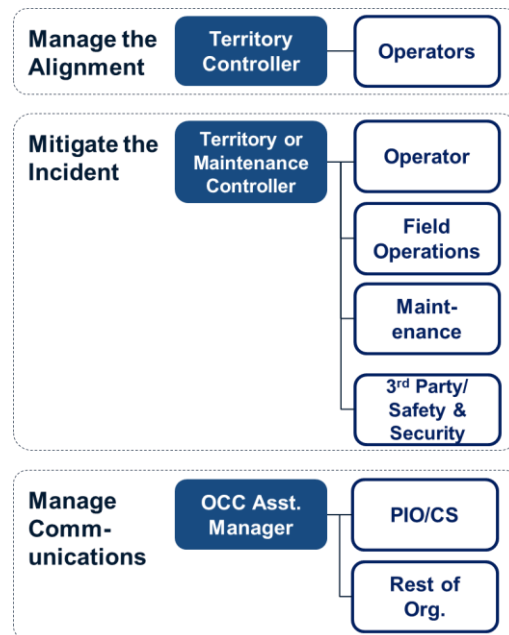
Top Recommendations: Roles & Responsibilities, Staffing

- Undertake efforts to staff a minimum of five OCC assistant managers, to provide a staffing level that allows at least 20 hours per day of OCC on-site managerial coverage while also covering vacations, projects and unplanned absences. Assess afterwards if a sixth Assistant Manager is necessary. (This staffing assumes a schedule of four days per week, 10 hours per day).
- Create and document the expectations and activities of Controllers on shift when they have downtime or excess capacity, i.e. what they can and should be working on when they have this downtime.

- Increase the preventive efforts of the OCC organization at all levels, including the development of standardized mitigation plans and post-incident reviews.
- Empower Controllers and Assistant Managers to make decisions to resolve incidents without escalating all incident communications. Define three incident roles per shift, one of which is responsible for communications, especially rapid and accurate information to customers and TriMet's Public Information Office. Because experience and capability are not spread equally amongst Controllers' shifts, ensure each shift should have a technical or experienced resource available to it, either on shift in the room or external to the OCC.

3) Information Management & Procedures/Tools

Findings and Observations

TCRC is the Transit Change Review Committee, and is "responsible for the development and review of changes to Standard Operating Procedures" [SOP001], but the Information Management process extends to steps both before and after TCRC that can hinder timely review of needed SOPs.

Figure 8: Current State Gaps in the Information Management Process
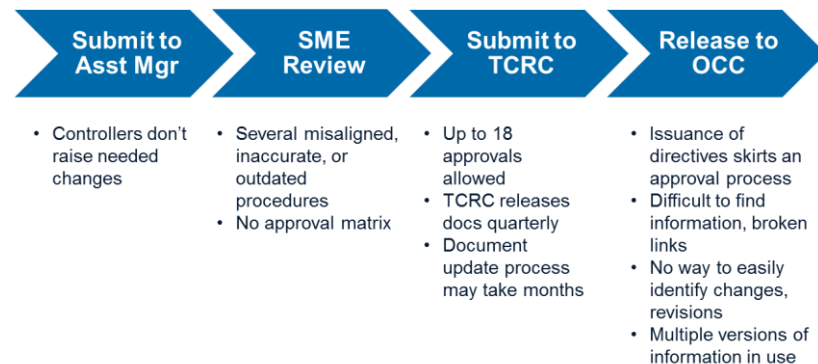
We analyzed the Information Management process supporting controllers and documented the opportunities and current gaps that have led to inconsistent or inaccurate procedures in *Figure 8* (e.g. SOPs 051, *Incident Notification Guidelines*; SOP 526, Platform PA/Readerboards).

Controllers use a variety of technologies and tools in the daily course of their work, and *Figure 9* is a summary consensus rating of their tools. Feedback on the current state of a given tool was generally consistent across the 15+ controllers we interviewed.

Figure 9: OCC Technology & Tools User Scorecard

System	Score	Comment
SCADA, train tracking, incl. AIM	👎	Not accurate enough
Radio	👎	Garbled, unreliable
ACID (incident reporting)	👎	Not efficient, leads to lack of information for downstream users
Intranet	👎	Not comprehensive. Too many info locations, broken links
Yard Movement tool	👎	Too slow, impedes trains
Train Status (excel)	👍	No complaints
Avtek (switchboard)	👍	No complaints
PolicyTech (document tracking)	👎	Sufficient but not managed (content outdated). Not used outside OCC
Shift notes (excel)	👍	Adequate. Locks up frequently
Cameras	👍	Resolution problems at certain times; limited yard cameras
Schedule writer	👍	No complaints

Top Recommendations: Information Management, Tools

1. Accelerate the transition from the 800 MHz radio system to the 700 MHz radio system. .
2. Remove SOPs from the usual approval and release cycle of TCRC, in favor of a process approval matrix for SOPs and Directives.
3. Develop a robust Controller portal and standardize how Controllers access the most up-to-date information.
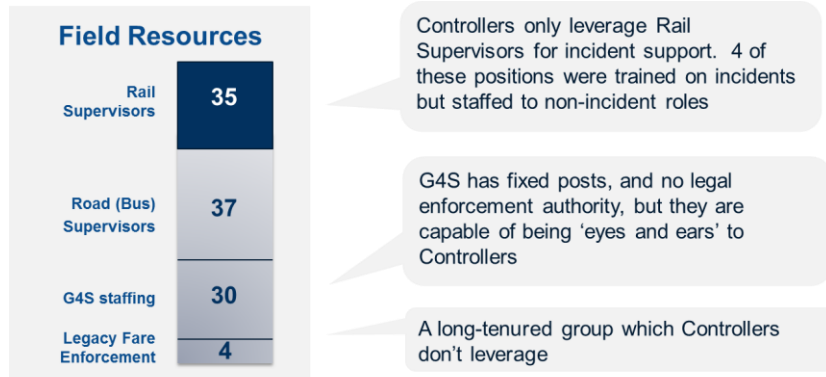
4) Rail Supervisors' Operations

Findings and Observations

Rail Supervisors work within the Field Operations group supporting Controllers to mitigate incidents when they occur. Additionally, they are responsible for ensuring Rail Operators are fit for duty, supporting customer service, and ensuring riders adhere to TriMet's rules and policies.

Controllers depend on Rail Supervisors for their own success but multiple interviews indicated additional field resources, in addition to Rail Supervisors, are not often called upon to provide support, even low level support like 'eyes and ears' input. These additional field resources include a 3rd Party security agency, Road (Bus) supervisors, and the Fare Enforcement unit.

The accompanying *Figure 10* shows that, in addition to the 35 Rail Supervisor positions, there are 71 additional personnel that could provide support when needed.

Figure 10: Additional Field Resources for Incident Mitigation

Field Resources

Rail Supervisors	35	Controllers only leverage Rail Supervisors for incident support. 4 of these positions were trained on incidents but staffed to non-incident roles
Road (Bus) Supervisors	37	G4S has fixed posts, and no legal enforcement authority, but they are capable of being 'eyes and ears' to Controllers
G4S staffing	30	
Legacy Fare Enforcement	4	A long-tenured group which Controllers don't leverage

The Field Operations group is managed by two assistant managers; although they work different shifts and cover all aspects of Field Operations during their shift, they generally split their managerial focus into Rail Supervisors and Road (Bus) Supervisors. Field Operations Assistant Managers work closely with OCC Assistant Managers to distribute their workload and manage incidents. While both Field Operations Assistant Managers stated their workload was heavy at times, the Assistant Manager covering Rail Supervisors was able to spend a greater percentage of his time directly managing his staff and operations than were OCC Assistant Managers to directly manage their staff and operations.

Additional Field Operations Assistant Managers do not appear to be needed if the recommendations in this assessment are implemented. Specifically, additional assistant managers would not be needed if additional OCC Assistant Managers are hired, and if their administrative workload can be reduced, and if additional Rail Supervisor training is provided.

Like Controllers, Rail Supervisors felt an opportunity exists to enhance their ongoing training. Working with trainers, we outlined a possible future training curriculum for Rail Supervisors, which is provided in *Figure 11*.

Figure 11: An Enhanced Rail Supervisor Training Curriculum

Tools & Procedures	Substations
	Track & Signals
	Flagging & Right of Way
	Specialist System Safety
	Accident & Incident Investigation
	Code
	Troubleshooting
Communications	Professionalism
	Behaviorial writing

Top Recommendations: Rail Supervisors' Operations

1. Implement recommendations #2 and #3 from this paper's section, 'Rail OCC Recruiting & Training' within Rail Supervisors' Operations (link here).
2. Have Controllers leverage other existing Field Operations staff and contractors to help mitigate incidents.

Net Staffing Impact

The recommendations within this report have an impact on TriMet's staffing levels, resulting in up to six additional hires. These details can be summed up as:

- OCC and Field Operations Training: an increase from one trainer to two, and possibly three in the long-term
- OCC Assistant Managers: from two to five, and possibly six in the long-term
- Field Operations Assistant Managers: no change
- Controllers: no change
- Rail Supervisors: no change

[NOTE: at the time this assessment concluded, these additional staffing hires were included in TriMet's FY17 recommended budget.]

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