

The Operational Nuts and Bolts of Precision Scheduled Railroading

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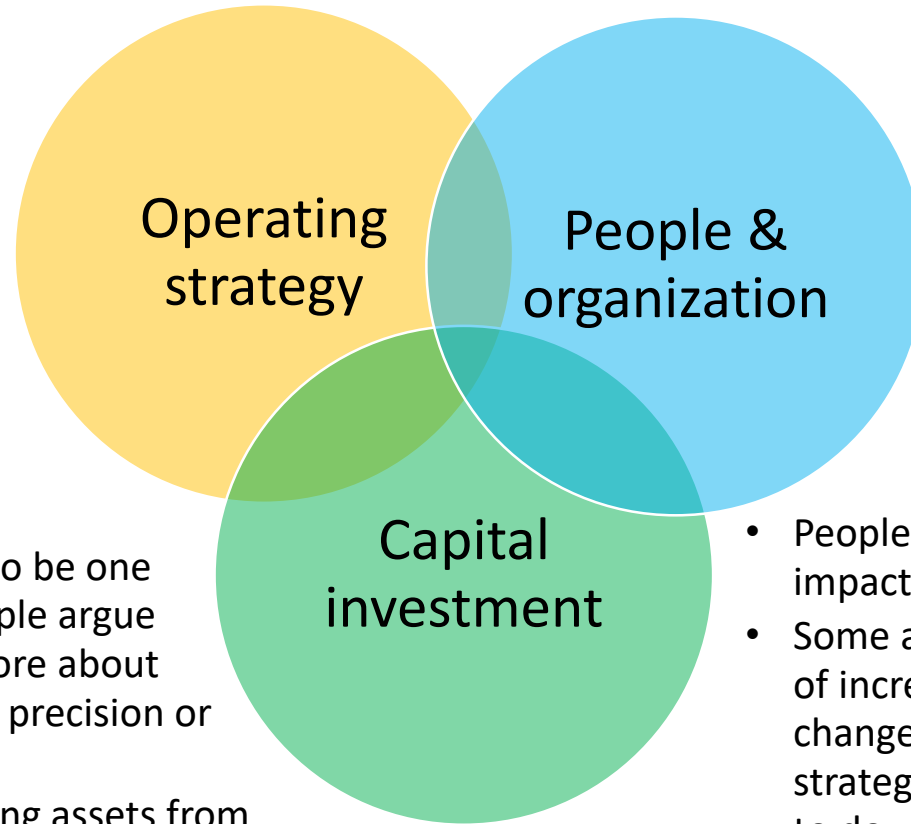
Three Core Dimensions of PSR

Leverages “Lean” principals to drive out waste?

- Arguably the operating strategy brings together many core principals that should be widely supported by the industry driving to better asset velocity, overall efficiency, shipment speed, and reliability

- Focus of this talk

- Capital investment appears to be one of the core areas where people argue against PSR – and may be more about management approach than precision or scheduling
- However, if we separate rolling assets from fixed facilities, it is clear that if railroads better utilize their rolling assets, then fewer such assets will be needed



- People and organizational impacts of PSR are large
- Some are a natural outcome of increased efficiency and changes in operating strategy – others have more to do with management’s expectations of what can be demanded of each employee

This talk will focus on operating strategy, and leave the issues of capital investment, people management and organizational structure to others to discuss and debate...

Elements of many PSR operating strategies

- **Restructure local service**: Better utilize crews & locos, while asking move of customers and local crews
- **Increase car velocity**: Reduce switching, while using block swaps more and providing multiple outlets for traffic – focus on plan adherence and elimination of blocking, connection, and train make-up errors
- **Minimize train miles/minimize road loco and crew needs**: Run fewer, longer, more generic trains on a balanced network, filling out the trains to their maximum capacity, while focusing on crew and locomotive cycling
- **Change customer services**: Eliminate “boutique” blocks and trains/standardize product offerings

Despite statements in the trade press that PSR focuses more on “point-to-point” moves, the reality is the opposite as the long train philosophy drives more traffic to be treated as general manifest traffic – perhaps riding in smaller, longer distance blocks

Restructure local service (1 of 2)

Better utilize local crews and locos

- **Maximize workloads:** Ensure that workloads for each local job are maximized and are reasonably balanced
- **Consolidate duty stations:** Have at least 2 local jobs at each location so that they can share locomotives
- **24/7 scheduling:** Schedule the jobs for both days and nights to maximize locomotive utilization
- **Don't over power:** Do not over power local jobs, eliminate “protection” locos for failures

Ask more of local crews

- **Block in-bound locals:** Require local crews to switch their in-bound cars into blocks that can go deeper into the network
- **Improve quality:** Drive towards completion of all work in a disciplined manner within a duty period
- **No early quits:** Focus on full day's work for a full day's pay

Restructure local service (2 of 2)

Ask more of customers

- **Customer blocking:** Identify where customer should make at least one block that will go deeper into the network
- **24/7 access:** Move customers to be “open gate” 24/7 to ensure scheduling flexibility
- **7 day loading/unloading:** Encourage customers to ship 7 days a week, and reduce shipment peaking
- **Fewer cars/faster turns:** Tighten demurrage/detention to encourage faster turns of cars and reduce local car inventories

Impacts

- **Fewer locos:** Loco fleet reductions of 500 plus units observed
- **Less labor:** Maximizing labor productivity
- **Better asset velocity:** Reduced intermediate switching and better shipment velocity
- **Fewer peaks:** Reduced impact of peaking on network fluidity, balance and capital costs
- **Fewer cars:** Reduced car fleet requirements
- **Better local fluidity:** Reduced local facility congestion
- **Improved quality:** Reduced error rates in switching, connections, blocking, etc. driving down costs and improving velocity

Increase car velocity (1 of 3)

Focus on asset velocity

- **Organizational focus:** Build organization that is focused on maximizing asset velocity of railcars and locomotives
- **Continuous improvement:** Constantly look for opportunities to further speed the movement of equipment and reduce idle time (customer detention time, loco servicing time, 24/7 use of local locos, reduced switching, building deeper blocks at origins, multiple daily outlets for larger blocks, reduced peaking, 24/7 customer access, etc.)
- **Operating discipline:** Ensure strong operating discipline to minimize errors and rework that would cause delays

Drive up connection performance and trip plan adherence

- **Plan adherence:** Improve performance by focusing on plan adherence and elimination of errors
- **Monitor:** Aggressively monitor connection performance and trip plan adherence – actively identify largest sources of failures and take actions to correct (“Hunter blame report”)
- **Change culture:** Do not lower standards, change behavior instead

Increase car velocity (2 of 3)

Reduce switching/block swap more

- **Improve switching skills:** Focus on becoming more efficient and disciplined in the switching/blocking process
- **Near origin blocking:** Build more blocks closer to origin at smaller yards that will go deeper into the network
- **Block swap more:** Utilize block swaps to move the smaller blocks through network, avoiding intermediate classification work – figuring out how to do the swaps efficiently
- **Reduce total switching/downgrade yards:** Based on the above, reduce switching at some larger yards, downgrading their role (can mean yard closures, or stopping use of some humps)

Eliminate blocking/make-up errors

- **Zero blocking/make-up errors:** Drive blocking errors and train make-up errors to zero
- **Quality checks:** Examine the make-up of every outbound train to ensure all cars are in correct block and blocks are in correct order
- **Correct errors:** Force corrective actions if errors are found with goal of driving error rate towards zero

Increase Car Velocity (3 of 3)

Provide multiple outlets

- **2+ departures per day:** For larger blocks ensure there are at least two departures per day for those blocks, even if this means increased train complexity

Impacts

- **Reduced errors/rework:** Reduced error rates in switching, connections, blocking, etc. driving down rework costs, mis-route delays/costs, and improving velocity
- **Less switching:** Reduced intermediate switching and better shipment velocity
- **Improved service:** Better plan adherence improves asset velocity, trip plan times and reliability
- **More complex trains:** More complex train plan, requiring heightened focus on operating discipline
- **Lower capital/labor:** Reduced overall capital and labor requirements
- **Better reliability/velocity:** Multiple outlets mean reduced yard times, improved asset velocity, shorter delays for missed connections
- **Less equipment:** Reduced locomotive and car fleet size – fewer “cars on line”
- **Lower equipment costs** (ownership and maintenance)

Minimize train miles/minimize road loco and crew needs (1 of 3)

Run fewer, longer, and more generic trains

- **No single purpose trains:** Reduce/eliminate operation of single purpose trains allowing for train consolidation and operation of fewer, longer trains
- **Multiple outlets:** Effectively increase train frequency for all lines of business by mixing traffic across all trains in the same lanes
- **Fewer, longer trains:** Run longer trains, potentially increasing effective line capacity and reducing labor requirements and improving locomotive utilization

Balance train network/run trains on-time

- **Balance network:** Focus on running the same number of trains in each direction on every corridor
- **Run on-time:** Run trains on-time as planned, ensuring that trip plans become achievable (when combined with blocking/connection discipline)
- **Fill out trains:** Ensure train size is maintained through careful train design, elimination of single purpose trains, and opportunistically filling of trains

Minimize train miles/minimize road loco and crew needs (2 of 3)

Fill out trains, leveraging the strategic use of dynamic blocking

- **Fill trains:** Maximize capacity utilization of trains by filling them out with “extra” traffic – e.g., mixing lines of business on trains both by plan and opportunistically
- **Stage/monitor traffic to fill trains:** Achieve this in part by staging traffic to take advantage of extra capacity and having the ability to identify such opportunities
- **Dynamic by-pass blocking:** Track volumes on a daily basis, and where opportunities arise build longer distance one-off blocks (e.g., a “slug” of 30 cars to the same destination might justify a direct one-off block)
- **Tightly manage dynamic blocks:** Move the one-off block either on its “normal routing” using block swaps instead of intermediate switches, or through dynamic assignment to a train on a one-off basis (**not on an extra train!**)

Focus on crew and locomotive “cycling”

- **Balance network:** Balance trains and power requirements so network is self-balancing for locos and crews
- **No “protection” locos:** Do not over power trains
- **Squeeze out idle time:** Adjust train schedules to keep locos moving, optimize servicing
- **No assignment silos:** Look for alternate uses (local switching) for unavoidable idle periods
- **Flatten peaks:** Run network as evenly as possible 7 days per week

Minimize train miles/minimize road loco and crew needs (3 of 3)

Impacts

- **Fewer resources:** Reduced train miles, labor requirements, and loco requirements - observed road fleet reductions of 1000+ locomotives at large Class I railroads
- **Better capacity utilization:** Improved train capacity utilization by mixing LOBs on trains
- **Improved velocity/reliability:** Improved asset velocity and reliability by leveraging multiple outlets per day opportunities through use of mixed trains
- **Less switching:** Reduced intermediate switching and better shipment velocity through dynamic blocking and increased use of block swaps
- **Tighter traffic & train monitoring required:** Organization and systems to monitor traffic and identify dynamic blocking opportunities and manage their execution, need to support more complex train operations (block swaps, train filling)
- **More consistent workloads** (less peaking)
- **Predictability = better utilization:** Better loco and crew utilization due to operational predictability
- **Fewer deadheads/less idle time:** Less held away time/deadheads due to balance
- **Crew swaps:** Opportunity to swap crews between trains reducing hotel/away/deadhead costs

Change customer services (1 of 2)

Eliminate “boutique” blocks and trains / standardize product offering

- **Standardized services:** Focus on standardized services across all customers with increased focus on operating discipline, velocity and reliability
- **Fewer customer specific services:** Eliminate the need to do customer specific or market specific operations through better “standard” services
- **Tighten use of unit trains:** Only operate unit trains where they are truly dedicated trains – do not “build up” unit trains by accumulating traffic over multiple days – run such traffic in the manifest network
- **Do not run one-off unit trains**
- **No deep dives for customers:** Focus on running the network as planned so deep dives are not required
- **No single customer commitments:** No commitments to customers that are not consistent with what the existing operating plan is capable of (stick to the “product catalog”)
- **Other impacts discussed previously:** customer level blocking, reduced peaking, 7-day loading/unloading, 24/7 open gate, tighter demurrage/detention rules, less local inventory

Change customer services (2 of 2)

Impacts

- **Plan simplification/easier management:** Reduced specialized switching and plan complexity, increased plan efficiency
- **Better velocity:** Improved asset velocity by avoiding accumulation delays
- **Better train capacity utilization/fewer trains:** Ability to mix traffic across trains to fill them out
- **Possible negative service impacts:** Potential impact on specific customer service levels – ideally countered by improved overall velocity and reliability
- **Simpler sales and commitment process:** Publish a “customer catalog” showing what the standard service would be

Concluding thoughts...

- PSR is not achieved through a single action, or small number of actions, but through a collection of actions that cumulatively result in a significant change in operating practices and culture
- No single “PSR Railroad” implements all of these operating strategy elements, but most strive for the majority of them
- Technology opportunities abound to help enable each of these strategy elements
- As PSR has been adopted for more complex railway networks, modeling and optimization tools have played a larger role
- In addition to planning support, technology has a role in supporting execution for activities such as plan compliance monitoring, product catalogs, identification of one-off blocking opportunities, and mixed train make-up support